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Making the Rules

The Governance of Standard Development Organizations and their Policies on Intellectual Property Rights

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Abstract

This study provides a comprehensive analysis of the governance of standard development organizations (SDOs), with a particular emphasis on organizations developing standards for Information and Communication Technologies (ICT). The analysis is based on 17 SDO case studies, a survey of SDO stakeholders, an expert workshop, and a comprehensive review of the legal and economic literature. The study considers the external factors conditioning SDO decision making on rules and procedures, including binding legal requirements, government influence, the network of cooperative relationships with other SDOs and related organizations, and competitive forces. SDO decision-making is also shaped by internal factors, such as the SDOs' institutional architecture of decision-making bodies and their respective decision-making processes, which govern the interaction among SDO stakeholders and between stakeholders and the SDO itself. The study also analyzes governance principles, such as openness, balance of interests, and consensus decision-making, and discusses their interplay. The insights from these analyses are applied to SDO decision making on Intellectual Property Rights (IPR) policies, which represents a particularly salient and controversial aspect of SDO policy development.

Foreword

This report has been initiated by the Digital Economy Unit of the European Commission Joint Research Centre (JRC). It was prepared in the context of the three-year research project on Research on Innovation, Start-up Europe and Standardisation (RISES), jointly launched in 2017 by JRC and DG CONNECT of the European Commission. The report was developed in the framework of 2017 communication of the European Commission 'Setting out the EU approach to Standard Essential Patents' (COM(2017) 712 final). This research builds on the previous work and expertise of the JRC gathered in the field of standardisation and intellectual property rights, namely the JRC reports:

- 2015 'Fair, Reasonable and Non- Discriminatory (FRAND) Licensing Terms; Research Analysis of a Controversial Concept' EUR 27333 EN
- 2015, 'Intellectual Property and Innovation in Information and Communication Technology (ICT)' EUR 27549 EN
- 2016 'Patent Assertion Entities in Europe; Their impact on innovation and knowledge transfer in ICT markets' EUR 28145 EN
- 2017 'Licensing Terms of Standard Essential Patents; A comprehensive Analysis of Cases' EUR 28302 EN.

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Executive summary

In this study, we have sought to add to the body of knowledge concerning standardization by conducting an extensive empirical and theoretical study of Standard Development Organisation (SDO) governance across a set of 17 SDOs that produce standards in the ICT sector: AFNOR, CEN-CENELEC, DIN, DVB Forum, ECMA, ETSI, IEC, IEEE-SA, IETF, ISO, ITU-T, JEDEC, SAC, TSDSI, VITA, W3C (in alphabetical order of acronym), as well as ANSI (although not formally an SDO), given its role in the standardization ecosystem. The existing literature highlights how SDOs emerge as transnational regulators, fitting between private ordering and public law, and how they play a significant role in the EU in particular. The aim of the study was to conduct further research on SDO policymaking, in particular as regards Intellectual Property Rights (IPRs), and to achieve a comprehensive overview of the structure of the interplay of IPR systems and SDOs from a public policy perspective.

A case-study was prepared on each of the SDOs, including an interview. The information obtained through the case-studies was complemented by a survey of stakeholders, including active participants in SDOs as well as civil society and public interest organisations. We also carried out a stakeholder workshop to obtain further input regarding our empirical findings.

The standardization ecosystem

SDOs evolve within a broader standardization ecosystem that constrains their governance choices. These constraints on SDO governance include legal constraints, constraints resulting from diverse relationships with other SDOs, and constraints due to competitive responses to SDO decision-making.

Legal constraints arise inter alia from international trade law, competition/antitrust law, intellectual property law and public procurement law. More specifically, the Agreement on Technical Barriers to Trade administered by the World Trade Organization and decisions taken thereunder specify how SDOs should be governed, in order to avoid the creation of barriers to trade. EU instruments (Regulation 1025/2012) dealing with standardization under internal market rules build upon international trade law. As for competition and antitrust law, the provisions concerning restrictive agreements (Sherman Act § 1, Art. 101 TFEU) and single-firm conduct (Sherman Act § 2, Art. 102 TFEU) were applied to the conduct of firms in and around standardization in major decisions on both sides of the Atlantic, eventually feeding into soft-law instruments such as the Horizontal Guidelines of the European Commission[1] and OMB Circular A-119 in the U.S. The constraints from trade and competition law have crystallized around a number of principles that apply to SDO governance, including transparency and openness, non-discrimination, impartiality, balance of interests and consensus-based decision-making.

SDOs are also constrained by their relationship with other SDOs. Some of these relationships are vertical: the more traditional and established SDOs tend to be part of a top-down hierarchical structure – international, regional and national – while more self-initiated SDOs will tend to gravitate bottom-up towards the established SDOs as they seek to achieve recognition for their standards. Next to that, there is also a large nexus of cooperative horizontal relationships between SDOs and between SDOs and open-source software (OSS) organisations.

Another major constraint on SDOs comes from competitive forces amongst SDOs. Our research revealed these forces to play out in more elaborate ways than the literature has envisaged so far. There is some evidence of movement of dissatisfied stakeholders to other SDOs, including in response to IPR policy changes. In the early phase of standardization,

[1] Guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements [2011] OJ C 11/1. See also 2018 Rolling Plan for ICT Standardisation, available at <https://ec.europa.eu/growth/content/2018-rolling-plan-ict-standardisation-released_en>

'voting with one's feet' seems to be an attractive option, but later on, SDO membership is stickier. At that point in time, switching costs, path dependency and IPR in the standard may make it more difficult to attract a critical mass of stakeholders to another SDO (as opposed to exiting altogether). However, our research points to another form of competitive reaction that does take place in those later stages, namely "stepping out of the room": dissatisfied stakeholders form a consortium next to the SDO that will implement the vision of these stakeholders, ostensibly in complement to the SDO, with the hope that the outcome from the work of that consortium can later be brought back to the SDO and endorsed by it. In such a situation, both the dissatisfied stakeholders and the SDO must tread carefully in order to avoid falling afoul of legal constraints, in particular competition law. Finally, it is also possible for dissatisfied stakeholders to remain within the SDO and try to minimize the impact of the decision with which they disagree.

There are important differences between SDOs with respect to the external constraints that are most relevant for their respective governance. SDOs fall into three layers: one layer is made up of the formal and established SDOs at international (ISO, IEC, ITU), regional (including the European Standards Organisations CEN, CENELEC and ETSI) and national levels (in our sample: AFNOR, ANSI, DIN and SAC) that tend to be constrained by law and cooperative relationships. A third layer includes the more informal SDOs (often referred to as consortia), which compete with other SDOs for members, contributors and adopters, and often seek accreditation or approval of their specifications by other, more established and formal organisations to strengthen their position (DVB, ECMA, JEDEC, and VITA from the sample examined): for them, competitive constraints combine with legal constraints and the constraints imposed by the formal organisations with which they collaborate.

A second layer – including IEEE, IETF and W3C, in our sample – is both less constrained by formal networks and regulatory responsibilities conferred by public authorities than SDOs in the highest layer, yet sufficiently well-established to be less vulnerable to competitive pressures. The second layer might also be less constrained in its ability to have tailor-made governance. ETSI and TSDSI do not fit neatly into this layer model: they share features of the middle and the highest layer.

Layer	Attributes	SDOs
First	- Quasi-regulatory functions delegated by government - Importance of network of vertical relationships - Specific and formal legal requirements	AFNOR, ANSI, DIN, CEN, CENELEC, ISO, IEC, ITU, SAC
	- Shares elements with first and second (depending on the activity)	ETSI, TSDSI
Second	- Established leadership over technical field - Importance of switching costs	IEEE, IETF, W3C
Third	- Significant competitive constraints - Bottom-up orientation to more formal bodies for greater legitimacy	DVB, ECMA, JEDEC, VITA

From a public policy perspective, we observe the predominance of a light-touch **self-regulatory approach towards SDOs**. The role of public authorities in the day-to-day functioning of SDOs and in the substance of their work is generally limited. Indeed, SDOs have traditionally originated from private-sector efforts, and stakeholders often value the autonomy enjoyed by SDOs. The approach of most public authorities to SDOs has generally been supportive of industry-led processes. Over the recent decades, both in Europe and to an even larger extent in the U.S., a consensus has emerged that the public interest is often

best served by relying on the existing system of private-industry driven SDOs, ranging from the more established standardization bodies to the more informal SDOs that characterize the ICT sector.

While they rarely participate in the day-to-day functioning of SDOs, public authorities may play a significant role in monitoring and enforcing the legal constraints on SDO governance. In particular, the self-regulatory approach to SDOs is implicitly or explicitly conditioned on SDO decision making following accepted procedural principles, which are meant to ensure that the outcomes of SDO activities and decisions are in line with public policy. The foremost regulatory tool available for this approach are trade and competition policy, translating the general idea that the interests of users of the standardization system (including those stakeholders not directly represented in SDO governance) are best served by vigorous competition at each layer of the process.

In particular with respect to standard development, public authorities routinely defer to the decisions reached by private SDOs complying with general procedural principles. This ***procedural approach*** accommodates a fair amount of diversity in SDO governance, within the constraints set by law and market forces. That diversity fits with an experimental model (regulatory competition, experimentalist governance or legal emulation) where SDOs control the flow of solutions between themselves, without precedential effect as between SDOs.

Governance architecture

In line with the above, we observed considerable heterogeneity in SDO governance, reflecting the different circumstances of each SDO. There is no one-size-fits-all solution.

SDO internal governance institutions shape the way each organization makes decisions, within the constraints determined by the forces analyzed above. Fundamentally, SDO governance is built on the tension, which we observed in our research, between a more leadership-driven model (in particular IEEE-SA, VITA and W3C from the samples examined), and SDOs more strongly oriented towards consensus among members (exemplified by DVB, ECMA, ETSI, JEDEC, and TSDSI). IETF does not formally have membership, but its processes are strongly oriented towards stakeholder consensus, placing it in proximity to the membership-driven model. The international organizations with national membership also tend to emphasize consensus decision-making.

The tension resonates with the divide, mentioned earlier, between formal SDOs and industry-driven, more informal SDOs. The more formal SDOs (and in particular CEN, CENELEC, ISO, IEC and ITU-T, as well as the National Standards Bodies such as AFNOR and DIN) are mandated to consider public interest concerns in their work. This contrasts with industry-driven SDOs (such as DVB, ECMA, JEDEC and VITA), which generally emphasize technical aspects of their work. While most SDOs have a written mission statement describing their goals and operating principles, these mission statements are rarely referred to in practice. Instead, the extent to which SDOs may pursue independent organizational goals besides the individual interests of membership or stakeholders depends on specific features of SDO governance, including the organizational form, the division of roles among governance bodies, the voting rules within these bodies, processes for selecting SDO leadership, and the role and responsibilities of SDO staff.

Most of the SDOs we studied are non-profit, non-governmental incorporated organisations. Membership types vary, however: in most SDOs, members are organisations, and most prominently companies. ISO, IEC and CEN-CENELEC are made up of national committees, which can lead to more consensus-oriented policymaking. IEEE-SA has a large individual membership (around 7000 members), meaning that the leadership is elected by a more dispersed and less engaged constituency. IETF has no formal membership structure and any interested individual may participate. In other SDOs (in our sample, VITA, JEDEC, ECMA,

DVB, TSDSI, ETSI), the membership is made up of firms with commercial interests. Sometimes these members are grouped into categories by commercial function (e.g. DVB). Many SDOs (in particular ETSI and IEC) also have tiered membership, to reflect different levels of participation in SDO activities and geographical origin (e.g., ETSI).

With respect to SDO leadership (governing boards and permanent staff), SDOs typically draw board members from their membership. As for permanent staff, both its size and its responsibilities vary considerably from one SDO to the other. The existence of a significant permanent staff, with leadership functions, is a predictor of more leadership-driven governance (observable at W3C, VITA, IEEE SA, DIN, IEC, ISO, ITU-T and SAC). Staff typically participates in meetings, without the right to vote. In some SDOs, the staff also drafts policy documents for the organization. Other SDOs put policymaking more firmly in the hands of the board, with a strong membership representation on the board (ETSI, JEDEC, DVB, IETF).

SDOs differ in respect of the role of individuals participating in SDO policy development (as committee or assembly members). Some SDOs expect these individuals to represent a member or stakeholder (usually their employer), making governance more membership-driven. Other SDOs expect individuals not to represent a member/stakeholder but rather to act in the interests of the SDO or of society at large, which strengthens the autonomy of the SDO towards its membership and makes it more leadership-driven.

Within governance, the focus of our study was on policymaking. With two exceptions (IETF and VITA to varying degrees), SDOs follow different procedures to develop their rules and policies as compared to standards. Differences are found in voting rules (more majority voting instead of consensus), different decision-making bodies (the general assembly and the board instead of working groups), eligible participants (formal members instead of any interested party), transparency (generally less than for standards development), and the duties of the participants (more emphasis on duties towards the SDO rather than towards the member). Most SDOs feature one or more of these differences. At the same time, our stakeholder survey indicated that stakeholders would prefer policymaking to follow processes that provide at least as many procedural safeguards as for standard development.

One of the most complex issues studied was the decision-making procedure. In some SDOs (e.g. ANSI, IETF, ISO), decision-making on policy is shared between different bodies, depending on the subject-matter, whereas in others (e.g. IEEE, ITU-T, VITA), a single body is responsible for all policy matters. In most SDOs, policy matters must move through many bodies (committees and boards); however, the real locus of decision-making varies from one SDO to the other, and sometimes within an SDO from one decision to the other.

In general, where the central decision-maker for policy matters is the general assembly of members (e.g. ECMA, ETSI, and TSDSI), policymaking will tend to be membership-driven. Where the central decision-maker is a board (e.g. IEEE-SA, JEDEC, and VITA), policymaking can be more leadership-driven, to the extent the rules for board appointment and status give the board more autonomy vis-à-vis the membership, as outlined above. Where the central decision-maker is a specific policymaking body (e.g. at AFNOR) designed to balance stakeholder interests, here as well policymaking will tend to be less influenced by powerful members and more leadership-driven. Finally, where the ultimate decision-maker on policy is a non-elected director or board (such as at W3C), policymaking is predictably leadership-driven.

It should be noted that voting rules for policymaking are not always reflective of SDO practice. On paper, most SDOs have majority voting for policymaking, with voting thresholds ranging from simple to two-thirds majority. Individual votes are mostly kept secret. Some SDOs (ETSI, DVB) have specific voting rules designed to make it difficult to

overrule significant stakeholders or stakeholder categories. Nonetheless, the empirical evidence is that votes are rare, and that policymaking is mostly done on a consensus basis.

Policymaking is bound to lead to disputes. Save for a few exceptions (IEC, ISO), most SDOs offer procedures to issue formal or informal interpretations of policies, although many of these interpretations tend not to be made public. Similarly, all SDOs but one allow for appeals of policy-related decisions. Disputes can also arise as between SDO members, relating to policy-related issues (in particular the application of IPR policies). Here SDOs report few disputes, and generally show a strong aversion to intervening in disputes amongst members (with the exception of W3C, VITA and DVB).

The different features of SDO governance architecture combine to lead to a stronger role for SDO leadership or a greater emphasis on member or stakeholder consensus. The effect in this regard of the different features is summarized in the following table:

Governance feature	Leadership-driven model	Membership/consensus-driven model
Ultimate decision maker	Elected board (DIN, IEEE-SA.. Unelected leadership (SAC, W3C)	General Assembly (DVB, ETSI.. Open processes (IETF)
Voting rules		National aggregation of votes (IEC/ISO/ITU, CEN-CENELEC, ETSI on HS and policies) Votes by category (DVB)
Election process	Staggered tenure (DIN, IEEE) Nomination committee approach (ANSI) Election by dispersed individual members (IEEE)	Board members appointed by members (DVB, JEDEC) Overweighting of relevant stakeholders (ETSI)
Individual duties	Fiduciary duties to organization (IEEE..) Representation of broader interests (ANSI)	Represent membership (ETSI, DVB…)
Organizational form	Activity of another organization (IEEE-SA, W3C)	Activity of its members (DVB, JEDEC, VITA)
Role of staff	Extensive staff (AFNOR, DIN, SAC), significant staff leaders (ANSI, IEEE, VITA, W3C)	Very limited or almost absent (ECMA, IETF)

On balance, our sample can be divided between a more leadership-driven group (AFNOR, ANSI, DIN, IEEE-SA, VITA and W3C) and a more membership-driven group (DVB, ECMA, ETSI, IETF, JEDEC and TSDSI), with CEN-CENELEC, ISO, IEC and ITU-T falling somewhere in-between.

Governance principles

The governance principles arising out of the law, as set out above, were formulated with standardization activities in mind. From our survey, it appears that stakeholders tend to agree that policymaking should follow these principles as well.

Policymaking is generally less open than standard development, since participation tends to be restricted to SDO members, and membership is not free at most SDOs (and not open at SDOs that are made up of national standardization bodies).

As for transparency, different models co-exist with respect to standards development. Some SDOs are very transparent in the process of standards development but will then make the final standard available only against a fee (e.g. CEN-CENELEC, IEEE, ISO), while other SDOs that rely on membership dues will offer less transparency (to the outside world) in the

course of development, but will make the final standard available for free (e.g. W3C, IETF, ECMA). When it comes to policymaking, SDOs tend to be far less transparent, even though our survey indicates stakeholders would prefer more transparency.

Balance of interests is a concern in policymaking just as in standards development. Many SDOs seek to achieve a balance of interests in the bodies that decide on policies. Such balance has both geographical and commercial dimensions. As regards the latter, the categories differ: ANSI's categorization distinguishes between producers, users, and general interest, while EU Regulation 1025/2012 emphasizes the need to involve SMEs, consumer, environmental and social stakeholders. Some SDOs (e.g. IEEE SA) use *ad hoc* categorizations, defined per project. In practice, many SDOs experience difficulties in attracting sufficient representatives outside of the producer and implementer constituencies. In addition to balance in representation, a few SDOs also seek to balance voting, by having majority-per-category requirements (e.g. DVB).

Throughout our study, SDOs reported a tension between openness and balance: both objectives can be hard to attain at the same time. Some SDOs privilege openness (e.g. IEEE-SA and IETF), others balance (e.g. DVB), and others emphasize openness in standard development and balance in policymaking matters (e.g. AFNOR and DIN,). An alternative path is to rely on the fiduciary duties of SDO leaders towards the SDO or the general interest of SDO members in order to dampen any adverse effects from openness or balance (e.g. IEEE-SA).

After having considered the SDO ecosystem, the governance architecture and the governance principles, it becomes possible to draw a model of how and why SDO activities and decisions are legitimate, i.e. worthy of support, from a public policy perspective. That model draws upon the main sources of legitimacy in the regulatory literature, i.e. consent, market forces, democracy, procedure and expertise. In the understanding of SDOs and their stakeholders, the *consent* of participants, as expressed through SDO decision-making, provides a substantial measure of 'internal' legitimacy to SDO activities and decisions. The external constraints applicable to SDO *procedures*, as found in the principles arising from trade, competition/antitrust and procurement law, channel consent so as to avoid clashes with the policies underlying these laws. Still, from a public policy perspective, consent might not be sufficient, given the broad impact of SDO activities and decisions beyond the SDO and its stakeholders. *Market* discipline is more elaborate than previously thought and can also confer some legitimacy. While SDOs are not themselves *democratic* institutions, in certain cases (in the EU in particular) they do receive delegated tasks from democratic bodies, also contributing to their legitimacy (ETSI, CEN-CENELEC). Finally, SDOs concentrate *expertise*, even though they sometimes deal with policy matters that lie outside of the typically technical expertise of the participants. Through the combination of all these sources, SDO activities and decisions can therefore aspire to sufficient legitimacy from a public policy perspective, warranting the self-regulatory approach described above.

Governance and IPR policies

All SDOs that we studied have IPR policies, which are embodied in a range of documents, depending on the SDO. Our survey showed that stakeholders do care about these policies, and that they are material in their decisions relating to participation in SDO activities and decisions. At the same time, our survey also indicates that Product-Centric and Patent-Centric firms diverge in their assessment of and expectation towards IPR policies, making this policy area both highly salient and highly challenging.

The main features of IPR policies, for the purposes of this research, are rules on patent disclosure of potentially Standard-Essential Patents (SEPs), on patent licensing of such SEPs (often on the basis of commitments to Fair, Reasonable and Non-Discriminatory (FRAND)

licensing) and on the transfer of such licensing commitments upon transfer of SEPs to another party.

IPR policies are made and changed in the standardization ecosystem described above, with the procedural approach pursued by public authorities. Yet in the specific case of IPR policies, that procedural approach is supplemented with a ***safe harbour approach*.** In the safe harbour approach, public authorities describe the general content of an IPR policy that would usually be deemed to comply with legal requirements applicable to SDOs, including competition/antitrust, public procurement, and trade law. These general descriptions have developed into a "Baseline Policy", which is generally understood to be compliant with legal constraints. "Baseline Policies" typically define a requirement of patent disclosure and licensing at a high level of generality (see Chapter 7.2). Many SDOs' IPR policies are limited to this "Baseline Policy" without significant additional detail. The ISO/IEC/ITU joint IPR policy and the IPR policy found in the ANSI Essential Requirements are good illustrations of Baseline Policies, and they have been adopted by many SDOs, thus further reinforcing the Baseline Policy as a widely shared institutional norm. The Baseline Policy is thus supported by significant external factors shaping SDO policy approaches. Accordingly, we find that SDOs that are particularly constrained by the external factors from the standardization ecosystem outlined above tend to stick more closely to the Baseline (including the first layer organizations AFNOR, ANSI, CEN, CENELEC, ETSI, IEC, ISO, ITU; and the third layer organizations ECMA and JEDEC).

Over time, a number of SDOs have developed their IPR policies further, and have gone beyond the Baseline Policy (DVB, IEEE-SA, VITA, W3C), or adopted idiosyncratic policy approaches that differ from the Baseline Policy (IETF), typically as a result of market or legal developments that prompted the SDO or some of its stakeholders to seek a review of the IPR policy. Common variations include the creation of a licensing obligation for certain parties and/or defining requirements for inclusion of patented technologies that go beyond a general FRAND licensing commitment.

An SDO's approach to policy provisions going beyond the baseline is a function of its internal governance model. In our research, we identified three categories of IPR policy changes that move a policy beyond the Baseline Policy: (i) uncontested policy changes, like the adoption of a transfer requirement for FRAND commitments and licenses, (ii) changes contested among the stakeholders, where the SDO ends up committing itself in the outcome ('*committal choices*') and (iii) changes contested among the stakeholders, but where the SDO ends up not committing itself in the outcome ('*non-committal choices*'), for instance by offering a menu of options, an optional choice or a broad interpretation open to many readings. When we map IPR policy choices to our study of governance architectures, we observe that committal choices tend to be made by leadership-driven SDOs, and non-committal choices by membership-driven SDOs.

	Committal choices		Non-committal choices	
Policy choices				
Ex-ante disclosure of licensing terms	Mandatory ex-ante disclosure	VITA	Optional ex-ante disclosure	ETSI, IEEE (2007)
Dispute resolution	Mandatory ADR	DVB, VITA	Leave dispute resolution to parties	most SDOs (incl. ETSI, IETF, ISO/IEC/ITU)
	Restricting right to seek injunctive relief	IEEE (2015)		
Royalty-free licensing	mandatory RF	W3C	optional	IEEE, IETF, many, other SDOs
	potentially mandatory RF	ECMA		

Interpretations				
FRAND	Define specific criteria of FRAND	IEEE (2015)	provide no position as to what (if any) specific pricing criteria define FRAND	ETSI, IETF, ISO/IEC/ITU, and most other SDOs
Component-level licensing	Specific policy provision requiring component-level licensing	IEEE	No position with respect to ongoing controversy/ ambiguity of policy	ETSI
	Specific policy interpretation	ANSI		

In principle, both committal and non-committal choices can be legitimate, but in different ways. As a starting point, IPR policymaking – at least on the issues that are emphasized here – is sufficiently close to standardization that it should be analyzed using the same approach. The Baseline Policy enjoys legitimacy because of its link with the external constraints arising from law. For committal choices, consent is important: given the distributive effects of such choices, their legitimacy depends on how solid a consensus was reached in the SDO on a contested issue. Non-committal choices might appear to enjoy a broader consent within the SDO, but our research indicates that they are more likely to be subject to market discipline. In the end, SDOs are forced to confront contested issues and seek a legitimate solution, whether head-on by making a committal choice or indirectly by facing market responses to a non-committal choice. In all cases, SDOs can seek to bolster the legitimacy of their choices through endorsement by a public authority.

It is part and parcel of the self- or co-regulatory approach to SDO governance, as it applies to IPR policies, that SDOs have some autonomy to move beyond the Baseline Policy. Each SDO decides for itself, in the light of its specific circumstances, whether and how to manage its IPR policy. It is therefore to be expected that some variance in IPR policies will result. At the same time, SDOs are in relationships with one another (cooperative, including global partnerships such as 3GPP or OneM2M, and competitive), and there is a core of stakeholders that participate in multiple SDOs. IPR policy changes are bound to circulate amongst SDOs. In our research, we have endeavoured to analyse the circulation mechanisms.

For *uncontested* policy changes – transferability of FRAND commitments encumbering SEPs – circulation and adoption by many SDOs can be very fast, and eventually the Baseline Policy can evolve to include these changes. As for *contested* policy changes, two mechanisms are at work. On one hand, horizontally as between SDOs, an experiment or emulation mechanism may be at work, whereby the changes adopted by a first-mover SDO are studied by subsequent SDOs: these SDOs look at whether the first-mover was successful with those changes, and whether the changes are appropriate in the context of the subsequent SDO and decide accordingly. This mechanism is likely to preserve diversity in IPR policies, all the more considering that membership-driven and leadership-driven SDOs will probably opt for different choices (non-committal or committal, respectively).

On the other hand, circulation through *precedent* is also possible if a hierarchically superior institution is involved. Circulation through precedent means that a decision of one SDO becomes binding for another SDO, because the decision of the first SDO would have been endorsed by a hierarchically superior institution which the second SDO is bound to follow. Historically, competition or antitrust authorities and courts, as well as ANSI, have played this role. Competition authorities and courts are constrained by the limits of competition

law, and do not always intervene consistently, over time or over jurisdictions. ANSI is not truly a public authority, and its remit is limited to a subset of US-based SDOs.

Outlook and recommendations

We highlight the predominance of a *self-regulatory* approach to the development of SDO IPR policies. In line with the general benefits of self-regulatory processes, many SDO IPR policies were developed with limited use of public resources and within specialized governance bodies vested with a technical expertise that it would be difficult for public authorities to provide. Furthermore, the process is able to accommodate the diversity of SDO circumstances, a point which stakeholders have repeatedly emphasized.

Public authorities have usefully participated in the governance model through a combination of *procedural* and *safe harbour* approaches. Through the procedural approach, public authorities have supported and defended general procedural principles of SDO decision making, such as openness, balance of interests, and consensus. In the realm of IPR policies, the safe harbour approach has resulted in a Baseline IPR policy, which ensures compliance with basic tenets of competition, trade and public procurement law. Overall, this general and rule-based regulatory approach has served the public interest well.

Accordingly, **we invite public policymakers to prioritize the strengthening and further development of the procedural and safe-harbour approaches over more direct intervention in SDO decision-making.**

In addition to this general assessment, a number of specific challenges to the current regulatory model warrant closer attention.

For one, there can, at times, be some distance between the ideals of openness and balance of interests and the reality of SDO activities and decisions, which can be dominated by a few industry stakeholders that are directly concerned and thus take a very active stance. The expansion of the realm of ICT standardization to include other industries – with the Internet of Things – and a global set of stakeholders only heightens this issue. While commercially significant stakeholders from other industries may be able to make their voices heard and their influence felt, the same cannot be said for dispersed stakeholders such as small and medium enterprises (SMEs), consumers, or civil society and public interest groups. Our research indicates that policy approaches aiming to solve this issue through direct participation – i.e. by bringing additional voices to the table (consumer associations, SME associations, etc.) – have not been very successful. Similarly, mandates for individuals participating in SDO governance bodies to pursue broader social interests appear to be of limited help. There is no track record of how individuals serving in SDOs interpret their mandate, or how (if ever) the mandate is enforced. In practice, we see the danger that broad reference to the under-defined interests of SDO "outsiders" is a convenient tool that could be used to justify almost any policy decision. **We conclude that the interests of under-represented groups are best served when public authorities look out for the public interest within the current regulatory scheme, following and deepening the previously mentioned procedural and safe-harbour approaches.**

While the SDO governance model overall performs well from a social perspective, on perhaps the most contentious issue – the definition of licensing obligations for SEPs – we observe a significant departure from the otherwise prevailing self-regulatory model. Most SDO policies include a very general FRAND requirement. Attempts at some SDOs to further develop that requirement are mired in controversy within SDOs and beyond. The specific implications of a FRAND licensing obligation have thus mostly been defined by courts and public authorities, but, so far, the results are mixed, with a string of very complex and sometimes inconsistent decisions and pronouncements that is unsustainable in the long run. Furthermore, in contrast to the general ideal of self-regulation, the specific and often

technical details of FRAND obligations have increasingly been interpreted and defined by generalist courts and regulators instead of the highly specialized expert bodies available within SDOs. Finally, the definition of IPR policy details in national courts poses the risk of international fragmentation.

To guard against these potential risks of departing from an otherwise successful self-regulatory model, **we recommend that the European Commission, together with other public authorities, produce clear guidance on the appropriate procedural principles for SDO policy development.** This guidance would clarify how the procedural approach applies to policy development, an issue which is currently ambiguous and contested among different stakeholders. Spelling out the procedural principles that should generally be regarded as appropriate for policy development would increase the legitimacy of SDO decision making following such principles, and may widen the range of instances in which public authorities can defer to SDOs for substantive policy choices.

The guidance on procedural principles should carefully distinguish between different SDOs, and the different justifications for SDO self-regulation. Our three-layer model of SDOs could provide a useful basis for this differentiation. The large number of SDOs in the third layer are subject to significant competitive forces. Cognizant of the benefits of competition and diversity among these industry-led SDOs, public authorities should not intervene in the policymaking at these SDOs (unless there is evidence of a clear problem). The SDOs' own processes, to which members assent by joining the SDO, together with the possibility for stakeholders to instead participate in competing SDOs, constitute the most effective regulation of these SDOs' conduct. In the first layer, SDOs are shielded from such competitive pressures by their quasi-regulatory role conferred by public authorities and their position in a formal network of SDOs. Self-regulation of these SDOs gains its legitimacy from decision-making procedures based on openness, balance of interests, transparency, availability of appeal, and consensus. Given the evident and immediate bearing that IPR policies have on standardization decisions, IPR policy deliberations should also fall under these procedural principles. SDOs in the second layer usually do not have a formal regulatory role conferred by public authorities. Nevertheless, their de facto leadership over a technical field and the cost of migrating ongoing standard development efforts to alternative venues may constitute significant barriers to competition. Decision-making of these SDOs should therefore be analyzed on a case-by-case basis, differentiating in particular between policies limited to future standardization projects and those with a direct bearing on existing standards or ongoing projects. With respect to SDOs in the third layer, these principles are still relevant, but less directly applicable, particularly when third layer SDOs are formed by small groups of firms with specific technical goals in mind.

With such guidance, SDOs should be able to further develop their IPR policies while reducing internal and external disputes. This does not imply that different IPR policies will evolve in the same direction. If needed, SDOs should be able to coordinate their IPR policies, as is the case for instance with 3GPP. Otherwise, a diversity of approaches between SDOs is a prized feature of self-regulation. Nevertheless, on certain issues, such as the meaning of a commonly-used term such as FRAND, it might be confusing and costly to entertain different substantive meanings across SDOs. While SDOs already have venues to discuss their respective policies, we see value in an accreditation process on the model of ANSI for US-based SDOs, which provides for a certain review of SDO practices, interpretation of commonly used policy language, and a clearly circumscribed precedential effect to individual SDOs' decisions. **We recommend that the European Commission consider expanding the role of the Multistakeholder Platform to include the review and/or certification of SDO IPR policies.** The Multistakeholder Platform's role in SDO self-regulation could be strengthened by expanding its role, while creating the conditions for a more pronounced participation by the most relevant and immediately affected stakeholders.

The European Commission's 2017 Communication "Setting Out the EU Approach to Standard Essential Patents" describes a path for the Commission's contribution in support of SDO policy development. The Communication describes general principles of IP valuation in FRAND negotiations. On many of the most contentious specific other issues, the communication does not give direction to SDOs, but rather signals the availability of the Commission to engage in a collaborative process. The clarification regarding the transferability of SEP licensing obligations constitutes a model for such a collaborative process, which we call a **tandem approach** (next to the procedural and safe-harbour approaches). Pursuant to a tandem approach, public authority pronouncements and SDO decision making interact to clarify and further develop institutional norms and general legal principles. **We recommend that the European Commission pursue this tandem approach carefully, taking into account the overall self-regulatory scheme.** Collaborative efforts involving the participation of SDOs, industry stakeholders, public authorities, and independent experts can provide useful guidance regarding the application of general legal principles and policies common to a larger number of SDOs, provided these efforts are in phase with SDOs' internal governance processes and respect SDOs' autonomy over their policies.

1 Introduction

This study provides a comprehensive analysis of the governance of standard development organizations (SDOs), with a particular emphasis on organizations developing standards for Information and Communication Technologies (ICT). The analysis is based on 17 SDO case studies, a survey of SDO stakeholders, an expert workshop, and a comprehensive review of the legal and economic literature. The study considers the external factors conditioning SDO decision making on rules and procedures, including binding legal requirements, government influence, the network of cooperative relationships with other SDOs and related organizations, and competitive forces. SDO decision-making is also shaped by internal factors, such as the SDOs' institutional architecture of decision-making bodies and their respective decision-making processes, which govern the interaction among SDO stakeholders and between stakeholders and the SDO itself. The study also analyzes governance principles, such as openness, balance of interests, and consensus decision-making, and discusses their interplay. The insights from these analyses are applied to SDO decision making on Intellectual Property Rights (IPR) policies, which represents a particularly salient and controversial aspect of SDO policy development.

Standardization has long been recognized as playing an important role in technological innovation, the diffusion of new technologies, and economic growth. Standardization is particularly important for ICT. Over just a few decades, the rapid progress and diffusion of ICT have transformed many aspects of our economy, and indeed our daily lives. Currently, researchers and industry are working on a new set of ICT, with a focus on communication between devices and machines. In a near future, these technologies, collectively labeled the Internet of Things (IoT), may enable among other advances autonomously driving cars, smarter grids for electricity, gas and water, and significant improvements in the production and distribution of goods and services.

Nevertheless, these potential benefits can only be realized with the help of advanced technology standards that guarantee interoperability and facilitate seamless communication among a large number of devices offered by different vendors. The success of the future IoT thus hinges upon the successful development of a new generation of ICT standards and the novel technological inventions that are essential to these standards.

While technology standards can be developed in a variety of ways, including government regulation and de-facto standardization by market selection, most ICT standards are developed through explicit coordination among industry stakeholders. SDOs – open, voluntary and consensus-based organizations specializing in the development of such standards – play a central role in this process. SDOs have developed a great number of ICT standards, and are already playing a crucial role in the development of standards in support of the IoT. In spite of their fundamental importance, SDOs remain insufficiently understood by both policy makers and researchers. Indeed, there is a large variety of SDOs, and many of these organizations are highly complex and dynamic. The study of SDOs is therefore an important and challenging field of research in economics, law, and other social sciences.

One aspect of SDOs that has attracted significant policy and research interest is the interplay between SDO standardization and IPR systems, in particular patenting. A growing body of research documents that IPR and standardization systems are complementary and interdependent. Both patents and SDO standards contribute to the codification of technical knowledge, support the rapid disclosure of new inventions, and facilitate transactions and coordination in a complex process of distributed innovation involving a continuously increasing number of heterogeneous actors. Nevertheless, policy makers, regulators, researchers, and industry practitioners have long been aware of significant potential concerns arising at the interface of the SDO and patent systems. A particular concern is that the standardization of technology by an SDO might unduly leverage the patent rights

protecting technology that is required for the implementation of the SDO's standards and allow the owners of such standard-essential patents (SEPs) to extract excessive royalty payments from manufacturers of standardized products. Most SDOs developing standards for ICT technologies have adopted IPR policies in order to address this and other potential concerns. The efficacy of these policies is the subject of a contentious, ongoing debate.

As part of this ongoing debate, the European Commission published in November 2017 a communication setting out the EU approach to Standard-Essential Patents (SEP). The Commission declared that there is "a need for a clear, balanced and reasonable policy for Standard Essential Patents in the EU". Nevertheless, the Commission laments that "conflicting interests of stakeholders in certain SDOs may make it difficult for these organisations to provide effective guidance on such complex legal and intellectual property (IP) policy issues". The Commission thus not only recognizes the importance of SDO policies on SEPs for EU policy objectives, it also recognizes that these policies are primarily defined by the SDOs themselves in a complex interplay with SDO stakeholders and diverse external forces and constraints. As a premise for Commission policy action with respect to SDO policies on SEPs, it is therefore crucial to gain a better understanding of the processes through which these policies are developed and modified.

There is significant disagreement in the industry about appropriate SDO policies on IPR. In particular, companies with a primary business interest in patent licensing revenue commonly have policy preferences that differ from those of companies with a primary business interest in revenue from the sales of standard-compliant products. These different preferences may lead to conflicts when SDOs change or consider changing their IPR policies. Controversies about IPR policy choices thus have recently fueled significant interest in SDO governance; i.e. the various processes and forces conditioning and shaping SDO policy choices on potentially controversial issues. Unfortunately, there is to date only very limited evidence on SDO governance, and no comprehensive analysis of all major aspects of SDO governance relevant to the development of IPR policies in a significant and representative sample of major SDOs.

In order to fill this gap, the Joint Research Center (JRC) of the European Commission in collaboration with the Commission's Directorate General for Communications Networks, Content and Technology (DG Connect) has called for a comprehensive study on SDO governance, in particular as it applies to the development of IPR policies and with a particular emphasis on ICT standards for IoT. To this end, the JRC published an Invitation to Tender in March 2016 (JRC/SVQ/2016/J.3/0003/OC) (Tender). The Technical Specifications for the Invitation to Tender set out the following questions for the study:

> The present study aims at achieving a comprehensive overview of the structure of the interplay of IPR systems and SDOs from a public policy perspective. Considering the past experience and stakeholder interests as well as the global context in which this interplay is taking place, the study should identify elements of best practices for this interaction.
>
> The study must find out whether the current model of governance for the interplay of IPR systems and SDOs in Europe is well functioning from a welfare perspective. In the case that it is not, it should identify why is it not operating in an optimal way and how could the interplay of systems be improved, providing concrete recommendations in that case.
>
> The analysis will take into account in particular the following questions:
>
> […] Do SDOs have to consider a horizon that goes beyond the interests of their members?

What is or can be the role in standardisation setting of societal groups such as consumers, end-users etc. and those of other industry players, in particular the so-called "vertical" players (transportation, life sciences, energy, etc.)? How are they represented in the process of ICT standard making?

[..I]s there a need for SDO policy coordination in general and for IPR policies coordination in particular? If coordination is not possible, what are the potential points of conflict?

What would be an appropriate plan and infrastructure to allow collaboration between SDOs, between Patent Offices and between SDOs and Patent Offices?

What is in particular the role of patent quality (and implicitly of quantity) as an essential input factor into the standardization system?

What are the most important factors for a sustainable co-existence of IPR systems and standardization systems in Europe in the context of the Digital Single Market?

What are the benefits of standard setting and of specific IPR rules in standard setting and what their impact on the European economy?

What role does transparency play in building SDO policies? In this context and that copyright (and/or open access).

What role can or should policy makers, such as the European Commission, play to ensure that the interplay between IPR systems and SDOs has a positive effect for the society?

The present study results from the successful bid to perform the study requested by the Tender and responds to the Commission's Technical Specifications for this study. In line with the Technical Specifications, the research team has carried out a comprehensive literature review, 17 SDO case studies, an online survey of diverse SDO stakeholders, and an in-person stakeholder workshop. We selected the SDOs and stakeholders for their importance to the debate on IPR policies in the field of ICT standardization. Our study thus rests on a comprehensive analysis of policy development in the major SDOs in which ICT standardization is carried out, and the input received from a large and diverse pool of expert practitioners representing many of the most significant SDO stakeholders from various sides of the debate.

For purposes of our analysis, we considered an SDO to be an open organization developing technical standards. We thus excluded consortia or alliances consisting of a fixed set of member organizations that are not open to the participation of other interested stakeholders. We furthermore did not include in our sample any of the large number of organizations that participate in standard development in an ancillary role, without developing their own standards and specifications. We do however include organizations developing technical specifications published as technical standards by another SDO; and we include ANSI, an accreditation body that, even though not developing its own standards, defines essential requirements for standard development that inform the policies applicable to the development of a large number of important standards. We also included the National Standards Bodies (NSB) AFNOR and DIN, even though these organisations have additional responsibilities extending beyond the development of standards, and do not refer to themselves as SDOs. For the remainder, we selected a sample of SDOs that are both individually important, geographically diverse, and sufficiently representative of the much larger universe of diverse SDOs.

Our analysis focuses on SDO governance, i.e. how SDOs are governed, including their organizational architecture, their leadership, their membership and their decision-making processes. In so doing, given the focus of this study, we concentrate on governance as it

relates to rules and policies, such as the SDOs' membership agreement, bylaws, Memorandum of Understanding (MoU), other binding policies as well as non-binding strategy and guidance documents. We also consider the processes for specific policy decisions as opposed to the development of generic rules, e.g. dispute resolution mechanisms. We only consider the processes through which SDOs make policy choices, and do not analyze or assess the content or effects of individual policy choices, except with respect to their implications for the policy development processes. We first develop a general analysis of SDO governance, which we then corroborate and refine by studying the special case of IPR policies. As the goal of this analysis is to compare the rule-making process of different SDOs in practice, we do not comprehensively include all IPR-related policies in this analysis, but focus on a somewhat narrower subset of particularly salient IPR policy questions that are relevant to all SDOs in our sample. We therefore concentrate on SDO policies relating to the disclosure and licensing of (potential) SEPs, and only briefly touch upon policy provisions with respect to prior art status of standards-related documents, copyrights, trademarks and other issues.

The remainder of this study is organized as follows: in Section 2, we position our studied research questions in the context of existing studies and scholarship. In Section 3, we explain the methodology for our case studies, interviews, surveys and stakeholder workshop. Section 4 provides a broad overview of the standardization ecosystem and its external constrains: law, mutual relationship among SDOs, interactions with public authorities and limits of the competitive environment. In Section 5, we present the findings of our study concerning the governance architecture of SDOs, including issues such as SDO staff, policy development, dispute resolution and the types of stakeholder influence. In Section 6, we discuss the most fundamental SDO governance principles and develop an analytical framework to analyze the legitimacy of SDO policy making. In this section, we present a number of important findings concerning openness, due process, transparency, balance of interest and consensus-building. In Section 7, we turn our attention to IPR policies of SDOs, review the typical approaches, provide results of our fact-finding exercise and draw a number of conclusions about how changes are made, what influences their acceptance or contestation and their impact on legitimacy of such changes.

2 Literature Review

In this section, we briefly review three streams of existing research to which our study most closely relates: (1) general studies of SDOs, including a large number of case studies, as well as studies of SDOs in their interaction; (2) studies of SDO processes, including many analyses of standardization processes, and some very limited research on processes for the development or modification of SDO policies; and (3) the broader institutional literature on organizations and their governance, as it most directly applies to SDOs. We conclude on a statement of the gaps in the existing knowledge that our study aims to fill.

In addition to the research summarized in this background literature review, a much larger body of literature has informed our analysis of SDO governance. We reference and discuss these other sources throughout the study where appropriate and useful.

2.1 General studies of SDOs

The international standard-setting "ecosystem" and its principal components are described in detail by David and Shurmer (1996), Mattli and Büthe (2003), Nickerson and zur Muehlen (2006), Cargill and Bolin (2007), Biddle et al (2012), Ernst (2012), Bekkers et al. (2014) and Lundqvist (2014).

Standards can be developed in a variety of ways, including by public sector agencies, market selection, or explicit coordination in consensus-driven organizations. Wiegmann et al. (2017) review the available literature on each of these 'modes' of standard development and their different interactions. Our study focuses on standard development by consensus-driven SDOs; even though we take into account and analyze the interaction of SDOs with both government and competitive market forces.

There is a large array of different organizations participating in the development of consensus standards. Updegrove (2017) catalogs more than 1,000 active consortia, trade associations and other SDOs operating in various fields. Not all of these organizations develop their own standards or specifications. Many consortia participate in the development of standards taking place at other organizations in a variety of ancillary roles. A growing literature analyzes the role of such consortia for standard development in interplay with a broader and more formal organization where the standard is developed (e.g. Leiponen, 2008; Baron and Pohlmann, 2013; Bar and Leiponen, 2014; Baron et al., 2014, and Delcamp and Leiponen, 2014). In our study, we analyze the governance processes of SDOs, i.e. organizations that develop standards and specifications, and do not include consortia that only support standard development at other organizations[2]. Nevertheless, in section 4.4.2, we explore the role of such consortia for SDO governance.

Even restricting the focus on SDOs, i.e. organizations that develop and publish voluntary consensus standards, there still is a large number and variety of organizations, including formal and established international bodies as well as short-lived single-project organizations with a narrow technical focus. Consequently, theoretical research on the functioning of these organizations has long been highly abstract and general. One stream of research investigates and compares different decision rules within SDOs. Farrell and Saloner (1988) e.g. model the consensus standardization process in an SDO as a war of attrition between opposing stakeholders. Though this process was shown to result in greater coordination than decentralized activity, it is cumbersome. Farrell and Simcoe (2011) further explore and expand the war of attrition model to analyze standard-setting by consensus. Other analyses study standard development by voting. Goerke and Holler

[2] As discussed, the definition of "SDO" varies. We thus do include several organizations that do not consider themselves SDOs, such as the national standards bodies AFNOR and DIN; the accreditation body ANSI; and DVB, which develops technical specifications published as standards by the SDOs CEN and ETSI.

(1995) and Bonatti and Rantakari (2016) analyze the efficiency of alternative decision rules in SDOs. Spulber (2018) analyzes decision-making in SDOs and predicts that the interplay between voting in SDOs and competition in the market results in the selection of efficient standards. We will discuss the theoretical research comparing the efficiency of decision-making processes in Section 5.1., as a background to our empirical analysis of the processes in the SDOs in our sample.

In addition to comparing decision-making processes within SDOs, existing theoretical research has investigated the interplay between SDO decision making and public regulation (e.g. Cabral and Salant, 2014) or between SDO decision making and competitive forces (Lerner and Tirole, 2015; Spulber, 2016). Of particular interest to our study are analyses of how SDO decision making rules are shaped by these interactions. Lerner and Tirole (2006, 2015) and Chiao et al. (2007) analyze SDO processes as endogenous outcomes of the competition between SDOs to attract new standardization projects. We will discuss at greater length the implications and empirical relevance for our analysis of SDO governance in section 4.4.1.

A significant focus of the research interest is the interplay between SDO standardization and IPR, and in particular patents (see e.g. Bekkers et al., 2014). Empirical research has investigated the relationship between patenting and standardization at the industry level (e.g. Blind, 2002); the firm level (Gandal et al., 2007; Blind and Thumm, 2004; Fischer and Henkel, 2013); or the individual inventor level (Kang and Motohashi, 2015). Most of the research however has focused on the specific issue of SEPs. Large bodies of legal (e.g. Lemley and Shapiro, 2007) and both empirical (e.g. Rysman and Simcoe, 2008) and theoretical (e.g. Lerner and Tirole, 2015) economic research have investigated questions and issues related to SEPs. In section 7.1, we will review some findings of this existing literature, in particular insofar as they compare and discuss features of SDO policies on SEPs (e.g. Lemley, 2002; Bekkers and Updegrove, 2012). For more comprehensive surveys of this literature, see Contreras (2018a) and Baron and Pohlmann (2018) [3].

Besides the significant research focus on SEPs, there is limited comprehensive comparative research on the functioning of different SDOs. There are currently only a few studies comparing larger samples of SDOs with respect to their membership, procedures and output (e.g. Chiao et al., 2007; Baron and Spulber, 2018) [4]. Economists have therefore used practitioner surveys (Weiss and Sirbu, 1990; Blind and Thumm, 2004; Blind and Mangelsdorf, 2013; Fischer and Henkel, 2013) or companies' business communications (Aggarwal et al., 2011) to study company participation in SDO standardization.

In addition, a number of detailed qualitative (e.g. Bekkers, 2001; DeLacey et al., 2006; Murphy and Yates, 2009) and quantitative (e.g. Simcoe, 2012) studies of single organizations have significantly contributed to the analysis of SDO standardization. For a more comprehensive review of SDO case studies and a comprehensive data description, see Baron and Gupta (2018).

2.2 Studies of SDO processes

The processes of an SDO are usually defined in the SDO's bylaws (sometimes also called constitution), policies or membership agreement. The extent to which the bylaws define the specific aspects of SDO operations varies greatly, as SDOs may be more or less formally established organizations. As a rule, an SDO's bylaws stipulate the SDO members' rights to

[3] See Baron and Pohlmann (2018) for a survey, methodological discussion and presentation of a new database of SEP declarations.

[4] See Baron and Spulber (2018) for a survey, discussion and a new database.

participate in the standard development and other activities of the SDO, and their obligations to pay membership dues and comply with its policies.

Baron and Spulber (2018) categorize SDOs into three groups according to the composition of their membership[5]. In several international SDOs, membership consists in member countries, and the SDO policies define how members are represented (e.g. by national standards organizations like AFNOR, BSI or DIN). In the majority of SDOs, membership consists in legal persons, with private companies constituting the majority of membership. In addition, universities, government agencies, consumer or industry groups or other SDOs are also frequently SDO members. The policies of SDOs operating under these rules may differentiate between different categories of member entities, e.g. by granting rebates on membership dues for academic research institutions or consumer groups; or by stipulating standard development processes aiming at a balance of the interests of different categories. Finally, some SDOs are based on individual participation, including e.g. engineering societies and IETF.

Another set of SDO policies that fundamentally affect the nature of the SDO are the rules on standard approval. Baron and Spulber (2018) compare the voting rules of 36 SDOs, and find that approval requirements for standard adoption range from simple majority to unanimity. The majority of these SDOs also have consensus rules, where consensus is sometimes defined as a specific super-majority voting in favor of a standard, and absence of qualified disagreement[6]. Many SDOs allow a standard to be adopted if all objections against the standard have been addressed, and allow dissenting members to appeal decisions on standard adoption. SDOs that require a lower threshold of approval for standard adoption and have a more limited set of members can decide more quickly on standards, while SDOs with broad participation of stakeholders from different interest groups and high approval thresholds issue standards that are more authoritative. SDOs with different rules for participation and standard adoption thus occupy different roles in the standardization ecosystem, and are active in different stages of the technological life-cycle.

It is also common for SDOs to cooperate. In particular, SDOs with lower approval thresholds may submit their standards for additional endorsement to a more inclusive, consensus-oriented SDO (see e.g. Blind, 2011). Many formal SDOs have specific policies for the consideration of standards that have already been approved by another, usually less formal, standardization body (Baron and Pohlmann, 2013; Baron et al., 2014).

The focus of our study, the processes of SDOs for revising their rules and procedures, has by comparison received relatively little academic attention. More than 20 years ago, David and Shurmer (1996) argued that formal, international SDOs are characterized by a clear distinction between standard setting and governance. "The intention of these institutional arrangements, if not always their effect, is to very clearly separate the political from the technical aspect of the SDO's decision process." (David and Shurmer, 1996, p. 794). David and Shurmer (1996) argue that this division reflects a "technological idealism", whereby engineers should not be encumbered by strategic considerations, and focus on selecting technological solutions purely based on merit. We will investigate the degree to which these decades-old observations still hold in today's dynamic standardization environment.

[5] This classification system roughly corresponds with Bekkers et al. (2014) discussed in Part 1.2 above.

[6] Standards bodies have developed a standardized definition of consensus. Under the ISO/IEC Guide 2.2004, "consensus" is defined as "General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments. NOTE Consensus need not imply unanimity."

Only few studies have analyzed processes for decision making specifically on SDO IPR policies. Iversen (1999) offers a case study of one such process, the adoption and subsequent revision of ETSI's IPR policy in 1993 and 1994. This case study highlights the importance of the influence of SDO stakeholders, as well as political pressures from governmental authorities. Layne-Farrar (2014) analyzes revisions of SDO IPR policies as responses to potential antitrust concerns, and discusses the relationship between SDO policy making and the actions taken by antitrust authorities. Tsai and Wright (2015) also document a larger number of changes to SDO IPR policies and discuss the implications of SDO-initiated changes for antitrust policy. In addition, Willingmyre (2016) offers a comparative view of SDO policy development procedures based on review of publicly-available policy documents of five SDOs. He highlights that SDOs' procedures typically differ from the processes for standard development and place varying priorities on the balance of SDOs' constituencies and consensus decision-making.

2.3 General institutional literature on the governance of organizations

In the above, we have covered in detail the institutional aspects of SDOs themselves, taken in isolation. In a broader perspective, SDOs are seen as an institutional response to governance issues surrounding standardization. SDOs create standards and standardization processes, which complement the regulatory functions of other institutions, including national regulatory authorities and international organizations. This privatization of the creation of rules raises important questions regarding the enforcement of public policy objectives. Courts and competition authorities are already intervening in and around the activities of SDOs, which prompts the question whether they bring an institutional advantage over SDOs in dealing with the issues in question.

Once it is assumed that governance implies some public functions, then the large literature on regulatory institutions becomes relevant. The work of Majone (1996), for instance, is concerned with establishing the proper conditions for regulatory institutions to achieve legitimacy and accountability. Many authors have developed this further, leading to a number of sets of "good governance" principles, some of which have been issued by official institutions such as the OECD. See here the work of Lavrijssen, Larouche and Hancher (2003), Ottow (2015) or the more recent synthesis attempted by CERRE (2014).

Within the EU context, this has led to a complex regulatory architecture, with EU authorities and Member State authorities, giving rise to horizontal and vertical relationships, some cooperative, some conflictual (see the contributions in Geradin, 2005). In their overview piece, Larouche and Hancher (2011) show that EU law has tended to create boundaries and draw lines to regulate these relationships at first, and is slowly moving towards a more integrative approach. This line of analysis can probably be applied to the regulation of standardization processes.

There is an extensive general literature on institutions, as it is available in the legal and economic scholarship concerning competition/antitrust and economic regulation. For general overviews, see Ogus (1994), Baldwin and Cave (2012) and Baldwin et al. (2010). Some literature concerns the respective merits and demerits of institutional solutions that leave room to private actors, such as self-regulation and co-regulation. The work of Black is central to this area (see for instance Black, 2001). See also Senden (2005).

Recent developments in competition law – with the promotion of private enforcement – have also revived the literature on the advantages and disadvantages of enforcement via courts or regulatory authorities (see for instance Hüschelrath and Schweitzer, 2014).

From a regulatory perspective, SDOs engage in a type of private ordering. According to Abbott and Snidal, standards are pervasive mechanisms of international governance (Abbott and Snidal 2001, 2009). States and private actors create them "across a wide range of circumstances to promote their collective welfare by coordinating and constraining individual behavior" (Abbott and Snidal 2001). Private ordering refers to the use of systems of rules that private actors create, observe, and often enforce through extra-legal means (Ellikson, 1991; Schwarcz, 2002). As collected by Contreras (2018a), there are multiple case studies that look into this regulatory aspect of private ordering in diverse areas, such as diamond and cotton trade (Bernstein, 1992; Bernstein, 2001), Japanese organized crime syndicates (Curtis and West, 2000), the Internet domain name authority (Boyle, 2000) or the New York Stock Exchange (Schwarcz, 2002; Macey, 1997). Many authors studied standardization as a form of a trend of transnational rule-making (Brunsson and Jacobsson, 2000; Shelton, 2000; Murphy and Yates, 2009; Pauwelyn et al., 2012).

The institutional perspective has been applied to SDOs in particular in the legal and political science literature (Kirton and Trebilcock (ed.) 2004; Schepel 2005; Kerwer 2006).

While the existing background literature sheds some light on the issues of SDO governance, number of issues remain unaddressed, which this project tries to study. To begin with, there is no systematic empirical comparison of how SDOs determine their rules; which objectives they pursue; who has the authority to make decisions on their behalf; how they coordinate with other organizations; and to which legal constraints and competitive forces they are subject. Without these analyses, there can be no serious assessment of the overall economic, legal and institutional effectiveness of these processes. Such an assessment must form the basis for policy guidance.

3 Methodology

3.1 General approach

In accordance with the Technical Specification, the study rests on two main sources of new empirical information: first, we conducted 17 case studies of SDO governance. For each of the 17 SDOs, we conducted an interview with an SDO representative knowledgeable about the SDO's governance and policies and analyzed publicly available SDO documents relating to the SDO's governance processes. Second, we conducted a stakeholder survey in which we asked a diverse set of SDO stakeholders about their views and attitudes with respect to SDO governance. Our survey collects the views of organizations with stakes in standard development, as opposed to personal opinions of individual SDO participants. We focused on organizations that are particularly relevant for the governance of the 17 studied SDOs[7] .

3.2 Case studies

3.2.1 Sample

We have used four general criteria for the selection of these SDOs: (1) Overall relevance of the SDO, and in particular relevance of the SDO for the intersection between standards and IPR; (2) Representativeness of the overall diversity of existing SDOs; (3) Particularly informative case-study because of a unique approach or a relevant IPR policy change; (4) Geographical distribution and significance to the technological areas that are most relevant to the aims of the study.

3.2.1.1 Sample selection criteria

We defined a sample of SDOs based on the general criteria of relevance, representativeness, and distinctiveness.

In order to select the most relevant SDOs, we used available information on the number of patents declared to be essential to different SDOs' standards. This information provides a first indication of the relevance of an SDO for discussions regarding IPR and standardization. Together, IEEE, ETSI/3GPP, ISO, IEC, ITU-T, IETF, W3C, OMA, OASIS, ECMA and ANSI account for more than 98% of the IPR disclosures included in the Searle Center Database (excluding the DVD Forum and BluRay Disc Association, which are ad-hoc consortia and not formal SDOs) (Baron and Pohlmann, 2018). These nine SDOs also constitute the group of SDOs that have produced standards subject to significant disputes around the world regarding SEPs.

Some SDOs are particularly relevant because their IPR policies influence the practices of hundreds of other organizations. A very large number of SDOs worldwide closely follows the common IPR policy of ISO, IEC and ITU-T. 3GPP is a consortium of seven important SDOs, including ETSI (ETSI collects and publishes declarations of patents that are essential to 3GPP specifications). The ETSI/3GPP policy[8] therefore also applies to important parts of the work of the member organizations (such as ATIS in the US). Finally, though ANSI is not itself an SDO, as the accreditation body for developers of American National Standards, the ANSI IPR policy sets minimum standards for more than 200 U.S.-based SDOs. While these organizations can follow other procedures in the remainder of their standard development

[7] This study was exempted from Institutional Review Board (IRB) review at the University of Utah on 1 March 2017 on the basis that it did not seek to obtain information concerning individual human subjects. This exemption was relied upon by Northwestern University. Separate approval was obtained from the Tilburg University ERB on 22 June 2017.

[8] 3GPP project (not an SDO in itself) relies on IPR policies of its partners, such as ETSI.

tasks, the ANSI policy is highly relevant for the IPR polices practiced by a large number of US-based SDOs. Some SDOs are particularly relevant to our study because of their importance for standards development in the technological fields that we are primarily interested in. 3GPP with its member organizations and IEEE are the leading SDOs for the development of wireless telecommunication standards. This is the field which has been the focus of the policy debate on the intersection between IPR and standards over the past two decades. IETF and W3C are the leading SDOs in the field of Internet standardization. With the development of new generations of ICT standards and the Internet of Things, Internet standardization is increasingly relevant to and interrelated with standard development in a large number of other industries.

The sample should also be representative of diversity of SDOs and the variation in SDO approaches with respect to IPR. Previous studies have found only limited variation regarding the fundamental approaches of SDOs with respect to the inclusion of patented technology (see e.g. Baron and Spulber, 2018). In particular, there are two broad groups of SDOs: those that require commitments to license patents on Fair, Reasonable and Non-Discriminatory (FRAND) terms (including SDOs offering menus of commitments, including FRAND licensing terms), and SDOs that generally require royalty-free licensing or non-assertion of SEPs, or allow their working groups to require royalty-free licensing or non-assertion of SEPs. In order to be representative, the sample should include examples of both types (e.g. IEEE, ISO/IEC/ITU-T, 3GPP/ETSI, and ANSI for the former group; W3C and Bluetooth for the latter, as well as hybrids such as OASIS and ECMA).

As stated in the introduction, our definition of SDOs excludes a large number of organizations that develop standards or participate in some capacity in the development of standards. To make reasonable comparisons, we exclude organizations such as closed consortia, open source consortia, or for-profit standards developers. The sample should nevertheless be representative of the different types of SDOs that fall within our definition. These SDOs can have very different ways of operating. In particular, there are formal international SDOs, in which member countries are represented by their national standards body (ISO and IEC) or regulatory bodies (ITU) in addition to sectoral members (e.g. companies). In private SDOs such as ETSI, ECMA, and JEDEC, membership is dominated by private companies. Engineering societies such as IEEE and SAE have a large individual membership base, as well as institutional membership (mostly companies). A special case is the IETF, where participation is only on an individual basis. Another relevant distinction is between "general purpose" SDOs such as ISO and CEN, and organizations such as the DVB Project or Bluetooth with a much narrower technological focus.

In addition to SDOs that are relevant and representative of the diversity of organizational models, we included SDOs that have particularly original and/or instructive specificities. Of particular interest are those SDOs that have recently undergone an important change in their IPR policies. The most significant policy changes highlighted in the literature (Contreras, 2013a; Stoll, 2014; Baron and Spulber, 2018) are changes which occurred at JEDEC (changes based on policy gaps identified during Rambus litigation), OASIS and W3C (adoption of royalty-free policies), VITA (adoption of a policy of ex-ante disclosure of most restrictive licensing terms), and IEEE (restricting access to injunctive relief, specification of methodologies for calculating FRAND royalties). VITA is not among the organizations featuring very significant numbers of SEP disclosures, but provides an interesting case study because of its singular approach to SEP licensing. We have also included W3C because its focus on software-based standards and solutions implicates many of the copyright issues arising in today's standards environment. For example, the integration of open source software and traditional standards has caused substantial concern and reactions within the ICT sector.

Few SDOs intervene directly in IPR licensing. An exception is that set of SDO policies that aim to facilitate the creation of patent pools. IEEE had a brief partnership with a patent pool licensing administrator. The DVB Project still has a policy designed to facilitate the emergence of patent pools for DVB standards. DVB also has other notable policy attributes, such as mandatory ICT arbitration, that are interesting to consider, and a recent set of policy amendments.

Last, but not least, our selection of SDOs was motivated by geographical considerations. ISO, IEC and, ITU-T are international SDOs based in Geneva; DIN, AFNOR, and SAC are national SDOs; ETSI, CEN and CENELEC as European SDOs; ANSI accredits SDOs that develop American National Standards; most of the other SDOs that we studied are globally active (IEEE, W3C, IETF, JEDEC, VITA, ECMA), although sometimes with a more regional footprint (e.g. DVB, whose standards related to European broadcasting). We have also included one SDO based in India (TSDSI).

Based on these criteria, we constituted a sample of 19 SDOs. We contacted each of these SDOs; and with the exception of two SDOs (Bluetooth and OASIS), a representative of each of these SDOs was willing to meet and answer questions regarding the SDO's governance model. In light of our selection criteria, we decided that this sample of 17 SDOs is sufficiently representative and relevant for the topics addressed in our study.

3.2.1.2 Composition of sample

Case studies were carried out on the following 17 organisations (in alphabetical order of their acronym):

AFNOR	Association française de normalization
ANSI	American National Standards Institute
CEN	European Committee for Standardization [9]
CENELEC	European Committee for Electrotechnical standardization
DIN	Deutsches Institut für Normung
DVB	Digital Video Broadcasting (Project)
ECMA	European Computer Manufacturers Association
ETSI	European Telecommunications Standards Institute
IEC	International Electrotechnical Committee
IEEE-SA	Institute of Electrical and Electronics Engineers Standards Association
IETF	Internet Engineering Task Force
ISO	International Organisation for Standardization
ITU-T	International Telecommunication Union Standardization Sector
JEDEC	JEDEC Solid State Technology Association
SAC	Standardization Administration of China
TSDSI	Telecommunications Standards Development Society, India
VITA	VMEbus International Trade Association
W3C	World Wide Web Consortium

[9] While CEN and CENELEC are two separate legal entities, in the areas covered by this report they are usually acting in concert, hence their being considered jointly as CEN-CENELEC.

3.2.2 Data collection

3.2.2.1 Desk research

With respect to each of the 17 SDOs studied, we collected current policy documentation, typically from the SDOs' web sites. We then summarized the principal governance features of each SDO and verified the accuracy of these summaries with the SDO representatives interviewed (see below). These summaries also facilitated in-depth discussion during the interviews and formed part of later deliverables.

3.2.2.2 Interviews

We conducted personal interviews with representatives of each of the 17 SDOs studied. For each SDO, a representative having personal knowledge of and experience with the SDO's governance and policies was selected. In many cases, the interview subject was an executive director or high-level staff member of the SDO.

We developed a standardized interview script that was adapted for each interview. In several cases, we provided the interview subject with a copy of the interview script to allow them to prepare for the interview and, in some cases, to prepare written responses in advance.

Most interviews were conducted in person, but some, for logistical reasons (e.g., SAC), were conducted via Skype. Several interviews were supplemented by written responses submitted by the interview subject before or after the interview. In one case (ITU), at the request of the SDO, the representative was not interviewed but provided short responses to selected questions and shared reflections on the background research. Apart from ANSI, all interviews were fully recorded and transcribed. Apart from AFNOR (French), all interviews were conducted in English. The transcripts were shared with the interviewees and approved by them. The SDOs and interview subjects were assured that their interview transcripts would not be shared beyond the research team.

3.3 Survey

3.3.1 Questionnaire

As prescribed by the Technical Specification, we sought to gather information through the survey regarding stakeholder perceptions and experiences relating to SDO governance and policy making, particularly as they relate to IPR. We also collected demographic data relating to the survey respondents.

The survey was designed to be administered and taken online using the Qualtrix survey program. Questions were nested and staged according to prior responses. We asked a total of 57 questions, including Yes/No responses, rankings on both 3-point and 5-point Likert scales, and open-ended (text box) questions. There was no limit to the length of open-ended responses. We also offered an open-ended text box on every page of the survey. Some questions allowed respondents to rank different SDOs on similar sets of criteria using Quatrix loop logic.

Based on testing by the research team, we estimated that completing the survey would take a knowledgeable individual between 30-60 minutes.

The survey was coded and administered by Northwestern University using the Qualtrix survey software. Each recipient was sent an email containing an individualized URL link to the survey.

The full version of the survey is attached as Annex 1 to this document.

3.3.2 Sample selection

As prescribed in the Technical Specification, a structured list of stakeholders was developed in which potential survey respondents were identified in four categories: "holders of standard essential patents (SEPs), companies and other organisations in the relevant technical fields holding patents other than SEPs, companies and other organisations in the relevant technical fields not holding any patents, and representatives of groups that stand for consumer interests and the broader interest of society".

We identified a total of 475 stakeholders, using the following methodology:

First, we used quantitative criteria to identify 343 stakeholders with a significant interest in standardization, with a particular focus on the sample of SSOs that we study. This exercise was mostly based on the Searle Center Database and related databases with quantitative information on SDOs (Baron and Spulber, 2018; Baron and Pohlmann, 2018; Baron and Gupta, 2018; Baron and Ciaramella, 2018). In particular we included the following stakeholders:

Membership

Entities that are members of 17 or more SDOs, out of 200 SDOs mainly in the field of ICT (Baron and Spulber, 2018)

SEPs

Entities that declared 11 or more different patents to be SEPs (Baron and Pohlmann, 2018)

Entities that acquired 10 or more patents previously declared to be SEPs (Baron and Ciaramella, 2018; this analysis is based on USPTO reassignment data and thus covers US patents only)

Implementers

Entities that produce or have produced 50 or more different certified Wi-Fi products[10]

Entities that produce or have produced 10 or more different GSM/UMTS/LTE certified phones or chipsets[11]

Contributors

Entities that submitted 200 or more contributions, such as work items or change requests, to 3GPP[12]

The different databases from which these firms are drawn are not equally large. We selected cutoffs that seemed sensible based on the identities of the marginal firms (i.e. reducing the cutoff would result in including predominantly firms that do not appear to be significantly affected by standardization or actively participate in SDO governance debates).

Many entities were selected into the sample based on multiple criteria. We did not attempt to classify these entities into their "primary" category.

Overall, the quantitative method identifies 173 regular SDO members, 142 significant SEP owners, 111 significant implementers of standards subject to SEPs, and 87 significant contributors to standards development at 3GPP. Based on these figures and our review of the list, the quantitative method results in a relevant sample of stakeholders, which includes many of the stakeholders actively participating in SDO governance debates.

[10] We used data retrieved from the Wi-Fi Alliance's certified product finder, https://www.wi-fi.org/product-finder
[11] We used data from the GSM Arena's product comparison website, https://www.gsmarena.com/
[12] We used data compiled by Baron and Gupta (2018). There is no comparable database for other SDOs. We therefore could not use e.g. data on technical contributions to the entire sample of SDOs studied

The selection criteria are nevertheless based on firms' observed (past) behavior with respect to SDOs and SDO standards. It may therefore underrepresent companies that are significant stakeholders in current SDO governance debates because they expect standards developed by these SDOs to become increasingly relevant to their products. Furthermore, as companies are selected based on their individual relevance for the debate, our sample overrepresents large and technology-centric companies. A much larger number of other companies (and other types of organizations) are also affected by the SDOs in our sample, but are either too small, or too remotely affected by SDO standards, to be included among the most relevant stakeholders. Nevertheless, collectively, this large group of small or peripheral players is an important SDO constituency.

We therefore complemented the sample selected based on the quantitative criteria with manual additions, to ensure greater coverage and representativeness of different types of stakeholders.

First, we added 13 firms from industries where SDO governance with respect to IPR is expected to become more important.

Second, we added 31 public interest or civil society organizations with potential interest in standardization.

Third, we added 100 entities (mostly public interest or civil society) that seemed relevant to ensure representativeness. In particular, we included organizations representing large and small businesses as well as consumers; societal groups interested in internet governance and IPR; and trade associations representing IPR owners, public research institutes, and a variety of industries using standardized technology subject to essential IPR. We also included associations of IPR lawyers, licensing professionals, pool administrators, and other companies or professional associations with a particular expertise related to standardization and IPR. We made sure to include stakeholders who volunteered to be surveyed, who had responded to the public consultation of the EC, or who participated in recent conferences related to SDO governance with respect to IPR. We did not include SDOs (from within or outside our sample) in the sample of survey respondents.

The final sample was balanced with respect to geography and type of stakeholders. 176 stakeholders are based in the US, 155 are based in Europe, and 98 in Asia.

The sample includes 343 firms, 62 interest groups or trade associations, 30 civil society associations, 14 public authorities, 12 public research institutes or government-subsidized research organizations, 6 law associations, and 3 universities (only those participating in standards, we did not include academics writing on SDO governance).

For each stakeholder, we identified an individual involved in standardization, of as high a rank as possible within the organization, to serve as the primary contact point for the survey. We obtained email addresses for these individuals through personal contacts, direct outreach, or searches of public web sites.

We allowed only one survey response per entity, though individuals within the same entity were permitted to consult and collaborate on their entity's response.

3.3.3 Response rate

In total, we received 47 valid and complete responses. Not every respondent answered every question, and we report the total number of non-blank responses throughout the report, for each question.

There are several possible reasons that survey responses may have fallen below the target goal of 200 responses. First, due to the highly contentious nature of the topic, we were informed by at least two large stakeholders that they deliberately declined to participate in the survey so as not to prejudice themselves in current or future litigation or lobbying efforts. Second, the survey appears to have taken longer than anticipated to complete for some organizations. The time commitment involved may have dissuaded some smaller stakeholders from participating. Third, some stakeholders (particularly those from civil society) informed us that they lacked the relevant expertise to complete the survey, or that they did not participate actively enough in SDO governance to make their responses meaningful. Fourth, being drafted in English, the survey may have challenged stakeholders without relevant staff who are fluent in English (this point is not insignificant, as even some large European SDOs interviewed for our case studies preferred to be interviewed in languages other than English). As an offsetting benefit, the existence of these obstacles suggests that the 47 entities that did respond to the survey were highly motivated. This inference is further supported by the number of free text responses that were provided and the actual time taken by many respondents to provide comprehensive responses to the survey (we were informally told that some respondents spent several hours completing the survey). As a result, we have a high degree of confidence in the survey responses received.

In order to increase the response rate, we sent multiple reminders, and granted two extensions of the deadline for responding. We also identified and contacted secondary contacts at a large number of the organizations in the sample, and personally approached individual representatives of these organizations at various stakeholder meetings. As individual respondents suggested that they preferred a printable version of the survey to our online format, we created and distributed a pdf version of the survey (identical to the online questionnaire). Our invitation to participate in the survey was also relayed and endorsed by EC officials and representatives of various SDOs that we studied. From these efforts and informal interactions with stakeholders on our list, we infer that our intended respondents were well appraised of the opportunity to participate in this study.

3.3.4 Respondent demographics, non-response bias

Beyond the question of the response rate, we considered the self-selection criteria of respondents. To do so, we compared respondents to non-respondents using the categories of respondents defined above. There is no clear non-response bias by type of organization. The response rate among companies was slightly lower than among other organizations, but the difference overall does not appear significant. The same is true regarding the quantitative criteria we used. Organizations selected because of their high number of declared SEPs or active contributions to 3GPP were slightly more likely to respond than companies selected because of their large number of SDO memberships or certified standard-compliant products, but again, the differences do not appear to be significant.

Type	Respondents	Non-respondents	Response rate
Company	33	329	0.091
PRI	1	11	0.083
University	0	3	0.000
Law Association	1	6	0.143
Civil Society	4	27	0.129
Interest Group / Trade Association	4	68	0.056
International Organization	0	4	0.000
Government	1	17	0.056
Standards-related	2	2	0.500
Civil Society	0	1	0.000
Selected based on quantitative criteria			
Membership	19	154	0.110
SEPs	19	123	0.134
Implementer	12	99	0.108
Contributor	13	74	0.149

Table 3.1. – Survey respondent demographics

These results do not imply that respondents are similar to non-respondents. We do not have an empirical basis to compare the entire set of surveyed organizations, but we can compare the characteristics of organizations selected based on quantitative criteria. Differences between respondents and non-respondents are unequivocal: respondents are members (on average) of 59.1 SDOs (17.6 for non-respondents), have declared 760.1 SEPs (61.6 for non-respondents), produced 342 certified Wi-Fi products (59.9 for non-respondents), and made 6,656.1 contributions to 3GPP (660.1 for non-respondents). The interpretation of this comparison is straightforward: at least among companies selected based on quantitative criteria, the stakeholders with the quantitatively largest stake in SDO standards were most likely to respond to the survey. The alignment of self-selection with our initial sample selection criteria suggests that extending the survey beyond our selected sample would have resulted in a further decline in the non-response rate, with only very limited additional responses.

When interpreting our survey results, these characteristics of respondents must be borne in mind. We selected a sample of potential respondents based on quantitative or qualitative evidence indicating that they are individually important SDO stakeholders, either as contributor, implementer, or organization representing a relevant constituency. Among the organizations we selected, the most relevant SDO stakeholders (among each of these groups) were most likely to respond to the survey. The survey results are thus unlikely to be representative of the views of remotely or indirectly affected constituencies. The survey results are however representative of the views of the most active elements of SDOs' stakeholder base. This group is quite small, not only in our survey but in general.

3.3.5 Characteristics and categories of respondents

In the literature of standards-essential patents, commentators have observed meaningful distinctions between the behavior of firms that generally seek to derive significant revenue from the licensing of SEPs (Patent-Centric firms) and firms that participate in standardization activities but derive their principal revenue from the sale of standardized products and do not seek to derive significant revenue from the licensing of SEPs (Product-Centric firms) (Contreras 2013a). Additionally, given our focus on SDO governance, we wished to differentiate between respondents who actively contributed to or otherwise participated in SDOs, versus those who were interested in standardization but did not participate in SDOs. Accordingly, we divided respondents into one of three categories: Patent-Centric SDO Participants, Product-Centric SDO Participants, or Interested Non-Participants. [13]

We identified Non-Participants based on responses to Question 10. Those who selected either choices (a - active contributor to standards development) or (b – attendee and observer of SDO proceedings) were classified as SDO Participants, while those who selected choices (c – user of standards that does not actively participate in standards development) or (d – stakeholder interested in standardization processes, without being an active participant in SDOs or a user of standards) were classified as Non-Participants. Three respondents skipped this question. Based on our understanding of the market, we classified two of these as Non-Participants and one as a Participant. A total of 8 of 47 respondents were classified as Non-Participants.

We further classified the 39 SDO participants as either Patent-Centric or Product Centric. In order to develop an objective classification for each respondent, we combined four of the respondent's survey responses that tend to indicate Patent-Centric versus Product-Centric preferences with external data regarding the respondent's SEP holdings and SDO memberships.

The specific survey questions used to classify respondents in this manner were:

> Q10.a – did active contributors to standards development seek to derive patent licensing revenue as a primary goal?
>
> Q41.a – significance to respondent of the risk of exorbitant royalty demands and/or patent litigation
>
> Q41.b - significance to respondent of the risk of making IP available on undesirable terms
>
> Q57 – desirability of SEP owners committing to most restrictive licensing terms

We normalized each of these responses to a 1-5 scale, with 5 being the highest indicator of Patent-Centric preferences, then averaged the four responses for each respondent. Respondents who skipped all of these questions were assigned a value of 1.

In addition, we tabulated the total number of SEPs declared by each respondent at major SDOs with publicly-accessible SEP databases. We used a recent database compiling SEP declaration information from various SDO databases (Baron & Pohlmann 2018). [14] Firms

[13] For classification purposes, we avoided the common distinction between "innovators" or "SEP holders" and "implementers", as many of the firms that are involved in standardization, and which responded to our survey, both hold SEPs and implement standards in products. We chose instead to classify SDO participants based on their revealed attitudes toward the licensing and enforcement of SEPs.

[14] SDOs included in this data include: Afnor, ANSI, CEN, CENELEC, DIN, DVB Forum, ECMA, ETSI, IEC, IEEE, IETF, ISO, ITU-T, JEDEC, SAC, TSDSI, VITA, W3C - though the vast majority of SEPs were declared at ETSI. The database is available to academic researchers upon request (searlecenter@law.northwestern.edu).

were assigned a score from 1-5 based on the number of SEP families they declared as follows:

1	0
2	1-10
3	11-100
4	101-500
5	> 500

We then averaged each respondent's score based on its survey responses and its score based on SEP holdings to yield a total score between 1-5. Respondents with scores of 3.0 or above were classified as Patent-Centric, and lower than 3.0 were classified as Product-Centric. [15] This methodology yielded 14 Patent-Centric Participants with scores ranging from 3.0 to 4.9, and 25 Product-Centric Participants with scores ranging from 1.0 to 2.3. As noted above, 8 respondents were classified as Non-Participants.

The majority of respondents were based in Europe (62%), followed by North America (23%) and Asia (9%) [Q.1]. Most were for-profit firms (70%), with the remainder self-identified as civil society (6%), trade associations (6%), not-for-profit organizations (4%) and various types of governmental entities [Q.2]. Approximately half of respondents (48%) had more than 10,000 employees, while about one quarter (26%) had fifty or fewer [Q.3].

The largest number of respondents (55%) indicated that they focus on the telecommunications sector (55%), closely followed by computing and networking (51%) and consumer electronics (45%) (note that multiple entries were permitted per respondent). Other industries with significant representation were automotive (26%), semiconductors (23%) and health care (23%). Only 4% of respondents indicated a focus on civil rights/human rights, and 11% on consumer protection [Q.4].

Not surprisingly, the large majority of respondents indicated that technical standardization is very or extremely important to their organizations (89%). No respondents indicated that standardization was not important to them [Q.5]. This being said, not all organizations devote the same degree of personnel or resources to standardization activities. Our survey indicates that there is a clear a set of respondents that devote substantial resources to standardization while others do not. For example, 41% of respondents indicated that more than 50 employees in their organizations are actively engaged in standards development or policy, while 43% indicated that 10 or fewer are thus engaged [Q.6]. Likewise, 39% of respondents actively participate in 21 or more SDOs, while 34% actively participate in 5 or fewer SDOs [Q.7]. And 27% of respondents budget more than €1 million toward SDO participation and standards-related advocacy, policy and development work, while 20% budget less than €10,000 [Q.8]. These results differ substantially, however, when broken down using the classification system outlined above. For example, of Patent-Centric respondents, 75% reported having 100 or more employees devoted to standardization activities, 85% reported participating in 21 or more SDOs, and 82% reported standardization budgets in excess of €1 million. Among Product-Centric respondents, on the other hand, only 17% reported having 100 or more employees devoted to standardization activities, 24% reported participating in 21 or more SDOs, and 17%

[15] This division represents a natural break in the scores, with several respondents clustered around 2.3 before jumping to 3.0.

reported standardization budgets in excess of €1 million (with 28% reporting budgets less than €10,000).

These results suggest, consistent with intuition, that Patent-Centric SDO participants, many of which seek to earn substantial revenue from SEP licensing, invest accordingly in SDO participation, while Product-Centric participants, who, on average, are less inclined to seek revenue from SEP licensing, invest less in the SDO processes that are likely to lead to enhanced SEP revenue. In other words, when SEP licensing is a profit-generating business unit for firms, firms are more likely to invest in that business unit, as direct firm revenue is at stake, while the converse may be true of firms that do not view SEP licensing as a profit-generating business unit. In addition, given that our question relating to standardization personnel and budgets [Q.6, Q.8] included both technical and policy-related activities, those firms with large standardization staffs and budgets (primarily Patent-Centric firms) are more likely to devote more resources (personnel and financial) to engaging in and seeking to influence policy debates through activities such as public advocacy, lobbying, research support, and the like. An alternative explanation may be that Patent-Centric firms devoting more substantial resources to standardization simply value standardization more highly (as opposed to SEP licensing revenue). Our survey does not allow us to draw any definitive conclusions about this question.

3.4 Stakeholder workshop

Following the completion of our case studies and survey, we, together with the JRC, convened a workshop of interested stakeholders to provide additional perspectives and texture to the information gathered through these other methods. Some 40 individuals participated in the workshop, consisting of a mixture of representatives from organizations that were and were not represented in our case studies and survey, as well as representatives of the European Commission. Each workshop participant was provided with a preliminary summary of our case study and survey results and was asked to offer comments and potential explanations for the data collected. The workshop was conducted under Chatham House Rule, such that individual participants will not be disclosed unless they ask for publication of their names, nor will particular statements be attributed to individual participants.

3.5 Terminology

In this report, we have adopted a number of terminological conventions for the sake of consistency and readability.

We refer to the organizations that we have studied as "standards-development organizations" or SDOs. Throughout the literature, the term SDO is used interchangeably with the term "standard-setting organization" or SSO. We have chosen to use the term SDO simply for the sake of consistency. We refer to the organizations included in our sample as SDOs, including the National Standards Bodies such as AFNOR or DIN, even though these organizations don't refer to themselves as SDOs. We include ANSI in the sample because of its importance for the governance of many SDOs, even though ANSI itself does not develop or set standards, and does not consider itself an SDO.

SDO IPR policies often refer to the licensing of patents on terms that are "fair, reasonable and non-discriminatory" (FRAND) or that are "reasonable and non-discriminatory" (RAND). The terms FRAND and RAND are generally used interchangeably throughout the literature, and most commentators and courts do not recognize any difference between these terms. Accordingly, we choose to use FRAND, except when quoting specific judicial decisions or

SDO policies that use the term RAND. No significance should be attributed to which term is used in any given instance in this report. [16]

Throughout this report, we discuss the changes that SDOs make to their policies. In referring to a policy "change", we are referring to any alteration, amendment or clarification to the written text of an SDO policy document. Such changes could be minor (e.g., changing the date of the document) or major, including a complete revocation and replacement of a prior policy document. In referring to policy "changes" we express no opinion regarding whether the change was major or minor, or whether it acts primarily as a clarification of an existing policy provision or adds new obligations or commitments.

[16] U.S. Dep't of Justice & U.S. Patent & Trademark Office, Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments 1 n.2 (2013), www.justice.gov/atr/public/guidelines/290994.pdf ("Commentators frequently use the terms [RAND and FRAND] interchangeably to denote the same substantive type of commitment.").

4 Standardization Ecosystem

In this chapter, we analyze factors shaping SDO governance that are external to the SDO.

Highlights

- SDOs are subject to a set of external influences; including legal constraints, relationship with government and civil society, formal and informal cooperative relationships with other SDOs, and competitive forces (e.g. competition from other SDOs and consortia)
- Legal constraints on SDO governance arise from international trade law, competition law, and rules on the use of standards in regulation and public procurement; in addition to the SDO's own legal instruments and national civil law.
- There are numerous vertical and horizontal cooperative relationships among SDOs.
    - The international architecture comprising ISO/IEC/ITU at the international, the ESOs CEN, CENELEC and ETSI at the regional (European), and AFNOR, ANSI, DIN and SAC at the national level represents a hierarchical vertical model of cooperation.
    - The ANSI accreditation process and industry-driven SDOs submitting their specifications to more formal bodies for adoption as standard (e.g. DVB to CENELEC or ETSI, ECMA to IEC) represent a bottom-up vertical model.
    - 3GPP exemplifies the large number of horizontal cooperative relationships among SDOs.
- There are many instances of competition among SDOs; but other competitive responses to SDO processes and decision-making are often more prevalent. Competitive constraints are more relevant to industry-driven SDOs and consortia, as opposed to SDOs with a formal quasi-regulatory role and significant formal ties to government and other organizations
- It is useful to classify SDOs by the different external forces to which they are primarily subjected. We propose a three-layer model:

Layer	Attributes	SDOs
First	- Quasi-regulatory functions delegated by government - Importance of network of vertical relationships - Specific and formal legal requirements	AFNOR, ANSI, DIN, CEN, CENELEC, ISO, IEC, ITU, SAC
	- Shares elements with first and second (depending on the activity)	ETSI, TSDSI
Second	- Established leadership over technical field - Importance of switching costs	IEEE, IETF, W3C
Third	- Significant competitive constraints - Bottom-up orientation to more formal bodies for greater legitimacy	DVB, ECMA, JEDEC, VITA

- From a public policy perspective, we identify the prevalence of a self-regulatory model; in which public authorities largely defer to the decision-making of private organizations, and public intervention tends to be ex post and light-touched.
- The predominant regulatory approach is a *procedural approach*, where public regulation is more concerned with appropriate SDO processes, and more deferential to individual SDO decisions

All SDOs are subject to legal requirements and constraints, such as contract law, competition law, and trade law, in addition to more specific regulations. Furthermore, many SDOs operate within a tight network of collaborative relationships with other SDOs and with other private organizations, such as consortia. These collaborative relationships may impose formal or informal constraints on SDO governance. Finally SDOs are subject to market forces, and in particular competitive pressure; and must attract members, technology contributors, and implementers. Analyzing the complex interplay of these external constraints is a prerequisite for a thorough understanding of SDO governance.

Standardization lies at the intersection of private coordination and public regulation. Historically, SDOs in most Western countries arose out of efforts by private actors – engineers and industry – to create a forum for standardization (ISO, 2007; Ruppert, 1956).[17] The benefits of standardization for those private interests are well known, including static efficiencies (economies of scale, reduction in transaction costs), the reduction or outright removal of adverse information asymmetries,[18] and market expansion through compatibility and interoperability. These private interests also possess the requisite expertise to identify areas where standardization would be beneficial and carry out the technical task of standardization.

At the same time, standards developed by private SDOs are routinely used for binding regulation, or referred to therein. Therefore, "technical standard setting, though conducted largely through private organizations, possesses many attributes of a public function" (Contreras 2017a). There is thus undeniably a public dimension to standardization.

Many standards directly contribute to the attainment of public policy goals related to safety, health, the environment or consumer protection. These standards are not the main focus of this report, and as such we will not deal with them extensively. This study is concerned with product compatibility or interoperability standards in the ICT sector, a sector where many standards also include patented technology. The public dimension of compatibility or interoperability standards arises from their impact on trade and competition. Interoperability standards may have significant positive effects on competition and international trade (Schmidt and Steingress, 2018). At the same time, standardization may create market barriers for products or technologies and thus impose unreasonable restrictions to competition and/or international trade. The common priority for competition and trade policy with respect to standardization is to preserve the benefits of private standardization, while curbing its potential to create unnecessary barriers.

The legal response to trade and competition public policy concerns has less often been to control the *content* of the standards produced by SDOs in order to avoid barriers to trade or restrictions of competition. Rather, public authorities have recognized the inherent value of the work carried out by private SDOs; and sought to impose constraints on the standardization *process*. This approach is followed worldwide.

Beyond trade and competition, standardization can affect other public policy objectives, such as public procurement, industrial policy[19] and innovation. Private standards can reduce the cost and increase the effectiveness of public procurement and public regulation. Reliance on private standards for these purposes often rests on an approach that is very similar to the approach taken by competition and trade policy. More generally, private

[17] By contrast, in many Asian countries, including China, South Korea and Japan, as well as in Canada, the National Standards Bodies setting national industry standards and participating in international standards organizations such as ISO and IEC are government agencies.

[18] When standards convey credible information to the customers about product characteristics, in a way that customers could not otherwise obtain or trust.

[19] See for instance European Commission, 2011 (A strategic vision for European standards: moving forward to enhance and accelerate the sustainable growth of the European economy by 2020 (COM(2011)311) 1 June 2011).

standardization can play a central role in industrial policy, a point that is often emphasized in EU policy documents.[20] Given the role of private standards for stimulating competition and innovation, public authorities have taken an active interest in strengthening the existing private standardization ecosystem. On matters of industrial policy and innovation, however, policy orientations differ, with the EU taking a more pro-active stance than the US, for instance.

In this chapter, we analyze this complex and evolving standardization ecosystem both from the perspective of the SDOs and the public perspective. From the public perspective, we highlight the prevalence of a self-regulatory model, whereby public authorities only rarely directly intervene in SDO decision making. This deference rests on two basic principles: first, procedural principles enshrined in a number of legal instruments and other formal mechanisms are meant to ensure that SDOs reach decisions based on due consideration of all relevant positions; second, the voluntary nature of standards and SDO participation coupled with the existence of a large number of SDOs preserves competition among and across SDOs. From the SDO perspective, SDOs differ with respect to whether the legal and formal controls of their internal processes or competitive pressures from the outside constitute the most immediate check on their decision making. This heterogeneity can explain significant differences between SDO governance approaches.

4.1 Legal constraints on SDOs

The following paragraphs set out the legal constraints that have resulted from the intervention of public authorities in the governance of standardization. A first set of legal norms applicable to SDOs can be found in the respective instruments by which they are created. These vary from treaties and international agreements – for SDOs with an international legal personality, ITU being the main example – to articles of association, memoranda of understanding or other similar instruments for SDOs that take a legal form arising from the corporate law of a given jurisdiction. These legal instruments are specific to each SDO, and to some extent, they are within the power of the SDO and its membership to change. Accordingly, they are included in the analysis of SDO governance at Chapters 5 and 6.

The present section covers legal norms external to SDOs, over which they have no direct control and which accordingly constrain SDOs in the design and operation of their governance. Some of these norms are specifically directed at standardization – and hence at SDOs. They are usually concerned with how standardization impacts trade, either at the international level (4.1.1.) or at the regional or national levels (4.1.2.). In addition to specific legislation, important legal constraints on the governance of SDOs comes from other areas of law that apply generally to economic activity and therefore to standardization. To some extent, one could argue that these generally-applicable laws have had a greater influence on SDO governance than specific law. They include competition or antitrust law (4.1.3.), intellectual property law (4.1.4) and, indirectly, public procurement law (4.1.5.).

4.1.1 Law specifically concerning SDOs - International trade law

At the international level, standardization organizations are subject to general constraints arising out of international trade law, and in particular the Agreement on Technical Barriers to Trade (TBT). The TBT Agreement is part of the larger World Trade Organisation (WTO)

Agreement.[21] It aims to "encourage the development of […] international standards" while ensuring that they "do not create unnecessary obstacles to international trade" (Preamble, see also Wijkstrom and McDaniels 2013). In order to reach those goals, the TBT directs WTO members to use international standards to the extent possible when they need to impose technical regulations on traded goods (Article 2.4).[22] When a national technical regulation is adopted in accordance with Article 2.2 TBT and based on international standards, it is presumed not to be restrictive of trade.

Since international standards are defined as documents emanating from a "recognized body", which includes non-governmental bodies – that is, most of the SDOs in our sample – the TBT contains a provision that seeks to ensure that standard-setting is carried out in a context that does not allow for hidden protectionism and the creation of trade barriers. Article 4 compels WTO members to comply with a Code of Good Practice for the Preparation, Adoption and Application of Standards (WTO TBT Code of Good Practice) in the standardization activities directly under their control (public standardizing bodies) and to take all reasonable measures to ensure that non-governmental SDOs within their jurisdiction also adhere to and comply with that Code of Good Practice.

The WTO TBT Code of Good Practice is set out at Annex 3 to the TBT. It is open to acceptance by: (1) any standardizing body within the territory of a Member of the WTO, whether a central government body, a local government body, or a non-governmental body; (2) any governmental regional standardizing body one or more members of which are Members of the WTO; (3) any non-governmental regional standardizing body one or more members of which are situated within the territory of a Member of the WTO. ISO keeps a list of standardizing bodies that have accepted the WTO TBT Code of Good Practice.[23] From our sample, all the SDOs that are part of the hierarchy set out below under Heading 4.3.1.1. – ETSI, CEN-CENELEC, DIN, AFNOR, SAC, ANSI – explicitly accepted the principles.[24]

ISO/IEC Guide 59:1994 was adopted contemporaneously with the WTO TBT Code of Good Practice, as a contribution from the ISO/IEC to the discussion of best practices.[25] Guide 59:1994 contains provisions regarding the procedure for the development of standards (including the consensus principle, appeals, consultation, publication and review), the impact of standards on trade (including the avoidance of anti-competitive behaviour, consumer protection, non-discrimination and the use of patented technology), participation in standards development (including openness to interested parties, balance of interests and coordination via national standardization bodies) and coordination amongst standardization organisations.

Taken together,[26] the WTO TBT Code of Good Practice and the ISO/IEC Guide 59:1994 set out the broad lines of how standards development should take place.

By way of further development and synthesis, a subsequent decision of the TBT Committee has set out a set of six governance principles regarding SDOs.[27] As the TBT Committee

[21] WTO Agreement: Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154, 33 I.L.M. 1144 (1994).

[22] Exceptions are allowed "when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfillment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems." Note that, as part of Annex 1A of the WTO Agreement, the TBT Agreement only applies to goods, not services.

[23] See https://tbtcode.iso.org/sites/wto-tbt/home.html.

[24] See https://tbtcode.iso.org/sites/wto-tbt/list-of-standardizing-bodies.html

[25] ISO/IEC Guide 59:1994 – Code of Good Practice for Standardization (1993), available at www.iso.org.

[26] A note prepared by the WTO Secretariat, G/TBT/W/132 (29 March 2000) usefully compares the two documents, pointing to overlaps and complementarities.

[27] Decision of the Committee on Principles for the Development of International Standards, Guides and Recommendations, G/TBT/9, Annex 4 (13 November 2000).

indicates, "[t]he following principles and procedures should be observed, when international standards, guides and recommendations […] are elaborated. The same principles should also be observed when technical work or a part of the international standard development is delegated […] to other relevant organizations, including regional bodies." The principles include a) transparency, b) openness, c) impartiality and consensus, d) effectiveness and relevance, e) coherence, and f) a need to address the concerns of developing countries. While most of the principles refer to the process of developing standards, e.g. their drafting, discussion, review and adoption, the principle of openness applies to membership as well as 'participation at the policy development level and at every stage of standards development'. According to the case-law of the WTO, a standard does not qualify as international one if it 'is not open to the relevant bodies of at least all Members'.[28]

4.1.2 Direct Regulation of SDOs and Standardization

4.1.2.1 In the EU

Standards have always been seen as a key component in building the EU internal market. The harmonization of technical standards at the EU level dates back at least to the creation of CEN in 1961. Until the 1980s, most of this harmonization was achieved through detailed product specifications found in directives issued by the Council and the European Parliament. This slow and unwieldy approach (Goerke and Holler, 1998) was replaced in the run-up to the Single Market: the Council Resolution of 7 May 1985 on a New Approach to technical harmonisation and standards[29] introduces a more decentralized system, where EU legislation is limited to setting out the procedural and institutional framework and the essential requirements to be met by standardized products, and the primary responsibility for creating European standards is entrusted to the European Standardization Organisations (ESOs). These ESOs comprise CEN and CENELEC, and later ETSI. The 'essential requirements' typically concern health, safety, environmental and consumer protection. Standards developed by the ESOs, while remaining voluntary, also produce legal effects, namely a presumption of conformity with the essential requirements (and thus a safe harbor from national regulatory controls) for the purposes of free circulation within the internal market. The New Approach creates incentives and opportunities for private companies to participate in the standards development activities of the ESOs, with the help of national standards bodies. At the same time, the EU retains a direct influence on the governance of the standard development process through the framework legislation mentioned above, which includes the power to set the agenda (through standardization requests, which can be turned down by SDOs but rarely are in practice) and review – however marginally – the work of SDOs.[30]

The New Approach led to the proliferation of voluntary standards that offer free access to the large internal market (Mattli 2001). In the literature, the reform of standardization is often studied as a part of the overall integration process (van Gestel and Micklitz 2013; Mattli 2001; Austin and Milner 2001). There is an extensive legal literature discussing the position of such delegated rule-making in the principles of rule of law (Joerges et al. 1999 – providing an excellent summary).

The central role of the EU – and in particular the European Commission – in organizing the development of European standards was further exemplified by ETSI, created upon initiative

[28] WTO, *United States – Measures concerning the importation, marketing and sale of tuna and tuna products*, Report of the Appellate Body, WT/DS381/AB/R (16 May 2012) at par. 399.
[29] [1985] OJ C 136/1.
[30] See Goerke and Holler (1998) for a critical discussion of the New Approach.

of the Commission in 1988.[31] The Commission preserved important prerogatives in the newly created ESO. For instance, it could urge the adoption of standards, provide financial means for their development, require their use for public procurement, and prevent the adoption of standards that it believes contrary to the objective of the Single Market (Besen, 1990).

The European Commission once again played a pivotal role in various redefinitions of ETSI's IPR policy, attempting to strike a balance between the protection of patent rights and unrestricted access to the standard (Iversen, 1999). With the worldwide success of ETSI standards for mobile telecommunication, there was an increase in conflicts regarding the interpretation and success of these policies (Bekkers, Verspagen, and Smits, 2002), which placed ETSI at the center of an extensive debate on SDO IPR policies (See Part 7).

Currently, European standardization policy is encapsulated in Regulation 1025/2012 on European standardization.[32] Regulation 1025/2012 applies both to the ESOs and to the national standardization bodies (NSBs) of the Member States, such as AFNOR, DIN, etc. Regulation 1025/2012 imposes obligations upon the ESOs and NSBs with respect to governance, including transparency (Articles 3 and 4) and stakeholder participation (Article 5) – including the participation of consumer, environmental and social organizations (Articles 5, 16), SMEs (Article 6), public authorities (Article 7). Furthermore, the Regulation sets out an elaborate system for standardization agenda-setting (Articles 8, 10) and the financing of European standard development (Article 15). In addition, Article 13 of Regulation 1025/2012 creates a mechanism whereby ICT standards developed by other SDOs (referred to as 'ICT technical specifications' for the purposes of the Regulation) can be recognized as valid references for the purposes of public procurement. In order to achieve recognition, the SDO that developed the standard must meet the governance requirements of Annex II to Regulation 1025/2012. That Annex is largely inspired by WTO law, and includes the principles of openness, consensus and transparency.[33] These elements of Regulation 1025/2012 are discussed in greater detail further below in connection with the specific topics of Chapters 5 and 6.

In addition, it should be pointed out that the Court of Justice of the European Union has held that it has jurisdiction over both European standards developed by ESOs – since they are part of EU law, even if they are developed by private organizations[34] – and national standards developed by NSBs – since they are liable to constitute an obstacle to internal market freedoms, here as well even if they are developed by private organisations.[35] Most recently, the CJEU became involved in the interpretation of the harmonized standards when it was asked to give a preliminary ruling on the interpretation of such a harmonised standard produced by CEN-CENELEC in the light of the facts available to it and to determine the technical standard applicable to a particular product.[36]

[31] The creation of ETSI was proposed in the Green Paper on the Development of the Common Market for Telecommunications Services and Equipment, COM(87)290final (30 June 1987) as part of the complete reorganization of the European telecommunications sector that would follow in the 1990s. Once the regulatory and operational functions of the old legal monopolies were to be split, with the regulatory functions eventually going to independent National Regulatory Authorities (NRAs), standardization fell uneasily between the two sets of functions. In order to preserve the links between what would become industry players and administrations and to provide impetus to standardization in the ICT sector, the Commission proposed the creation of ETSI.

[32] [2012] OJ L 316/12. Regulation 1025/2012 replaced or modified a large number of EU instruments and streamlined the EU standardization framework.

[33] As well as the presence of IPR declarations at least compliant with FRAND, as discussed in Chapter 7.

[34] CJEU, Judgment of 27 October 2016, Case C-613/14, *James Elliott Construction* ECLI:EU:C:2016:821.

[35] CJEU, Judgment of 12 July 2012, Case C-171/11, *Fra.bo* ECLI:EU:C:2012:453.

[36] CJEU, Judgment of 14 December 2017, Case C-630/16, *Anstar Oy* ECLI:EU:C:2017:971

4.1.2.2 In the U.S.

In contrast to the EU, there are few specific legal provisions targeting standardization or SDOs in the United States. US federal law does not specify the types of SDOs that can produce standards that will be incorporated by reference into binding regulation (Bremer, 2016). Instead, the National Technology Transfer and Advancement Act of 1995, as supplemented by OMB Circular No. A-119 (2016), expresses a strong preference for the use of standards from private, non-governmental "voluntary consensus standards bodies" rather than government-specific standards in regulation and procurement. Circular A-119 provides a definition of 'voluntary consensus standards bod[y]', which generally has the attributes of '[o]penness,' '[b]alance of interest,' '[d]ue process,' and an 'appeals process,' together with the goal of '[c]onsensus,' which means that the procedure must be designed to yield 'general agreement, but not necessarily unanimity,' including a 'process for attempting to resolve objections by interested parties.'" The requirements of Circular A-119 are presented as an implementation of commitments and obligations under WTO law, in particular the TBT Agreement, as described above.[37]

In parallel, ANSI administers the designation of privately-developed standards as 'American National Standards' (ANS). ANS designation is advantageous, both commercially and legally. In order to achieve such designation for their standards, SDOs must be ANSI-accredited. Accreditation occurs when ANSI is satisfied that a SDO meets its 'essential requirements'. These requirements include governance principles that echo those of Circular A-119, including openness, lack of dominance among its members, balance of interests, coordination and harmonization, notification of standards activity, consideration of views and objections, evidence of consensus, appeals, procedures and written procedures.

4.1.3 Competition/antitrust law

Next to legal developments that are specific to standardization, as set out above, SDO activities are greatly shaped by generally-applicable laws, in particular competition and antitrust law.

The influence of competition and antitrust law on SDO governance is felt in two different ways: first, rules concerning agreements between competing firms (Article 101 TFEU, s. 1 Sherman Act) set out certain principles of SDO governance, including IPR policies. Second, rules concerning monopolization or abuse of dominant position (s.2 Sherman Act, Article 102 TFEU) come to bear particularly in the debates surrounding possible limits for the behavior of holders of standard-essential IPR, including related to IPR policies.

4.1.3.1 Restrictive agreements and SDO governance

Article 101 TFEU and s. 1 Sherman Act can apply to the collective action of firms in creating an SDO, as well as to the collective activities of firms undertaken within SDOs. The creation of an SDO can be seen as an agreement between competitors, and a resulting standard can also qualify as an agreement, since it can dictate standardization of different grades or sizes of a particular product or technical specifications in product or service markets where compatibility and interoperability with other products or systems is beneficial.

SDOs therefore involve horizontal co-operation agreements within the meaning of Article 101(1) of the Treaty on the Functioning of the European Union (TFEU). The extent to which Article 101 TFEU applies to such agreements depends on their impact on competition. There might be cases where the impact is limited: for instance, on a given relevant product

[37] See the *Revision of OMB Circular No. A-119, "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities"* 81 FR 4673 (2016), and in particular the explanatory notes at 6.

market, products made according to different competing standards (from different SDOs) are actually competing with one another. Alternatively, in a given product market, products manufactured according to a standard may compete with non-standardized products. In such cases, the agreements arising from a single SDO might not have that much impact on competition on the derivative product market, and maybe these agreements would fall outside the scope of Article 101 TFEU altogether. Glader (2010) explores some of these scenarios.

At the other extreme, if standardization is used as a vehicle to exclude competitors or to fix prices, then the standardization agreement underpinning an SDO might give rise to a restriction of competition by object within the meaning of Article 101(1) TFEU, in which case it is very likely to be found in breach of EU competition law. It is to be noted that, under EU competition law, the notion of 'price fixing' as a restriction by object is generously interpreted, extending not only to the fixing of prices as such, but also to other interference with pricing mechanisms that could lead to price coordination (see among others Petit 2016).

In between agreements that do not restrict competition and those that restrict competition by object (and are thus likely to breach Article 101 TFEU), one finds agreements that would restrict competition by effect, for which it is possible that the conditions of Article 101(3) would be fulfilled, so as to save the agreement from breaching Article 101 TFEU. The 2011 Guidelines to the Application of Article 101 TFEU to horizontal cooperation agreements ('Horizontal Guidelines 2011'), issued by the European Commission in the light of its decision practice provide guidance for the assessment of possible effects of standardization agreements on competition (Larouche and Overwalle, 2015). The Commission identifies three scenarios where agreements concerning standardization could have anti-competitive effects: a reduction in price competition, the limitation of technical development and innovation, and exclusion through preventing effective access to the standard. The Horizontal Guidelines 2011 also identify a number of safe harbour conditions, which normally take agreements outside of the scope of Article 101(1) TFEU and many of which overlap with the requirements emanating from WTO law. These conditions include: unrestricted participation in standard-setting, transparency, the voluntary nature of standards as well as access to the standard on fair, reasonable and non-discriminatory terms. First of all, as regards unrestricted participation, SDO policies should 'guarantee that all competitors in the market or markets affected by the standard can participate in the process leading to the selection of the standard' (Horizontal Guidelines 2011). It also means that SDOs should have 'objective and non-discriminatory procedures for allocating voting rights' and also 'objective criteria for selecting the technology to be included in the standard'. Secondly, stakeholders should be able 'to effectively inform themselves of upcoming, on-going and finalized standardization work in good time at each stage of the development of the standard' (Horizontal Guidelines 2011).

In addition, the Horizontal Guidelines also touch upon IPR policies, since these policies also qualify as agreements between firms within the meaning of Article 101 TFEU. The impact of competition law on IPR policies is discussed at greater length in Chapter 7, below.

Similar principles are applicable in the US. Following a series of cases in the 1980s involving abuses of the standardization process, in two leading cases,[38] the U.S. Supreme Court established that in order to avoid antitrust liability, SDOs should observe a certain level of transparency, openness and due process. These requirements have also been embodied in subsequent business review letters (BRLs) and other guidance from U.S. antitrust enforcement agencies (BRLs for VITA and IEEE; DOJ-FTC, 2000; DOJ-FTC, 2007).

[38] *American Society of Mechanical Engineers (ASME)* v. *Hydrolevel* 456 US 556 (1982) and *Allied Tube & Conduit* v. *Indian Head* 486 US 492 (1988).

As a result of that case-law, it is agreed in US antitrust law that the cooperation between firms that takes place in the course of standardization is to be assessed under the rule of reason. In the Standards Development Organization Advancement Act (SDOAA) of 2004,[39] Congress has expressly provided that the conduct of SDOs themselves, when engaging into standards development, is to be assessed according to the rule of reason. The SDOAA does not extend to the conduct of participating firms, however, hence its limited impact in practice. As with EU competition law (and restrictions by object), the SDOAA excludes certain harmful conduct from its ambit, namely market allocation, price-fixing and the exchange of competition-sensitive information beyond what is required for standardization.

Traditionally, antitrust concerns regarding the potential for collusive agreements in SDOs have focused on potentially anticompetitive effects of standardization processes. In light of such concerns, many stakeholders and SDOs are reluctant to engage in discussions of patent licensing terms within the standardization process. According to our survey, a majority of stakeholders were of the opinion that competition/antitrust considerations somewhat or greatly influence their decision whether or not to discuss patent and licensing-related matters with other SDO participants. That being said, individual disclosure of the most restrictive licensing terms, including maximum royalty rates, prior to the adoption of the standard is generally seen by competition authorities as non-restrictive of competition (Horizontal Guidelines 2011, DOJ VITA business review letter).

More recently (since November 2017), officials of the US DoJ have repeatedly warned that there is a "potential for cartel-like anticompetitive behavior" also in the process of developing SDO policies, and in particular IPR policies. According to these statements, if an adopted policy appears "designed specifically to shift bargaining leverage" between different SDO stakeholders, the process through which such policy was adopted warrants antitrust scrutiny.[40] It has still to be seen whether and how the DoJ's recently expressed concerns will translate into enforcement decisions and how this approach will square with that of the other principal antitrust enforcement agency in the U.S., the Federal Trade Commission (FTC), which continues to focus more on allegedly anticompetitive unilateral conduct by patent holders, rather than collusion amongst stakeholders.[41] These statements have also led to significant debates amongst academics and former policymakers.[42] This doctrinal tension between the two principal U.S. antitrust enforcement agencies underscores the sometimes unstable and unpredictable nature of external legal constraints on SDO governance.[43]

4.1.3.2 Single firm conduct and SDO governance

In addition to constraining the actions and policy decisions of SDOs, competition law concerns often focus on single firm conduct – Article 102 TFEU and Section 2 Sherman Act (or s. 5 of the FTC Act). In particular, starting in the early 1990s and picking up speed in the 2000s, competition and antitrust law were applied to police the potential restrictions on competition that could arise from the inclusion of patented technology in standards. As will

[39] Pub. L. 108-237 (codified at 15 USC 4301 and following).

[40] https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center

[41] See in particular the case against Qualcomm launched on 17 January 2017, which is still pending before a US federal district court.

[42] See a supportive statement issued on 13 February 2018, at https://cpip.gmu.edu/wp-content/uploads/sites/31/2018/02/Letter-to-DOJ-Supporting-Evidence-Based-Approach-to-Antitrust-Enforcement-of-IP.pdf, as well as a critical statement issued on 17 May 2018, at https://www.competitionpolicyinternational.com/wp-content/uploads/2018/05/DOJ-patent-holdup-letter.pdf.

[43] F. Scott Kieff has studied the susceptibility of the U.S. DoJ and FTC to political and commercial pressures, coining the term "government hold-up" to describe the action of government actors to influence policy in response to these pressures (Kieff and Layne-Farrar 2013 at 1098-1100 (commercial pressures); Kieff 2017 at 119 (political pressures)).

be discussed at greater length in Section 7.2.1., the inclusion of patented technology in standards may raise competition law concerns, e.g. if standardization of the technology softens competition and allows a patent owner to extract excessive royalty payments from standard implementers. Excessive royalty requests may be particularly prone to violate competition law if a patent owner had previously committed to FRAND licensing terms or failed to disclose the existence of patent rights in the course of standard development.

SDOs may therefore be required under competition law to adopt policies that address the potential for anticompetitive effects. In its Horizontal Guidelines 2011, the European Commission stipulates that SDOs requiring standardization participants to disclose the existence of potential SEPs and requesting commitments to license these SEPs on FRAND terms would normally not violate Article 101 TFEU. We discuss in Section 7.2. that these policy provisions are elements of a so-called Baseline Policy that many SDOs adopt in order to ensure compliance of their IPR policies with legal requirements.

While antitrust scrutiny of single firm conduct in standardization mostly focuses on the conduct of individual standardization participants, it also has significant implications for SDO governance. In the past, representatives of antitrust authorities have invited SDOs to adopt more specific policies (and particularly IPR policies) to mitigate the risk of anticompetitive conduct by individual SDO participants. In Section 7.4.4., we analyze the implications of such public advocacy for SDO governance. Furthermore, enforcement of antitrust law against single-firm abuses may give additional weight to SDO policies and create additional sanctions against violations of policy provisions determined by the SDO.

In Huawei v ZTE, the CJEU held that "[i]n [certain] circumstances, and having regard to the fact that an undertaking to grant licences on FRAND terms creates legitimate expectations on the part of third parties that the proprietor of the SEP will in fact grant licences on such terms, a refusal by the proprietor of the SEP to grant a licence on those terms may, in principle, constitute an abuse within the meaning of Article 102 TFEU" (at para. 53). Under certain circumstances, the violation of a FRAND commitment may thus constitute a breach of Article 102 TFEU, and may give rise to competition law defenses or sanctions, in addition to any other consequences that may arise under contract law.

In *Rambus*, the European Commission was concerned that Rambus, as a member of JEDEC, might have abused its dominant position in the market for DRAMs by intentionally concealing that it had patents and patent applications which were relevant to the standard. By doing so, Rambus was alleged to have breached JEDEC policy regarding patent disclosure.[44] Rambus eventually offered commitments regarding its licensing of patents, which were accepted by the European Commission. On the U.S. side, enforcement against single firm conduct followed a similar approach, albeit with some setbacks for the antitrust authorities (as when the Court of Appeal overturned the FTC decision in *Rambus*[45]): see Hesse and Marshall (2018) for an overview of the cases. As mentioned above, recent statements by DOJ officials suggested that U.S. antitrust authorities have "strayed too far" in their focus on single firm conduct in SDOs; and that antitrust authorities should be most concerned about SEP licensing disputes when these bear elements of collusion.

4.1.4 Intellectual Property Law

Another layer of general laws influencing standardization is intellectual property law.

As discussed, many SDOs adopt policies intended to ensure that patent rights do not act as obstacles to broad adoption of standards. Such SDO policies might have an effect on the

[44] See Case COMP/38.636 – RAMBUS; This behavior is known in the literature as 'patent ambush' and it was analyzed extensively by scholars around the world (Hemphill (2005), Royall (2008), Hillel (2010), Liguo (2010), Abramson (2011), Pappalardo and Suzor (2011)).

[45] *Rambus* v. *FTC* 522 F. 3d 456 (DC Cir. 2008).

ability of patent owners to seek remedies for patent infringement generally available under IP law.

The effect of SDO policies on the determination of remedies for intellectual property infringements is not limited to standardization insiders (SDO participants, who subject their patent rights to licensing commitments). The internal policies of SDOs can also influence the position of standardization outsiders, non-participants in SDO processes. Contreras and Gilbert observe, for instance, convergence of the assessment of damages in situations where the FRAND-encumbered and non-encumbered patents are enforced against infringers in the United States (Contreras and Gilbert 2015). Contreras studies the assertion of SEPs by outsiders in the United States and observes that they constitute a material segment of all SEP assertions, and that outsiders are willing to assert SEPs even when they are encumbered by FRAND and other licensing commitments (Contreras 2016b). A comparable empirical study mapping the scale and consequences of enforcement by standardization outsiders in Germany and the UK has also recently been released (Contreras et al., 2018).

Copyright law is also important to SDOs. Most SDOs have rules relating to the contribution of copyrighted material to the SDO's standardization process, and the use and distribution of copyrighted specifications produced by the SDO. Some SDOs (IETF) use copyright to prevent others from making derivative works of their specifications (so-called "forking" of the standard). Some SDOs charge for copies of their standards. These SDOs sometimes assert the copyright in their specifications to prevent distribution of the specifications without a required payment. The exact conditions under which SDOs sell copies of their standards are usually defined in the so called 'Sales Policies' of the organizations.

There is ongoing litigation in the US and the EU concerning copyright protection for standards.[46] In the US, this mostly concerns standards that are incorporated into law by reference and the ability of public interest organizations to publish those standards without the permission of the relevant SDO. In Germany, the debate about the copyright status of standards dates back to 1980s during which the German Federal Supreme Court and the Federal Constitutional Court issued important decisions concerning public domain status of a sub-set of standards.[47] In other countries, this issue regained on importance after the Court of Justice of the European Union held in the *Elliott* case that referenced standards form part of the Union law.[48] Moreover, the most recent copyright decisions of the CJEU increasingly harmonize the notion of a work, including potential exclusions from copyright-ability on the public interest grounds.[49]

Last but not least, copyright law can also act as a constraint when it comes to reference implementations that are developed by SDO members. When such implementations are embodied in software, they are protected under copyright law as a computer program and thus can be distributed and used only under a valid license. These copyrighted works are then protected separately from the underlying text of the standard.

All of the mentioned issues are important for activities of SDOs, including parts of their business models. However, in this study we focused on those IPR policies which are particularly important from the perspective of the members who shape their governance.

[46] See Am. Soc'y for Testing & Materials v. Public.Resource.Org, Inc., (D.C. Cir., Jul. 17, 2018) and OLG Hamburg, Decision of 27 July 2017, Case U 220/15 Kart, GRUR-Prax 2017, 493; MMR 2018, 269/270, WuW 2018, 285-288, available on www.landesrecht-hamburg.de.

[47] For the situation in Germany, see German Federal Constitutional Court (1998) 1 BvR 1143/90; German Federal Supreme Court (1983) I ZR 129/81; Gunda Dreyer, Jost Kotthoff and Astrid Meckel, Urheberrecht: Heildelberger Kommentar (3rd edition, 2013), § 5, para 17; Thomas Fuchs Die, Gemeinfreiheit von DIN-Normen seit dem Inkrafttreten des § 5 Abs. 3 UrhG, available at https://delegibus.com/2004,8.pdf

[48] CJEU, Judgment of 27 October 2016, Case C-613/14, *James Elliott Construction* ECLI:EU:C:2016:821

[49] CJEU, Judgement of 13 November 2018, Case C-310/17, *Levola Hengelo*; See also Advocate General Szpunar's Opinion in C-469/17, *Funke Medien NRW*.

The copyright policies concerning standards are infrequently raised as an important stakeholder issue. This might change in the future with an increased development of reference implementations. The practice and effects of copyright licensing of standards and reference implementations and their impact on public access and re-use would merit a separate study.

4.1.5 Public Procurement

In addition to antitrust/competition law and intellectual property law, other areas of law also influence the environment of SDOs, albeit more indirectly. In particular, in the course of streamlining public procurement, authorities have looked to open standards as a way of reducing the cost-of-ownership of certain products covered by legal or de facto standards.[50] In Europe, in particular, this has led to specific measures in the area of public procurement.[51]

In the European Union, public procurement must comply with Directive 2004/18/EC which differentiates between formal standards and other technical specifications (a term which, as seen above, encompasses standards developed by private organisations as opposed to international standardization organisations, ESOs or NSBs). For the latter, a description of functional requirements and use of technology-neutral specifications is additionally encouraged. Art 23(1) of the Directive requires that '[t]echnical specifications shall afford equal access for tenderers and not have the effect of creating unjustified obstacles to the opening up of public procurement to competition'. Standards therefore should not be used in a discriminatory fashion that is unjustified by the subject matter of the contract (Commission v Ireland, 1988; Weston and Kretschmer (2012)).

The key element in EU public procurement law, for our purposes, is a requirement that public authorities procure software or other technology systems by reference to standards (as opposed to proprietary technologies). Various studies cited by Shah and Kesan (2007) predict significant cost savings for agencies utilizing standards, which can theoretically reduce costs of document format incompatibility and conversion. These standards are often referred to as "open standards", a term which has expanded beyond public procurement into general discussions of standards and standardization (Russell, 2014).

Despite the widespread use of the term, there is no generally accepted definition of "open standards" (see generally Ernst, 2012; Updegrove, 2012; Baron and Spulber, 2018 and Lundell et al. 2015). Shah and Kesan (2007) define open standards by reference to three criteria: public availability, licensing on FRAND terms, and development in a process open to public participation. West (2007) offers an economic analysis of openness along several dimensions including access, competition and cost. Kretchmer (2011) identifies 17 related attributes of open standards, classified according to the requirements of different interest groups (SDOs, commercial implementers, end users, economists and attorneys).

For the purposes of this report, there is no need to take position in this debate. The European Parliament considers that "open standards must be based on openness of the standardisation process and development and availability of standards for implementation and use, in accordance with Regulation 1025/2012 and the WTO principles".[52] The Council of the European Union also defined open standards as "those developed within standard developing organisations in accordance with WTO principles (i.e. based on transparent,

[50] De facto standards can naturally be also of an entirely proprietary nature.

[51] See the Commission Communications "Against lock-in: building open ICT systems by making better use of standards in public procurement" COM (2013) 455 (25 June 2013).

[52] EP Resolution of 4 July 2017 on European standards for the 21st century, P8_TA(2017)0278, under 8. The EP also urges the Commission to clarify the "core elements of an equitable, effective and enforceable licensing methodology structured around the FRAND principles."

open, impartial and consensus based processes) and available to fair, reasonable and non-discriminatory (FRAND) terms."[53]

The definitions of open standards used by the EU thus consistently refer to WTO principles of standard development, and the availability of standard-essential IPR on FRAND terms. The EU definitions of open standards thus further reinforce the normative force of these principles for SDOs.

4.2 Relationship with public authorities and NGOs

4.2.1 Role of public authorities

4.2.1.1 Role in creation and establishment of SDOs

Many SDOs arose out of industry, without much guidance from public authorities. Such is the case for JEDEC, DVB and ECMA. Other SDOs – IEEE-SA and IETF –arose out of a professional association or a stakeholder community. ANSI's predecessor, the American Engineering Standards Committee, was created as a federating organization by five American professional associations in the early twentieth century (Contreras – History Chapter 2017).

A few SDOs have been created directly by public authorities: ITU, for one, was created by international treaty. SAC is a governmental agency, and TSDSI maintains close ties with various Indian government ministries. ETSI was formed in upon initiative of the European Commission in the wake of EU telecommunications liberalization, as part of the official roadmap to liberalization.[54] IETF also has a hybrid origin, given the involvement of the US government in the early days of the Internet.

Several SDOs have some official existence, even though the impetus for their creation came from industry. Such is the case in particular for national standards bodies in the EU, such as AFNOR and DIN. Both SDOs were created as industry organizations, and their official role was only established later by law or through a contract between the SDO and the government. ISO and IEC arose as international federations of national standards bodies. ISO arose during World War II out of the cooperation of the private-sector national standards bodies of the US, the United Kingdom and Canada. The creation of ISO was nevertheless related to the international coordination between allied countries, which also led the creation of the United Nations.[55] ISO soon acquired an official status with the United Nations, e.g. a consultative status at the United Nations Economic and Social Council. CEN and CENELEC's predecessors CENEL and CENELCOM were created as non-profit organizations by the national standards bodies of EEC and EFTA member countries to facilitate trade in the common market. CEN-CENELEC concluded an agreement with the European Commission in June 1984, under which CEN-CENELEC can be commissioned to carry out the necessary technical work for the adoption of EN standards. Together with ETSI, their current formal relationship with the EU was formalized with the designation as ESOs in Regulation 1025/2012.

[53] Council conclusions on the enforcement of Intellectual Property Rights, 6681/18 (1 March 2018), point 12.

[54] The creation of a 'European Telecommunication Standards Institute' as a permanent forum for "an increased contribution by industrial and user experts" was proposed by the Commission in its 1987 'Green Paper on the Development of the Common Market for Telecommunications Services and Equipment' (Com(87) 290).

[55] This relationship is evidenced e.g. by the fact that Geneva was selected as the seat of ISO, because it was also designated as the seat for several specialized agencies of the intergovernmental United Nations organization (Yates and Murphy, 2007).

4.2.1.2 Role in Day-to-day activities

The level of, and the processes for, public authority involvement in the day-to-day activities of SDOs vary widely.

At the level of agenda setting, mechanisms are in place to enable public authorities to induce certain SDOs to engage into standards development. In the EU, the European Commission, after consultations at the European level, can request the ESOs – CEN-CENELEC and ETSI – to undertake the development of a standard (a request which the ESOs may decline). Regulation 1025/2012 includes an elaborate mechanism of yearly reporting, the annual EU Work Programme for Standardization, in order to align the agendas of EU institutions and ESOs. The European Commission furthermore enjoys a special status within the ESOs, as a "counsellor" without voting rights. In addition, in the ICT sector, a yearly Rolling Plan for ICT standardization complements the general Work Programme; it is prepared by the European Commission in collaboration with the Multi-Stakeholder Platform (MSP) on ICT standardization.

In the U.S., though ANSI and the U.S. government have engaged in an active public-private partnership, "the federal government's role mainly has been reactive, supportive, and, ultimately, passive".[56]

In the course of standards development, the role of public authorities is usually well circumscribed in the governance of the SDO. In the U.S., federal agencies are required to adopt private sector voluntary consensus standards rather than government-developed standards, absent extenuating circumstances (e.g., military applications). As a result, governmental requirements regarding the nature of voluntary consensus standards, which are embodied in OMB Circular A-119, are broadly followed by U.S.-based SDOs.

For SDOs whose standards are used e.g. by the military, typically a special committee/working group is set up to liaise with the relevant government agency (VITA, JEDEC). Where standards development closely affects public policy, for instance on privacy, culture or the environment, SDOs will try to involve government representatives, either as observers (W3C) or within a specific membership category (DVB). Some SDO working groups are subject to specific procedures or requirements because their work touches upon security-related issues, and involves participation of the military or security agencies.[57] Other SDOs do not grant any specific status to public authorities and simply allow them to participate on the same footing as any other member organization (IEEE-SA, IETF).

In the U.S., the National Institute of Standards and Technology (NIST), a non-regulatory agency of the Department of Commerce, is chartered "to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life."[58] The bulk of NIST's budget is devoted to laboratory science and measurement, though it also coordinates, promotes and facilitates standardization activity in areas including cybersecurity and the smart grid.

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[56] Sagers (2011) at p. 795: "Like state and local governments, the federal government is a large consumer of private standards, but the federal government has also participated in the very creation of the standards sector. Still, the federal government's role mainly has been reactive, supportive, and, ultimately, passive. Its role has been to nurture or comply in the creation of a regulatory system that, for reasons of politics - not, fundamentally, reasons of practical or logical necessity – has remained 'private' and that effectively handles a very large portion of this country's regulatory work. Over the long history of the growth of this apparatus, the federal government's relationship to SSOs has been highly deferential, and, above all, the relationship has been ad hoc".

[57] E,g, ETSI has a working group on 'Lawful Interception'. Unlike other ETSI working groups and most standardization processes in the SDOs in our sample, the work of this group (involving participation of secret services) is confidential, thus constituting an exception to the open nature of SDO standardization processes.

[58] See http://www.nist.org.

At the international level, national governments directly participate in governance processes at ITU-T. Through their contributions to the Telecommunication Standardization Advisory Group and its AdHoc Groups, national governments of ITU member countries participate in deliberations on standardization processes and SDO policies. For national governments of countries such as the US with a tradition of limited government participation in SDO governance, these contributions constitute a rare and exceptional direct government endorsement of specific SDO policy choices, and provide an opportunity to signal the government's position on contentious SDO policy matters to private sector SDOs.[59]

4.2.1.3 Government relations

Beyond the – usually limited – involvement of public authorities in day-to-day activities, SDOs typically also maintain a government relations function. Some of them (ECMA, ETSI, IEEE, IETF, OASIS, CEN-CENELEC, ITU-T, W3C), for instance, are members of the European Multi-Stakeholder Platform on ICT Standardization.

4.2.1.4 Stakeholder views on government participation in SDOs

The limited role of government agencies in SDO processes is in line with the preferences of the large majority of stakeholders participating in our survey. Only five (10.9%) of the surveyed stakeholders believe that government agencies (other than competition authorities) should play a strong or leading role in technical interoperability standardization (excluding health and safety standards). While only five (10.9%) respondents indicated that government should play 'no role at all', 36 respondents (78.3 %) stated that government should play a small or moderate role. These preferences seem to be consistent with the observed level of government involvement at the SDOs in our sample.

In line with these observations, patent-centric firms, product-centric firms and non-participating stakeholders all on average consider 'intervention of government agencies' and 'administrative (governmental) procedures or complaints' to be ineffective methods for resolving disputes among SDO members.[60] Similarly, in a situation where an organization is not directly represented in an SDO governance body, patent-centric firms, product-centric firms and non-participating stakeholders on average responded that government agencies are unlikely to represent their organization's interests adequately (average score of 2.67 out of 5).

It should however be noted that the stakeholders participating in our survey were predominantly larger companies, and probably far more actively engaged in SDO governance than the average SDO stakeholder. These stakeholders did not consider that any other organization apart from themselves could adequately represent their interests in SDO governance bodies (with trade associations the least unfavorably rated option).[61] It is possible that smaller companies or individual consumers would welcome stronger government involvement, because they are less capable of representing their own interests in SDOs.

[59] See e.g. the US contribution 43 of June 2014, detailing the position of the US government on IPR policies seen as helpful for industry-led consensus-standard development https://www.nist.gov/sites/default/files/documents/standardsgov/T13-TSAG-C-0043-A1-r1-E.pdf

[60] Intervention of government agencies received an average score of 2/5, making it the second-lowest scored option after 'Formal (binding) arbitration by SDO staff' among the proposed options.

[61] Consistently, the surveyed stakeholders on average found 'seeking a leadership role within SDO' to be a relatively effective means for SDO policy making (3.49/5); whereas 'petition governmental agencies' was seen as neither effective nor ineffective (3.03/5).

Table 4.1. – Relationship with patent offices

SDO n/a=not available	AFNOR	DIN	DVB Project	ECMA	ETSI	IEEE SA	ISO	ITU	JEDEC	W3C
Documents available to patent offices	n/a	n/a	All available	Request help from time to time	Yes	Yes	Yes (JTC1 to JPO)	MoU with EPO	Requests were usually turned down	No request so far
Help to patent office in prior art searches	Upon specific request	n/a	n/a	n/a	n/a	Yes	Limited	MoU with EPO	n/a	n/a
Cooperation with patent offices to improve disclosure	n/a	Limited	No	No	Yes (EPO)	n/a	n/a	n/a	n/a	n/a

While the surveyed stakeholders were unfavorable to government assuming a leading role in SDOs, only a small minority considered that government agencies should play no role at all. Asked to what degree SDOs should cooperate with various types of public authorities (national ministries, research funding agencies, competition authorities, patent offices, health and safety regulators, trade bodies); the surveyed stakeholders were most favorable to a closer cooperation with competition/antitrust authorities (3.23/5), followed by patent offices (3.12/5). Consistent with this ranking, a majority of the surveyed stakeholders (65.3%) considered that governmental agencies should be concerned with 'Ensuring that participants in standardization do not engage in anticompetitive conduct' and 'Ensuring that SDO patent policies are fair and balanced'. On the other end, only a small minority of stakeholders expressed support for governmental agencies choosing which technological features to be included in standards or ensuring that standards support the best technological features.

4.2.2 Relationship with patent offices

The potential relationship of SDOs with patent offices has two dimensions. First, SDO activities – and in particular the information circulated in the course of these activities – can be considered to form part of the prior art for the purposes of patent examination; such is the case at the EPO (Bekkers et al. 2016).[62] Nevertheless, patent examiners may not always have direct access to such disclosures. IETF and W3C make all technical documents available via the Internet at no charge, thus making these materials readily available to patent offices and applicants. Some SDOs make information available to patent offices upon request (DVB, ECMA, IEEE-SA). Others prefer to keep this information confidential and do not disclose it to patent offices (JEDEC, VITA). Some SDOs (DIN, ISO) are more reluctant to disclose their information, because they fear adverse impacts on their business model which depends on sales of standard documents, or because they do not wish to disclose information contained in preparatory documents that are not released as final standards.

[62] See e.g. EPO Guidelines for Examination, Section 7.6. "Standards and standard preparatory documents", https://www.epo.org/law-practice/legal-texts/html/guidelines/e/g_iv_7_6.htm

Several patent offices, and in particular the EPO, have entered into cooperation agreements with individual SDOs (including ETSI, IEEE SA, ISO/IEC JTC1, ITU). Under these agreements, patent offices may access final standard documents that would otherwise only be available for purchase, and/or access preparatory documents, to build searchable databases that examiners can access. Empirical evidence (Bekkers et al., 2016) suggests that such SDO cooperation with patent offices can result in an increased number of patent applications being rejected for lack of novelty.

Secondly, patent offices could also play a role in assessing essentiality claims made by patent holders. Some SDOs have expressed interest in cooperation with patent offices for that purpose, but patent offices have generally been reluctant to respond. The Japan Patent Office is the first and currently only patent office to offer such essentiality evaluations upon request.[63]

4.2.3 Relationship with NGOs

Even though many SDOs try to achieve a balance of interests, participation by non-industry and non-government actors (typically NGOs representing consumers, users, etc.) varies. Werle and Iversen study how rules of the process can discourage participation by certain players so that minority, civil society and public policy interests are not well-represented (Werle and Iversen, 2006). In many cases, however, representativeness of SDO procedures is limited by practical constraints such as cost, resources and expertise, rather than restrictive policies.[64]

Some organizations such as CEN-CENELEC are required to engage in public enquiry and consult external organizations, such as environmental groups or trade unions, with regard to relevant matters. Comments received through such public enquiry must be taken into account in SDO decision-making. Similarly, at ETSI, decision making on European standards is based on weighted national votes, where the national vote is cast by a National Standards Body in accordance with the outcome of a national public enquiry. Other SDOs conduct such outreach on a voluntary basis, either directly or through their members.

Several SDOs, such as IEEE and IETF, state that they rely on the openness of their process to attract all relevant stakeholders to the SDO's deliberations. In the past, IEEE reports that it was more active in this regard, particularly with respect to standards having a broad potential impact in areas such as the environment, and in which affected stakeholders were likely to be unfamiliar with the standardization process. IETF reports that it previously made efforts to engage civil society in its work, but it experienced difficulties in establishing a useful dialogue between technical standards developers and those interested in policy issues. Similarly, W3C states that it affirmatively seeks involvement of relevant stakeholders – including consumer and privacy groups – that are not currently working in its technical groups.

Other SDOs – typically of the 'bottom-up' type arising out of industry initiatives – report that no NGOs take part in their activities (JEDEC, VITA) because of their technical focus.

Within the 'established' SDOs, the expectation is that NGOs will be included in the work of national standardization bodies – DIN, AFNOR, ANSI – and that their viewpoints will be reflected in the input coming from these national bodies into regional or international standard development work.

At the EU level, in view of the limited involvement of NGOs, Regulation 1025/2012 has provided for the participation – backed by EU financing – of organizations representing

[63] See <https://www.jpo.go.jp/torikumi_e/kokusai_e/seps-tebiki_e.html>

[64] "In most SDOs, participation is not remunerated and it is a rather expensive undertaking to contribute time and work to preparatory work while incurring membership fees and travel expenses" (Iversen et al., 2004, p. 112).

SMEs, consumers, environmental interests and social interests. As reported by AFNOR in our interview, it is sometimes difficult to organize that representation in practice; with its 3SI programme, ETSI has tried to address that problem through the appointment of a specific advocate for societal and SME interests, with an ombudsman-like mandate.

4.3 Relationship with other SDOs and with OSS consortia

In addition to legal constraints on SDO governance and constraints resulting from SDO interaction with public authorities and civil society, SDO governance is also significantly influenced by SDO interaction with other SDOs, through contractual obligations or other formal requirements. Many SDOs are bound by formal agreements to practice common policies, are subject to the requirements formulated by another organization vested with superior authority or must ensure smooth technical cooperation with other SDOs. More generally, SDOs bring together large numbers of individuals and firms, of which each have their respective networks of relationships, and these networks are usually linked with one another. Many stakeholders are members or participants in a number of SDOs, thereby providing a channel for the circulation of information and for interaction amongst SDOs.

Constraints on SDO governance can result from either vertical or horizontal relationships between SDOs, which affect different SDOs differently.

4.3.1 Vertical relationships between SDOs

Perhaps most directly, the governance of numerous SDOs is constrained to different degrees by their vertical relationships with other SDOs. These constraints can be indirect and relatively loose, but many SDOs are also directly bound to follow the principles and even the specific policies defined by an encompassing international or national SDO. This complex picture blends two visions, a more structured hierarchical vision and a looser bottom-up vision.

4.3.1.1 Hierarchical vision

The hierarchical vision is best summed up in the ISO/IEC Guide 59:1994, *Code of good practice for standardization*, at para. 1.2:

At international level, the voluntary standardization process is essentially coordinated under the auspices of the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunications Union (ITU). These bodies are apex organizations for an extensive infrastructure which has its foundations at national level, and extends into regional activities whenever necessary. This global system (i.e. standardization at national, regional and international level) is linked together via collaboration agreements between ISO, IEC and ITU at international level; by similar agreements between standardization organizations at regional level, such as CEN, CENELEC and ETSI in Europe; and at the base, through an extensive array of collaboration agreements between the national members of the three apex organizations.

Under the hierarchical model, general guidelines and principles are defined at a high hierarchical level, in encompassing international organizations. The decisions at this higher hierarchical level are generally made by consensus of the SDOs to which these guidelines will apply. In the realm of SDO governance, in particular, the hierarchical vision is embodied in a series of hard-law and softer instruments on both sides of Atlantic, as discussed in Section 4.1.1.

At the European level, the same hierarchical vision is replicated regionally. As set out above, through a combination of primary EU law[65] and communications by the European Commission,[66] a model of SDO governance is set out, which closely tracks the international model of the previous paragraph. European standardization organisations – CEN-CENELEC and ETSI – embody this governance model.

National standardization bodies in Europe – such as DIN and AFNOR – are designated by their national governments as members of CEN or CENELEC, and are subject to CEN-CENELEC membership requirements.[67] CEN-CENELEC Internal Regulations Part 1D and CEN-CENELEC Guide 22:2018 define specific due process requirements (regarding transparency, openness, impartiality and consensus – see Section 4.1.3), and define principles regarding effectiveness, coherence and viability that member SDOs are required to adopt. The national standardization bodies accordingly look up to the regional and international levels for guidance in matters of governance. AFNOR for instance considers itself as "CEN France" or "ISO France", i.e. the French national representation of the international standardization system.[68] At the same time, decision making in CEN and ISO is driven by these national bodies. Both AFNOR and DIN confirmed that most of governance and policy debates take place on the European or international level.[69]

Within the EU Member States, the hierarchical model extends further down. In addition to their role as standards developer, both DIN and AFNOR have obtained legal recognition from their respective national governments, entrusting them with the responsibility to define national standardization strategies (often transposing international principles) that are followed by numerous sectorial standardization bodies or committees.[70] AFNOR furthermore controls the French sectorial standardization bodies accredited by the French government.

On the U.S. side, ANSI, a private organization, makes the connection between the international standardization organisations and numerous, mostly private-driven, US-based SDOs. US interested parties participate in ISO and IEC through Technical Advisory Groups (TAGs) accredited by the ANSI Executive Standards Council (ISO) and appointed by the USNC (IEC) and the procedures that govern these TAGs are the International Procedures (ISO) and the USNC Statutes and Rules (IEC). US representation in ITU-T is by the National Institute of Standards and Technology (NIST). Nevertheless, the standardization system in the US is far less hierarchical than in the EU.

4.3.1.2 Bottom-up vision

Next to this hierarchical vision, there is a bottom-up vision, whereby SDOs arise out of the desire of stakeholders to develop standards, and then grow into established organizations.

[65] Regulation 1025/2012 of 25 October 2012 on European standardisation [2012] OJ L 316/12.

[66] See the Commission Guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements (Horizontal Guidelines) [2011] OJ C 11/1 or the Communication setting out the EU approach to SEPs, COM(2017)712 (29 November 2017).

[67] CEN-CENELEC Internal Regulations Part 1:2018. Part 1D: CEN and CENELEC Membership Requirements.

[68] Historically, AFNOR was created with the purpose to allow French industry to be represented in international standardization bodies. This history is reflected in the fact that French Law (a decree from 2009) governs how AFNOR represents French interests in international standardization bodies, and that by extension these legal rules apply to AFNOR's own governance.

[69] By DIN's own estimates, only 15% of its activities are confined to the national level, the remainder taking place within the international organizations. The National Standards Bodies also have a distinctive role for the adoption of European standards at ETSI. In the process of adopting European standards, the National Standards Bodies are responsible for conducting the national public enquiry and casting the national vote. This process and the relationship between the National Standards Bodies and ETSI is formalized in a Memorandum of Understanding.

[70] Article 1 of AFNOR's statutes stipulates that AFNOR's mission is the orientation and coordination of standards policy in France in the public interest. In Germany, the Normenvertrag of 1975 between DIN and the State defines the role of DIN in the development of a national standardization system.

Along the way, they develop their own governance and policies. From our sample of SDOs, many – VITA, JEDEC, DVB, ECMA – started out from discussions within the industry. Others – IETF and W3C – evolved out of the original community of academic and governmental developers of the Internet. IEEE-SA is an emanation of a large professional association.

At some point, however, these SDOs often – but not always - need to connect with the established standardization organizations – at the national, regional or international level. The need for such a connection typically arises when the standards developed by the SDO in question need to be given a more official existence, so as to benefit from the legal properties attached to 'official' standards, such as recognition across borders, legal presumptions attached to conformity, etc. And on the private side, especially, there is frequent vertical interaction among smaller consortia and larger SDOs, whereby standards developed within consortia are often submitted to larger SDOs such as IEEE or ISO to be legitimized and broadly adopted.

Some US-based SDOs such as IEEE, VITA and JEDEC have achieved ANSI accreditation, and must comply with the ANSI Essential Requirements with respect to standards approved as American National Standards. Other US-based SDOs, however, such as IETF and W3C, do not elect to seek ANSI accreditation for a range of reasons. ANSI accreditation is not required for SDOs to develop standards that will be adopted by US (or international) governmental agencies.[71]

SDOs originating in the EU, such as DVB and ECMA,[72] cooperate with European standardization organizations (CEN-CENELEC and ETSI) and are thereby potentially influenced by their governance model. DVB specifications for instance are often adopted as ETSI standards in view of gaining regulatory recognition.[73] If that happens, the ETSI IPR Policy applies in addition to DVB's own policy.[74]

There is therefore an interface between the SDOs created through a more bottom-up process and SDOs that are part of the more hierarchical vision, in that the former may seek to make their standards enjoy the benefits attached to standards produced by the latter. In so doing, the former will be expected to align their governance and policies with the latter, yet the precise nature of that expectation may vary. First, as ANSI clearly indicates, its Essential Requirements concern the development of American National Standards. How SDOs arrange their affairs outside of the development of American National Standards is not subject to review by ANSI. Second, the models trickling down from the international level – as described above – tend not to be couched in very prescriptive terms: they are formulated as recommendations or principles. Accordingly, there is some leeway in how SDOs align their own governance and policies with these models. The previous sections showed a significant level of variation in the governance and policies of SDOs, with few suggestions that any of the observed variants would run afoul of the models. In our interviews, SDOs also confirmed that they considered that the models set out at the international, regional or national levels left them some margin of maneuver in the design of their own governance and policies.

[71] e.g., the Internet as we know it consists of protocols produced by IETF and W3C, yet is used by governments around the world

[72] ECMA is part of the European Multi Stakeholder Platform on ICT Standardisation, and cooperates with ETSI. It also works with the international bodies.

[73] "DVB develops specifications and looks to recognized standards bodies such as ETSI or CENELEC to adopt standards incorporating these specifications" (Eltzroth, 2008)

[74] "While expecting compliance with its own IPR policy, DVB also alerts its members to the need to adhere to the rules of the standards body to which its specification is delivered" (Eltzroth, 2008).

4.3.2 Cooperative horizontal relationships

4.3.2.1 Cooperative horizontal relationships among SDOs

In addition to the potential for competition between SDOs, there are *cooperative horizontal relationships* amongst SDOs. For instance, the three large international SDOs – ISO, IEC and ITU – work together on policy matters. They have a joint IPR policy, and ISO/IEC have developed a large number of joint activities, including a code of good practice for standardization. Similarly, at the European level, CEN-CENELEC and ETSI also cooperate frequently. National organizations – such as AFNOR and DIN – cooperate with other national organizations within regional or international entities. Within CEN-CENELEC, for instance, the British (BSI), French (AFNOR) and German (DIN) organisations have a close working relationship. As described by DIN, within the European standardization system, cooperation prevails over competition.[75] At the other end of the spectrum, many more specialized SDOs, such as JEDEC, DVB and VITA, sometimes look to other SDOs for guidance and inspiration in the elaboration of their policies.

Collaboration is sometimes more focused: ETSI, TSDSI and other SDOs not in our sample work closely together within the 3GPP.[76] Technical specifications developed at 3GPP are published as standards by the member SDOs. Formally, each of these SDOs defines its own IPR policy, and individual members are bound by the IPR policies of the respective 'Organizational Partner' (i.e. SDO) of which they are member. Nevertheless, article 55 of the 3GPP Working Procedures defines general requirements for these IPR policies. In particular, it states that "Organizational Partners should encourage their respective members to grant licences on fair, reasonable terms and conditions and on a non-discriminatory basis." In our interviews, we were told that the close cooperation of SDOs within 3GPP in practice requires that the member SDOs apply more or less identical IPR policies. With respect to IoT, OneM2M follows the cooperative model of 3GPP.[77]

There are other examples of horizontal coordination among SDOs, which constitute a much looser form of harmonization. For example, IEEE-SA, IETF and W3C are all part of Open Stand, a group promoting a series of open governance and standardization principles.[78]

In addition to cooperation among SDOs on policy matters, there is a widespread pattern of cooperation among SDOs in standardization. Baron and Spulber (2018) document that the average standard document in a large sample had 1.14 equivalent documents at other SDOs; i.e. each standard is on average accredited by more than two different SDOs. Co-development or co-accreditation of standards by different SDOs may result in additional constraints on an SDO's policy making. Cooperation among SDOs may be complicated by different policy provisions. DVB specifications adopted as ETSI standards are e.g. subject to different approaches, resulting in practical difficulties for the cooperation between both bodies and for companies participating in either or both.[79] SDOs may further be constrained in their technological decisions by the policy provisions of another body (e.g. technology available under the policies of an SDO may not be available under the policy of a different body, with which the SDO seeks to co-develop its standards; in such cases, the more

[75] However, we should note that the relationship between national SDOs and ESOs is also governed by the rules on competing overlapping projects. Once the proposal for a standardization work is accepted by the relevant ESO, any overlapping national work is frozen (so called "standstill"). For national SDOs this means that they have to stop and prevent the development of standardisation deliverables at their organizations that would have a similar scope as pending European standards. See for broader debate - <https://erncip-project.jrc.ec.europa.eu/sites/default/files/m487-cpexpo.pdf>

[76] Actually, participation in 3GPP is the *raison d'être* of TSDSI.

[77] See http://onem2m.org/about-onem2m/intellectual-property-rights.

[78] See https://open-stand.org.

[79] As recognized by Eltzroth (2008), "as a practical matter, the match between DVB and ETSI rules does not appear to be perfect".

restrictive policy could be decisive for the choice which technologies can be included in a co-developed standard).

Co-accreditation of standards by various SDOs may also result in a further competitive check on an SDO's ability to impose policy provisions. If a standard is already formally adopted by one or various bodies, the additional benefit from another body's endorsement may be more limited; thus reducing the SDO's ability to impose conditions. Technology sponsors seeking endorsement from more than one SDO may thus use this as a leverage of their negotiation power. An example of such a situation is the standardization of Java, where Sun chose ECMA in view of easier access to PAS procedure at JTC1, but also to be less dependent on JTC1 approval.[80]

4.3.2.2 Cooperative relationships with OSS consortia

SDOs increasingly interact with open source consortia, especially in the area of software standards. In the last few years, several SDOs issued reports on the interaction between these two communities, and most notably ETSI (ETSI 2005, ETSI 2006, ETSI 2012, ETSI 2015, ETSI 2016). Moreover, SDOs like ANSI, ITU-T and ETSI held number of special meetings devoted to the intersection of the two ecosystems. ETSI has created a special group of its Board (Board OSS) to investigate how to improve ETSI's interaction with the OSS community. A number of SDOs, such as ETSI, W3C, IETF, JEDEC or ECMA have direct experiences with some type of incorporation of open source projects.

In our survey, we asked participants to report on their relationship with and views on open source consortia. In particular, we enquired about their existing participation, asked them to reflect on the question of closer collaboration between two ecosystems, its benefits and existing barriers. Of 45 survey participants, 62% reported to have participated in open source consortia. Moreover, from 38 respondents, 26 (68%) saw an opportunity for closer interactions between SDOs and OSS.

Benefits of closer integration were summarized by one of the respondents as follows: "[a]s technology advances, and the pace of that advancement increases, many new features are being implemented in software rather than hardware. Of those software features, many benefit from the collaborative nature of open source projects. Close interaction between traditional SDOs and OSS consortia will result in better, faster and more efficient technical standards, and a better standards ecosystem for all." Another company went a step further, noting that: "Closer interaction is unavoidable". Some other respondents remarked that any growth in collaboration should be determined by market demand or that open source is a business model, which 'has nothing to do with the decision about standardization'.

The opportunities were especially seen in the implementation phase. As one respondent put it, "[w]hen standards are developed, the most natural developers of standard-compliant software are those SDO members who create the standard. They already have decided for some, usually commercial, reason to contribute to the creation of the standard and are those who know the standard best. Obviously, it may make a lot of sense, if these experts complement their standard with standard-compliant software. This could for example improve adoption of the standard by the market. Thus SDOs should be eager to have those SDO members which develop the standard on board when it comes to the implementation of standard-compliant software."

[80] "Sun understood that in the past ECMA standards had been submitted to a yes/no vote in JTC1 without any modifications, and often successfully so. If Java would become an international standard, customers, partners and developers would feel more confident about investing in it. But, Sun said, it would also be pleased if Java would remain an ECMA standard" (Egyedi, 2001).

The areas in which several respondents thought further collaboration of SDOs and open source might be fruitful were cybersecurity, internet technologies, software engineering, Cloud, Internet of Things (IoT), 5G, Big data, Geospatial technologies or Blockchain.

When asked to identify the main barrier to collaboration, 13 respondents out of 35 (37%), identified intellectual property as an issue.[81] A few other respondents also selected governance, sustainability of results or culture as barriers to collaboration. According to one respondent, "[b]oth SDOs and open source consortia may collaborate more efficiently if each of the actors recognises the strengths that it brings to a project, and their interactions between the two communities are strictly governed by agreements in place which define the project, the role of participants in the project, project management, milestones and clearly set out the obligations regarding receipt and treatment of confidential information."

When respondents were asked to assess compatibility of FRAND and OSS, a number of participants noted that OSS is not homogenous and thus it depends on the project and the specific use case. However, there was less agreement on more specific issues. For instance, some respondents stated that most open source licenses can be legally compatible with FRAND-licensing, which can also include royalty-free licensing. At least one respondent representing a larger firm, however, was of the view that Open Source Initiative (OSI)-certified licenses are 'totally incompatible with a FRAND IPR Policy'.[82] Another respondent noted that it is 'unhelpful towards the aim of integrating elements of standardisation development with targeted open source community' to adopt only the OSI definition of open source. On the other hand, several respondents negatively reflected on the practice of SDOs choosing an open source license that is OSI-certified, such as BSD (Berkeley Source Distribution),[83] but then adding extensions that carve out patents, and thus making the entire license OSI-incompatible for two reasons. Either they questioned the substance of such choice leading to royalty-free licensing (see below), or they complained about the practice of referring to such licenses as open source licenses, despite noncompliance with the OSI definition.

According to several respondents, rather than incompatibilities, possible 'inconsistencies' exist between the IPR-regimes of the two ecosystems. As expressed by one: 'OSS may involve royalty-free licensing of patents used for a work and its derivative works which is somewhat open, while SDO Policy generally limits or closes the licensing assurance to patents needed for the standard as set forth in its specification. An SDO may provide for a reasonable royalty for a FRAND license, while OSS may involve royalty-free. That said, an initiative can recognize the two regimes and comply with both with proper treatment.' It was stressed that 'two License Regimes are only then incompatible if they contain obligations that cannot be implemented at the same time'.

At least one respondent emphasized that even open source licenses requiring royalty-free licensing are, from such perspective, 'still compatible with any kind of FRAND licensing requirement because even if a FRAND licensing requirement permits [royalty-bearing] licenses any patent holder still can grant a royalty-free license'.

Several respondents also expressed their views on the role of SDOs in the process of integration of open source projects. The opinions were not uniform on this matter. While some respondents were of the view that since standardization itself is business model neutral, its decisions about integration of open source projects should be neutral as well. In other words, the corresponding IPR-licensing of such projects should, in their view, be

[81] One respondent noted that open source communities seem to want free access to intellectual property rights, not only fair, reasonable and non-discriminatory (FRAND) access.

[82] OSI is a non-profit organization that evaluates the compatibility of various OSS licenses with its definition of OSS. See osi.org.

[83] See http://www.linfo.org/bsdlicense.html

consistent with royalty-bearing patent licensing, at least as a baseline. The ability to choose between royalty-bearing and royalty-free modes were emphasized by a few, arguing that one-size fits all is not the right approach for the entire ecosystem. On the other hand, even some of these respondents emphasized that royalty-bearing licensing should not be referred to as 'Open Source' when it does not comply with the widely accepted OSI definition.

Different views were also expressed as to the consequences of SDO choices regarding OSS. According to one respondent, preference for OSI-compatible licenses "may have the consequence that SDO members who contributed to the development of the standard under a FRAND licensing requirement that permits royalty-bearing licensing will not contribute to the development of standard-compliant software if the SDO decides to use an aggressive OSS license that comprises a royalty-free patent license." Another respondent put this more strongly, noting that "[a]ny extreme position that there is only one type of business model or one type of intellectual property will be disruptive to the overall aim of standards globally."

On the other hand, at least one respondent stressed that opposition to open source licenses requiring royalty-free licensing comes mostly from a small group of SEP holders.

In its 2017 Communication Setting out the EU approach to SEPs, the European Commission mentioned that it would continue to investigate the relationship between open source and standards, including through the financing of further studies.

4.4 Competitive forces

In addition to the vertical and cooperative relationships discussed in the previous heading, , SDO governance is also subject to constraints resulting from competition among SDOs, including competitive responses that involve non-SDO vehicles (consortia).

4.4.1 Competition among SDOs

In parts of the literature, the relationship between SDOs is analyzed as a *competitive relationship*, where SDOs set policies to attract technology owners seeking a forum in which to conduct standards development (Lerner and Tirole, 2006; Chiao et al., 2007; Lerner and Tirole, 2015).[84] This is linked with the general literature on regulatory competition, in its original version as set out in Tiebout (1956) (for a review of the literature, see Larouche, 2013). SDOs can be compared to local authorities that offer different local policy mixes (trade-offs between taxes and public services), leading citizens to 'vote with their feet' and congregate in the localities that offer policy mixes corresponding to their preferences.

Should stakeholders be dissatisfied with the performance of a given SDO, they can 'vote with their feet' and take their standards development activities to another SDO, or even launch a new SDO. In particular, it has been suggested that, in reaction to a change in SDO policy that is perceived as adverse, stakeholders would look for, or create, an alternate

[84] Lerner and Tirole (2006) analyze how firms self-select into SDOs. They predict that owners of lower quality technology are willing to make greater concessions to have their technology adopted as a standard. These concessions in particular can take the form of more binding licensing requirements. Chiao et al. (2007) empirically test some of these predictions using a sample of 59 SDO policies. They find that SDOs that are oriented toward a small group of sponsor firms are less likely to demand policy-based concessions from members. The significance of this relationship depends on the number of SDOs operating in a field, which suggests that it is indeed competition between different SDOs which allows patent owners to find a favorable venue for the standardization of their technology.

forum to pursue standards development. Our survey [Q.50] suggests that this approach is used in practice. Among 29 respondents, 34% (69% of Patent-Centric respondents and 7% of Product-Centric respondents) indicated that they had left an SDO or considered doing so because of the SDO's IPR policy or IP litigation. There is a difference, however, between leaving an SDO (exit option) and being able to find another forum to substitute for that SDO. The former is an individual action by a single stakeholder, whereas the latter is more difficult to achieve: it requires a sufficient critical mass of stakeholders that move to (or create) the new forum in order to make it viable.

In the economic literature, SDO "forum shopping" is sometimes considered as a source of inefficiency in SDO policy design. Lerner and Tirole (2015) find that SDOs requiring specific licensing commitments for SEPs would be unable to attract SEP owners if competing with SDOs practicing less restrictive IPR policies. Policies requiring such specific commitments are thus unlikely to endogenously emerge from competition between SDOs, even though Lerner and Tirole (2015) argue that these rules may be socially preferable to existing IPR policies.

However, SDOs compete not only in the technology market to attract valuable technologies, but they also compete to attract members, and their standards compete in the product market for implementers. It is unclear whether SDOs are more concerned with attracting the owners of potential SEPs or standard implementers, and it is likely that the balance between implementers and SEP owners varies between industries and technological fields. It is also important to take into account the decision-making process within SDOs to analyze this multi-sided competition. Spulber (2018) models SDO decision-making when there is competition both among technology providers and standard implementers, and concludes that the forces of voting within SDOs and competitive pressure balance each other out.

A different view on competition between SDOs (e.g. Tsai and Wright, 2015) predicts that SDO policies are responsive to the risks resulting from the inclusion of IPR in a standard, and that a competitive outcome will take into account the interests of both SEP owners and implementers. According to this view, competition between SDOs should break up any hold-up position of SEP owners who imposed their patented technology on a single SDO. Furthermore, if an SDO adopts inefficient policies or is subject to paralyzing conflicts of interests (so-called "wars of attrition", e.g. Farrell and Simcoe, 2012; Simcoe, 2012), companies have a plethora of alternative SDOs to choose from.

There are thus a number of important arguments that competition between SDOs determines or at least affects SDO governance, resulting in efficient or inefficient outcomes, depending on the theoretical approach. The extent to which SDO policy making really is constrained by competition with other SDOs is however empirically unclear. Chiao et al. (2007) find that in their sample there are on average approximately 14 SDOs operating in the same technological field; suggesting a significant degree of competition between SDOs. But any count of SDOs by technological field is highly dependent on the definition of fields. While a website with information on standards organizations (www.consortiuminfo.org) currently lists over 1,000 organizations setting standards in the general field of Information and Communication Technologies, most of these organizations are highly specialized. Within a narrowly defined technological field, there may thus be only one or a small number of active SDOs. Furthermore, it is common for different SDOs to cooperate in the development of standards. The presence of various SDOs in one technological field alone is thus not an indication of competition.

More generally, counts of SDOs by field may not be a meaningful measure of competition. On the one hand, it is true that a large number of new SDOs are created every year; and existing SDOs may change their policies, discontinue operations or begin standards development in new technological fields. These observations suggest that the *barriers to*

entry for new organizations, or for organizations practicing new policies or entering new fields, are relatively low. The absence of barriers to entry and the potential competition from new SDOs would then act as a check on an SDO's ability to impose policies running counter to the interests of its members, even if an SDO faces no competition from SDOs currently active in its field. Yet on the other hand, standards development may be tied to specific SDOs, and can only be migrated to other SDOs at a substantial cost. These *switching costs* include the cost of coordinating with other SDO members, as well as the loss of organizational and reputational capital. Indeed, SDOs provide a framework for repeat interaction between their members (Larouche and Schuett, 2016), and the value of a technology's adoption as an SDO standard depends on the SDO's reputation. The value of repeat interaction and reputation are built over time, and cannot be easily reproduced in a different organization. SDO members may thus face significant difficulties in migrating their standards development projects to a different organization when they are unhappy about a policy revision at a particular SDO.[85]

Our interviews indicate that, at least from the point of view of SDOs themselves, the scope for stakeholder mobility in response to dissatisfaction with the SDO is limited. In other words, SDO participation is sticky. A number of factors were advanced to support this conclusion.

First, an SDO concentrates expertise and knowledge concerning the type of technology and product category that it is dealing with. All relevant stakeholders will gravitate towards the SDO. Accordingly, unless 'mass defection' takes place, stakeholders cannot hope to find the same critical mass of expertise elsewhere. As was pointed out in one interview, in one instance where a major stakeholder was disgruntled, that firm's only avenue was to exit the sector covered by the SDO.

Secondly, from a dynamic perspective, there is some path dependency to standardization, at least in the ICT sector: once a standard is successful, further generations of the standard are expected to follow in tune with technological and commercial progress. This reinforces the position of the existing SDO as the forum to hold further standards development. Seen from such a dynamic perspective, there may be no practical alternatives to the existing SDO: stakeholders would introduce disruption if they moved standard development to another forum, or worse, the standard could be left at a standstill and eventually abandoned.

Thirdly, SDOs frequently hold intellectual property rights (usually copyright) in the standard itself.[86] Copyright over standards can make it more difficult to move standardization activities to another SDO.

Finally, many interviewees mentioned that the main factor motivating stakeholders to join an SDO was the substance of standard development activities, not the governance or the policies of the SDO. This also implies that there is an assumption that SDOs do not differ markedly on these aspects, or at least do not seek to differentiate themselves through their governance or policies. However, a number of SDOs – ECMA, VITA, DVB, W3C – mentioned their IP policies were distinctive features; these policies came to be as they are, however, more as a result of an organic, endogenous evolution ("in tune with the needs of our membership") than an attempt to profile themselves competitively. This is confirmed by our survey results [Q9] according to which on a scale from 1 to 5 (with 1 being not important and 5 being very important), participants graded the importance of IPR policies to their

[85] Such transitions do, however, occur. See, for example, Contreras (2016a), detailing the transfer of Worldwide Web standards such as HTML from IETF to the newly-formed W3C due to policy and cultural disagreements, while leaving HTTP at IETF.

[86] The standard must be expressed in a document, over which copyright exists. This is in addition to the patent rights of stakeholders that would be come into play if the standard requires practicising Standard-Essential Patents for its implementation.

decision to join or participate in a specific SDO at 3.95 on average. At the same time, IPR policies come only after two other factors - relevance to business (4.64) and SDO reputation (3.98) - and closely followed by SDO relevance to public policy (3.88), openness of SDO processes (3.84) and availability of the standards (3.76).

In the same vein, participants in our stakeholder workshop indicated that the 'outside options' available to stakeholders might vary over time. In the early days of a standardization effort, competition between SDOs to attract standardization projects is seen as a real possibility. Workshop participants even reported that such competition has intensified over the recent years, as the number of SDOs has grown faster than the demand for standardization. It is thus a common occurrence that various SDOs attempt to initiate standardization work in the same emerging technical field.[87] As standardization moves ahead and standards are set, it often becomes less and less realistic to move out of an SDO altogether.[88]

Other workshop participants nevertheless pointed to examples of relatively mature standardization projects that were abandoned, or fully developed standards that receded in the market, as a result of competition from standards developed by other SDOs or consortia. One such example is the IEEE 1394 (Fire Wire) standard, which did not achieve as much market success as could have been expected, in light of the competition from the Universal Serial Bus (USB) standards developed by the USB Implementer Forum (USB-IF). Some workshop participants stated that one possible reason for this competitive outcome is the fact that essential technology for USB standards is available under USB-IF's royalty-free policy. This example suggests that competition from standards developed in other SDOs or groups can act as a check on the market power of the owners of standard-essential technology even at a later stage in standard development.

More generally, an SDO's ability to impose policies and conditions may be limited by competition among SDOs, including at more mature stages of standard development, based on a more dynamic analysis of competition. In particular, as confirmed by a representative of an SDO stakeholder at the workshop, industry stakeholders self-select into SDOs not only based on the SDO's current policies, but also based on the SDO's procedures for changing its policies. In order to attract standardization projects and technology contributors at the competitive stage, SDOs therefore must provide sufficient safeguards against opportunistic policy changes at a mature stage. Furthermore, most SDOs have multiple standardization projects, and must continue to attract new projects to survive. While an SDO may opportunistically change its policies without immediate competitive repercussions to its existing, mature projects, such a change could damage its reputation and ability to attract or initiate new projects. These arguments suggest that competition among SDOs may provide long-run checks on an SDO's ability to impose unbalanced policies, potentially attenuating concerns about SDO lock-in and anticompetitive effects of single policy changes at SDOs with mature standardization projects.

[87] Some workshop participants stated that as a consequence of this rivalry, it has become more common for SDOs to initiate standardization projects on their own initiative, rather than as solicited by industry stakeholders. It is unclear to what extent this evolution is only driven by rivalry among SDOs. IEEE SA e.g. reports that it has recently initiated standardization projects based on staff initiative rather than industry stakeholder demand, but attributes these initiatives to a growing concern for societal issues insufficiently addressed by industry-driven initiatives.

[88] While standardization projects initiated within an SDO may be subject to significant path-dependency, it is not uncommon for already well-advanced de-facto standards to be 'shifted around' among SDOs. Egyedi (2001) analyzes one prominent example for this competition: the Java programming language was developed by Sun Microsystems and initially submitted to ISO/IEC JTC1 under the 'PAS procedure' for expedited standardization. In light of JTC1's resistance to Sun's demands regarding intellectual property rights, and in particular the trademark rights over Java, Sun withdrew the PAS request and instead chose ECMA for the standardization of Java; in particular because "Sun's position in ECMA was stronger than in JTC1." This example seems to match quite neatly the forum shopping model developed by Lerner and Tirole (2006, 2015).

4.4.2 Consortia and other competitive responses to SDOs

In addition to competition among SDOs, there are other competitive responses available to dissatisfied stakeholders even at a more advanced stage of standard development. They involve either working outside the SDO or trying to voice their disagreement from within the SDO. Similar to competition from other SDOs, the availability of these competitive responses reduces SDOs' ability to impose rules for standard development that a critical constituency dislikes.

4.4.2.1 Stepping out of the room

In a number of instances, dissatisfied SDO stakeholders may "step out of the room" (work outside of the SDO) to try to make further progress on a standard, or to begin a new standardization project, in line with their own preferences. Once progress has been achieved, these stakeholders may gravitate back to the SDO to seek endorsement of their work product. Through this action, stakeholders may leverage their position without going so far as to leave the SDO.

For example, Shapiro and Varian first drew attention to this practice in connection with the "modem wars" of the 1980s, observing that "If you can follow a control strategy or organize an alliance outside the formal standard-setting process, you may be far better off: you can move more quickly, you can retain more control over the technology and the process, you will not be bound by any formal consensus process, and you need not commit to openly licensing any controlling patents." (Shapiro and Varian (1999, p.239)).

For instance, in the course of mobile communications standards development, mobile operators formed a specific association (Next Generation Mobile Networks or NGMN) designed to voice and present the expectations and requirements of mobile operators in the course of standard development in 3GPP and other fora.[89] More recently, mobile operators have stepped up their efforts to open up the radio access network (RAN): two initiatives, the xRAN Forum[90] and the C-RAN alliance, merged to form the ORAN (Open RAN) Alliance, in order to foster the use of open standards, software-based implementation (virtualization) and open 'whitebox' elements for the RAN.[91] ORAN is profiled by stakeholders as a vehicle to put pressure on existing SDOs, with the ability to turn it into a stand-alone SDO should it ever become necessary.

Similarly, the Wi-Fi Alliance was created with the aim of streamlining and strengthening the IEEE 802.11 family of standards through a certification program around "Wi-Fi" brands.[92] Its certification role complements the standardization work of IEEE-SA. Nevertheless, the certification program rests on the development of a standardized 'interpretation' of IEEE's 802.11 standards, which can be considered a standardization activity potentially entering into competition with the role of an SDO.[93] In another instance related to IEEE's 802.11 standards, a number of companies formed the Enhanced Wireless Consortium (EWC),

[89] See www.ngmn.org and Contreras (2013a, pp. 178-79) (discussing NGMN background and experience with ex ante disclosure of licensing terms).

[90] See www.xran.org

[91] See the press release on the creation of ORAN on www.xran.org.

[92] See www.wi-fi.org.

[93] DeLacey et al. (2006) describe how by 1998, two different IEEE standards (IEEE 802.11a and IEEE 802.11b) existed for wireless connections. A group of companies formed the Wireless Ethernet Compatibility Alliance (WECA) – which would become the Wi-Fi Alliance – "to develop a shared interpretation of the 802.11b standard—contained in a dense 400 page document—that would avoid interoperability issues." Subsequently, "several major software and computer makers quickly lined up behind the new 802.11b standard, some even before the standard was completely ratified." This description suggests that the work of WECA/Wi-Fi Alliance resulted in a coordinated selection among different IEEE standards, and that this outside group of firms built support for a specific version/interpretation of the standard even before the standard was approved using IEEE's standard approval process.

"supposedly out of frustration with the existing impasse" [over the development of IEEE 802.11n] (DeLacey et al., 2006). The alignment of positions among EWC members substantially impacted standardization of IEEE 802.11n, and in the view of some critics amounted to a "form of hijack of the process" (DeLacey et al., 2006).[94]

Another example is the CI Plus specification, concerning the Common Interface in the DVB standards. A number of stakeholders were dissatisfied with progress within the DVB Project regarding the new version of the CI standard: they founded a separate forum, which developed the CI Plus specification.[95] Given the success of the specification, it was brought back to the DVB Project and adopted as a DVB standard.

Similar to consortia such as the WiFi Alliance or NGMN, OSS consortia can often complement the work of SDOs. As discussed in section 4.3.2.2., several SDOs have specific policies intended to foster the contribution of OSS consortia to the preparation of technical specifications and/or the rapid implementation of their standards. Nevertheless, as is the case for other consortia discussed in the previous paragraphs, OSS consortia can also take on roles that are often carried out by SDOs, and thus partly or fully replace SDOs in the development of technical standards.

There are also precedents for stakeholders stepping out of the room in reaction to SDO policy matters. For example, the Wireless Gigabit Alliance (WiGig) (now folded into the Wi-Fi Alliance) arose as a reaction to IEEE-SA's then IPR policy: the members of WiGig wanted to develop a gigabit-speed wireless LAN standard on a royalty-free basis. They brought the result of their work to IEEE. More recently, the Video Compression Industry Forum (VC-IF) has been set up by a number of stakeholders involved in ISO/IEC MPEG and ITU-T VCEG standards, among others. This forum aims to complement the activities of the SDOs and address implementation issues, including IPR matters.[96]

W3C itself arose out of a desire by the principal developer of the Worldwide Web protocol to develop further web standards in an environment that was more streamlined than the consensus-driven, and sometimes cumbersome, IETF (Contreras 2016).

The results of our stakeholder survey also support the existence and significance of this "leaving the room" option. In Question 22, respondents listed "participate in industry discussions/forums" and "form alliances with like-minded SDO members" as the two most effective means for influencing SDO policy-making, well ahead of a set of 10 other options, with the options "withdrawing from SDO" and "threaten legal action" ranking a distant last.

Legally, stepping out of the room is a delicate matter, for both the stakeholders who leave the room and for the SDO.

As regards the stakeholders, their actions in forming the consortium or alliance are themselves subject to the same trade and competition law rules as apply to SDO themselves. In other words, the consortium or alliance cannot be used as a vehicle to violate competition or antitrust law, for instance by excluding certain technological solutions without valid justification. The recent DensiFi episode provides a good illustration of how stepping out of the room to form a consortium – in this case, a Special Interest Group (SIG)

[94] The example of EWC is particularly significant, because the group emerged from a gridlock resulting from the opposition between two different fractions (TGn Sync alliance and WWiSE) with different preferences regarding the licensing terms under which the 802.11n technology should become available (DeLacey et al., 2006). The example thus suggests that standardization activities by break-out groups of an established SDO can impact if not define the licensing terms for standard-essential technology in addition to the IPR policy of the SDO formally in the lead.

[95] See www.ci-plus.com.

[96] See www.vc-if.org.

– can give rise to difficulties. The matter was resolved internally within IEEE-SA,[97] but also attracted the attention of the US DOJ.[98] It centered around the activities of DensiFi, a SIG formed by a majority of the firms active in the development of 802.11ax, a new generation of the 802.11 wireless LAN standard. The precise aims of DensiFi are not clear from the publicly available documents. An internal IEEE-SA investigation found that DensiFi held private discussions concerning technical materials ahead of their submission to the IEEE Task Group in charge of 802.11ax (TGax), and that the DensiFI members were able and expected to vote as a block at TGax to favour their proposals and block other proposals. Furthermore, the investigation also noted the tiered governance structure of DensiFi, whereby a subset of DensiFi members determined the course of action, and the difficulty of gaining admission to DensiFi. The investigation concluded that the DensiFi members had breached the internal IEEE rules prohibiting "dominance"[99] of standardization by some interests, to the detriment of open and fair participation of all interested parties. In response, IEEE-SA restricted the voting rights of DensiFi members at TGax (all DensiFi members were deemed to hold a single collective vote), unless DensiFi was disbanded, which it promptly was. The IEEE 802 Executive Committee also issued prospective instructions to participants, in order to prevent similar issues from arising in the future.[100]

The DensiFi matter was not decided under competition or antitrust law, but it is not difficult to see how the creation and operation of DensiFi could have led to competition/antitrust issues.

As regards the SDO, in addition to the difficulty of navigating a situation in which part of the membership disagrees more or less openly with the course of action at the SDO, competition or antitrust law issues could also arise if the policing of alliances or consortia leads to inadequate or disproportionate remedies. The SDO could either underreact and allow anti-competitive conduct by the alliance or consortium members to fester or, alternatively, it could overreact and unduly restrict the ability of SDO members to form rival fora for standardization (which is protected under competition or antitrust law). It appears that the DoJ investigation into the DensiFi case, mentioned above, also extends to the manner in which IEEE-SA took remedial action in the case.

These conflicting legal risks for SDOs expose a tension in the public policy approach to SDOs. In pursuit of the public interest, public authorities generally defend both the competitiveness of the overall system, in which stakeholders can choose from a variety of SDOs for their standardization needs, and the openness and balance of standardization processes within each SDO. While both objectives may often be complementary, there can be situations in which competition from alternative standardization fora effectively reduces the openness and balance of standardization processes within an SDO.

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[97] The case originated in a complaint made by a member of the IEEE-SA 802.11 Working Group (WG), relating to the work of the Task Group in charge of developing the 802.11ax standard (TGax). See the Report of the Investigating Officer, IEEE 802.11-16/1519r0, at https://mentor.ieee.org/802.11/dcn/16/11-16-1519 (9 November 2016). On the basis of that report, the IEEE 802 Executive Committee adopted mitigation actions: ec-16-0186-01-00EC, at https://mentor.ieee.org/802-ec/dcn/16/ec-16-0186-03 (8 November 2016). These actions were approved by the IEEE SA Standards Board on 7 December 2016. An appeal against the decision of the Standards Board was rejected on 20 January 2017: http://www.ieee802.org/appeal_decisions/Ericsson_Smith_InterDigital_17_0106/SASB-Appeal-Officers-Decision-20Jan2017.pdf.

[98] As reported on MLex: https://mlexmarketinsight.com/insights-center/editors-picks/antitrust/north-america/doj-probes-role-of-special-interest-group-in-new-wifi-standard (26 January 2018).

[99] "Dominance" is not used here in the same sense as under competition law.

[100] See the "Best Practices for Industry Group Interaction with IEEE 802" (November 2016), available at https://mentor.ieee.org/802-ec/dcn/16/ec-16-0190-00-00EC-industry-group-best-practices.pdf and the proposals for additional guidance (November 2016), available at https://mentor.ieee.org/802-ec/dcn/16/ec-16-0149-00-00EC-2016-nov-proposed-addition-to-chair-s-guidelines-re-participation.pptx.

4.4.2.2 Voicing disagreement from within the SDO

In addition to leaving an SDO, supporting competing standards, and moving parts or the entirety of standardization activities to a break-out group, firms can sometimes resist an SDO policy change while continuing to participate in the SDO's standardization and governance activities. The most prominent example of this strategy is the response of a number of significant patent holding contributors to IEEE's 2015 patent policy change. These companies, including Qualcomm, Ericsson and Nokia, indicated that they are not willing to commit to license their SEPs under the terms and conditions defined by the amended IEEE policy. Nevertheless, these companies continue to contribute to IEEE-SA working groups. Some companies stated that their SEPs are covered by generic letters of assurance issued prior to the 2015 policy change; and some companies have issued "negative" LOAs (letters of assurance), i.e. disclosure statements indicating that they own potentially standard-essential patented technology that is not available for licensing under the terms of the IEEE patent policy (Katznelson 2018; Pohlmann 2017). The IEEE patent policy simply states that "An asserted potential Essential Patent Claim for which licensing assurance cannot be obtained (e.g., an LOA is not provided or the LOA indicates that licensing assurance is not being provided) shall be referred to the Patent Committee."

The recent IEEE experience suggests that it is possible for companies to continue to contribute to an SDO's standardization processes while objecting in principle to some of the SDO's policies (Pohlmann 2019). SEP holders may, under the policies of IEEE and several other SDOs, indicate that they are unwilling to license patented technology on terms they do not wish to offer. If the patented technology is technologically essential or sufficiently superior to alternative technologies, SDO participants may nevertheless elect to adopt standards including that patented technology even without a licensing assurance.[101] Layne-Farrar et al. (2014) model a standardization process in which an SDO's ability to adopt a restrictive patent policy is constrained by the patent holders' outside option to leave the SDO and offer their technology on terms unconstrained by the SDO patent policy, and find that SDO policies that are inconsistent with this "participation constraint" result in socially inefficient outcomes.

These approaches are characteristic of "dissenting" behavior within a group. In addition, dissatisfied stakeholders can also use the governance mechanisms at their disposal (appointment, selection or election of officers) to seek to gain a greater voice in SDO governance matters. Examples of this approach are discussed in Section 5.2.2.3 below.

To summarize, there is a variety of potential competitive limitations on an SDO's ability to impose specific policies on industry participants, which may vary by the stage of technological maturity of a standard.

[101] Of course, if this uncommitted patented technology is not essential to the standard, then the other SDO participants may wish to "design around" it, thus excluding it from the standard. See NAS, 2013, p. 73 ("Working groups may also use disclosure information to choose between different technical alternatives or to mount efforts to design around a certain patented technology").

Table 4.2. – Cooperation and competition among SDOs

Common policies with other SDOs	Coordination with other SDOs	Policies as competitive edge	Compatibility with policies of other SDOs	SDO
n/a	Depends on policy, coordination within CEN	n/a	n/a	AFNOR
n/a	Active in CEN/CENELEC	No	n/a	DIN
No	Follow developments at ETSI, ANSI and ITU	Does not have that effect	n/a	DVB
n/a	n/a	Yes	IPR policy coord with ETSI and ISO/IEC/ITU	ECMA
Same IPR policy within 3GPP	IPR policy coordination very important	Not really	No	ETSI
IEC/ISO/ITU	n/a	n/a	With ISO and ITU	IEC
Open Stand	No	No	No	IEEE
Open Stand	No. Other SDOs are informed.	No, there is no competition	No	IETF
IEC/ISO/ITU	n/a	Compliance with WTO requirements gives edge	With IEC and ITU	ISO
IEC/ISO/ITU	n/a	n/a	With IEC and ISO	ITU
No	With ANSI. Collaboration with IEEE, SEA	ANSI compliance as selling point	Try to look for compatibility with others	JEDEC
Within ISO/IEC	No	No	Look at comparable national organisations	SAC
n/a	With ETSI and others within 3GPP	n/a	n/a	TSDSI
n/a	With IEC	n/a	No. Look for inspiration but act on their own	VITA
Open Stand	Not really	Yes	No	W3C

4.5 Interaction between external constraints

4.5.1 The private perspective: a three-layer model of SDOs

From the perspective of SDOs, the combined effect of different external constraints on SDO governance shapes different SDOs in different ways according to their place in the standardization ecosystem. The analysis of external factors shaping SDO governance thus forms the basis of a typology of SDOs. The traditional approach distinguishes between "formal" and "informal" SDOs. On one hand, designated national or European standards bodies such as AFNOR, DIN, and CEN-CENELEC, face limited, if any, competition from other SDOs in the realm of their designated competencies. These organizations are nevertheless subject to relatively tight legal and vertical constraints. On the other hand, industry-driven organizations such as ECMA, JEDEC and VITA are subject to far fewer hierarchical constraints. They however compete with similar organizations for membership, technological contributions and standard adoption.

Büthe and Mattli (2011) describe two models of SDOs, the "hierarchical" European model and the "fragmented" US model. This categorization is only of limited use to describe the governance with respect to IPR policies in the SDOs that we analyzed. DIN, AFNOR, and CEN fit relatively neatly into the hierarchical model, because they mostly implement the policies defined "above" (at the international level) and concentrate most of their policy making efforts on influencing what happens at the international level. But at the same time, their weight in the international ecosystem is not particularly large, especially in IPR policy discussions. Buthe and Mattli's (2011) finding that the international governance of standardization is dominated by European-based, hierarchical organizations is impossible to sustain in the primarily-ICT focused IPR policy debates. Organizations with significant IPR debates, such as ETSI, IEEE, IETF, and W3C, not only fit less easily into the categorization of "hierarchical" or "fragmented" organizations, they also, for the most part, escape a neat categorization into "European" or "US-based".

For several significant policy changes at organizations that are important for the standards/IPR debate, vertical relationships did not appear to be much of a constraint. First, even the IEEE IPR policy change in 2015, a widely commented change that most observers would probably describe as significant and contentious (see Section 7.x, below), took place within IEEE's corporate governance rules and was approved by ANSI as conforming with its essential requirements (in addition to the Business Review Letter obtained from the DOJ). In the case of an organization like IEEE, these vertical constraints thus apparently accommodate a broad range of IPR policy choices, and leave substantial room for maneuver.

Second, some organizations that have important idiosyncrasies in their governance can decide not to seek any endorsements from ANSI or a similar organization if they already possess sufficient legitimacy and credibility in the eyes of their stakeholders. This is for instance the case of IETF and W3C. These organizations are relatively free of vertical constraints precisely because they also face relatively little competitive pressure. Other, typically smaller, private and informal organizations seek ANSI accreditation or other means of formal recognition to attract members or build support for their standards. Similarly, private and informal SDOs that would generally be free to determine their own policies within broad confines established by general legal principles, voluntarily decide to adopt or copy important policy provisions from established SDOs (such as ECMA using the language of the ISO/IEC/ITU patent policy as IPR policy) to build confidence in their governance.

The vertical relationships with leading entities therefore are most crucial to organizations that are smaller or competing with other organizations. In addition to a pyramidal structure with ISO/IEC/ITU-T at the top overseeing regional and national bodies next to a mass of

competing smaller SSOs and consortia, in our sample, we observe a number of (relatively smaller) organizations subject to both competition and vertical constraints, and a number of important and quite independent organizations that are each relatively focal for what they do (IETF, W3C, IEEE and ETSI). Of course there are interactions between their policies, but it would be difficult to discern a significant tendency towards convergence or isomorphism.

In order to account for these observations, we propose a model with three types or layers of SDOs.

The highest, most stable layer is constituted by the formal and established SDOs, including the large international organizations (ISO, IEC, ITU) and the designated national and regional standardization bodies. These organizations often have significant functions that are shielded from competitive pressure. A significant number of legal instruments confer to these officially recognized bodies a quasi-governmental role and authority with respect to the development of certain technological standards, and the definition of certain principles of standardization policy. At the same time, the exercise of these functions is often controlled by specific national or international legal rules, the official status of the organization and its standards is conditioned on respecting legally defined governance principles, and even the specific procedures of the individual standardization bodies are often specified by the law.

At the bottom layer, no such constraints apply to the large number of informal industry consortia that exist and are created and dissolved every year. These organizations however must attract members, contributors and implementers, and building confidence in the processes and policies of the organization is an important factor for this competition. While the existing literature (Lerner and Tirole, 2006, 2015; Chiao et al., 2007) has analyzed how this competition induces SDOs to grant some categories of stakeholders particularly favorable terms, we observe, instead, that smaller and less authoritative SDOs that need to convince stakeholders of their credibility often revert to adopting policies developed by established and formal SDOs. These SDOs sometimes seek accreditation by bodies such as ANSI or by the national government in certain EU Member States in order to further that end, verbatim adopt the policies of large established SDOs, or submit their standards and specifications to more formal SDOs for approval (e.g. DVB to ETSI or CENELEC).

Between the formally recognized standardization bodies and the more informal and smaller SDOs, there is a layer constituted by several large and significant SDOs, such as IEEE and IETF, that are generally stable and recognized internationally. These organizations receive their authority not primarily from a formal legal designation, but instead from their technical leadership, their installed base of standards and standardization projects, and their established membership. All of these features make it difficult for participants to shift standardization to a new organization and erect barriers to entry for competing organizations attempting to enter their domain of expertise. Because these organizations can develop or modify their policies without the participation of public authorities or civil society, and because such actions are not immediately subject to the sanctions of competitive forces, these organizations have a realistic chance of developing their own, tailor-made policies and processes. At the same time, these organizations can account for technology standards subject to a large number of SEPs. These organizations are therefore often in the focus of the debates on SDO governance with respect to IPR.

However, not all formal and established SDOs fit perfectly within a single layer. ETSI, in particular, as one of the European standardization organisations represents such a case. ETSI shares the features and the behaviour of SDOs from the top and middle layers. Like SDOs in the top layer, ETSI carries out important functions conferred to it by public authorities, in close hierarchical cooperation with other bodies. In the development of harmonized European standards, ETSI decides by national votes that are cast by national

delegations after a public enquiry and weighted according to the weighting schemes that are also used for the decisions of the European Council. In contrast to this process with its elements of public policy, decision making on all other technical specifications follows weighted individual voting of ETSI membership (predominantly consisting in private companies). In its governance processes, ETSI makes policy decisions that share elements with and apply to both the more regulation-oriented process for European standards and the industry-driven processes for technical specifications. A further difficulty resides in the fact that decisions on IPR policies predominantly affect ETSI specifications adopted through 3GPP, a partnership of more or less industry-driven SDOs with its own industry-driven standard development processes. The diversity of these external constraints on ETSI's governance not only makes it difficult to neatly categorize ETSI into a single layer of the model, it also represents a specific challenge for ETSI's governance features.

4.5.2 The Public Perspective: Regulatory Models

The previous section described how external constraints – arising from the law and from the market – can combine to create an SDO ecosystem. From the public policy perspective, the interaction of public authorities with this ecosystem is part of the broader regulatory system. The integration of the standardization ecosystem in the regulatory system follows different regulatory models.

While the prevalent regulatory approach to standardization has evolved over time and differs between countries, we observe several regulatory features that characterize the regulatory approach to SDOs in the EU and the US:

1. Overall regulatory involvement is light-touch, emphasizing **general pronouncements and ex-post involvement**.
2. The prevalent regulatory model is **self-regulation**, whereby public authorities defer or refer to SDO decision making, even though there are significant elements of co-regulation with a more active role of public authorities (involving public delegation to SDOs or collaboration among public authorities and SDOs).
3. The predominantly light-touch regulation allows for **diversity among SDO policies**. Government pronouncements may confer precedential value to decisions of individual SDOs. Nevertheless, circulation of individual SDO decisions more commonly follows an **experimental model.**
4. Public regulation generally follows a **procedural approach**, prioritizing regulation of process over regulation of outcomes.

4.5.2.1 General pronouncements and ex post involvement

As a starting point, that institutional framework can be organized in different ways, depending on the following parameters:

- *Degree of detail in tasking*. Public authorities can set out their vision of the public interest either in general or in more specific terms. General terms could be cast as objectives (e.g. "Broadest diffusion and use of the standard") or principles (e.g. "Non-discrimination"). The public interest could even be simply derived from generally-applicable laws (competition law, trade law, etc.). Alternatively, public authorities could be very specific in the tasks entrusted to the SDOs, as is often the case with EU standardization requests under the New Approach ("Create a working group to develop a standard to replace Standard XYZ in the light of the technological and commercial developments specified below");

- *Involvement ex ante or ex post*. Public authorities can either kick-start the regulatory cycle with an *ex ante* statement, which then triggers the SDO into action, or take a more reactive stance and wait for SDOs to be active before contemplating whether SDO actions are in line with the public interest. This design choice ties in with the previous parameter: presumably, a more specific tasking would be done *ex ante*, whereas *ex post* involvement would be more compatible with a definition of the public interest in more general terms.

From the available literature and from the data we have gathered throughout our research, it is apparent that the institutional framework for standardization – certainly in the ICT area where our research focused – tends to rely on general statements and *ex post* involvement. In other words, it is hands-off and light-touch. This conforms with the emphasis placed on consent, market constraints and expertise in the legitimacy analysis found below in Chapter 6. As long as SDO stakeholders consider that a given SDO enjoys "internal" legitimacy because its activities and decisions rest on consent,[102] since this SDO is subject to market discipline (or supervision by a democratic body) and since this SDO gathers the expertise on its subject-matter, then public policy can go out from a hands-off, light-touch approach that assumes that SDOs activities and decisions are in the public interest unless otherwise shown.

Such a light touch framework brings with it a number of advantages. First, it aligns with the perception of the SDOs and their stakeholders themselves. Throughout our round of case-studies, we have read in SDO documents and heard in our interviews that SDOs are primarily industry-driven, as will be detailed in the next Chapter. Similarly, in our stakeholder survey, many answers evidence that stakeholders consider that SDOs are primarily there to address "internal" industry concerns. In Question 9 of our survey, stakeholders listed "relevance to business" as the most important consideration for joining an SDO, by a significant margin above other considerations. Questions 31 to 34 concerned the role of public authorities in standardization processes. The responses indicate that stakeholders see a small to limited role for public authorities in standardization, focusing on trade and competition policy, as expressed in the governance principles set out earlier. Those results were bolstered by the comments received at the stakeholder workshop, which reflected a strong perception that standardization is industry-driven and derives its legitimacy from the involvement of stakeholders.

Whether that perception is accurate or not can be left open, since our research also reveals that, to a significant extent, the governance principles arising from the application of trade law and competition law have been internalized by stakeholders and have become part of the 'culture' of standardization. In other words, these principles are frequently assumed, without any reference to their legal origins. For instance, a number of participants in the stakeholder workshop stated, in the course of their comments, that it went without saying that standard development needed to be open and transparent. They did not see any other way to proceed. Similarly, during our interviews and at the stakeholder workshop, many statements indicated that the use of consensus decision making is more widespread than the formal documents would lead one to believe: here as well, it has become part of the shared assumptions of the participants.

[102] In that applicable procedures and due process principles have been followed and the outcome is therefore within the scope of what stakeholders agreed to when joining the SDO. At the same time, the legal constraints arising from competition and trade law, as described earlier, affect these procedures and these principles in such a way as to avert – or at least reduce – the risk of conflict with these bodies of law. "Internal" legitimacy is therefore not entirely internal: it arises within the constraints set by law, and accordingly it is appropriate for public policy to recognize such legitimacy.

As to how such internalization could take place, we would venture one explanation, based on our observations. From a public law perspective, the principles of openness, transparency, balance of interests, and consensus, can be seen as governance principles, i.e. constraints on the governance of SDOs. Yet, from a more private law perspective, these principles can also be seen as rights conferred on participants, or put another way, claims against other stakeholders and SDOs. Openness comes down to a right to participate in the activities of SDOs, transparency to a right to information and access, consensus and balance of interests to a right to have a voice in decision-making, etc. Once these principles are translated into perceived rights, they become embodied in the governing principles of the SDOs and they will form part of the legal position of stakeholders.

4.5.2.2 Self-regulation

In terms of regulatory theory, the institutional framework for the SDO ecosystem in the EU and the US comes very close to *self-regulation***.** Industry participants, on their own initiative, identify standardization needs and develop voluntary industry standards. Public authorities, as long as legal constraints are respected and market constraints operate, have a high degree of *tolerance* with respect to SDO activities and decisions; i.e. they consider standardization to be primarily a private and commercial activity and see no need to intervene either in support of the process or to impose restrictions of any kind. This represents a conscious policy choice in many countries (Contreras, 2017; Bremer, 2016; Büthe and Mattli, 2011). Standard-setting serves a complementary function to a more traditional command-and-control regulation where soft norms act to fill gaps left by hard-law (Delimatsis 2015). It allows non-state players to participate in regulating the behavior mostly thanks to their expertise (Senden 2004).

In many instances, public authorities can *defer* to the standardization process; i.e., it considers that the existence of a well-functioning self-regulation mechanism obviates the need for regulation. As noted above, the U.S. federal government expresses deference to privately-developed standards under OMB Circular A-119, which contains an express preference for the use of privately-developed standards over government-developed standards in federal agency regulation and procurement. Government deference to SDOs extends beyond mere technical standardization, as SDO policies create elements of regulation that could otherwise have been created through more explicit regulation. In more limited circumstances, public authorities *refers* to the activities of private SDOs, e.g. by incorporating SSO standards by reference into regulation, from building codes to military specifications, or designating SDOs whose standards can be used in public procurement.

In some instances, public authorities can be more present and engage in a dialogue with SDOs and their stakeholders, bringing the relationship away from canonical self-regulation, and closer to *co-regulation*.[103] Most prominently, in the EU, as noted above, there is a greater degree of public intervention in agenda-setting (even if done in dialogue and collaboration with stakeholders, as with the EU Rolling Plan for ICT standardization) and *ex post* approval of officially-sanctioned standards (European or national).[104] That intervention is usually conceived as a *delegation* to the SDO. Usually, delegation is based on an explicit

[103] For examples of co-regulation in standard-setting, see Weiser (2017), describing, inter alia, the LEED green building standard. According to Weiser (2017), these processes are examples of "New Governance" strategies, where "public and private actors interact in increasingly complex and collaborative ways to address problems of public policy" (Solomon, 2008; citation from Weiser, 2017). The collaborative processes in standard setting described by Weiser (2017) furthermore reflect a form of "network governance", which refers to "decisionmaking processes that are neither hierarchical nor closed and that permit persons of different ranks, units, and even organizations to collaborate as circumstances demand." (Sabel and Simon, 2004; citation from Weiser, 2017).

[104] Under EU law, such official sanction does not render the standard mandatory, but it does confer some form of safe-harbour protection to firms implementing the standard, in respect of the essential requirements identified in the relevant EU legislation.

mandate to a specific organization, with clearly circumscribed scope and explicitly mandated processes. Respect for the scope of the mandate and of the mandated procedural requirements can be subject to judicial review, preserving the public law character of the regulatory process.

There are a number of examples of delegation to SDOs: governments in EU member states and at the EU level routinely task SDOs to develop specific regulatory standards (government is a participant in DIN and AFNOR, at the same level as industry). In Germany and France, government has delegated to DIN and AFNOR the role of developing national standardization strategies. EU Member States designate a national standards body to the EU, in order to represent their national interests at the ESOs. The French government has delegated to AFNOR the supervision of French sectoral standardization bodies (based on AFNOR's review, government issues or withdraws accreditation of these bodies). Such forms of explicit delegation are rare in the US or at the international level.

Despite the presence of such delegation, SDOs such as ETSI, CEN-CENELEC, DIN and AFNOR, as well as their stakeholders, see themselves as industry-driven, much like their counterparts outside the EU.

4.5.2.3 Diversity and coherence

As mentioned above, it is the essence of the SDO ecosystem, from a public perspective, that the public presence is felt through general pronouncements and *ex post* control. When seen against the backdrop of a multiplicity of SDOs, another advantage of that institutional framework becomes apparent: it can accommodate considerable diversity amongst SDOs. As will be explained below in Chapter 6, governance principles – openness, transparency, balance of interests, consensus – are formulated in general terms and are implemented in a number of different ways by SDOs. There is no reason why these principles should receive a single interpretation, all the more if, as outlined above, they are conceived of as creating claims for stakeholders, which other stakeholders and SDOs must address satisfactorily. What is satisfactory in the specific context of one SDO might not be in the context of another. In that sense, it is to be expected that these governance principles will be interpreted and implemented differently from one SDO to the other. Accordingly, there is a certain virtue in generality, in that it allows room to accommodate a diversity of solutions, in a context where, as we heard repeatedly from SDOs and stakeholders, each SDO operates in a specific context.

Of course, there are limits to the diversity of implementations and interpretations: some of them might be outside of acceptable boundaries and aggrieved stakeholders are likely to challenge them. The policing of these boundaries is carried out *ex post*, as set out above, by public authorities. Depending on how claimants frame their challenge, the public authority could be a court, a competition authority, or a trade authority. In the US, in addition, ANSI's processes for re-accreditation of ASDs and withdrawal of approved ANS for cause provide a mechanism for aggrieved stakeholders to request review of the compliance of an SDO's processes with ANSI's essential requirements.

Once an authority steps in, the room for diversity in interpretation and implementation of an SDO's policies is bound to be reduced. After all, the authority interprets a single set of legal norms that apply across the board to many, if not all, SDOs: this could be international trade law, EU law (Regulation 2015/2012), competition or antitrust law or – in the case of ANSI – the Essential Requirements. From the point of view of the authority, the starting point must be that its interpretation of "openness" – to continue with that requirement – will

apply across the board to all SDOs. Of course, the authority can – intentionally or not – anchor its reasoning so deeply in the specific circumstances of a given SDO that the ruling will be difficult to transpose to other SDOs. Failing that, however, the authority cannot prevent its ruling from applying to at least some other SDOs subject to the legal norms in question.

Leaving aside cases where an authority intervenes and diversity is reduced or eliminated, the question arises whether and how the diversity of implementation and interpretation amongst SDOs is to be managed. After all, as highlighted above, SDO pay attention to what other SODs are doing – whether because of competitive pressures or collaborative ventures – and the set of stakeholders is largely overlapping from one SDO to another: almost all patent-centric firms in our survey participate in more than 20 SDOs, whereas the product-centric firms tend to participate in at least 5 different SDOs.

Unavoidably, ideas concerning governance are bound to circulate amongst SDOs. As far as we know, no conceptual model has been put forward as to how such circulation takes place in the specific context of standardization. However, guidance can be sought from the more general literature on the circulation of legal ideas, as found in law and economics, public law and comparative law.

A first model would be precedent, as it exists in legal systems in the common law tradition and to a large extent in the civil law traditions as well. A system of precedent implies that courts are bound by decisions issued by higher courts within the same hierarchy (courts of appeal, supreme court), and that they are open to be persuaded by decisions rendered by courts at the same or lower level, or – to a lesser extent – by courts in related legal systems. The binding or persuasive value of precedent depends of course on the prior decision being applicable on its facts to the current case. This reservation creates some room for courts to escape precedent via careful distinction of earlier cases.[105] While appealing at first sight, the doctrine of precedent is not really suitable for SDOs: whatever hierarchy might exist cannot compare to the court structure, and SDOs do not share the unity of purpose which drives courts to uphold precedent.

Rather, it seems to us that each SDO is firmly in control of its own governance, much as it is in control of its standardization processes. Unless a matter has been decided by a public authority, an SDO can decide for itself and should therefore be free to follow what other SDOs have done or not. As will be seen in subsequent chapters, SDOs pay attention to what other SDOs are doing and try to learn from the experience of other SDOs, but they do so on their own terms. We observe neither total divergence and fragmentation nor unstoppable convergence around unified solutions.

From a public perspective, this would imply a form of experimental model. SDOs have room to experiment in the face of general pronouncements by public authorities that admit of multiple interpretations and implementations. Each SDO can then venture on its own path, but it faces pressure to reach an outcome that is satisfactory to a sufficient number of its stakeholders. Over time SDOs learn from one another, as ideas circulate. They can distill from the experience of other SDOs in order to improve the quality of their own governance. The literature offers a number of variants on this theme, ranging from regulatory competition (Tiebout, 1956 and Easterbrook, 1983) to experimentalist governance (Sabel, 2008 and Weiser, 2017), and including more policy-centered models such as legal emulation (Larouche, 2013). Experimental settings do require a number of pre-conditions to work: it should be clear to all participants that an experiment is taking place, and the requisite

[105] The doctrine of precedent works slightly differently in civil law systems, where the holding of cases – especially higher court cases – tends to be distilled in a legal proposition for precedential purposes, and therefore can become more readily divorced from the actual facts of the case than in common law systems.

mechanisms should be in place to ensure that learning takes place and lessons are drawn (otherwise one simply has a fragmented patchwork of diverging outcomes).

One downside of such an experimental model is that, outside of cases where public authorities intervene to reduce diversity, the SDO ecosystem could very well settle on an equilibrium where many different interpretations and implementations of a single general pronouncement have currency amongst SDOs. For any given SDO, the outcome will depend on its circumstances and possible idiosyncrasies. Public authorities might therefore find it difficult to achieve a greater level of convergence, unless they engage into some dialogue with SDOs.[106]

[106]See for instance the United States Standardization Strategy (USSS): "The U.S. government and industry should strongly and visibly coordinate their work in international forums to promote the consistent interpretation and application of internationally recognized principles on standardization, including those reflected in the WTO TBT Agreement and the Decision on Principles for the Development of International Standards." https://share.ansi.org/shared%20documents/Standards%20Activities/NSSC/USSS_Third_edition/ANSI_USSS_2015.pdf The development of the USSS itself is an example of explicit co-regulation: "The Strategy was developed through the coordinated efforts of a large and diverse group of constituents representing stakeholders in government, industry, standards developing organizations, consortia, consumer groups, and academia. Throughout the process, all the participants expressed a commitment to developing the USSS in a way that was open, balanced, and transparent. The result is a document that represents the vision of a broad cross-section of standards stakeholders and that reflects the diversity of the U.S. standards system." DIN described a very similar process for developing the German standardization strategy.

5 Governance architecture

Highlights

- There is considerable heterogeneity in SDO governance, given the different circumstances of each SDO. There is no one-size-fits-all solution.
- By way of broad categorization, we observed a more leadership-driven model (in particular IEEE-SA, VITA and W3C from the samples examined), and a more membership-driven model (exemplified by DVB, ECMA, ETSI, JEDEC, and TSDSI, ISO, IEC, ITU-T, CEN-CENELEC, DIN, AFNOR and to some extent IETF as well). These two categories map over the formal vs. industry-driven distinction drawn in the previous chapter.
- In most SDOs, members are organisations (mostly commercial firms). ISO, IEC and CEN-CENELEC are made up of national committees. IEEE-SA has a large individual membership (around 7000 members), meaning that the leadership is elected by a more dispersed and less engaged constituency.
- SDOs typically draw board members from their membership. As for permanent staff, both its size and its responsibilities vary considerably from one SDO to the other. The existence of a significant permanent staff, with leadership functions, is a predictor of more leadership-driven governance (observable at W3C, VITA, IEEE SA, DIN, IEC, ISO, ITU-T and SAC). In some SDOs, the staff also drafts policy documents for the organization. Other SDOs put policymaking more firmly in the hands of the board, with a strong membership representation on the board (ETSI, JEDEC, DVB, IETF).
- Some SDOs expect board members to represent a member or stakeholder (usually their employer), making governance more membership-driven. Other SDOs expect these members rather to act in the interests of the SDO or of society at large, which strengthens the autonomy of the SDO towards its membership and makes it more leadership-driven.
- With two exceptions (IETF and VITA to varying degrees), SDOs follow different procedures for policy development than standards. Differences are found in voting rules (more majority voting instead of consensus), different decision-making bodies (the general assembly and the board instead of working groups), eligible participants (formal members instead of any interested party), transparency (generally less than for standards development) and the duties of the participants (more emphasis on duties towards the SDO rather than towards the member). Most SDOs feature one or more of these differences. Yet stakeholders would prefer policymaking to follow processes that provide at least as many procedural safeguards as standard development.
- In some organisations (e.g. ANSI, IETF, ISO), decision-making on policy is shared between different bodies, depending on the subject-matter, whereas in others (e.g. IEEE, ITU-T, VITA), a single body is responsible for all policy matters. In most SDOs, policy matters must move through many bodies (committees and boards); however, the real locus of decision-making varies from one SDO to the other, and sometimes within an SDO from one decision to the other.
- Where the pivotal decision-maker for policy matters is the general assembly (e.g. ECMA, ETSI, and TSDSI), policymaking will tend to be membership-driven. Where the pivotal decision-maker is a board (e.g. IEEE-SA, JEDEC, and VITA), a specific policymaking body (e.g. at AFNOR) or a non-elected director or board (as with W3C), policymaking can be more leadership-driven.

- Most SDOs provide for majority voting for policymaking, with voting thresholds ranging from simple to two-thirds majority. Individual votes are mostly kept secret. Some SDOs (ETSI, DVB) have specific voting rules designed to make it difficult to overrule significant stakeholders or stakeholder categories. Nonetheless, the empirical evidence is that in practice votes are rare, and that policymaking is mostly done on a consensus basis.
- Save for a few exceptions (IEC, ISO), most SDOs offer procedures to issue formal or informal interpretations of policies, although many of these interpretations tend not to be made public. Similarly, all SDOs but one allow for appeals of policy-related decisions. Disputes can also arise as between SDO members, with SDOs showing a strong aversion to intervening in disputes amongst members (with the exception of W3C, VITA and DVB).

Governance feature	Leadership-driven model	Membership/consensus-driven model
Ultimate decision maker	Elected board (DIN, IEEE-SA.. Unelected leadership (SAC, W3C)	General Assembly (DVB, ETSI.. Open processes (IETF)
Voting rules		National aggregation of votes (IEC/ISO/ITU, CEN-CENELEC, ETSI on HS and policies) Votes by category (DVB)
Election process	Staggered tenure (DIN, IEEE) Nomination committee approach (ANSI) Election by dispersed individual members (IEEE)	Board members appointed by members (DVB, JEDEC) Overweighting of relevant stakeholders (ETSI)
Individual duties	Fiduciary duties to organization (IEEE..) Representation of broader interests (ANSI)	Represent membership (ETSI, DVB…)
Organizational form	Activity of another organization (IEEE-SA, W3C)	Activity of its members (DVB, JEDEC, VITA)
Role of staff	Extensive staff (AFNOR, DIN, SAC), significant staff leaders (ANSI, IEEE, VITA, W3C)	Very limited or almost absent (ECMA, IETF)

In Chapter 4, we analyzed how SDO policy choices are constrained and determined by external factors. As discussed, SDO policy choices are sometimes fundamentally shaped by legal constraints, the SDO's formal or informal relationships with public authorities or other organizations (including other SDOs and open source consortia), as well as the SDO's ability to attract and retain members. In many cases, however, decision-making is more significantly determined by the interaction of SDO stakeholders and leadership through the internal institutions of SDO governance. These mechanisms will be addressed in this Chapter.

Much of the technical work within SDOs is carried out by experts working for companies with commercial stakes in technical standard development and the outcome of SDO policy deliberations. These companies bear the major part of the substantial costs of standards development. Companies whose employees participate in SDOs generally expect these individuals to represent the company's interests, and sometimes define specific guidelines or directions that the employees are asked to follow. These expectations may contrast or even conflict with the expectations of SDOs with respect to the behavior and allegiance of individuals participating in SDO decision-making.

In our survey, we asked corporate stakeholders participating in standardization which of four statements best describe the expectations they place on their SDO representatives (n=38) [Q14]. Almost one third (32%) said that they expect them to use their independent expert judgment to pursue the company's goals and strategies. This was followed by 26 % of the respondents which expect them to use their independent expert judgment to represent the interests of their company within the SDO; 16 % of the respondents to use their independent expert judgment to contribute to the general interest; 10 % to liaise with management before taking positions within the SDO. Another 16% said none of the above statements best describe their expectations. This position was often chosen to highlight that none of these exclusively or predominantly describes their expectations because this might depend on the type of decision or the business context. For instance, as noted by one of the respondents, in some cases, the participating company might not have a strong opinion in which case 'the employee uses his or her best judgment'. However, 'in a leadership role', the individual would be expected to work in the best interest of the SDO.

Companies and other stakeholders thus are represented in SDOs by their employees, whom they more often than not expect to represent the interests of the company. SDO members participate in decision-making regarding the SDO's policies and rules directly through vote, and/or indirectly through the election of leadership. There is little explicit analysis of these internal institutions in the academic literature on SDOs. Nevertheless, there is a broader theoretical literature on public choice, which can be usefully applied to SDOs.

5.1 Background: Political Economy of SDO decision-making

Broadly speaking, there are two different theoretical approaches to analyze the relationship between an SDO and its stakeholders. We will see in this Chapter that the empirical reality of SDO governance often combines elements from both approaches.

On one side, it is possible to analyze SDOs as monolithic decision-makers pursuing an autonomous organizational goal, under the constraints imposed by the divergent goals of SDO stakeholders. Chiao et al. (2007) e.g. analyze the interaction between SDOs and "sponsors" of a standard that the SDO may decide to endorse. SDOs differ in the extent to which they are likely to endorse a standard submitted by a sponsor. Less sponsor-friendly, i.e. more autonomous, SDOs are able to request greater concessions from technology sponsors (in the form of more demanding IPR policy restrictions on licensing terms for standard-essential technology), because their endorsement carries greater weight. Empirically, Chiao et al. (2007) analyze SDOs as more "sponsor-friendly" if they have organizational membership (as opposed to individual or national membership), or are self-declared special-interest groups (SIG). Factors associated with greater autonomy of the SDO are consensus decision-making and the age of the SDO. These factors make it more difficult for a stakeholder to gain SDO endorsement of its technology.

This analysis focuses on the relationship between an SDO and a single technology sponsor. In many important standard development projects, and in most SDO policy disputes, there is not a single external stakeholder, but a heterogeneous group of stakeholders with opposing interests. Furthermore, many of these stakeholders are SDO members, and directly participate in SDO decision-making. There is thus not always such a neat distinction between the interests and actions of the SDO and the interests and actions of its stakeholders.

At the opposite extreme, SDOs can be analyzed as heterogeneous groups of actors (e.g. members), that follow pre-determined rules to make decisions as a group based on the votes of individual group members. For instance, in our interviews, IEC representatives viewed their role as 'the administrative organ of the organization', which doesn't 'manage' policy discussion among its members, but only provides a 'platform' for exchange. Similarly,

according to the ECMA representative, '[i]t is like a hotel. I am the director of the hotel and the membership is the hotel guests.' There is a growing body of economic literature analyzing decision-making by groups (also called coalitions), even though it has so far never been specifically applied to SDOs.

A large literature analyzes different voting rules, and in particular compares the efficiency of majority and unanimity decision-making on rules. The predominant view suggests that unanimous decision-making is more likely to produce Pareto-optimal outcomes[107] (Buchanan and Tullock, 1962; Mueller, 2003), because a rule can only be adopted or changed unanimously if it leaves no member worse off than under the status quo.[108] Unanimous decision-making is not adopted in any SDO that we studied. Nevertheless, as we will see, many SDOs have governance processes designed to discourage decision-making against the sustained opposition of a significant group of stakeholders.

Independently of the decision rule, the political economy literature predicts that groups may fail to adopt new rules, even if these rules are beneficial for all members. Acemoglu et al. (2012) find that coalitions or clubs may fail to adopt efficiency-enhancing rules, because some members vote against rules that may improve the organization's performance, if these rules simultaneously weaken these members' influence on future policy revisions. This may be relevant for the analysis of SDOs. Different SDO rules, and in particular different IPR policies, may have an effect on the composition of the SDO membership. Stoll (2014) e.g. finds a substantial decrease in membership at OASIS after a revision of its IPR policy, while "among the new members the share of non-profit research organizations and systems integrators significantly increases in the aftermath of the change." A similar decrease in membership occurred at W3C after it moved to a royalty-free patent policy, though membership recovered thereafter (Contreras 2016a). In contrast, in the years following the adoption of a controversial policy change at VITA in 2006, there was a marked increase in membership with only one notable defection (Contreras 2013a). These examples suggest that changes to IPR policies may have an effect on the future composition of the SDO.

In a recent contribution, Dziuday and Loeperz (2016) analyze dynamic decision-making on rules in a setting in which decisions on rules have persistent effects. They find that groups may fail to adopt efficient rules, and decision-making is characterized by excessive polarization. The reason is that group members are reluctant to make concessions, because they anticipate that decisions are difficult to reverse.

To summarize, SDO governance can be analyzed as an interaction between a relatively autonomous organization and its stakeholder base, or as a form of decision-making by heterogeneous groups of actors participating in organizations with specific rules and procedures for making decisions as a group. As we will see, there are various institutional features of SDOs that determine whether SDOs make their own autonomous decisions, or just aggregate the individual votes of the SDO membership following pre-determined rules.

We highlight the significant role of the legal form of SDOs, the composition of its membership, the distribution of responsibilities among member assemblies, boards, and staff, the election procedures for SDO boards, and the policies describing the responsibilities of individuals participating in SDO policy deliberations as important factors determining to what extent SDOs make autonomous decisions. We find that SDOs are distributed along a spectrum, where at one end SDOs make decisions that are (at least in the short term) autonomous with respect to SDO membership, and on the other end SDOs act as groups of independent actors (members) with heterogeneous interests. In line with

[107] A rule is pareto-optimal if it is impossible to find another set of rules that would be more favorable for at least some members, while leaving no member worse off.

[108] Other theoretical contributions (Dougherty and Edward, 2012) and experimental evidence (Dougherty et al., 2014) however suggest that majority voting on rules is more likely to result in pareto-optimal rules.

the political economy literature, we find that these groups tend to avoid making decisions that are opposed by a significant stakeholder category. As we have seen, the political economy literature suggests that the dynamic nature of decision-making further contributes to reducing the ability and willingness of such groups to make decisions that are potentially controversial among their membership.

5.2 SDO Processes

Several institutional features of SDO governance contribute to determine the extent to which the SDO makes its own decisions as an autonomous organization as opposed to making such decisions by stakeholder consensus. These features can be summarized as (1) the SDO's form and mission, (2) the status of SDO staff and boards, (3) the formal procedures for policy development, and (4) rules for dispute resolution.

5.2.1 The SDO's form and mission

5.2.1.1 The legal form

The majority of the 17 SDOs studied in this project are non-governmental organizations. The exceptions are SAC, which is a Chinese governmental agency,[109] and ITU, which is an intergovernmental organization. Of these non-governmental SDOs, most are incorporated as legal entities in a particular jurisdiction, with the exception of W3C and IETF. Among those SDOs that are incorporated, all the SDOs have the status of non-profit organizations in their respective jurisdictions. AFNOR has the additional status of an 'organization recognized in the public interest' under French law ("Reconnaissance d'utilité publique").

W3C operates as a contractually-defined activity of four host institutions: the Massachusetts Institute of Technology (MIT), the European Research Consortium for Informatics and Mathematics, Keio University and Beihang University. Most of W3C's administrative functions are centralized at MIT. IETF conducts its work as an organized activity of the Internet Society (ISOC), a tax-exempt District of Columbia non-profit corporation, which also provides financial support to IETF. Despite its connection to ISOC, IETF maintains a separate governance structure which is largely selected by the IETF community, broadly defined. Likewise, the IEEE Standards Association (IEEE SA) is an operating unit of the Institute of Electrical and Electronics Engineers (IEEE), the professional association for the electrical engineering profession. IEEE does not intervene in the daily business of IEEE SA, but the IEEE's governing board can deliberate on IEEE SA policy matters.

Incorporated organizations have a certain degree of autonomy; and their boards have fiduciary duties towards the organization (unlike informal consortia, which are purely instruments of their membership). At the same time, incorporated organizations have to protect the interests of their members. Some organizations are more removed from stakeholder influence, because they are organized activities of other organizations. This is most clearly the case of a governmental agency such as SAC. To a lesser extent, W3C derives some autonomy with respect to members and other corporate stakeholders from the fact that it is an activity of the host organizations, which bear the ultimate responsibility for W3C decisions. The W3C Director, who is responsible for the 'direction of the Consortium', is appointed by MIT, one of the host institutions.[110] The remaining three host institutions appoint three Deputy Directors.

Similarly, IEEE SA derives some autonomy with respect to its own membership and stakeholders from the fact that it is a part of IEEE, an engineering society with a long

[109] Though unique in our study, there are other national SDOs in other countries that we did not study.
[110] See https://www.w3.org/2009/12/Member-Agreement (Sec 4d)

history and a broad individual membership base. When IEEE SA's 2015 policy change met substantial resistance from a significant group of IEEE SA stakeholders, the IEEE SA Board of Governors voluntarily submitted the policy to the IEEE Board of Directors for approval; and relied on the broad approval by the IEEE Board of Directors as a significant factor for the legitimacy of the controversial decision. Furthermore, while board members at IEEE SA, as in many other SDOs, are volunteers and not paid by the organization, IEEE SA places particular emphasis on the fiduciary duty of these individuals towards IEEE as an organization. For instance, the managing director of IEEE SA is also a member of the Management Council of IEEE. This 'dual position', according to our interviews, creates a broader duty on his/her side toward 'the entire organization'.

5.2.1.2 The type of SDO membership:

All SDOs in our sample except IETF and SAC are membership-based organizations in which firms, individuals or other organizations obtain some formal legal status as members of the SDO with appurtenant rights and obligations. At most SDOs, members must comply with the organizations' rules and procedures, as well as other membership criteria in order to preserve their membership. Every organization with membership allows its members to terminate their participation. In such cases, however, the members usually have some residual obligations, such as payment of remaining membership fees and, in particular, continued observance of licensing declarations or commitments vis-à-vis their copyrights and patents.

There is significant variance among SDOs in terms of membership types. Several SDOs have individual members along with organizational members (e.g. ANSI, ETSI, VITA, IEEE). AFNOR and W3C permit individuals to join, although membership is meant primarily for organizations.[111] At CENELEC, individual representation is technically permitted, but this appears to be a historical artifact and is not currently used. On the other hand, many SDOs only allow organizations to join (e.g. JEDEC, TSDSI, DIN, ECMA). IEC, ISO and CEN-CENELEC only allow national members, such as national committees, as their members. ITU is an inter-governmental organization and agency of the United Nations and its membership consists of Member States. In addition, the divisions of ITU (ITU-T, ITU-R, ITU-D) have sector members, including international organizations (e.g. EU), national public administrations and private companies. IETF has no formal membership structure, and permits any individual with an interest in IETF's technical work to participate, subject to compliance with IETF's policies and rules. SAC, as an agency of the Chinese government, does not provide for non-governmental membership.[112]

Usually the membership structure of the SDO influences other forms of participation. At organizations such as CEN-CENELEC, in which membership is limited to national committees, the SDO tries to ensure openness by permitting participation by non-member stakeholders in the work of the organization. In some SDOs, these non-members may also have more formalized roles as partners or liaison organizations.

[111] The case at AFNOR is mainly theoretical: the only individuals who enjoy membership are in reality the past Chairmen of the Board who are granted the title of honorary members ("membres d'honneur").

[112] This being said, as reported by a representative of SAC, although SAC does not have the usual SDO membership, each technical committee (TC) has its own membership. Each TC will recruit members who are willing to join the TC at the time of establishment or change of the committee, and the TC will then submit the list of institutions that have applied to join or remain to SAC. Upon approval of the list, SAC will issue a certificate to each representative of organizations (stakeholders) certifying the representative's organization's status (general membership, chair, secretary, etc.) and tenure in the TC. SAC has specific rules about the responsibilities and obligations of every member of its TCs.

Organizations with a national or regional focus may limit their membership to firms having operations with in their country or region. For example, both ETSI[113] and ANSI[114] limit full voting membership to firms based in Europe and the U.S. respectively. This being said, in today's global economy, these distinctions may be increasingly meaningless, as multinational firms operate in a multiplicity of jurisdictions and both ETSI and ANSI have significant voting members that are headquartered outside of their core regions. TSDSI offers a different category of membership to firms without a presence in India. These non-domestic members have limited rights with respect to governance of the organization.

Several SDOs divide members into categories beyond geography (e.g. ANSI, ETSI, VITA, DVB, TSDSI, IEC, ECMA). These categories serve different purposes. In some industry-specific SDOs such as DVB, membership is limited to categories associated with various roles in the industry, e.g. manufacturers or infrastructure providers. Some SDOs formulate explicit policies requiring a balance of different categories of interests to be represented (Baron and Spulber, 2018). Membership categories can support this goal. At DVB for example needs to be endorsed by a majority of members within each category in some cases.

In addition to member categories, many SDOs, such as ETSI and IEC, offer tiered membership to allow members to self-select into the kind of membership that best reflects their interest in the SDO's work – be it to merely observe, participate at a technical level, or also participate in organizational governance and voting. Lower tiers are usually associated with fewer rights, e.g. no right to vote on governance issues, but also lower fees.

Several SDOs use this strategy to attract broader participation. For example, IEC offers different form of affiliation in order to engage countries that do not have a strong interest and/or means to work on standardization. On the other hand, SDOs such as AFNOR, DIN and W3C have a single membership tier, but different fee structures based on the size of the member (as measured e.g. by number of employees). While several SDOs thus adjust membership fees according to measures of firm size, in our sample only ETSI weights member votes according to the importance of the firms' sales in the industries affected by ETSI standards. This feature, which emphasizes the influence of the commercially most relevant stakeholders, applies to ETSI's decision-making on technical specifications and the election of board members, but not to changes to ETSI's policies.

Some SDOs also use membership categories to shape the make-up of the organization. VITA has a specific category for individuals, who are offered free membership because of their expertise and previous work.

The type of SDO membership and membership categories determine the extent to which SDO governance is driven by stakeholders (see also Chiao et al., 2007). In SDOs with national representation, such as ISO, IEC, ITU-T, CEN and CENELEC; stakeholders usually participate only indirectly, by participating in the definition of the national positions taken by the national members of the international SDOs (typically national standards bodies, or national committees). On one hand, this indirect participation may contribute to particularly consensus-oriented policy development, because the individual positions represented within the SDO already represent a national position balancing opposing interests at national level. On the other hand, staff or board members of such organizations may acquire a larger role in the definition or interpretation of the SDO's policies, because the stakeholders primarily affected by these policies can only indirectly participate and influence these decisions.

[113] Section 6.4 of the ETSI Statutes provides that "Full Members shall be established in a country falling within the geographical area of the European Conference of Postal and Telecommunications Administrations (CEPT)."

[114] With respect to ANSI members, ANSI limits voting rights to entities that are "created under the laws of the United States or any State thereof". ANSI Constitution and Bylaws, Secs. 2.01.3, 2.07 (2015).

However, sometimes, such as at IEC, stakeholders might be active as board members of an SDO.

Other SDOs only allow for individual membership, or reserve important prerogatives to individual SDO members. At IEEE SA for example, elections for the IEEE SA Board of Governors are open to individual membership, as opposed to a general assembly of organizational members. Currently, there are approx. 7,000 individual members with the right to vote, and in the estimates of the IEEE representative participating in our interview, approx. 20% of these members effectively vote in governance board elections. As compared to SDOs with organizational membership, board members are thus elected by a constituency that is more dispersed and less engaged in SDO governance; reducing the extent to which these board members have to satisfy stakeholder expectations.

In contrast, many other SDOs' membership consists of companies with direct commercial stakes in the SDO's standards. These SDOs are potentially more directly responsive to stakeholder interests. Nevertheless, many of these SDOs actively encourage participation of a diverse set of interests. SDOs facilitating the equal participation of entities without immediate and significant commercial interests at stake (e.g. through reduced membership fees for universities or SMEs) have a more diverse constituency, and are less under the influence of direct stakeholders. Other SDOs however reserve lower membership tiers for these entities, or give larger weight to the votes of larger companies. These SDOs thus are potentially more responsive to the interests of the most significant commercial stakeholders.

5.2.1.3 The mission statement

Most SDOs have a written mission statement describing the SDO's goals and operating principles. In general, SDOs seem to consider a broad range of social and technological objectives in their work. CEN-CENELEC and ETSI, in this context, distinguish between industry-initiated and European (harmonized) standards that are mandated by the European Commission. While the latter contribute to implementation of the law and spell out critical issues such as safety, the former primarily facilitate market integration, in particular the internal market goals of the European Union. Similarly, TSDSI was established to ensure that Indian requirements are addressed by global telecom standards. IEC also sees its role in taking into account interests of global societies. It claims to support 12 of 17 UN sustainable development goals through its standardization work. ITU-T states that it works for the public good and considers, in particular, the special needs of developing countries.

For pure industry-based SDOs, such as VITA, JEDEC and ECMA, the public interest is mentioned only occasionally as an underlying goal of the SDO. Instead, these SDOs emphasize technical aspects of their work. In general, the perception seems to be that SDOs might support the public interest, inasmuch as it is served by the development of robust technical standards.

As to specific issues related to broader public and social goals, IETF and W3C have dealt with privacy considerations in their work. W3C has also identified accessibility, e.g. in terms of the World Wide Web's ability to process less widespread languages, as an important issue. For DVB, copyright, consumer rights and objectives of the European television and audiovisual markets are taken into account. DIN and ETSI emphasize innovation and consumers.

In principle, a specific organizational mission enshrined in SDO policy documents could strengthen SDO legitimacy to make decisions as an autonomous organization in pursuit of a goal that is common to the SDO's members. In instances of controversy, SDO leadership can refer to its role as custodian of the common interest in pursuit of the organization's mission to overcome opposition of individual SDO members or categories of members. Nevertheless, our interviews suggest that SDOs make little reference to their mission

statements. While some SDOs, and in particular IEEE, emphasized public policy goals of the organization as important objectives of their policy-making, these policy goals are not codified as a mission statement in the SDO's policies and procedures. Other SDOs, such as JEDEC, explicitly stated that the mission of the organization is to serve the interests of its members.

SDO	AFNOR	ANSI	CEN-CENELEC	DIN	DVB	ECMA	ETSI	IEC	IEEE SA	IETF	ISO	ITU	JEDEC	SAC	TSDSI	VITA	W3C
Membership based?	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	not at SAC level, but yes at technical committee level	yes	yes	yes
Constituency	Organizations and individuals (rare)	Organizations, individuals, SDOs	National committees	Organizations	Organizations	Organizations	Organizations	National committees	Organizations and individuals	-	National committees	Member States / Sector member: Organizations	Organizations	-	Organizations	Organizations	Organizations and individuals (rare)
Categories of members	no	yes	no	no	yes	yes	yes	yes	yes	no	yes	yes	no	-	yes	yes	no
Scope	General / national	General / national	General [CEN] + Electrotechnical [CENELEC] / regional	General / national	ICT / global	ICT / global	ICT / regional	Electrotechnology / global	Electrotechnology / global	ICT / global	General / global	ICT / global	Microelectronics / global	General / national	ICT / national	ICT / global	ICT / global
Legal form	Non-governmental	Non-governmental	Non-governmental	Non-governmental	Non-governmental	Non-governmental	Non-governmental	Non-governmental	Non-governmental	None	Non-governmental	UN agency	Non-governmental	Governmental agency	Non-governmental	Non-governmental	None (Consortium of individuals)

Table 5.1 – SDO legal form and membership

5.2.2 SDO staff and boards

5.2.2.1 Different types of SDO leadership

SDO leadership consists of individuals who are empowered to lead the technical and policy agendas of the organization, make certain decisions regarding the organization, convene or lead meetings, and oversee the financial and business aspects of the organization. In many cases, the holders of leadership positions are drawn from the SDO's membership, while at other SDOs full-time staff hold leadership positions. In many cases, SDOs use a combination of member plus staff-based leadership. The staff- or board-driven SDOs create more space for the steering work of individuals than membership-driven organizations that give most of the actual powers to general assemblies.

Once individuals are selected for leadership positions, they are typically expected to represent the interests of the SDO. At DVB, the Steering Board sets the overall policy direction and handles its coordination, priority setting and management, approves DVB specifications and offers them for standardization to the relevant international standards bodies. According to the DVB Memorandum of Understanding, the Steering Board has a maximum of 51 elected representatives with the pre-defined seats for following constituencies:[115] 14 Content Providers/Broadcasters (public and private); 13 Infrastructure providers (satellite, cable, terrestrial or network operator); 17 Manufacturers/software suppliers; 7 Governments/national regulatory bodies.

At JEDEC, "[t]he board is responsible for the policies of the organization and for review of technical proposals, or technical ballots from our committees, from our technical committees, to ensure that the procedural due process has been met." Seats on the Board are thus occupied by Directors representing individual firms. Once elected to a seat on the Board, the firm maintains its position until the seat is voluntarily relinquished.

At the majority of SDOs in our sample, the *member leadership* positions are not paid (e.g. DVB, CEN, CENELEC, IEEE, IETF). It is useful to recall the example of W3C, which was created as a response to IETF's governance limitations. The goal was to establish an SDO with faster processes than IETF.[116] One of the key features of W3C in this regard was not only more power concentration with leadership, but also the paid character of work undertaken by the staff. IETF, on the other hand, relies on non-paid volunteers who are company or self-supported.[117]

Many SDOs employ full- or part-time paid staff that facilitate the day-to-day operations of the SDO. Staff often fill secretariat, website, meeting planning, and technical support roles. In some SDOs, such as ANSI, IEEE and VITA, staff hold high-level managerial positions usually designated by titles such as chief executive officer, executive director or managing director. These staff positions are often highly compensated.[118] Staff leadership of SDOs can be quite influential with respect to the SDO's external communications, operations, agenda and processes. In many cases, staff leadership interact closely with member leadership to manage the organization.

Nevertheless, the responsibilities conferred on SDO staff vary considerably among SDOs, as does the size of SDO staff. DIN for example employs approximately 400 individuals, whose responsibility it is to ensure that DIN policies are followed in standards development. This staff also play an active role in the development of standardization processes and policy

[115] See https://www.dvb.org/resources/public/documents_site/dvb_mou.pdf
[116] (Greenstein 2009, p. 237).
[117] See https://www.ietf.org/proceedings/67/slides/newcomer-0.pdf
[118] E.g., according to its 2016 IRS Form 990, ANSI's CEO received total compensation in 2016 of approximately US$1.75 million.

documents, as "they are the experts in standardization" (according to our interviewee from DIN). At other SDOs, many of these tasks would be carried out by volunteer participants. IETF for example does not have its own employees, though a full-time ISOC employee serves as the IETF Administrative Director (IAD) and numerous other administrative functions are outsourced to an external association management firm. Even so, a significant portion of the IETF standards process is run by volunteer participants.

In almost all SDOs, SDO staff can provide some form of administrative and technical support, including in the course of policy development. Most SDOs have legal counsel providing legal advice on policies (at W3C, the staff may also involve the legal counsel of the host institutions). SDO staff may act in a secretariat role in governing bodies (e.g. at CEN-CENELEC). This secretariat role encompasses purely administrative tasks but may also confer the SDO staff the responsibility to ensure that policies are in accordance with other rules.

The existence of a significant full-time staff, including staff positions with leadership functions, is a significant factor explaining why some SDOs are more autonomous in their decision-making with respect to members and stakeholders than others. This is most clearly exemplified by the contrast between W3C, where the executive director holds the highest leadership position, and IETF, which has almost no staff of its own. VITA and IEEE SA are other examples of SDOs with powerful staff leadership positions. DIN, IEC, ISO, ITU-T and SAC all have significant staff, both in terms of numbers and prerogatives. At DIN, while technical standardization is mostly carried out by individuals participating in DIN committees on behalf of stakeholders, most policy functions are carried out by DIN staff who are seen as holding expertise with respect to standardization procedures, and representing the interests of DIN and the entirety of its stakeholders. These SDOs can more easily develop an autonomous organizational policy than SDOs that rely on volunteers seconded by SDO members or stakeholders for almost all their operations.

5.2.2.2 Role of staff in defining the SDO's policies

SDOs differ in the extent to which staff take an active role in defining the SDO's policies. While staff members usually do not have the right to vote, they often participate in SDO meetings and provide input. At JEDEC, the board may solicit input from staff depending on the type of technical expertise required (e.g. legal implications or financial implications). At W3C, staff members do not vote, but can raise support for a proposed policy. "We do not vote. We encourage members to express their opinion. We might say we think this is a good thing, please vote for it if you agree."

In some SDOs, the staff may draft the actual policy documents submitted to the governing bodies for vote. At DVB, generally the project office prepares the text of a policy. At IEC, the staff members "tend to be the ones preparing the drafts, based on the input that we receive. We'll be the ones wordsmithing, if you wish, but it's the members that will decide on the final policies."

At IETF, the IAD facilitates the process of policy development and often prepares drafts of documents in coordination with legal counsel. In a very different organizational setup, W3C has given a significant role to the W3C team (which includes attorneys), and the W3C executive director is the ultimate authority for decision-making.

5.2.2.3 Procedures for election of boards

While SDO staff holds influential positions with the ability to determine SDO policies in some SDOs (DIN, SAC, W3C), and staff participates in policy development in various functions at most SDOs, a larger number of SDOs relies on elected boards for making fundamental policy decisions. While boards are generally elected by SDO membership, the specific rules

and procedures for the election of boards crucially determine the degree of independence of the board with respect to SDO members.

Some SDOs have rules for the election of boards that give a particularly strong representation to significant SDO members. In ETSI, this takes the form of weighing votes in according to members' Units of Contribution,[119] which is effectively the size of the membership fee. This applies to approval of ETSI Standards (excluding harmonized European standards), , but also to election of officials, Board members and the Board chairman. [120] At JEDEC, individual members of the Board of Directors are directly appointed by companies that are most actively involved in the SDO. Only firms paying maximum dues and having an identified representative on two or more committees for at least the past two consecutive years, may nominate one candidate for Board membership. Moreover, once elected to a seat on the Board, the firm maintains its position until the seat is voluntarily relinquished.

VITA's Board is partly composed by Sponsor Directors who are appointed by so called Sponsor Members. The main difference between sponsor and regular members is their contribution (3,000 vs 25,000 USD) which translates into their ability to appoint a Director to the VITA's Board.[121] VITA's Board consist of at least three directors: an elected Executive Director, one or more sponsor-appointed Sponsor Directors and number of additional Elected Directors as determined by the Board.[122] The Board of Directors has a sole discretion, when to hold an election for additional directors. Moreover, a majority of the directors can create an Executive Committee, consisting of two or more directors, including the Executive Director. The Executive Director acts as a CEO of VITA and has general supervision, direction, and control of the activities and staff.

In other SDOs, the election process of the board gives less power to significant stakeholders. At DVB, the members of the Steering Board are elected by consensus of the general assembly if possible, otherwise by vote. Members of the general assembly vote by particular constituencies. No member can have more than one representative.[123] The Board elects a chairman who holds office for two years and who may be reelected.

In IEEE SA, the Board of Governors is elected by individual IEEE members as opposed to corporate stakeholders. The Board is thus elected by a constituency that is more dispersed and less immediately impacted by SDO decisions than the SDO's organizational members and corporate stakeholders. Furthermore, there is a structure of overlapping tenures of Board members, whereby in each election one new board member is elected by membership, and one new board member is appointed by incumbent board members. The Board of Governors appoints the members of the IEEE-SA Standards Board, the body that oversees IEEE-SA standardization processes.

DIN has a procedure whereby incumbent board members participate in the selection of new board members.

Other SDOs such as ANSI and IETF use a "nominating committee" approach, in which an appointed group selects qualified individuals (often meeting certain requirements specified in the SDO's written policies), either to stand for election or for direct appointment to a governing body.

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[119] See http://www.etsi.org/membership/fees

[120] It does *not* apply to amendments to ETSI IPR policy, which is adopted by the General Assembly using weighted national voting mechanism. Moreover, even ETSI IPR Guide might be adopted by the General Assembly. For more discussion see Chapter 5.2.3.2.

[121] See https://www.vita.com/MembershipBenefits

[122] See https://www.vita.com/resources/Documents/Policies/VITA%20Bylaws%202016%20Final.pdf (Sec 4.3)

[123] See https://www.dvb.org/resources/public/documents_site/dvb_rules_and_procedures.pdf

As perhaps the starkest example of autonomous SDO leadership, at W3C, stakeholders have no direct influence on the selection of the Director, who is appointed by one of the founding hosting organizations. Therefore, the Director is arguably more autonomous in the decision-making and can afford to make controversial decisions (e.g. a decision to incorporate DRM into HTML5 technology despite vocal objections by some commentators).[124]

It is worth noting that even in SDOs in which corporate stakeholders do not directly elect or appoint members of the governing body, such stakeholders may seek to gain influence over the decision-making authority of the SDO by seeking to win seats on the governing body through the prescribed electoral or appointment process. Contreras (2014) observes the rapid acquisition of leadership positions in IETF by Chinese firms (relative newcomers to IETF) through a deliberate strategy of hiring existing IETF veterans away from long-term IETF corporate participants. More recently, employees of two of the companies that objected to IEEE's 2015 IPR policy amendments have sought to join the IEEE-SA Board of Governors through its electoral process (even if board members are under a fiduciary duty to the institution and do not represent the views of their employers, as discussed in the next heading).[125] Thus, corporate stakeholders can seek to exert influence even in governance structures in which they do not have express voting authority.

5.2.2.4 The role of individuals participating in SDO Activities

AFNOR	ANSI	CEN-CENELEC	DIN	DVB Project	ECMA	ETSI	IEC	IEEE SA	IETF	ISO	ITU	JEDEC	TSDSI	VITA	W3C
Member entity	ANSI and member category	CEN; in adv. group: member	Member entity	Member entity	Member entity	Member entity; on the board: ETSI	Council board: IEC community	IEEE / personal capacity	Indivdl. partici-pant	Member entity	Member entity	Both member entity and industry	Member entity	Member entity / individual	Member entity; in some cases on adv. board: W3C

Table 5.2 - Individuals participating in SDO activities are expected to speak on behalf of…

While some tasks with respect to SDO policy development are carried out by paid SDO staff, many SDOs rely on the participation of individuals who are paid and employed by SDO stakeholders. These individuals may serve on SDO boards, participate in member assemblies, serve in ad-hoc bodies or otherwise contribute to the revision, discussion, and approval of new or modified SDO policies. Different SDOs have different expectations regarding the allegiance of individuals participating in decision-making on SDO policies.

Many SDOs expect participating individuals to represent a member organization, or another organization with recognized interests in the SDO's work. This is for instance the case at AFNOR, DIN, DVB, ECMA, ISO, ITU-T, and TSDSI. At DIN, everybody participating in the SDO needs authorization from a recognized organization. AFNOR requires all participants to shed light on which stakeholder they represent. At DVB, an individual who is no longer employed by a recognized organization will be replaced by another individual from the same organization. At ECMA, individuals expressly represent member companies. Only

[124] See https://arstechnica.com/information-technology/2017/07/over-many-objections-w3c-approves-drm-for-html5/ See also Contreras (2016a), discussing W3C leadership model.

[125] See https://www.ieee.org/about/corporate/election/standards-association-board-of-governors-members-at-large.html

exceptionally, particularly knowledgeable individuals may be invited to participate as invited experts in an individual capacity.

Other SDOs explicitly require that all individuals participating in decision-making on SDO policies act in an individual capacity or represent the SDO's interests. This is for instance the case at IEEE-SA. Regarding questions of SDO governance, it is "strictly forbidden" that individuals represent their employer's or a stakeholder's particular interests. IEEE governors, presidents and directors also have a fiduciary duty to IEEE under applicable corporate laws.

In several cases, individuals elected to governing bodies are asked to represent the entire organization or the entire community. At CEN-CENELEC, individuals sitting on governing bodies are required to represent the SDO and speak on a personal basis, even if they are employed by a member. Individuals participating in advisory groups however sit as representatives of a member organization. At IEC, members of the Council board are elected as individuals, and are asked to represent the entire IEC community, and not one particular national committee or industry. At ANSI, members of the ExSC "should, to the extent possible, represent the broadest interests of all standards developers and/or users. Next in order of priority, members should represent their assigned interest category [i.e., Organization Member, Company Member, Government Member, Consumer Interest Council, member-at-large] rather than their employer's specific interests".[126]

Several SDOs adopt mixed approaches. At W3C, individuals participate in governance questions as member participants. In some cases however, on the advisory board, they may be asked to speak for W3C and not from a specific member perspective. At JEDEC, individuals are appointed by member companies to sit on the board. Board members and members of ad hoc groups tasked with policy development speak both in their individual capacity and as representative of the member. In our interview, JEDEC identified this question as "one of the great dilemmas in the trade association business". In their view, 'when you're drafting a patent policy, the primary emphasis is going to be on the interests of the industry and the organization rather than your own individual company'. However, it is almost impossible for individuals of companies to 'to withdraw themselves from their own company interests and focus instead on the interests of the industry'.

At VITA, voting is on an individual basis (each individual vote is counted). However, individuals represent their employer's interests. Each sponsor member can appoint an individual to sit on the board of directors. These individuals are vetted to ensure that their agenda fits with the objectives of the stakeholder. VITA can turn down applications for sponsor membership, and offer regular membership instead, to companies or organizations that do not reflect the objectives of VITA.

At IETF, participation is entirely on an individual basis. Nevertheless, there is no policy against representing a company's interests or making contributions on behalf of the company. Officially, every individual participant's contribution is treated the same, regardless of whether it represents an individual opinion or a company's interests.

Policies defining obligations for individuals participating in policy development to take into consideration the interests of the SDO or society as opposed to the interests of an individual SDO member or stakeholder strengthen the autonomy of SDO decision-making with respect to the SDO membership or stakeholder base. Policies explicitly requesting individual participants to represent an SDO member or recognized SDO stakeholder on the other hand

[126] ANSI ExSC Operating Procedures art. 1. https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/2015_ANSI_ExSC_Operating_Procedures.pdf

strengthen the extent to which SDO decision-making reflects the interests and expectations of SDO membership.

5.2.2.5 Survey Results - SDO Leadership, Staff

Our survey posed several questions relating to participant perceptions regarding the role and effectiveness of SDO management and staff. Only 17% and 18% of respondents said that SDO staff or elected SDO boards, respectively, would adequately represent their interests in SDO governance, as opposed to 47% who felt that SDO staff and elected boards would *not* adequately represent their interests (n=36, 34) [Q21]. In contrast, 38% and 41% of survey respondents felt that trade/industry associations and firms in the same industry (e.g., competitors) *would* adequately represent their interests in SDO governance (n= 39, 37) [Q21]. These findings suggest that some SDO participants believe that SDO staff and boards, unlike industry associations and peer firms, may act in a manner that is not directly aligned with their corporate interests. It is interesting that even though SDO boards are typically elected from the membership, survey respondents generally viewed boards and paid SDO staff as equally unresponsive to stakeholder interests.

Table 5.3. – Decision-making and role of staff

Drafting work done by staff (policies)	Some staff leadership is paid	Designation of executive	Ultimate decision-making power	Number of staff	Own entity	SDO
n/a	No	n/a	Elected board / balanced group	220	Yes	AFNOR
Yes	n/a	n/a	Balanced group	100	Yes	ANSI
Yes (upon request)	No	Election by Membership	Member assembly	80	Yes	CEN-CENELEC
Yes	Yes	Appointment by a proxy	Elected board	430	Yes	DIN
Yes	Yes	Election by Membership	Elected board MoU: member assembly	5	Yes	DVB Project
n/a	Yes	Elected by Membership	Member assembly	n/a	Yes	ECMA
Yes (upon request)	Yes	Elected by Membership	Member assembly	n/a	Yes	ETSI
Yes (upon request)	Yes	Elected by Membership	Council (	n/a	Yes	IEC
Yes	n/a	Appointment & Election by Membership	Elected board	80-90	Yes	IEEE SA
Yes	No	Appointment by a proxy	Working group / IESG	1	No	IETF
n/a	n/a	Elected by Membership	Member assembly/council/ board	135+	Yes	ISO
No	n/a	Appointment & Election by Membership	Member assembly	700+	Yes	ITU
Yes	No	Nomination & Res. Elections	Elected board	6	Yes	JEDEC
No	Yes	n/a	National Congress/ Top Leaders	200	Yes	SAC
n/a	Yes	n/a	Member assembly	5	Yes	TSDSI
	Yes	Appointment & Election by Membership	Elected board	3	Yes	VITA
Yes	Yes	Appointed by a founder	Director	62	No	W3C

5.2.3 Processes for policy development

Most of the SDOs studied reported changes to their policies in recent years, and all of these SDOs have basic rules and procedures for making such changes. Some SDOs (IEEE, IETF, JEDEC, VITA, and W3C) made changes to their IPR policies that they described as significant and subject to an important and controversial stakeholder debate. Nevertheless, such significant changes are rare events, while smaller changes can occur at much greater frequency. IEEE reports 95 to 100 approved material policy changes over the last 10 years. At JEDEC, this number was estimated to be between 10 and 20.

Some SDOs that we interviewed specifically stated that frequently revising SDO policies is a good practice. At DVB, the organization's approach to its policies is to respond to issues as they occur, as opposed to trying to conceive of every possible issue in advance. At VITA, we were told, it is "part of the job of the executive director […] to continuously review policies and see if there's anything that needs to be updated, or fixed, or added, or deleted."

In this section, we discuss the processes that different SDOs use for these major or minor modifications to their policies. Similar to SDO form and mission and the status of SDO staff and leadership, these processes influence the extent to which SDO decisions on policies are responsive to the interests of the parties with immediate and significant commercial stakes in the SDO's standards, or reflect an autonomous position of the SDO as an organization. Whereas many SDO processes are oriented towards reaching a consensus among significant SDO stakeholders, other SDO processes are designed to facilitate decision-making even in situations where these decisions are opposed by significant SDO stakeholders or stakeholder categories.

5.2.3.1 Processes for policy development as compared to standard development

Table 5.4. - Are the same processes used for policy and standards development?

AFNOR	ANSI	CEN-CENELEC	DIN	DVB	ECMA	ETSI	IEC	IEEE SA	IETF	ISO	ITU	JEDEC	SAC	TSDSI	VITA	W3C
No	n.a.	No	No	No	No	No	No	No	Yes (for major changes)	No	No	No	No	No	Yes	No

In the majority of SDOs, the processes for adopting and changing SDO policies and rules differ significantly from the processes for standards development. There are two notable exceptions, IETF and VITA. These two SDOs indicate that they use the same processes for developing standards and major policy documents (minor policy revisions and/or guidance documents may be adopted in a more streamlined fashion by the management body or staff). In the remaining SDOs, the processes for adopting policy documents and standards differ in various respects:

First, the general nature of decision-making can fundamentally differ between the two processes. Many SDOs strive to adopt standards by consensus decision-making. By contrast, it is more common that decisions on policy are taken by vote. At IEEE-SA for example, standards are adopted by consensus.[127] By contrast, the Board of Governors of IEEE-SA makes decisions on policy changes by simple majority (the IEEE-SA Standards Board, SASB, needs to approve a policy change by two-thirds majority to forward it to the Board of Governors). At AFNOR, decisions in technical committees on standard development are never taken by vote, and are always adopted by consensus. By contrast, AFNOR's governance body, the *Comité de coordination et de pilotage de la normalisation* (CCPN), and the board of directors of AFNOR can make decisions on rule changes by majority vote. AFNOR explains this difference by noting that technical committees are open to everybody, whereas the CCPN and board of directors have a clearly defined membership, which is balanced among different constituencies.

Second, decision-making on rules and policies may involve different bodies than those involved in standards development. At ISO, decisions on modifications of its statutes are the responsibility of the General Assembly, and changes to the rules of procedure are the responsibility of the Council. At AFNOR, where the board of directors has largely delegated decision-making to the CCPN, decisions on rule changes are the only exception to this delegation. The board of directors therefore needs to validate these decisions. At DVB, the steering board alone is responsible for adopting rules and procedures, whereas technical standardization decisions are initiated in the working groups of the 'Commercial Module', and then forwarded to the 'Technical Module', before being submitted to the steering board for final approval. At TSDSI, unlike standards, new or modified rules and procedures have to be discussed first in the governing council before being submitted to the general body for ratification. Other organizations have special committees that exclusively deal with specific or general policy aspects, and where rules and procedures are drafted or discussed.

Third, the parties that are eligible to participate in decision-making may differ. At many SDOs, including AFNOR, DIN and IEEE SA, participation in technical committees is open to all interested parties, including non-members, whereas decisions on rules and policies are taken by committees and boards that have a defined membership, aiming at achieving a balanced representation of all interests. At ETSI, policies can only be modified in the General Assembly by a special convened meeting, where only the heads of delegation of the full members can vote. Similarly, at ECMA, only 'ordinary members' can participate in votes on rules and policy changes, whereas other categories of members can participate in decision-making on standards.[128]

Decision-making on rules and procedures may further differ from standards development by the degree of transparency and openness required in such decision-making. At many SDOs, meetings of technical committees are open to all interested parties and observers, whereas governing boards more often convene privately in executive session.

Another difference between decision-making regarding SDO rules and policies and technical standards relates to the duties of those making the decisions. When representatives of different firms and other organizations participate in standards development, it is generally understood that these individuals are acting in their personal capacities or on behalf of their employers or sponsors. The individuals participating in SDO rule and policy development, on the other hand, are often members of SDO governing boards and may therefore have a fiduciary duty towards the SDO, or at least an obligation to act in the best interest of the SDO rather than their corporate employers. At IEEE SA, speaking on behalf of a company or

[127] The principle of consensus decision-making does not rule out the possibility of voting. We were told that IEEE-SA generally considers consensus to be achieved when 75% of the voters are in favor of a standard.

[128] Other membership categories are associated with lower fees, and include categories reserved to small and medium enterprises or non-profit organizations.

another stakeholder on matters of governance is strictly forbidden, whereas standards development can be individual-based or entity-based, and even in individual-based processes it is tolerated that participants make technical contributions on behalf of their employers.

Finally, standards development and procedures for the adoption and modification of rules and policies may be subject to different external requirements. As will be discussed in Section 6, many SDOs abide by procedural principles for standard development, described inter alia in the rules of the WTO TBT. In the industry, it is disputed whether these requirements apply to the development of the SDO's policies and procedures (for more discussion, see section 6).

One of the most notable results from our survey relate to the relationship between standardization and policymaking processes. As seen just above, most SDO treat these two processes separately, with policymaking often offering less developed procedural safeguards. Yet stakeholders do not seem to agree with this state of play. When asked how policymaking processes should compare with standardization processes, in terms of openness, transparency, balance, consensus and availability of appeal [Q. 28], 85% of respondents replied that policymaking processes should be at least the same if not more stringent than standardization processes (i.e. 36% chose 'the same' and 49%, 'more stringent'). The balance between the two options ('the same' and 'more stringent') differed as between Patent-Centric and Product-Centric respondents: the former overwhelmingly prefer 'more stringent' processes for policy making, while the latter are more evenly divided between the two options. Ultimately, however, the overall picture is clear: procedural safeguards in policymaking should be brought closer to the level of safeguards in standards development.

5.2.3.2 Processes for introducing policy modifications

The processes for introducing policy modifications differ significantly across SDOs. Many SDOs allow their members and even non-members to submit recommendations for policy modifications. At ETSI, any member can propose modifications of the rules to the ETSI IPR Special Committee, after which they might be approved by General Assembly. In other SDOs, these recommendations must be submitted to the secretariat or appropriate board, and are advanced at the responsible body's discretion. At IEEE SA, any person can submit a proposed policy change to the Secretary of the appropriate board or committee. The secretary can determine whether to submit the recommendation for consideration by the board or committee. At AFNOR, members can submit proposals to the CCPN only as part of a formal appeal in a dispute in which they are involved. The more general way for an AFNOR member to initiate a recommendation is to submit a proposal to the CEO or the Chairperson of the Board of Directors. At IETF, anybody can propose a policy change. Many proposed policy and interpretive documents are submitted to IETF as Internet-Drafts in much the same manner as proposed technical protocols and specifications. Policy initiatives at IETF relating to topics such as meeting location, diversity and meeting conduct have been introduced by speakers from the floor of an IETF plenary session. Other policy changes have originated with the IESG and have then been progressed through the IETF's normal procedures for standards adoption.

In addition, SDOs may specify the bodies or individuals that have the ability to propose modifications to the SDO's policies. At AFNOR, the bodies who have the right to introduce policy proposals to be considered by the CCPN are the board of directors, any member of the CCPN, the permanent working groups (including volunteering members of the CCPN and the representatives of the French sectoral standardization bodies), and the AFNOR secretariat. At SAC, the initiative for policy modifications is with CNIS, a government think-tank providing research and analysis on standardization, and other organizations.

In our survey, we asked SDO participants about the effectiveness of different means for introducing policy amendments. Most respondents (56%, 67%, n=48) viewed themselves and/or other SDO members, respectively as the principal sources of important SDO policy proposals and amendments. Only 31% and 33% viewed SDO staff and government officials, respectively, as the originators of important SDO policy proposals.

5.2.3.3 Bodies involved in policy development

Most SDOs have a variety of governing bodies that share the responsibility for decision-making on SDO rules. There are two fundamental ways the responsibility between bodies is shared: on one hand, different bodies may be responsible for different policy documents, or different types of policy changes. On the other hand, different bodies may consider the same policy documents or policy decisions sequentially. In these cases, policy documents typically advance in a specified order from one body to another.

AFNOR	ANSI	CEN-CENELEC	DIN	DVB	ECMA	ETSI	IEC	IEEE SA	IETF	ISO	ITU	JEDEC	SAC	TSDSI	VITA	W3C
Elected board / balanced group	Bd. of Directors; Executive Standards Comm.	Member assembly	Elected board	Elected board MoU: member assembly	Member assembly	Member assembly	Council	Elected board	Working group / IESG	Member assembly/council/ board	Member assembly	Elected board	National Congress/ Top Leaders	Member assembly	Elected board	Director

Table 5.5. – What is the ultimate decision-maker on SDO rules and policies?

In many cases, one body is responsible for the most fundamental SDO policies, whereas other bodies are responsible for more mundane policy development and changes. The body responsible for the foundational documents of the SDO is not necessarily the most significant actor in an SDO's governance, e.g. because changes to these documents tend to be rare, or because these documents speak at a general level. In these cases, the actual policy debates within the SDO regarding potentially controversial issues, such as the IPR policy, take place in a different body that is responsible for changes to less fundamental policy documents. At ISO for example, the general assembly is responsible for changes to the statutes. The implementation of the statutes and most of the actual policy development (e.g. the IPR policy) are the responsibility of the Council, an elected board, which approves changes to the Rules of Procedure. The ISO Directives, which describe details of the organization of the standards development work, are the responsibility of the Technical Management Board.

In addition, multiple bodies may have to approve a policy change for it to take effect. Formally, proposed policy documents or changes typically progress upwards in the SDO hierarchy. Nevertheless, it would be misleading to systematically focus on the last element of the chain. At IEEE-SA, for example, the IPR policy is part of the IEEE-SA Standards Board bylaws. The Board of Governors needs to approve changes to these bylaws with a simple majority. The Standards Board however has to approve changes to its bylaws with a two-thirds majority to forward them to the Board of Governors. In practice, the Standards Board vote may thus be the critical hurdle for policy changes. The Board of Governors may in addition submit a policy change, at its own discretion, to the IEEE Board of Directors for

further approval. The Board of Governors decided to take this decision with respect to the much-discussed 2015 changes to the IEEE-SA IPR policy in order to reduce the political pressure on the Board of Governors.[129] The IEEE Board of Directors approved the IEEE-SA IPR policy with an 80% majority, much larger than the required simple majority and larger than the 73% majority achieved in the Standards Board (where a two-thirds majority was required). This particular policy change illustrates that the ultimate decision-maker within an SDO is not necessarily the most critical step in the process of policy development.

In many cases, the decisions taken by an executive board must be validated by the membership (e.g. CEN-CENELEC, ETSI) or the presiding board (e.g. DIN). Whether this validation is a formality or a critical step in the process of policy development may vary by SDO. Certainly, there are instances in which the ultimate decision-maker only plays a limited practical role. At ISO, the Council has authority over SDO governance and policy development. The fundamental role of the General Assembly is to elect the Council. Theoretically, the General Assembly may be called upon to validate the Council's decisions. As we were told, "It could happen, but it never happens". At AFNOR, the board must validate the CCPN's proposals on AFNOR rules and procedures, which, since CCPN's creation, it has always done.

There are several reasons that may limit the practical significance of the validation by the ultimate decision-making body. There may be an imbalance of practical experience and competence favoring the executive board (or a similar body taking the role of central actor of SDO governance) over the members of the general assembly or a supervisory board. In addition, the members of the executive board may be able to spend significantly more time on SDO governance. The general assembly usually convenes infrequently, typically once per year. At DIN for example, the members of the Executive Board are remunerated and work full time for DIN, whereas members of the Presiding Board are volunteers and are required to have a profession outside DIN.

In addition to the bodies with formal decision-making power, one often finds advisory bodies with no formal authority on SDO governance, yet significant influence in practice. These bodies (which are often specialized by governance area) concentrate technical expertise on particular work areas. It is quite common that much of the policy development takes place in such advisory bodies, so that the ultimate formal decision-making body votes on a text that was actually developed elsewhere, in an advisory body. At ANSI for example, the IPR Policy Committee (IPRPC) has no formal authority to approve ANSI policy. Nevertheless, IPR policy changes at ANSI are usually debated at the IPRPC, where a task force may be created to develop a draft policy text. The task force reports to the IPRPC, and when appropriate the IPRPC submits a recommendation to the Executive Standards Council, which is the formal decision-making body for ANSI standardization policy.

Many SDOs have a practice of creating special-purpose groups (sometimes referred to as "ad hoc", for instance at ETSI) for the development of specific policies. These special-purpose groups usually do not have authority to make decisions, but work together on the preparation, discussion and drafting of policy documents (e.g. ANSI, CEN-CENELEC, IEEE and VITA). For example, DVB used to have a special-purpose group on rules and procedures, but now policy agendas are developed by the steering board with the advice of the project office. At DIN, a committee is put in place for the development of important strategy or policy documents in order to collect inputs from a large set of stakeholders. SAC may create special-purpose groups with experts from SAC and CNIS, a think tank supporting SAC in policy making.

As discussed above, at IETF, policy documents (like standard documents) are often developed in working groups or less formal groups (e.g., "birds of a feather" (BOF) session)

[129] As discussed in the interview with the representative of IEEE-SA.

assembled for the purpose, though some guidance and procedural documents are developed and approved by the IESG.

In addition to special-purpose groups, several SDOs have permanent working groups or advisory boards that play a similar role, i.e. discuss, prepare and draft policy changes; whereas decisions on these changes are made in a different body. This is the case e.g. of AFNOR's permanent working group, and the process community group at W3C. In addition, several organizations have specialized permanent working groups on IPR, where possible changes to the IPR policy are debated and drafted (e.g. the IPRPC at ANSI, ETSI's IPR committee, the PatCom at IEEE-SA, and the patents and standards interest group at W3C). In addition, at W3C specific patent advisory groups (PAGs) are assembled to address specific patent-related issues pertaining to proposed W3C standards.[130]

The critical body for reaching decisions on SDO rules may vary depending on the nature of the policy change, the level of contentiousness, and the distribution of expertise among the different players within an SDO. The coexistence of multiple bodies within an SDO sharing the responsibility for policy development can thus make it difficult to identify the actual locus of power within an SDO.

Nevertheless, it is possible to discern some patterns and to classify SDOs broadly into different groups. Specifically, the critical decision-maker for each SDO can be a general assembly of members, a board (typically directly or indirectly elected by members), a specific governing council, or the SDO director.[131] The locus of decision-making authority within an SDO has obvious implications for its autonomy vis-à-vis stakeholders and members.

First, in several SDOs, at least some important changes to policies and procedures must be approved by a general assembly of members. This is the case at CEN-CENELEC, DVB, ECMA, ETSI, IEC, ISO, ITU-T, and TSDSI. At IEC, the ultimate legislator on policies is the council, where only the Presidents of the Full Member National Committees have the right to vote. The supreme organ of ITU is the Plenipotentiary Conference, which is composed of delegations from the Member States. In addition, ITU-R and ITU-T each have an assembly composed of delegations from Member States and representatives of Sector Members concerned. These assemblies make the final decisions on the policies of the respective ITU sections.

In several cases, the general assembly of members only votes on changes to the most fundamental governance documents (e.g. its statutes, bylaws, or Memorandum of Understanding (MoU) with members[132]). Whether the general assembly must validate changes to a specific policy thus often depends on whether the policy is part of the SDO statutes, or a separate document. At DVB, the steering board is generally responsible for rules and procedures. Nevertheless, the DVB IPR policy is part of its Memorandum of Understanding, which can only be modified by the general assembly of members.

SDOs in which the general assembly of members has the exclusive or ultimate decision-making authority for most fundamental policy questions most directly respond to the interests and expectations of their membership. This is particularly true for SDOs with

[130] See Contreras 2016b for a discussion of the PAG process and its use at W3C.

[131] Most SDOs are incorporated organizations and thus legal persons (and the other SDOs are organized activities of incorporated organizations or governmental bodies). These organizations may be subject to corporate or public law requirements regarding their governance structure, including e.g. the existence of a governing board and the rights of the organization's members to participate in the decision-making of the organization. These requirements vary depending on the country and/or state where the SDO is incorporated. For the purpose of this analysis, we compared SDOs with each other, regardless of the applicable legal requirements.

[132] The term MoU, when used in some SDOs, signifies a generally-applicable policy document that is applicable to all SOD members. This is in contrast to the more common usage of "MoU" to signify a signed contract between specific parties.

organizational membership (DVB, ECMA, TSDSI). In SDOs with national membership (CEN-CENELEC, ISO, IEC, ITU), the positions represented in the member assembly, in theory, already reflect a national consensus. At ETSI, despite corporate membership, such decision-making is in the hands of national delegations. While stakeholders thus only indirectly participate in the process of reaching decisions in these SDOs, these decisions may be particularly oriented towards a consensus of all major stakeholder constituencies, including non-member stakeholders.

Second, in many SDOs, member-elected governing boards act as ultimate decision-makers for most of the important decisions on rules and procedures (AFNOR, DIN, IEEE, JEDEC, VITA). At AFNOR, the board of directors is the ultimate decision-maker for such decisions. At DIN, the presiding board, whose members are elected by DIN membership or appointed by incumbent presiding board members, is responsible for policies. At IEEE-SA, the Board of Governors approves updates to the Operations Manual and the Standard Board bylaws. Members of the Board of Governors are elected by IEEE-SA membership or appointed by incumbent board members. At JEDEC, the board is the ultimate decision-making group with respect to policies. At VITA, all decision powers on policies are vested in the board. In its discretion, the board may decide to delegate decisions to the executive director, or submit them to a vote in the member assembly. In addition, at most SDOs where the member assembly must validate changes to some of the most important rules and procedures, governing boards may be responsible for other, less foundational policy documents, and/or may have to decide on changes to rules and policies before submitting them to the membership vote.

SDOs where a member-elected board acts as central decision-maker can potentially develop positions that are more autonomous with respect to members or stakeholders. This however depends on the status of the board. In SDOs like JEDEC, where the board is particularly responsive to the most significant contributors to standard development, the general practice is to involve membership in all important policy decisions, even though the board formally has the authority for these decisions. At other SDOs, such as AFNOR, DIN, IEEE, and VITA, the status of the board and the rules for board elections (e.g. the constituency, the term structure, etc.) make the board more independent from the parties with the most significant and immediate commercial stakes, and the board can use more discretion in the exercise of its decision-making authority.

Third, SDOs may have specific policy committees or councils designed to reflect a balance of stakeholders impacted by the SDO activities. At AFNOR, the CCPN is the decision-maker for most aspects of standardization. The CCPN members are appointed by the board of directors upon recommendation of the represented stakeholder categories, namely different government entities, companies (member companies and French business associations), and civil society. Only two of the 15 members of CCPN appointed by the Board of Directors are chosen among AFNOR member companies. At DIN, while the DIN members elect the members of the presiding board, DIN represents that the presiding board composition should reflect the categories of stakeholders and sufficiently represent public administrations. At ANSI, the Executive Standards Council (which operates under the Board of Directors) is the legislator for the ANSI Essential Requirements. Membership in the Executive Standards Council reflects a balance among categories of ANSI members (organizational members, company members, governmental members, members of the Consumer Interest Council, and members-at-large). On questions of IPR policy, the ExSC will often seek the advice and input of the ANSI IPR Policy Committee.

In SDOs where the authority over policy development to a large extent resides within bodies designed to reflect a balance of diverse stakeholder categories (such as ANSI's ExSC or AFNOR's CCPN), the composition of these bodies reduces the influence of the parties with the most significant and immediate commercial stakes in the standards to the benefit of

more dispersed and less immediately affected constituencies. This structure also encourages SDOs to develop positions that are relatively more autonomous with respect to the significant commercial stakeholders.

Fourth, SAC and W3C have ultimate decision-makers that are not elected by membership. At W3C, the ultimate decision-maker for policies is the W3C executive director. W3C members can appeal the executive director's decisions to the Advisory Committee. The case of SAC is different, because it is a governmental agency. Changes to SAC's IPR policy have to be approved by the leadership of both the SAC and SIPO (State Intellectual Property Office). Other procedural changes can be approved by the leadership of SAC itself. Obviously, SDOs with central decision-making bodies that are not accountable to SDO membership and/or stakeholders are most autonomous in their decision making, and can more easily reach decisions without the consent of significant stakeholders or stakeholder categories.

Finally, IETF uses its standard development procedures for major decisions on rules and policies. New policies or policy modifications are therefore initiated in working groups, "birds of a feather" (BOF) or other less formal settings, or by members of the IETF's governing bodies (e.g., the Internet Engineering Steering Group (IESG) or IETF Administrative Oversight Council (IAOC)). Proposed policies or rules, or amendments thereto, undergo consensus decision-making open to all IETF participants in the same manner as proposed technical standards. This being said, the IESG and IAOC often produce guidance documents relating to IETF procedures and practices that are not developed in this manner, but which are proposed, considered and adopted by the IESG or IAOC, as applicable. While parties holding significant and immediate commercial stakes in IETF standards have no privileged position to influence IETF policy, the IETF policy development procedures are open to the participation of any interested party, and decisions are reached by consensus. In stark contrast in particular to W3C, IETF's procedures are not designed to reach decisions against the resistance of a significant category of IETF stakeholders.

5.2.3.4 Voting rules used to make decisions on rules and policies

AFNOR	ANSI	CEN-CENELEC	DIN	DVB Project	ECMA	ETSI	IEC	IEEE SA	IETF	ISO	ITU	JEDEC	SAC	TSDSI	VITA	W3C
Majority (in practice, most decisions taken by consensus	2/3 majority	Majority	Consensus	2/3 majority, no consti-tuency against	Majority	Qualified majority (71%)	Majority	Majority	Consensus	Majority	Consensus	2/3 majority	Rough consensus	Majority(in practice consensus)	Majority	Director decision and appeals process

Table 5.6.- Voting rules of SDO bodies making decisions on policy matters

SDOs can reach decisions on policy matters by formal or rough consensus, vote (simple majority or supermajority), or special procedures. As noted in Section 5.1.1 above, there are different understandings of "consensus" even among SDOs that purport to follow consensus decision-making.

Few SDOs formally require consensus decision-making for policy or rule changes. For example, the committee created at DIN for the purpose of developing policy and strategy documents makes decisions by consensus (which does not mean unanimity, but that those who oppose the rule change "can live with it"). At IETF, there are no votes. All decision-making, including on rules and policies, is based on rough consensus as determined by the relevant Working Group Chair, Area Director or, in the case of IETF-wide policies, the Chair of IETF (see discussion in Section 5.1.1 above).

At SDOs that have voting requirements for policy decisions, rule changes require majorities ranging from simple to a two-thirds majority. At CEN-CENELEC, ECMA and VITA, members vote in the general assembly by simple majority (one member one vote). At ISO, the Council can reach decisions by a simple majority. At IEEE SA, updates to the operations manual and the Standards Board bylaws require a simple majority of the Board of Governors. At AFNOR, the CCPN can decide by simple majority, though in practice most decisions are taken by consensus. At ANSI, each policy committee can adopt its own voting rules, subject to the Executive Standards Committee's approval. The ExSC makes decisions on changes to its operational procedures, or for the procedures for standards development, by a two-thirds majority of voting members. At DVB, on changes to its rules and procedures and other matters the steering board decides generally by consensus (with an "antideadlock mechanism" calling for a two-thirds majority and support by all constituencies); changes to its Memorandum of Understanding governing document require a super-majority from the general assembly.

Majority-voting, especially voting rules requiring only simple majorities, are in principle more prone to reaching decisions against the opposition of significant stakeholders or stakeholder categories than decision-making procedures requiring consensus. Nevertheless, the significant differences between the voting bodies, the constituencies that have the right to vote, and the way votes are counted, make it difficult to compare or even rank the different voting schemes. It is nevertheless possible to identify voting rules that are designed to make it more difficult to overrule the opposition of a significant stakeholder or stakeholder category. This is particularly the case at DVB, where each decision needs to be approved by a majority of members within each of the defined membership categories (reflecting different business models in the broadcasting industry).

Since IPR policy of ETSI is an Annex of its Rules of Procedure, the Statute requires that the Generally Assembly votes by Weighted National Voting of national delegations.[133] Such voting requires a qualified majority of 71% of the weighted votes of national delegations to agree to an amendment.[134] However, in practice, consensus is preferred.[135] The national delegations are composed of ETSI full members, including national administrations and (predominantly) companies.[136] The voting rules within national delegations are not specified by ETSI, but the vote of each national delegation casted by the head of national delegation shall reflect the views of all members in such national delegation.[137] According to Bekkers (Bekkers 2001 at 151-155), it is not unusual that companies switch national delegations in order to influence the vote in the desired direction. The head of the national delegation casting the vote is usually a representative of a national government.

While the procedures of many SDOs allow for majority votes on rule changes, most of these SDOs describe formal votes on rule changes as extremely rare. At CEN and CENELEC, the respective boards could make decisions on rules by vote instead of consensus, but in practice, "that never happens". At AFNOR, the CCPN, which can make decisions on rules by

[133] See Art 11.2.1 of the Rules of Procedure and Annex 3
[134] See Art 18 of the Statute, and Art 19 of the Rules of Procedure
[135] Interview.
[136] See Art 3 of the Rules of Procedure
[137] See Art 11.2.1 of the Rules of Procedure

vote instead of consensus, has never made use of this possibility since its creation in 2009. At ETSI, "it's very rare that we're voting". At JEDEC, board decisions have to be approved by a two-thirds majority, "but most of the time, they are in fact unanimous". At TSDSI, the governing council attempts to make decisions by consensus, and only proceeds to vote if consensus fails. In its decisions on both standards and policies, DIN attempts to achieve support far beyond a simple majority (typically 90% of favorable votes) in order to promote broad adoption of its standards. At the ISO council, decisions are typically unanimous, but it is possible to vote (by simple majority) in cases of disagreement.

5.2.3.5 Transparency of policy deliberations

AFNOR	CEN-CENELEC	DIN	DVB Project	ETSI	IEEE SA	IETF	ITU	SAC	TSDSI	VITA	W3C
No	Only results (not percentage)	No	Some-times	Only results	On discretion of the board	No votes; process is public	Published proceedings contain resolutions	No	Only results	No, internal to VITA	Choice of members (only results)

Table 5.7. - Are deliberations and votes on SDO policy matters made available to the public?

As described above, some SDO governing bodies make decisions through consensus. Consensus can be determined in a variety of ways, but typically implies that there is no sustained opposition. A stakeholder opposing a decision must accordingly raise its opposition publicly in order to demonstrate a lack of consensus. Consensus decision-making may thus be in contradiction with secret voting. At ETSI for example, the absence of consensus would be demonstrated by sustained opposition during the debate. Stakeholders will therefore be aware of such opposition. Moreover, unless individual positions are not recorded in the minutes of the meeting or these minutes are not made public, the general public would also know about such opposition.

Votes, on the other hand, may be conducted secretly and counted by SDO staff, or taken openly at the relevant meeting by show of hands, general acclamation or roll call (individual oral) vote. At W3C, where most processes take place online, decisions are made by vote. Upon request of the voting members, votes may be made visible to W3C members, or to the 'W3C team' alone.[138] At AFNOR, the CCPN can elect to take decisions by secret ballot if the decision affects an individual, such as an appointment for instance, though in practice such decisions have always been taken by consensus. Nevertheless, a ballot box is placed in the room to symbolize that at any time it would be possible to proceed to a formal vote with secret ballots. Secret ballots are effectively used for elections of officers. Similarly, at TSDSI, elections of officers take place using secret ballots, whereas voting on rules is more commonly done by show of hands.

The results of such votes are typically reported publicly, but the votes of individual members are often not released to the public or included in the official records of the SDO. This is e.g.

[138] The W3C team consists of employees of the different W3C host institutions working for W3C.

the case at AFNOR's CCPN, ETSI, CEN-CENELEC, SAC, TSDSI, and W3C. In the case of secret ballots, CEN-CENELEC announces which decisions were supported by a majority of votes, but not the extent of the majority. Many SDOs, such as DVB, may issue press releases on important decisions taken by the steering board. Decision-making in DIN governing boards is not open, and the results are not published. At VITA, there have been specific cases in which the results of particularly important decisions have become public information, but in the majority of cases, it stays within the VITA membership.

At IEEE SA, the governing boards may vote in open or executive session, and the results of votes in open session may be included in public meeting minutes. At IETF, the entire process is open and accessible online.

Table 5.8. – SDO decision-making on policy matters

	Are votes made public?	Voting rules and majority	Individuals represent interests of…	Ultimate decision-maker on rules	Same process for policies and standards?
AFNOR	No	Majority	Member entity	Elected board / balanced group	No
ANSI		2/3 majority	ANSI and member category	Balanced group	n.a.
CEN-CENELEC	Only results (not percentage)	Majority	CEN; in adv. group: member	Member assembly	No
DIN	No	Consensus	Member entity	Elected board	No
DVB	Some-times	Supermajority	Member entity	Elected board; MoU: member assembly	No
ECMA		Majority	Member entity	Member assembly	No
ETSI	Only results	Qualified majority (71%)	Member entity; on the board: ETSI	Member assembly	No
IEC		Majority	Council board: IEC community	Council	No
IEEE	On discretion of the board	Majority	IEEE / personal capacity	Elected board	No
IETF	No votes; process is public	Consensus	Indivdl. partici-pant	Working group / IESG	Yes
ISO		Majority	Member entity	Member assembly/council/board	No
ITU	Published proceedings contain resolutions	Consensus	Member entity	Member assembly	No
JEDEC		2/3 majority	Both member entity and industry	Elected board	No
SAC	No	rough consensus at top leader level, 2/3 maj. at TC level	Government at SAC level; member entity at TC level	National Congress/ Top LEaders	No
TSDSI	Only results	Majority(in practice consensus)	Member entity	Member assembly	No
VITA	No, internal to VITA	Majority	Member entity / individual	Elected board	Yes
W3C	Choice of members (only results)	Director decision and appeals process	Member entity; in some cases on adv. board: W3C	Director	No

5.2.4 Dispute Resolution

SDO rules are complex, and different SDO participants may seek different business and policy goals by participating in SDOs. Accordingly, the interpretation of existing SDO rules and policy requirements sometimes becomes important to participants, and disagreements can occur. Resolving these disagreements can proceed in different stages, from seeking interpretive advice from different sources, to escalating a disagreement through channels for appeal within an SDO, to external dispute resolution mechanisms such as arbitration and litigation. Often, the lines between these mechanisms is not entirely clear, and seeking a rule interpretation from an SDO's governing body can, in some cases, resemble a formal appeals process. In our interviews with SDOs, we sought to gain an understanding of the range and nature of these approaches to resolving disagreements over existing SDO rules and policy.

5.2.4.1 Interpretation of Policies

SDO policies can be lengthy and complex, and policy language can be ambiguous or unclear. We asked SDOs whether they have formal or informal mechanisms for rendering authoritative interpretations of SDO policy and rule language. Some SDOs, such as ISO and IEC, responded that no such interpretive mechanisms existed. Their general view was that the policy language must stand on its own merits. However, these organizations still have staff responsible for providing personalized interpretations to the enquirers. Other organizations responded that interpretations of policy language may be provided, either by staff (ANSI, DIN, JEDEC, VITA, SAC, W3C) or a governing board or body (DVB, IEEE). In such cases, discussion of the relevant policy language often occurs at relevant committee or board meetings. IETF policies are interpreted by staff (legal counsel), document authors and the IESG, depending on the circumstances.

If policy interpretations are given, few SDOs have formal systematic mechanisms for disseminating these interpretations or archiving them for future reference. W3C commented that if an inquiry is made on a public mailing list, a response will be sent to that list, but if an inquiry is made by private email, a private email response will be made. Interpretations of the ANSI Essential Requirements, decisions of the ANSI Executive Standards Council, BSR and Appeals Board are publicly available on the ANSI web site. In addition, ANSI has published Guidelines for Implementation of the ANSI Patent Policy. IEEE indicated that interpretive advice could be included in meeting minutes which, presumably, could be accessed by the public. VITA includes a public online Question and Answer section relating to policies and procedures, and W3C indicated that it, too, maintains an online Frequently Asked Questions (FAQ) document regarding its processes and patent policy. While IETF does not have a single repository for posting answers to policy-related questions, it maintains several FAQs on different policy topics (e.g., trademarks, copyrights), and sometimes publishes IESG statements to memorialize particularly important policy interpretations or decisions. ETSI Board issues its ETSI Guide on IPRs. However, on some occasions, changes to the IPR Guide may be agreed during a meeting of the General Assembly.[139]

5.2.4.2 Appeals of SDO Decisions

As discussed above, the existence of an appeals process is one of the due process characteristics required of SDOs under various accreditation and governmental guidelines (e.g., ANSI Essential Requirements, US OMB Circular A-119, ISO/IEC Code of Good Practice). Typically, such appeals are understood to relate to standardization issues.

[139] See ETSI Directives, page 5

However, most SDOs indicated that they have an internal appeals process to address member disagreements with policy-related decisions of the SDO. Such disagreements can range from differences in opinion over rule interpretations (see above) to more serious allegations that SDO processes were violated, a member was treated unfairly, or that an action of the SDO is in violation of law. Several SDOs commented that simply being unhappy with the outcome of a valid SDO vote would not be appealable. These processes varied as to the type of process, number of appeal levels and ultimate deciding body. Most of these processes were specified as being internal to the SDO. Some SDOs encouraged discussions with staff as a first step in resolving the issue (DVB, VITA). ANSI has a specific appeals board, but most allowed appeals to be definitively resolved by the governing board or body. For disputes between members on SEP licensing, DVB requires external dispute resolution (ADR) via the International Chamber of Commerce (ICC). Only SAC indicated that no such appeals process exists.

5.2.4.3 Disputes Among Members

Overall, the SDOs that we studied reported that disputes among members over policy-related issues are relatively rare (none or fewer than one per year). In addition, several SDOs indicated a strong aversion to intervening in disputes between members, even when they were willing to offer members interpretive advice regarding SDO rules and policies. JEDEC expressed a similar sentiment regarding involvement in disputes among members: "Never have, never would."

Disputes among SDO members can arise in several contexts. Members may claim that other SDO members acted improperly or in violation of the law with respect to technical decisions made at the SDO (e.g., excluding a member's technology from a standard without adequate technical justification, thereby violating competition and antitrust laws). Members may also allege that other members failed to comply with their obligations to the SDO, such as, most prominently, such members' obligations to grant patent licenses on FRAND terms, but also ethical obligations and good conduct policies. Other types of violations, such as breach of fiduciary duty, breach of confidentiality, and the like are also possible, but were not mentioned by the SDOs that we interviewed. Most SDOs indicated that such disputes are rare (none or fewer than one per year).

There are, however, several exceptions to this general approach. A minority of SDOs take an active role in intervening in disputes between their members. W3C, for example, will form a patent advisory group (PAG) when one or more working group members raises a concern about patents and a particular standard under development. Another notable exception is VITA, which reports having two or three "big" disputes per year concerning policy and procedure implementation. In these cases, SDO management takes "an aggressive, active role" in resolving the dispute. And while VITA's policies establish a formal arbitration procedure for the resolution of member results, the organization reports that arbitration has never been invoked, as all such disputes have been settled informally after management intervention. Likewise, as noted above, DVB has a mandatory arbitration requirement relating to disputes among SDO members, but reports that it has never been invoked.

We note that several SDOs, including ANSI and IEEE, declined to respond to several of the questions in this section.

Table 5.9. – Dispute resolution

SDO intervenes in member disputes	SDO has appeals process for policy decisions	Are interpretations made public?	SDO offers formal policy interpretation	
No	Yes	No	No	AFNOR
No	Yes	Some public guidelines issued	Yes (staff, with consultation of policy comm.)	ANSI
No	Yes		?	CEN-CENELEC
No	Yes		Yes	DIN
ADR for IPR; otherwise informal	Yes		Yes (governing body)	DVB Project
No	Yes		?	ECMA
No	Yes		?	ETSI
No	Yes		No	IEC
No	Yes	Some included in public minutes	Yes (governing body)	IEEE SA
No	Yes	Yes	Yes (governing body, staff)	IETF
No	Yes		No	ISO
No	Yes		?	ITU
No	Yes		Yes (staff)	JEDEC
No	No		Yes (staff)	SAC
No	Yes		Yes (governing council)	TSDSI
No	Yes	Public Q&A section	Yes (staff)	VITA
		Public FAQ	Yes (staff)	W3C

5.3 Stakeholder Influence vs. SDO Leadership

We have described and analyzed strategies of stakeholder participation and representation in SDO processes and decision-making. We have seen that most stakeholders expect their employees participating in SDO processes to represent stakeholder interests. As noted in Section 5.3.3.5, only a minority of stakeholders feel that SDO staff or elected boards represent their interests. All SDOs rely on the participation and contributions of these stakeholders for their standard development activities, and many SDOs also involve stakeholder representatives in policy development. Nevertheless, the expectations of SDOs with respect to the conduct of these individuals may differ from the expectations of their employers, with some SDOs having explicit policies against individuals representing specific stakeholder interests in the course of SDO policy development. Moreover, the group of stakeholders within the membership might not necessarily fully overlap with entire range of stakeholders in society. The autonomy of SDOs might be thus be used to represent interests of these non-member stakeholders indirectly.

As we have seen, SDOs differ in the extent to which they cater to their members' and other stakeholders' interests and expectations. Some organizations have a relatively high degree of autonomy with respect to their membership or stakeholder base. This category includes AFNOR, ANSI, DIN, IEEE SA, VITA, and W3C. In these groups, important functions are carried out by staff or leadership. Election processes for boards and other leadership positions reduce the direct influence of the parties with the most immediate and significant commercial stakes in standards. Important decisions are taken by staff or boards, as opposed to member assemblies. The legal form of these groups can further contribute to strengthen the autonomy of the SDO with respect to corporate stakeholders in the membership. Some of these SDOs furthermore have explicit policies discouraging individuals participating in the SDO from representing individual stakeholder interests (IEEE SA), or asking these individuals to represent the SDO, general interest, and an entire category of SDO stakeholders instead of their individual employer (ANSI).

While many of these elements are present in some, but not all SDOs included in this group, some SDOs distinguish themselves with institutional features contributing to organizational autonomy (in particular W3C, and to a lesser extent IEEE SA and VITA).

In other SDOs, the role of the organization as such is much less pronounced, and decision-making is to a much larger extent driven by SDO membership, stakeholders, or individual participants. We include DVB, ECMA, ETSI, IETF, JEDEC, and TSDSI in this group. In these SDOs, decisions tend to be reached by the consensus of stakeholders or members. Policy decisions are primarily made in the general assembly of members (DVB, ETSI, TSDSI), by boards directly elected by and accountable to organizational members (DVB, ECMA, JEDEC), or in consensus-processes open to all interested stakeholders (IETF). In some of these SDOs, voting and election rules emphasize the influence of the SDO's most significant stakeholders (ETSI for board elections, JEDEC), ensure that no decision is made against the vote of a specific stakeholder category in the membership (DVB), or generally require consensus for SDO policy decisions (IETF). There are no formal policies discouraging individuals from representing specific stakeholder interests; in some cases, such representation is explicitly required (DVB, ECMA, TSDSI). As a result of these institutional features, compared to the first group of SDOs, decisions of this second group of SDOs are more likely to represent the joint decision of SDO membership or participants than an autonomous organizational decision. On the other hand, they are less likely to represent interests of non-member stakeholders. These SDOs are thus significantly less likely to make decisions opposed by a specific stakeholder category (as discussed in more detail in Section 7).

The international and regional SDOs based on national membership (CEN-CENELEC, ISO, IEC, ITU) are a somewhat special case. In their institutional features, these SDOs tend to be member-driven: member assemblies play an important role in the determination of SDO policies, and SDO leadership is directly accountable to SDO membership. Nevertheless, this membership consists in national members (CEN-CENELEC, IEC, ISO) or national governments (ITU). Commercial stakeholders are thus only indirectly represented in these organizations. Similarly unrepresented are other non-member stakeholders in society. Nevertheless, this institutional feature may also contribute to a more consensus-oriented form of decision-making, as the positions represented in the SDO already represent the respective national consensus. Similarly, the votes of national delegations at ETSI may represent a compromise of the national members, thus further cementing the consensus-oriented nature of ETSI's governance processes.

6 Governance principles

Highlights

- Policymaking is generally less ***open*** than standard development. Participation tends to be restricted to SDO members. Membership is not free at most SDOs, and it is not open at SDOs that are made up of national standardization bodies.
- Policymaking tend to be far less ***transparent*** than in standard development, even though our survey indicates stakeholders would prefer more transparency.
- Many SDOs seek to achieve a ***balance of interests*** in policymaking, along both geographical and commercial dimensions. In practice, many SDOs experience difficulties in attracting sufficient representatives outside of the producer and implementer constituencies. In addition to balance in representation, a few SDOs also seek to balance voting, by having majority-per-category requirements (e.g. DVB).
- SDOs reported a tension between openness and balance: both objectives can be hard to attain at the same time. Some SDOs privilege openness (e.g. IEEE-SA and IETF), others balance (e.g. DVB), and others emphasize openness in standard development and balance in policymaking matters (e.g. AFNOR and DIN). An alternative path is to rely on the fiduciary duties of SDO leaders towards the SDO or the general interest of SDO members in order to dampen any adverse effects from openness or balance (e.g. IEEE-SA).
- In the light of this chapter and the previous two, a model is put forward of how and why SDO activities and decisions are ***legitimate***, i.e. worthy of support, from a public policy perspective:
  - In the understanding of SDOs and their stakeholders, the **consent** of participants, as expressed through SDO decision-making, provides a substantial measure of 'internal' legitimacy to SDO activities and decisions.
  - External constraints applicable to SDO **procedures**, as found in the principles arising from trade, competition/antitrust and procurement law, channel consent so as to avoid clashes with the policies underlying these laws.
  - **Market** discipline is more elaborate than previously thought and can also confer some legitimacy.
  - While SDOs are not themselves **democratic** institutions, they sometimes receive delegated tasks from democratic bodies, also contributing to their legitimacy (CEN-CENELEC, DIN, AFNOR, ETSI).
  - SDOs concentrate **expertise**, even though they sometimes deal with policy matters that lie outside of the typically technical expertise of the participants.

  Through the combination of all these sources, SDO activities and decisions can therefore aspire to sufficient legitimacy from a public policy perspective, warranting the self- or co-regulatory model that is generally applied to them.

6.1 Procedural principles (due process)

6.1.1 Ensuring SDO Procedural Due Process

As a means of achieving compliance with legal requirements and the support of private and public stakeholders, many SDOs adhere to and endorse a set of fundamental procedural principles for standard development. As discussed in Section 4.1, in the WTO agreement on TBT, these principles are defined as Transparency, Openness, Impartiality and Consensus, Effectiveness and Relevance, Coherence, and Development Dimension; and these principles are reflected in many other legal documents relative to standardization (e.g. OMB Circular

119 in the US). EC Regulation 1025/2012 states that "European standardization […] is founded on the principles recognised by the World Trade Organisation (WTO) in the field of standardisation, namely coherence, transparency, openness, consensus, voluntary application, independence from special interests and efficiency ('the founding principles')." Many SDOs not only claim to comply with these principles, but actively promote these or similarly worded principles as fundamental guidelines for standardization. The SDOs participating in the OpenStand initiative e.g. actively promote the principles of 'Due Process, Broad Consensus, Transparency, Balance and Openness'.[140] ANSI defines essential requirements for due process, including openness, lack of dominance, balance, coordination and harmonization, consideration of views and objections, consensus vote, appeals, and written procedures. A large number of SDOs voluntarily seek to demonstrate compliance with these essential requirements; recognized through ANSI-accreditation as an American Standards Developer.

While these principles are broadly recognized as fundamental principles of the standardization activities taking place within SDOs, the relevance of many provisions mandating adherence to these principles is limited to purely technical standardization; as opposed to other SDO activities ancillary to standardization, and most importantly to the development of SDO policies and strategies. The provisions in this respect in Annex 3 of the WTO agreement on TBT for instance constitute a "Code of good practice for the preparation, adoption and application of standards", and do not discuss principles for developing or adopting other SDO documents, such as policies or strategies (except as regards the principle of openness). Similarly, ANSI's essential requirements "apply to activities related to the development of consensus for approval, revision, reaffirmation, and withdrawal of American National Standards (ANS)", and – as stated by ANSI in our interview – the processes for developing SDO policies are immaterial to an SDO's status as ANSI-accredited body.

As discussed in Section 5, all SDOs in our sample except IETF and VITA use processes for the development of policies that differ from the processes for developing standards.

Nevertheless, a significant majority of the stakeholders participating in our survey stated that the principles of 'openness, transparency, balance, consensus and availability of appeal' should also apply to the process of adopting SDO policy changes. 36% of the stakeholders stated that the processes for adopting policy changes should be similar in terms of these factors to the processes for adopting technical standards, and 49% (85% among patent-centric firms) stated that the processes for policy changes should be even more stringent in terms of these principles than processes for standard development. Only a combined 8% of respondents indicated that the processes for policy development should be less stringent than for standardization, follow whatever SDO leadership thinks is appropriate under the circumstances, or do not matter to their organization. While fewer explicit legal requirements exist for SDO processes for adopting policy changes than for standard development processes, it is therefore clear that a large majority of stakeholders expect that policy development processes reflect the fundamental principles of openness, transparency, balance, consensus and availability of appeal to a similar or even larger extent than standardization.

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However, as noted in Section 4.1.2, the various legal provisions that direct SDOs to adopt such due process principles do not define or explain these principles in great detail. Furthermore, several SDOs state that some of these principles do not or cannot apply to

[140]SDOs such as IEEE SA publicly promote these principles as serving the best interest of the public: http://standards.ieee.org/develop/policies/position-0514.pdf

policy development; or should apply differently. Accordingly, the implementation of these principles in general and in SDO governance in particular varies from SDO to SDO.

Below we discuss how various SDOs implement these principles in their governance structures.

6.1.2 Openness and Transparency

While openness and transparency are often discussed together, they are different, but related, concepts. Openness generally relates to a party's ability to participate in an SDO, and transparency generally relates to the availability of information regarding an SDO's internal processes.

Moreover, the important degree of reliance of regulatory authorities on private SDOs for the development of technical standards used in binding regulations raises concerns regarding free access to the law. The first concern regards access to the text of the standard itself, as the public must often pay private SDOs to access the copyrighted content of a standard, even if the standard becomes public law through incorporation by reference into regulation (Bremer, 2013; Mendelson, 2014). The second concern regards access to the technology necessary to implement the standard, which may be subject to patent or other IP protection. IPR policies of SDOs regarding copyright over the standard and licensing requirements for SEPs thus have important implications for the acceptability of the use of standards in public regulation.

6.1.2.1 SDO Openness

All of the SDOs that we studied (other than SAC, a governmental agency) view themselves as open to all materially interested parties. This openness takes two forms: (1) openness to membership in the SDO,[141] and (2) ability to participate in the SDO's standardization work. Nearly all SDOs that we studied permit all interested parties to participate in technical standardization activities. In many cases this is an express requirement of the SDO governing documents. ANSI's Essential Requirements (Sec. 1.1), which must be observed by all developers of American National Standards, provide that:

Participation shall be open to all persons who are directly and materially affected by the activity in question. There shall be no undue financial barriers to participation. Voting membership on the consensus body shall not be conditional upon membership in any organization, nor unreasonably restricted on the basis of technical qualifications or other such requirements.

Openness to SDO membership, however, is often more limited than the right to participate in technical discussions at an SDO. First some SDOs, such as CEN-CENELEC, ISO, and IEC, e.g. restrict membership to national standards bodies (other stakeholders can then participate via those bodies). Second, many SDOs charge non-negligible fess to its members.

Participation in governance processes is often substantially less open than participation in technical standardization. First, in many SDOs, formal SDO members have a greater voice in policy and governance decisions, though non-member opinions are often considered. Our survey reveals that SDO participants distinguish between the roles of SDO members and non-members in making SDO policy decisions. When asked who should be entitled to participate in proposing, discussing and adopting significant new SDO policies or policy amendments, 20% responded that "anyone who is interested, whether or not a member of

[141] SDO membership is discussed in greater detail in Section 5.1.2.

the SDO" should be entitled to participate in such activities, while 71% responded that only SDO members should be entitled to participate (n=45) [Q_45].

Second, while several SDOs – including ECMA, ETSI, IEC, ISO and TSDSI – discuss and approve policy changes in a general assembly open to all SDO members, in other SDOs, including AFNOR, DIN, IEEE, JEDEC and VITA, such decisions are taken in elected boards, so that not each member can directly participate in the discussion and vote. Our survey indicates that stakeholders observe a clear difference between direct participation in policy development and indirect representation by elected boards. Only 9% of the surveyed stakeholders indicated that significant new policies or policy changes should be discussed and adopted in a governance or policy board, as opposed to a process open to all members or to anyone interested in participating. Consistent with this response, only five out of 36 survey respondents indicated that elected SDO boards are likely to adequately represent their organization's interests in a situation where the organization is not directly represented, and only one respondent indicated that boards were very likely to adequately represent the organization's interests.

6.1.2.2 SDO Process Transparency

Virtually all SDOs that we studied maintain some level of process transparency. This includes, in varying degrees, making available for public inspection the technical standards development process, including draft standards and revisions, the process whereby technical standards are approved, and final standards documents themselves.

Some SDOs, such as IETF and W3C, conduct all standardization work through publicly available mailing lists and open meetings and publish all draft and final standards documents on their web sites without charge. These organizations portray themselves as completely transparent. Short of this extreme level of transparency, most SDOs announce upcoming or ongoing standardization projects on their websites and many regularly publish drafts of standards and solicit comments from the public, and even ask their members to help with distribution of draft documents and solicitation of feedback. At CEN-CENELEC and ETSI, specific public enquiry processes exist for these purposes.

On the other hand, some industry-led SDOs, such as DVB, VITA and JEDEC, generally do not make draft standards available outside of their membership before they are approved and/or submitted for ANSI public review. There are two general reasons offered for declining to provide draft standards for public review: to prevent non-members from using such drafts to obtain patents that would be then asserted against the SDO members, and to avoid sending inaccurate signals to the marketplace regarding the content of final standards. SDOs adopting this approach emphasize that the openness of their membership counter-balances the lack of public distribution of their work (i.e., anyone sufficiently interested in their standards is welcome to join).

Some SDOs that are very transparent in the process of standards development make final standards available to the public only upon payment of a fee (e.g. CEN-CENELEC, DIN, IEC, IEEE), while some SDOs that publicly disclose less during the process might publish the resulting standards free of charge on their websites (e.g. JEDEC, DVB).

These variations result, among other things, from different business models. Those SDOs that support themselves by selling standards cannot make them freely available, while SDOs that can support themselves through membership dues, meeting fees and contributions may not need to charge for their standards.

Separately from the availability of standards documents (both draft and final), SDOs differ in terms of transparency of their internal decision-making processes. At many SDOs, individual votes by members of governance bodies are not disclosed, either to the public or

even to SDO members. This contrasts starkly with the stakeholder expectations expressed in our survey. 83% of the survey respondents stated that SDO deliberations over significant new policies or policy changes, including meeting minutes and outcomes of votes, should be fully visible to the public (47%) or visible to SDO members (36%). But even where SDOs do not make all votes public, certain safeguards exist to ensure that voting is conducted appropriately. In particular, many SDOs including IEEE and W3C, as well as ANSI, have express policies concerning conflicts of interest for their governing body members, requiring disclosure of both financial ties and corporate affiliations for these individuals.

6.1.3 Balance of Interests

Most SDOs recognize that achieving a balance of interests in standardization decision-making is desirable, if not legally required. A significant majority of surveyed stakeholders (89%) stated that SDOs should ensure balance among different types of stakeholders when considering a significant new policy or policy change. Many SDOs (including AFNOR, CEN-CENELEC, DIN, ETSI, IETF, and TSDSI), as well as ANSI, have specific rules regarding the composition of their governing boards to make sure that there is a balance of interests. SDO balance requirements can generally be divided into two categories: geographic and commercial. Geographic balance seeks to achieve representation from a desired combination of different political units (countries, regions) in SDO governance. Commercial balance seeks to achieve representation from different commercial sectors (e.g., manufacturers, users, consumers). We discuss each of these approaches in turn below.

6.1.3.1 Geographic Balance

SDOs with significant governmental involvement often require that their governing bodies be comprised of representatives from specified national or regional political units. The intention is that SDO decisions be made by politically-recognized representatives of member states, each speaking with an equal voice, thereby avoiding dominance by larger economies. The most pronounced of these are ITU-T and ISO, in which membership and voting are by officially-recognized national delegations. Likewise, the voting members of IEC and CEN-CENELEC are national standardization committees. ETSI members are also grouped in national delegations for the purposes of voting on certain matters, including changes to the Statutes and the Rules of Procedure. TSDSI, with significant sponsorship from the Indian government, allocates part of its board to Indian governmental agencies, which collectively have a single vote.

6.1.3.2 Commercial Balance

In addition to geographic balance, many SDOs seek to achieve balance among the different commercial interests that participate in standards development. Such SDOs often divide participants into specified membership categories such as producers, consumers and civil society, and limit participation to specified numbers or proportions of participants from each category. Just to illustrate this point, one such large SDO is ASTM International (not in our sample), which explains the need for balance as follows:

The ASTM consensus process and its purpose of producing the most useful standard possible calls for representatives of small firms or consultancies to have the same vote as a large corporation. Small- and medium-sized enterprises have an equal footing with multinational corporate giants with numerous representatives on a subcommittee or

committee. This collective expertise should lead to more technical proficiency in a standard, but it must not lead to results that favor a certain company's process or product.[142]

In order to achieve this desired balance, ASTM requires that on technical committees, "producers may not outnumber the rest of user, consumer and general interest members of a subcommittee, and producers can have only 50 percent or less of the vote."

SDOs differ in terms of whose interests they try to balance. ANSI-accredited SDOs are obliged to follow its Essential Requirements, which require that '[p]articipants from diverse interest categories shall be sought with the objective of achieving balance'. The ANSI Essential Requirements further specify that "in defining the interest categories appropriate to standards activity, consideration shall be given to at least the following: a) producer, b) user, c) general interest." ANSI itself divides members into four "Member Forums" (company, government, organizational and consumer).[143] The Nominating Committee for ANSI's Board of Directors must have "a diversity of representatives and a balance of interests" and in selecting Directors must "attempt to ensure Board diversity and balance."[144]

In the European Union, according to Regulation 1025/2012, ESOs – CEN-CENELEC and ETSI – are required to 'encourage and facilitate an appropriate representation and effective participation of all relevant stakeholders, including SMEs, consumer organisations and environmental and social stakeholders in their standardisation activities.' At ETSI, for instance, this translates into a policy according to which one of its vice chairs is always held by a representative of users or SMEs. Similarly, at AFNOR and DIN, there are policies aimed at assuring balance in the representation of private companies, public administration and civil society.

IEEE has a policy of balancing different categories of interests that are defined ad hoc at the committee level depending on the project. This is in line with the ANSI Essential Requirements stipulating that "interest categories appropriate to the development of consensus in any given standards activity are a function of the nature of the standards being developed. Interest categories shall be discretely defined" [cite]. ISO explicitly requires its members to take appropriate measures to facilitate the participation of consumers, SMEs, civil society and public authorities. Similar project-based ad hoc balancing was said to be employed at W3C.

In our interviews, several organizations emphasized that they try to involve all relevant participants in SDO decisions. In other words, their balance strategy is one of representation. This mostly refers to the make-up of technical committees which are seen as key ways to assure balance of interests. For example, DIN obliges its members to inform the SDO if relevant stakeholders are not represented in particular matters, viewing broad participation as a requisite for state-of-the-art standards. At VITA, the technical director is responsible for making sure that there is a balance in the make-up of each technical committee. If there is a clear imbalance, the chairman may request the committee to solicit additional participants. DVB likewise requires broad representation from different sectors of the broadcast industry as a pre-requisite of initiating and continuing standardization work.

Many of the above balance requirements apply to technical standardization work. At IETF, where there is no express balance requirement for working groups, there are at least some

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[142] ASTM Intl., Committee Balance and Voting Requirements, ASTM Standardization News May/June 2013, https://www.astm.org/standardization-news/?q=en-route/committee-balance-and-voting-requirements-mj13.html

[143] https://www.ansi.org/membership/membership_forum/overview?menuid=2

[144] ANSI Constitution and By-laws, Sec. 3.03 (2015) https://share.ansi.org/Shared%20Documents/About%20ANSI/Governance/ANSI_Constitution_and_ByLaws_2015.pdf

requirements for balance in terms of governance. For example, membership on the Internet Engineering Steering Group (IESG), the principal governing body for IETF, is structured to achieve broad representation not among different types of organizations, but among individuals with different areas of technical expertise. Thus, the IESG consists of the Area Directors of each of IETF's seven technical work areas, together with certain ex officio appointees.

Despite the perceived desire for balancing interests, several SDOs indicated that they have experienced difficulty convincing less usual stakeholders to invest time, effort and resources in the standardization process. Even large firms are sometimes interested in only part of the standardization process, and do not participate as broadly as they could in SDO governance. One illustration of this issue described in the literature involves the Smart Grid Interoperability Panel (SGIP) (not in our sample), a U.S.-based SDO formed by the National Institute of Standards and Technology (NIST) to facilitate the development of technologies supporting a "smart" electrical power grid. In that case, despite the clear impact that resulting standards would have on the electrical power industry, it was difficult to attract interest by electrical utilities in SGIP's governance or policies, particularly those surrounding IPR. Instead, SGIP's IPR committee was populated largely by representatives of telecommunications and computer networking firms that had established an interest in standardization policy in those industries.[145]

6.1.3.3 Balance in Voting

The balance requirements described above typically mandate the composition of SDO technical and governance bodies by members of particular categories. In addition, some SDOs also impose balance requirements on voting. For example, DVB requires that decisions be supported by a majority of stakeholders within each membership category. At ETSI, votes of members are weighed: on certain matters – including amendment of the ETSI Statutes and Rules of Procedure – votes are cast by national delegations and weighted according to a formula that resembles that previously in use in the Council of the European Union; on other matters, votes are weighted by national GDP (for public administrations) or turnover in the electronic communications sector (for private firms), as set forth in ETSI's Directives. For the most part, however, SDOs rely on their compositional balance requirements to ensure that voting reflects the will of a balanced constituency. For example, ASTM's requirement that producers comprise no more than 50% of any technical committee means that producer firms will not be able to dominate any particular vote. SDOs that use consensus decision-making make it even more likely that minority views, so long as they are represented in the room, will be heard and respected.

Implementing a requirement for balance in voting can be difficult in practice when an unbalanced set of industry stakeholders expresses the desire to participate in a decision making process (on standards or policies). In application of this principle, some stakeholders could be excluded from a process on the ground that their industry or category is already over-represented. Nevertheless, respondents to our survey on average did not feel that firms from the same industry would adequately represent their organization's interests in an SDO governance body in which their organization could not directly participate. While the likelihood that firms from the same industry adequately represent an organization's interests is rated at 2,86 out of 5, firms from the same industry are nevertheless ranked as the second-best proxy for a company's interests, second only to trade or industry associations, and ahead of SDO staff or boards, government agencies, and firms from upstream or downstream industries.

[145] See Contreras (2012)

6.1.4 Consensus decision-making

Another important principle of standardization in SDOs is consensus decision-making. As discussed at greater length in section 5, many SDOs strive to make important policy decisions based on a broader consensus of stakeholders, even though most SDOs do have processes allowing them to reach policy decisions by vote. As discussed, the extent to which SDOs make policy decisions in the absence of consensus varies between SDOs depending on fundamental features of the SDO governance. Nevertheless, consensus is often described as a desirable if not always achievable goal by SDOs, and viewed as an important requirement by a large number of stakeholders.

As we have seen, even though the rules of most SDOs allow them to make policy decisions by vote, many SDOs have a tradition of decision-making by consensus. The term "consensus" itself has different meanings in different contexts, and few SDOs define it explicitly. ISO/IEC define consensus as "General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments." (ISO/IEC Guide 2:2004). At ISO and JTC1, if there is a doubt regarding the existence of consensus, approval by a two-thirds majority of the relevant committee or subcommittee will suffice, though every attempt should be made to resolve negative votes. Perhaps the SDO that has devoted the most consideration to the question of consensus is IETF, which has developed an entire document devoted to the topic. As explained in RFC 7282 (June 2014):

> 'Having full consensus, or unanimity, would be ideal, but we don't require it: Requiring full consensus allows a single intransigent person who simply keeps saying "No!" to stop the process cold. We only require rough consensus: If the chair of a working group determines that a technical issue brought forward by an objector has been truly considered by the working group, and the working group has made an informed decision that the objection has been answered or is not enough of a technical problem to prevent moving forward, the chair can declare that there is rough consensus to go forward, the objection notwithstanding.'

As is apparent from the above, consensus is different from a voting rule in that consensus factors in not only the preference of the voters, but also the intensity of these preferences. Consensus is typically characterized by the absence of sustained, intense opposition: a participant that is opposed to a given measure would vote against it in a voting procedure but, in a consensus procedure, that participant might decide that its opposition is not so fundamental as to warrant making a stand to prevent consensus from emerging. The standard for decision in a consensus procedure is not whether one agrees with a proposed measure or not, but rather whether one disagrees with the proposal to the extent that one cannot bear with it being accepted. This being said, it is not usually understood that consensus cannot be attained when a single stakeholder continues to object to a proposal, particularly when that stakeholder's objection can be attributed to self-interest (e.g., an insistence that its own patented technology be included in a standard when the majority of participants prefer a superior technology).[146] In such cases, many consensus-based bodies will recognize consensus even while acknowledging the dissenter's objection.

In our survey, 36% of respondents said that an SDO's processes for adopting policy changes should be the same or similar to its processes for adopting technical standards, and

[146] This observation is generally supported by case law, in which claims by SDO participants that the exclusion of their proprietary technology from a standard evidences anticompetitive conduct by the SDO and its other participants have generally been rejected absent other evidence of collusion. See, e.g., Addamax v. OSF (1st Cir.), Golden Bridge.

49% responded that the process for adopting policy changes should be more stringent than for adopting technical standards with respect to a list of factors including consensus [Q.28]. Interestingly, there was a significant difference in responses as between Patent-Centric and Product-Centric respondents. Of Patent-Centric respondents [n=13], 85% said that the process for adopting policy changes should be more stringent, while only 36% of Product-Centric respondents responded in this manner. A similar divergence appears in responses regarding the type of approval that should be required for important SDO policy amendments [Q.30]. Thus, 77% of Patent-Centric respondents, compared to only 40% of Product-Centric respondents, said that consensus should be obtained for important SDO policy amendments. The remainder of Product-Centric respondents were almost evenly split between super-majority voting (24%) and "it depends on the policy" (28%).

6.1.5 The Interplay of Due Process Principles and Resulting Tensions

While most SDOs take one or more of the above due process approaches, none that we observed attempt to implement all approaches simultaneously, at least not to a significant degree. One of the reasons for this may be an inherent tension among these principles. In our interviews, some SDOs identified this tension. IEEE, for example, was of the view that "you cannot have balance and openness." IEEE, which emphasizes openness in its processes, explained that allowing all interested parties to participate in its processes can lead to an unbalanced distribution of participants. That is, those parties most interested in a particular SDO's activities may cluster within certain industries, business models or geographies. Seeking to involve parties who are outside of those clusters may degrade SDO decision-making by enabling participants who are less invested in the outcomes to override the concerns of those who are most interested or who possess the greatest expertise. IETF, also recognizing this tension, has no specified balance requirements, but instead relies on openness and transparency to achieve consensus on both standardization and most policy matters.

By the same token, SDOs that impose balance requirements, thereby restricting participation to members of designated groups in pre-determined proportions, cannot be fully open to all interested parties (i.e., interested parties that are members of over-represented categories may not be permitted to participate, or to vote on, matters affecting them).

Some SDOs, recognizing this tension, diverge in their requirements of openness and balance depending on the context. AFNOR, for example, favors openness in standard-setting but balance as to governance and policy. Its technical committees are open and may therefore be unbalanced. For this reason, technical committees are not allowed to reach decisions by vote, but instead must make decisions by consensus. In contrast, AFNOR's governing bodies have a specified composition aimed to achieve a balance of interest, and can decide by vote.

There is a similar tension between both openness and balance, on one hand, and relying on the fiduciary duties of individuals in leadership roles towards the SDO as organization or requesting them to take into consideration public interest on the other hand. IEEE for instance stated that important decisions with respect to SDO governance are made in bodies that are not fully open to participation by any interested party, because such decisions must be made by individuals bound by a fiduciary duty to IEEE. While this sentiment was expressed by IEEE, IEEE is not unique in recognizing fiduciary duties of its governing body members, duties that are often imposed by corporate law in relevant jurisdictions. Furthermore, an approach of balancing decision-making processes according to stakeholder categories is in tension with requesting individuals to consider the public interest as opposed to the interest of a stakeholder or stakeholder category.

6.2 SDO governance and legitimacy

6.2.1 Legitimacy and Institutions

In Section 4.5.2., we have seen that there is a public interest in the activities of SDOs, including the development, production and management of standards. That public interest has long been recognized and acted upon: section 4.1. chronicles how standardization is affected by a set of laws that were created specifically to govern it, as well as by more general laws (e.g., antitrust and competition laws) that were applied to standardization so as to give rise to a distinctive legal corpus. Section 6.1. describes a set of procedural principles implemented to a varying degree by SDOs in their different processes to comply with legal and other external requirements, but also with the explicit goal to "serve in the best interest of the public".[147]

At a more analytical level, the question arises as to why and how the framework of external constraints outlined above – with its combination of legal and market constraints – and the SDO-internal processes designed to organize stakeholder participation and representation provide sufficient guarantees that SDO activities meet public policy objectives. In other words, what makes the activities and decisions of SDOs legitimate from a public perspective? For our purposes, we understand legitimacy as the property of SDO governance that makes SDO activities and output "worthy of support" (Baldwin, Cave and Lodge, 2012).

There is a wide range of literature on institutional legitimacy, which we will not review here (see Peter, 2017). Its central focus is to justify the existence and exercise of authority and coercion by a political entity. To the extent that we apply this literature to SDOs, we take it out of the traditional context of the nation-State and into the less charted realm of 'transnational' or 'global' governance (Buchanan and Keohane, 2006). As described in the literature, a number of sources of legitimacy can apply to institutions. While they all contribute to the legitimacy of the decisions taken by an institution, they attach to different elements of that institution. In line with a frequently-made distinction,[148] some of them attach to the input to the institution (input-legitimacy), others to the process(es) followed by the institution (process-legitimacy) and others still to the output as such (output-legitimacy). These sources of legitimacy include:

1. *Consent of affected parties.* Legitimacy flows from the fact that affected parties have consented to the action and the decision of the entity in question. At its most basic, consent provides a basis for the legitimacy of contracts. In a more elaborate fashion, consent can also serve to legitimize more complex institutions – such as corporations or associations – where stakeholders expressly agree to the rules of the institution upon joining and are then bound to the decisions of the institution, even if they might not agree with a specific decision. Legitimacy by consent reaches its limits when the effects of the decisions made by an institution extend beyond the set of parties that have consented, i.e. when there are spillovers or externalities.
2. *Market forces.* When an institution is subject to market forces, it will be punished for 'bad' decisions and rewarded for 'good' ones. This source of legitimacy is essentially output-oriented, and it depends on a number of assumptions. First of all, market forces must work in line with public policy objectives: if the public policy is to maximize welfare in the short term, then market forces will probably be aligned with it. More complex policy aims – including those relating to safety, health, etc. which lie outside of the purview of this report – might not be achieved through the

[147] http://standards.ieee.org/develop/policies/position-0514.pdf
[148] See Bekkers & Edwards (2007).

operation of market forces alone. Secondly, market forces must be effective, i.e. reward and punishment must follow and be visibly linked with performance.

3. *Democracy.* A key source of legitimacy is democracy, i.e. there is a cohesive *demos* from which the institution has emerged, and it follows democratic principles in its activities and outcomes. In the transnational realm, this is unlikely to occur; rather democratic legitimation would be indirect. This would imply that the institution would be under the control of a democratic body, as evidenced through mechanisms designed to make the institution accountable to the democratic body (delegation, transparency, reporting, review, etc.).
4. *Procedure.* Here legitimacy is seen to arise from the procedure that is followed by the institution (process-legitimacy). Procedural guarantees – including the cluster of principles regrouped under 'due process' or 'fundamental justice' – ensure that the outcome of the process is legitimate. Courts are the epitome of legitimation by procedure, since they are bound to a strict set of procedural rules in rendering their decisions and the strength of these decisions results from compliance with these rules. At the same time, even in the case of courts, one can question whether procedure is sufficient to ensure legitimacy.
5. *Expertise.* In the contemporary regulatory literature, expertise is seen as a source of legitimacy, in what are often pejoratively called 'technocratic' models. Because the institution is expert at what it is doing (or it is staffed by experts), then its decisions gain legitimacy. This is a form of input-legitimacy. Some assumptions must nevertheless be satisfied for expertise to contribute to legitimacy: expertise must be genuinely present, decisions must be based on expert considerations and not on extraneous motives, and decisions must be within the scope of the expertise. This is why expertise alone – not unlike procedure – is rarely sufficient to establish overall legitimacy.

6.2.2 Legitimacy and SDO Governance Models

The SDO ecosystem illustrates how public authorities are relying on a mix of the sources listed above in order to ensure the legitimacy of SDO activities and decisions. Taken individually, each of the sources has its limits, but they complement one another in the case of SDOs.

6.2.2.1 SDOs and Consent-Based Legitimacy

As a starting point, for many SDOs themselves and many of their stakeholders, ***consent*** provides legitimacy. SDOs can be seen as essentially private organisations, which draw their legitimacy from the consent of the parties. They are too complex to be based on a simple contractual model where every party has to consent to every action (which would translate into unanimity decision-making). Rather, as their legal status indicates,[149] they follow an associative or corporate model. Members join freely, and upon joining they accept the rules of the SDO. These include decision-making rules (as will be detailed below), which allow the SDO to decide matters following a specific voting procedure. Consensus decision-making – common among SDOs – comes close to consent, to the extent it is characterized by the absence of sustained opposition. Otherwise, SDOs make decisions according to some form of majority voting rule (simple or enhanced). As long as an SDO follows its decision-making rules, so the argument goes, then the resulting decision would be legitimized by the consent given upon joining that SDO, even with respect to parties that would have been outvoted.

[149] See *supra*, Heading 5.2.1.1.

In many cases, legitimation by consent can extend beyond the explicit provisions of the SDO policy documents. Several SDOs are established organizations, sometimes with more than a century of history. They operate under a large number of implicit organizational norms that are transmitted from experienced participants to newcomers. New members joining the SDO adhere and consent to these observable practices and implicit norms in addition to the explicit policy provisions. When analyzing the legitimacy of the process that was followed for making a specific decision, it can therefore be useful to assess whether the established practices and processes of the SDO were followed. Nevertheless, conformity with the implicit norms of an organization is often more difficult to assess than compliance with explicit policy provisions; especially in the case of SDOs that do not keep archives of their policy deliberations or make these available to stakeholders.

From the perspective of the SDO and its stakeholders, consent is generally seen as sufficient to endow the resulting decision with legitimacy. Building thereon, as discussed in Section 4.1, applicable laws provide that standard-setting should usually be done by consensus, which represents a relatively high level of consent, i.e. the absence of sustained opposition. Reliance on consensus not only reflects the practice of SDOs, but it also guarantees some measure of protection for all stakeholder interests, even those in the minority, by emphasizing the forcefulness of the opposition rather than its sheer numerical strength. In any event, from a public perspective, SDO decisions may create externalities or give rise to spillover effects: in such cases, while consent would provide a kind of 'internal' legitimacy, it might not suffice to establish the 'external' legitimacy of all SDO decisions.

6.2.2.2 SDOs and Market-Based Legitimacy

The disciplining and incentivizing effect of ***market forces*** is often brought up as an external complement to consent. Our survey [Q.9.f] confirms that SDO reputation is an important factor leading firms to decide whether or not to join (79% of respondents rating SDO reputation as important or very important to decision to join, n=42). The activities and decisions of SDOs would then be legitimized because participants are free to defect to a competing SDO if they are not satisfied with an SDO's conduct or policies. If participants remain, then it must be that the SDO is operating in an acceptable manner and hence its decisions would be worthy of support. This is in line with the predictions made in the more theoretical literature (See section 4). However, our research has also highlighted more complex competitive dynamics.

Standards are often written not on a blank slate, but rather against the background of existing standards concerning the same product or service. These existing standards were often developed in an established SDO, which then benefits from incumbency: it regroups the stakeholders, the expertise and the know-how concerning the product or service in question, and it is the natural forum to develop further standards. As our interviews indicated, SDO membership is sticky: it is not so easy for a dissatisfied participant to create another SDO or move to a competing SDO. In addition, at the very least, a critical mass of dissatisfied participants must leave for standard development in the alternative forum to be viable. Failing such a critical mass, the only real option is exit, which is what was predicted (but did not materialize) in the wake of VITA's policy change in 2007 (Contreras, 2013a). Our survey also confirms that stakeholder firms do pay attention to the IPR policies of an SDO before joining, suggesting that they are aware that it is difficult to move out once an SDO becomes established [Q.9.i]. Specifically, 75% of respondents stated that an SDO's IPR policies were important or very important to their decision whether or not to join a given SDO.

Rather, in the course of this study, we have come across instances where stakeholders "left the room" rather than "voted with their feet". These stakeholders – visibly dissatisfied with the IPR policies of established SDOs – decided to form consortia to make progress on

certain issues or develop new standards. Once these consortia achieve their goals, their work feeds back into or is submitted to those SDOs for validation and official status. The threat of "leaving the room" seems a more immediate form of competitive pressure brought to bear on SDOs, and a more potent threat than individual stakeholder exit or a collective movement to another SDO (new or existing) altogether. At the same time, the stakeholders that "leave the room" are also constrained: they must avoid falling afoul of the SDO's legal constraints, and hence they have an interest in positioning their consortium as a complement to the SDO, and in coming back to the SDO to benefit from its legitimacy.

6.2.2.3 SDOs and Democratic Legitimacy

While SDOs are not democratic institutions in the traditional sense, they can also receive indirect legitimation through delegations from democratic bodies, including national parliaments and executives, EU institutions or international institutions. As described in section 4.1. above, this is the case in the EU in particular, which entertains an elaborate – and distinctive – scheme to confer some delegated public authority on SDOs. The essence of the EU system is found in the 'new approach' as developed in the 1980s and more recently recast in Regulation 1025/2012, whereby EU institutions work closely with the three European standardization organizations (CEN-CENELEC, ETSI) and with national standardization bodies. As mentioned above, in order to provide democratic legitimacy, delegation must be accompanied by some form of accountability to the principal. In the EU, this takes the form of annual reports and work programmes, participation and transparency requirements.

6.2.2.4 SDOs, Due Process and Procedural Legitimacy

We observed in Section 4.1 that the governance principles emanating from trade law and competition law/antitrust law tend to converge. These governance principles can be seen as a set of safeguards designed to ensure, through procedural constraints, that the activities and decisions of SDOs are legitimate (at least as far as the policy goals of these laws are concerned). The consensus principle, for instance, could be read to imply that if and once no significant sustained opposition to a proposal is left, the resulting decision is likely not to run afoul of public policy and therefore enjoys some legitimacy. In other words, if a course of action was proposed that went against the public interest, chances are that some stakeholders would have opposed it strenuously as well.

Not only do the due process principles described above help to ensure that SDOs comply with applicable antitrust and competition laws, they also serve to legitimize the role of SDOs as the producers of output having a substantial public character.

The three due process principles studied above in Chapter 5 can help SDOs to achieve this legitimacy. For example, SDO rules requiring balance can ensure that all relevant stakeholders have a voice in the governance and policy making activity of the SDO. SDOs such as DIN, AFNOR, ETSI, DVB. CEN, CENELEC, ISO and IEC, by design, include international representation in their decision-making bodies, thereby ensuring that a diverse set of viewpoints is represented in SDO governance. In our survey, 89% of respondents (n=45) said that when an SDO is considering a significant new policy or policy change, it should seek to ensure that there is a balance of interests among the persons participating in the proposal, discussion and adoption of that policy (n=45) [Q46].

Openness and transparency also help to establish legitimacy and public accountability. Some SDOs such as IETF take this principle to heart, conducting nearly all deliberations over standards development and policy (including, surprisingly, SDO financial and budgetary matters)[150] via open meetings and online facilities, with publicly accessible archives. But

[150] Only a small number of contractual and personnel-related matters are not made fully available to the public.

IETF is something of an outlier. While many SDOs abide by principles of openness in standards development, a number of these do not apply the same principles to their internal governance or policy making. Our survey respondents were similarly divided on this issue. In response to the question of how transparent an SDO should make its deliberations over policy changes (e.g., meeting minutes and outcomes of votes), 47% responded that such information should be fully visible to the public, while 36% responded that such information should only be visible to SDO members (n=45) [Q47]. This being said, 70% of respondents felt that openness of SDO processes was important or very important to their decision to join an SDO (n=43) [Q.9.l].

6.2.2.5 SDOs and Expert Legitimacy

Finally, the SDO ecosystem relies on the ***expertise*** found within SDOs. There is no question that SDOs are expert fora: each SDO brings together stakeholders that are interested in a given product or service – whether as producers, implementers, IP holders, etc. – and these stakeholders[151] send their respective experts to participate in the activities of the SDO. Inasmuch as they are expert bodies, SDOs are somewhat similar to regulatory agencies, and regulatory studies literature can be used in analyzing them (with the necessary caution). Standardization is still conceived of primarily as an expert activity, carried out by technical professionals. SDO management and staff are also made up mostly of technical experts. This concentration of expertise gives SDOs some legitimacy: their activities and decisions deserve to be heeded because SDOs and the participating individuals are experts who know the subject matter better than the general public.

Nevertheless, as set out above, there are limits to expertise as a source of legitimacy, and these limits apply to SDOs as well. First, the activities and decisions of the SDO must genuinely be guided by expert (technical) considerations, and not by political or commercial considerations. In this respect, the precise role of individual participants in SDO activities is not always clear. They are sometimes seen as the representatives of their employers, in which case one can presume that they are sometimes taking positions on the basis of the commercial or political interests of their employers. Sometimes they are seen as delegates who should decide in the best interest of the organization (or in the general interest), in which case technical expertise should usually prevail. Secondly, expert legitimacy only extends as far as the relevant expertise. As is the case with regulatory agencies, SDOs are also called upon to decide matters that may not entirely – or at all – fall within their field of expertise. In such situations, there is no longer any reason to consider SDO activities and decisions legitimate on account of expertise.

6.2.2.6 Multifaceted Legitimacy for SDOs

In light of the above, we can see that legal constraints and market constraints combine to ensure, from a public perspective, that there is a credible case to consider that SDO activities and decisions are legitimate and therefore 'worthy of support'. Consent and market forces already confer a strong 'internal' legitimacy, to which a combination of democracy, procedure and expertise adds 'external' legitimacy so that, from a public policy perspective, one can have a measure of confidence that SDO activities and decisions do not conflict with public policy and can be respected (and even endorsed by reference in public law). The applicable law plays a role in setting parameters for consent, conferring indirect democratic legitimacy through delegation, and providing a set of basic due process procedural principles.

[151] If they are not individuals.

7 Application to SDO IPR policies

Highlights

- Stakeholders care about IPR policies (here with focus on disclosure and licensing rules), yet Product-Centric and Patent-Centric firms diverge in their assessment of and expectation towards IPR policies.
- In the specific case of IPR policies, the procedural approach set out in Chapter 4 is supplemented with a ***safe harbour approach***, where public authorities describe the general content of a "Baseline IPR policy" that would be deemed to comply with applicable legal requirements, including competition/antitrust, public procurement, and trade law.
- The Baseline Policy typically includes a requirement of patent disclosure and licensing at a high level of generality.
- It is part and parcel of the self- or co-regulatory approach to SDO governance, as it applies to IPR policies, that SDOs have some autonomy to move beyond the Baseline Policy.
- Many leading institutions limit their IPR policy to this "Baseline Policy" without significant additional detail (ISO/IEC/ITU joint IPR policy, IPR policy in the ANSI Essential Requirements).
- SDOs that are particularly constrained by the external factors outlined in Chapter 4 tend to stick more closely to the Baseline Policy (including the first layer organizations AFNOR, ANSI, CEN, CENELEC, ETSI, IEC, ISO, ITU; and the third layer organizations ECMA and JEDEC).
- Over time, prompted by legal or market developments, some SDOs have gone beyond the Baseline Policy (DVB, IEEE-SA, VITA, W3C), or adopted idiosyncratic policy approaches that differ from the Baseline Policy (IETF). Common variations include the creation of a licensing obligation for certain parties and/or defining requirements for inclusion of patented technologies that go beyond a general FRAND licensing commitment.
- IPR policy changes moving beyond the Baseline Policy comprise: (i) *uncontested* policy changes (transfer requirement for FRAND commitments and licenses), (ii) changes *contested* among the stakeholders, where the SDO ends up committing itself in the outcome ('*committal choices*') and (iii) changes *contested* among the stakeholders, but where the SDO ends up not committing itself in the outcome ('*non-committal choices*'), for instance by offering a menu of options, an optional choice or a broad interpretation open to many readings.
- When mapping IPR policy choices to governance architectures, it can be seen that committal choices tend to be made by leadership-driven SDOs, and non-committal choices by membership-driven SDOs.

	Committal choices		Non-committal choices	
Policy choices				
Ex-ante disclosure of licensing terms	Mandatory ex-ante disclosure	VITA	Optional ex-ante disclosure	ETSI, IEEE (2007)
Dispute resolution	Mandatory ADR	DVB, VITA	Leave dispute resolution to parties	most SDOs (incl. ETSI, IETF, ISO/IEC/ITU)
	Restricting right to seek injunctive relief	IEEE (2015)		
Royalty-free licensing	mandatory RF	W3C	optional	IEEE, IETF, many, other SDOs
	potentially mandatory RF	ECMA		
Interpretations				
FRAND	Define specific criteria of FRAND	IEEE (2015)	provide no position as to what (if any) specific pricing criteria define FRAND	ETSI, IETF, ISO/IEC/ITU, and most other SDOs
Component-level licensing	Specific policy provision requiring component-level licensing	IEEE	No position with respect to ongoing controversy/ ambiguity of policy	ETSI
	Specific policy interpretation	ANSI		

- The Baseline Policy enjoys legitimacy because of its link with the external constraints arising from law. Both committal and non-committal choices can be legitimate, but in different ways.
  - For committal choices, consent is important: legitimacy depends on how solid a consensus was reached in the SDO on a contested issue.
  - Non-committal choices might enjoy a broader consent within the SDO, but are more likely to be subject to market discipline.

  SDOs are therefore forced to confront contested issues and seek a legitimate solution, whether head-on by making a committal choice or indirectly by facing market responses to a non-committal choice. In all cases, SDOs can seek to bolster the legitimacy of their choices through endorsement by a public authority.

- Since each SDO decides for itself, in the light of its specific circumstances, whether and how to manage its IPR policy, some variance in IPR policies will result. Yet, because of competitive and cooperative relationships between SDOs, IPR policy changes circulate amongst SDOs:
  - For *uncontested* policy changes circulation and adoption by many SDOs can be very fast, and eventually the Baseline Policy can evolve to include these changes.
  - For *contested* policy changes, two mechanisms are at work:
    - On one hand, horizontally as between SDOs, the changes adopted by a first-mover SDO are studied by subsequent SDOs, by way of *experiment or emulation.* Diversity in IPR policies is likely to remain, since membership-driven and leadership-driven SDOs will probably opt for different choices (non-committal or committal, respectively).
    - On the other hand, circulation through *precedent* is also possible if a hierarchically superior institution is involved, so that a decision of one SDO is made binding for another SDO through the endorsement of that institution. Such institutions face limitations, however: competition authorities and courts are constrained by the limits of competition law, and do not always intervene consistently, over time or over jurisdictions. As for ANSI, it is not truly a public authority, and its remit is limited to a subset of US-based SDOs.

7.1 Brief Review of SDO IPR policies

SDO IPR policies, particularly those relating to patents, have been studied extensively (Lemley, 2002; Chiao et al., 2007; Blind et al., 2011; Bekkers and Updegrove, 2012; NRC, 2013; Tsai & Wright 2015; Baron and Spulber, 2018). The purpose of our analysis is not to replicate these studies, but to examine the governance implications of SDO policies on IPR, and to use prominent changes to SDO IPR policies as case studies for our analysis of SDO governance. While SDO IPR policies can address a range of issues, including copyright, trademarks, and the prior art status of contributions to standard development, our analysis will focus on the most prominent and contentious aspect of SDO IPR policies, i.e. the provisions regarding disclosure and licensing of standards essential patents (SEPs).

7.1.1 Documents defining SDO IPR policies

SDO policies with respect to SEPs are often part of an SDO's broader IPR policies (e.g. ETSI, IETF, TSDSI). Nevertheless, many SDOs have a specific patent policy, and address other IPR matters (such as copyright and trademark usage) in other documents or other sections of the same document (e.g. IEEE, ISO/IEC/ITU, W3C, IETF). Whether as part of a broader IPR policy, or as a stand-alone policy, patent policies are generally defined by one of the following documents: a separate policy document, one or several of the SDO's general policy documents (e.g. bylaws, rules and procedures, operations manuals, etc.), or the SDO's member agreement (sometimes called a Memorandum of Understanding). In addition to actual policy documents, numerous SDOs have published guidelines or explanations relating to their IPR policies.

ISO, IEC and ITU-T have adopted a common code of practice, the "ISO/IEC/ITU common patent policy"; which is explained in the "Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC". These documents define a common policy with only minor differences that are specific to each organization. IETF's patent policy is described in RFC 8179, "Intellectual Property Rights in IETF Technology". ECMA has adopted the "ECMA

Code of Conduct in Patent Matters", W3C has adopted the "W3C Patent Policy", and TSDSI the "TSDSI Intellectual Property Rights Policy", which are all defined by separate policy documents.

CEN-CENELEC have a specific policy document on patent policy, the CEN-CENELEC Guide 8: "CEN-CENELEC Guidelines for Implementation of the Common Policy on Patents (and other statutory intellectual property rights based on inventions)". Nevertheless, this document is only "intended to complement, clarify and facilitate the implementation of the Patent Policy", which refers to the ISO/IEC/ITU common patent policy endorsed by CEN-CENELEC.

Other SDOs that we studied include a patent or IPR policy in their general policy documents (e.g. ETSI, IEEE SA, JEDEC, VITA). At ETSI, the IPR policy is included in Annex 6 to the "ETSI Rules of Procedure", the main policy document accompanying the Statutes and co-defining most of the high-level aspects of the organization. At IEEE SA, article 6 of the Standards Board Bylaws defines the organization's patent policy. This document "covers the organization and basic procedures of the IEEE-SA Standards Board." The Standards Board and its Bylaws are instituted by the "IEEE Standards Association Operations Manual". JEDEC and VITA include IPR policies in their most fundamental policy documents (Section 8.2 of the "JEDEC Manual of Organization and Procedure", and Section 10 of the "VSO Policies and Procedures", respectively).

The IPR policy of the DVB project is laid out in Article 14 of the « Memorandum of Understanding" among DVB members. In addition to the SDO's own documents, policies of other organizations sometimes also apply. AFNOR, DIN and CEN-CENELEC directly implement the ISO/IEC/ITU common patent policy, either by translating and transposing it into the organization's policies (AFNOR); or by reference and endorsement in the SDO documents (CEN-CENELEC and DIN).

AFNOR and DIN determine patent or IPR policies that apply to a variety of subsidiary national standards organizations.

ANSI has a patent policy, the "ANSI patent policy - Inclusion of Patents in American National Standards", which is Art. 3.1. of the ANSI Essential Requirements, and binding upon all ANSI-accredited SDOs with respect to their development of American National Standards. In our sample, ANSI-accredited SDOs include IEEE SA, JEDEC and VITA.

AFNOR's IPR policy, is included in the "Règles pour la normalisation française", 'Instances et procédures de travail, Partie 1' (Article 2.9., including the patent policy in art. 2.9.3.2.). This is AFNOR's main policy document, developed under the responsibility of AFNOR's board and the CCPN. In addition to AFNOR, this document is applicable to the French sectoral standardization bodies. DIN has a very short section on IPR in clause 7.9 of DIN 820-1 "Standardization – Part 1: Principles". This document is a basic German standard; it describes "general principles, organization and results of standardization. It applies for the bodies of DIN, the German Institute for Standardization e. V. and for other organizations as well as any person, including the 'public' if their involvement in accordance with this standard is intended."

In addition to these hierarchical relationships, SDO IPR policies are shaped by horizontal agreements. ETSI and TSDSI, together with other SDOs not in our sample, are part of 3GPP. In the "Third Generation Partnership Project Agreement", Section 3.1., they agree to "make their IPR Policy available for consideration by the other Organizational Partners", to "encourage that their IPR Policies are respected by their members", and to "encourage their respective members to declare their willingness to grant licenses on fair, reasonable terms and conditions on a non-discriminatory basis". The same principles are also institutionalized in Article 55 of the 3GPP Working Procedures.

7.1.2 Participant perceptions and concerns re. IPR policies

Our survey asked several questions regarding SDO participant perceptions and attitudes toward SDO IPR policies. As noted above [Q.9.i], 75% of the respondents to our survey stated that an SDO's IPR policies were important or very important to their decision whether or not to join a given SDO. 53% of respondents viewed exorbitant patent royalty demands or patent litigation as significant or very significant risks relating to standardisation, while 48% viewed obligations to make IP available on undesirable terms as significant or very significant risks.

Likewise, attitudes toward IPR roughly divided survey respondents into camps that were either Patent-Centric or Product-Centric. Most Product-Centric firms stated that it would be beneficial to have more guidance from SDOs regarding the meaning of licensing commitments (average score of 4.36 out of 5), more guidance regarding the specific obligations arising out of a FRAND commitment (average score of 3.73 out of 5), SDO participation in the formation of patent pools covering standards (average score of 3.5 out of 5), and SDO determination of aggregate royalty rates applicable to particular standards (average score of 3.5. out of 5). Patent-centric firms on average did not support these measures (average score of 2.50 for more guidance regarding the meaning of licensing commitments, 2.79 for more guidance regarding the specific obligations arising out of a FRAND commitment, 2.17 for SDO formation of patent pools, and only 1.5 for SDO determination of aggregate royalty rates). Other potential SDO policy responses, including SDO arbitration of policy disputes among SDO members (average score of 2.79 among product-centric, 1.75 among patent-centric respondents) and greater discussion of patent licensing terms among SDO members (average score of 2.86 by Product-Centric respondents, and only 1.50 by Patent-Centric respondents) were on average viewed unfavorably by both groups of respondents; even though patent-centric firms were once again significantly more likely to disagree with these policy options.[152]

Both types of firms on average were more likely to agree than disagree with the statements that "SDO policies requiring FRAND commitments have proven generally successful" and "FRAND ensures an adequate balance between implementers and IPR holders". Patent-Centric respondents generally evidenced higher levels of satisfaction (average scores of 4.64 and 4.43, respectively) than Product-Centric respondents (3.59 and 3.50, respectively). Conversely, Product-Centric respondents gave an average score of 3.64 to the statement "The terms 'fair' and 'reasonable' are too vague and open to too many conflicting interpretations", compared to an average score of 2.71 from Patent-Centric respondents.

The implications of this divergence are clear but not surprising: Patent-Centric firms prefer an environment in which SDOs do not interfere with patent licensing negotiations, while Product-Centric firms feel that some forms of increased SDO involvement in the patent licensing context would be beneficial. Given this clear divergence, SDOs do not have an easy task in developing IPR policies that satisfy all stakeholder groups. Below, we discuss how SDOs have approached the development and approval of their IPR policies against this backdrop.

7.1.3 Main IPR policy features and policy options

7.1.3.1 Patent Disclosure

[152] Possible reasons that SDO participants are unwilling to discuss SEP licensing terms, including potential competition law and commercial rationales, are discussed in Contreras 2017b (pp. 702-04).

Many SDOs require their members to disclose potential SEPs. Several researchers have empirically analyzed the differences in IPR disclosure rules both between SDOs and over time (Lemley, 2002; Chiao et al. 2007; Bekkers and Updegrove, 2012; Tsai and Wright, 2015; Bekkers 2017; Baron and Spulber, 2018).

Bekkers and Updegrove (2012) offer an in-depth survey of the policies of 12 SDOs representing a cross section of organizational models, geographic region, and technology focus. They describe in detail the many variants that SDOs have adopted regarding the mechanics of patent disclosure (timing, knowledge, level of detail, definition of essentiality, updating). Several papers analyze the effects of patent disclosure rules in a dynamic standard adoption process (Layne-Farrar, 2011; Contreras, 2011; Ganglmair and Tarantino, 2014).

7.1.3.2 Patent Licensing

SDOs have developed various policy requirements regarding the licensing of SEPs covering their standards. These policies differ among SDOs. Bekkers and Updegrove (2012) and ABA (2007) describe in detail the many variants that SDOs have adopted regarding licensing commitments (FRAND vs. royalty-free, beneficiaries, duration, field of use, geographic scope, transfer with underlying patents, suspension of licenses, requirements that licensees license-back their own patents (reciprocity), and the patent holder's ability to opt-out of granting licenses under certain circumstances). Several papers investigate the economic effects of existing or suggested licensing rules (Ganglmair et al. 2012, Dewatripont and Legros, 2013; Layne-Farrar et al., 2014)

According to existing studies, most of the SDO policies require licensing of SEPs on terms that are at least FRAND. Of 36 SDO patent policies reviewed by Lemley (2002), 29 contained FRAND commitments; and of 251 laptop standards identified by Biddle et al. (2010), 75% were subject to FRAND commitments. In their recent study of 36 SDO policies, Baron and Spulber (2018) find 9 SDOs that require FRAND licensing and 23 that permit the licensor to choose from a menu of licensing options, with FRAND licensing being the least restrictive. Pohlmann and Blind (2016) find, based on analysis of more than 200,000 SEP disclosures across a range of SDOs, that 68% of such disclosures contain FRAND licensing commitments. Though less common than SDO policies permitting SEP holders to charge royalties at FRAND rates, some SDOs require their participants to license patents on reasonable terms that are royalty-free (RF).

Much has been written regarding the meaning of FRAND. Comprehensive discussions of the many diverse terms found in FRAND licensing agreements can be found in Pentheroudakis and Baron (2017), NAS (2013), Bekkers and Updegrove (2012) and ABA (2007). In addition, there is an extensive literature proposing economically grounded interpretations of such FRAND licensing commitments (Baumol and Swanson, 2005; Layne-Farrar et al., 2007; Sidak, 2013; Carlton & Shampine 2014).

7.1.3.3 Patent Transfers

An increasing number of SDOs have required in their internal policies that participants that transfer SEPs as to which licensing commitments have been made must ensure that those commitments are binding on successive owners of the SEPs (ISO/IEC, IETF, IEEE, ETSI). The ANSI Essential Requirements (Sec. 3.1.1) contain a similar requirement. Bekkers and Updegrove (2012) catalog SDOs that impose such transfer requirements, and NAS (2013) and Block (2017) discuss the variety of SDO policy provisions that can be employed in this regard. The IEEE's 2015 policy amendments are an example of such provisions. Most commentators who have considered the matter support the implementation of voluntary policy mechanisms to ensure the binding nature of SEP licensing commitments following a

transfer of the SEPs (Kühn et al. (2013), NAS (2013), Kesan and Hayes (2014), Contreras (2015a), CRA (2016)).

In some cases, SDO participants have transferred SEPs to patent assertion entities (PAEs) for the purpose of monetization and assertion (this practice is sometimes referred to as "privateering" (Lundqvist, 2014, Hovenkamp & Cotter 2016, Ewing, 2011). Pentheroudakis (2016) found that approximately 80% of patents asserted by PAEs were obtained from operating companies. Contreras (2016b) and Contreras et al (2018) analyze the enforcement of SEPs in litigation by practicing and non-practicing entities in the U.S., Germany and UK, finding that a significant proportion of SEP assertions in each of these jurisdictions are brought by PAEs. In one recent case, a product manufacturer has alleged that a SEP holder conspired with a number of PAEs in violation of its FRAND commitments and U.S. antitrust laws to subdivide a portfolio of SEPs in order to collect excessive licensing fees (*Apple* (2016)). These issues will bear close scrutiny as such cases progress.

7.1.3.4 Encouragement of Patent Pools

Licenses for SEPs for several important standards, particularly in the consumer electronics industry, are available through patent pools. Despite the potential benefits offered by pools (Shapiro and Varian, 1999, Shapiro, 2001, Contreras, 2013b, Lundqvist, 2014), relatively few patent pools have been formed around technical interoperability standards. Biddle et al. (2010) find that of 251 standards implemented in a typical laptop computer, only 3% were subject to patent pools, with the remainder subject to FRAND or royalty-free licensing commitments. Pohlmann and Blind (2016), analyzing more than 200,000 individual SEP declarations, find that only 9% of declared SEPs are pooled. Among the existing patent pools, many pools only contain a subset of the known SEPs covering the standards for which the pools were formed. Examples include the Via Licensing and Sisvel pools for IEEE's 802.11 standard and MPEG-LA's pool for ITU's H.264 standard. There are several possible explanations for the relative scarcity of patent pools in the field, including significant up-front costs associated with evaluating pooled patents for essentiality (Contreras, 2013b). [153]

While patent pools are administered by pool licensing administrators operating independently from SDOs, some SDOs and consortia have policies of actively encouraging pool formation. The DVB Forum offers a unique example of a developer of voluntary consensus standards, all members of which participate in a patent pool (Eltzroth, 2008).

7.1.3.5 Alternative Dispute Resolution

Given the increase in litigation concerning standardization and SDO policies, several commentators have suggested the use of alternate dispute resolution (ADR) mechanisms to streamline the resolution of disputes relating to SEPs (Kühn, et al, 2013). The FTC and European Commission have also recognized arbitration as a suitable method for resolving SEP-related disputes (*Mororola and Google*, 2013, *Samsung EC,* 2014).

As a matter of implementation, Lemley and Shapiro (2013) propose that disputes regarding FRAND royalty rates be settled by binding "final offer" or "baseball" arbitration. In such proceedings, each party provides the arbitrator with a sealed "final offer," of which the arbitrator must choose only one, without modification. This approach is supported by CRA (2016, p.80), who offer the alternative of 'night baseball', in which the arbitrators are not

[153] Unlike SEPs subject to licensing commitments by the patent holder, current interpretations of antitrust law require that patents contributed to a pool must be found to be essential to the standard by an objective evaluator. DOJ-FTC (2000), DOJ-FTC (2007). CRA (2016) reports that the estimated cost of a third party patent essentiality assessment is approximately EUR 9000 (p.50), and that imposing such a cost on ETSI's 2G/3G/4G standards would result in an aggregate cost of approximately EUR 427.5 million (p.59). Merges and Mattioli (2016) estimate that the cost of the essentiality analysis for the MPEG Audio pool operated by Via Licensing was approximately US$5.25 million.

informed of the parties' offers, but must make an independent assessment of the royalty level, after which the royalty is set at the party's offer that is closest to the arbitrator's assessment. Larouche, Padilla and Taffet (2014) and Sidak (2014) challenge baseball arbitration as unnecessary and likely to undermine the standardization process. Contreras and Newman (2014) develop a framework for conducting arbitration concerning standards and SEPs. Among other issues, they raise concerns regarding the general confidentiality of arbitral awards.

A few SDOs have adopted ADR mechanisms in their rules and policies. Contreras and Newman (2014) identify and describe four long-standing SDO ADR policies. The DVB Forum has had such a policy in place since 1995 (Eltzroth, 2008). Most recently, IEEE amended its patent policy to permit, but not require, arbitration of SEP-related disputes (IEEE, 2015).

In addition to SDOs, several international arbitration bodies have begun to modify their practices and policies to accommodate proceedings concerning SEPs and standardization. The most ambitious of these has been the World Intellectual Property Organization (WIPO), which has developed a bespoke procedure specifically addressed to SEP disputes, including mediation and arbitration (Greenbaum, 2015).

7.1.4 External calls for IPR policy changes in the literature

Many authors raise the argument that "stacking" multiple complementary patents could lead to excessive levels of aggregate royalty rates (e.g. Lerner and Tirole, 2004; Llanes and Trento, 2012; Llanes and Poblete, 2014; Lerner and Tirole, 2015). Another perceived risk is the possibility of patent hold-up, i.e. an opportunistic increase in royalty levels for a patent after an SDO makes irreversible choices in standardization, and after standard users incur sunk costs in implementing the standard (Lemley and Shapiro, 2007; Farrell et al., 2007).

Even though the empirical evidence regarding the existence and prevalence of royalty stacking and patent hold-up is disputed (Galetovic et al., 2015; Contreras (2018a)), these perceived risks have motivated calls for legislative reform (Lemley, 2007) and antitrust intervention in standard setting (Cary et al., 2011). While many commentators contend that widely practiced SDO policies, such as disclosure and FRAND licensing requirements for SEPs, successfully address these concerns, many others suggest that there is a need for reform (Lemley, 2007; Kuhn et al, 2013). Some recent policy amendments, such as guidance on FRAND or ex ante disclosure of most restrictive terms, generated a significant controversy in the industry (IEEE 2015 (Lindsay & Karachalios 2015), ETSI 2007 (Tapia 2010), VITA 2007 (Contreras 2013a), W3C 2000 (Contreras 2016a)).

The academic analysis of the effectiveness of SDO policies is still undermined by the insufficiency of empirical evidence. Several authors and commentators critically observe that an important part of the debate on SDOs' IPR policies focuses on theoretical concepts with unclear and unproven empirical relevance. Satisfactory causal evidence regarding the effects of different SDO policies remains to date very limited.

A first fact-finding study for the European Commission analyzes data on declared SEPs, and presents the results of a survey of SDO stakeholders (Blind et al., 2011). The surveyed stakeholders reported on their experience with the SEP disclosure process, and their view on the impact of SEPs on standard development and entry into standard-implementing industries. Another study carried out for the European Commission (Bekkers et al., 2014) provides ample empirical data on standards subject to SEPs and on licensing in standard-dependent industries. This study points to litigation concerning SEPs and the insufficient transparency of SEP disclosures (e.g. because of so-called "blanket declarations") as particular areas of concern and proposes arbitration mechanisms and patent pools as potential solutions.

There are very few empirical analyses of the economic effects of specific SDO policies so far. Contreras (2013a) analyzes the consequences of the adoption of a unique IPR policy at VITA which instead of a more flexible FRAND commitment requires the *ex ante* disclosure of the most restrictive licensing terms before a patented solution is chosen for a standard. The study finds no evidence for the adverse effects of this policy predicted by its opponents, such as exit of IPR owners, reduction in the number of standards developed or delays in standard development. Stoll (2014) studies the effects of a change to the IPR policy of OASIS which allowed its working groups to determine by vote whether they want to practice a FRAND or royalty-free licensing requirement. The study finds that the adoption of this policy was followed by a significant decline in SDO membership. As for the 2015 IEEE policy change, some available evidence indicates that some SEP holders have reacted by issuing "negative" LOAs (letters of assurance), i.e. disclosure statements indicating that they own SEPs that are not available for licensing under the terms of the IEEE patent policy (Katznelson 2018). It is nevertheless unclear whether the IEEE policy change or the existence of negative LoAs has had an impact on standard development at IEEE SA. Some studies find no evidence for diminished technical support and engagement at IEEE (Pohlmann 2017; Pohlmann 2019). Other studies point to a decrease in the number of new projects initiated in particularly IP-intensive IEEE working groups and an increase in the average duration of specific phases in the development of IEEE standards as evidence for negative effects on innovation and consensus-finding (Gupta and Effraimidis, 2018).

In addition to this limited evidence on the effects of specific policies, a broader empirical literature analyzes relevant aspects of the performance of SDOs and industries characterized by a significant presence of SEPs. In particular, there is evidence that SDOs identify promising technologies and influence their subsequent adoption (Rysman and Simcoe, 2008); that standards including SEPs progress more quickly and survive longer than other, comparable standards (Baron et al., 2016); and that industries characterized by the presence of SEPs exhibit rapid innovation, decreasing prices and dynamic firm entry (Galetovic et al., 2015). In the absence of exogenous policy variation, the existing studies cannot identify causal effects of specific SDO policies.

7.1.5 IPR policy changes in practice

SDO policies, far from being static documents, are amended and adapted with some regularity. According to Tsai and Wright (2015), most SDOs change their IPR policies once per year. The changes are often a reaction to market developments that prompt SDOs or their stakeholders to call for a discussion of IPR policy. For instance, as discussed in 7.1.3.3, many major SDOs as well as ANSI have adopted limitations on the transfer of SEPs in order to prevent circumvention of FRAND declarations. Most of the policy amendments implementing this change, however, are not significant. Surveys of rule changes (Layne-Farrar 2014; Tsai and Wright, 2015; Baron and Spulber, 2018) highlight a large number of small changes, tending towards increasing sophistication; but relatively few substantial rule changes.

Layne-Farrar (2014) identifies substantial patent policy amendments at 10 major SDOs. She finds that most of the changes at the SDOs she studied have addressed concerns regarding patent ambush and excessive royalty rates. Tsai and Wright (2015) study SDO policy amendments pertaining to licensing rules and disclosure at 11 SDOs and find a gradual reduction in policy ambiguity across the board. On the basis of these findings, both Layne-Farrar and Tsai and Wright urge enforcement agencies to moderate their enforcement actions in order to give SDOs time to amend their policies to address concerns.

In their review of 36 SDO patent policies, Baron and Spulber (2018) observe a general strengthening of SDO licensing requirements over time, with four SDOs moving to royalty-free or non-assertion requirements after permitting royalties to be charged on SEPs, and

two moving to a mandatory licensing requirement from no licensing obligation at all. They observe no significant modification to disclosure requirements over the period studied. Contreras and Housley (2008), however, discuss a clarifying amendment to the IETF patent disclosure policy prompted by the alleged failure of a participant to disclose a patent covering an optional portion of a draft IETF standard.

A few recent SDO patent policy amendments have been more consequential and have attracted more attention:

- In 2003, W3C adopted a policy requiring W3C members participating in a W3C working group to make patents that are essential to the standards developed in this working group available to implementers on royalty-free licensing terms.
- In 2006, VITA adopted a patent policy amendment requiring that its participants disclose not only patents essential to the implementation of VITA standards, but also the maximum royalty rates they would charge for those patents.
- In 2007, IEEE and ETSI adopted policy amendments permitting, but not requiring, participants to disclose the maximum royalty rates that they would charge for SEPs.
- In 2015, IEEE adopted a set of major policy revisions. These included various clarifications regarding the meaning of the licensing commitments made to IEEE, limiting the ability of participants to seek injunctive relief against willing licensees, requiring commitments by transferees of committed patents, and permitting the arbitration of disputes over licensing terms (IEEE (2015)).
- In the last few years, a number of SDOs (IEEE, IETF, ISO/IEC, ETSI), as well as ANSI, have added to their IPR policies a requirement that SEP owners ensure that their FRAND commitments are transferred to any acquirer at the same time as the SEPs that those commitments encumber.[154]

These amendments are discussed in greater detail further below.

Using the observable variation in SDO policies regarding the main IPR policy features discussed above as well as the limited number of significant policy changes as empirical case studies, we can now apply our general analysis of SDO governance to the specific case of IPR policies.

7.2 IPR Policies in the Standardization Ecosystem

As we have discussed in Section 4, SDOs are part of a standardization ecosystem. As such, their rule-making, including their decision-making on IPR policies, is subject to legal constraints, market discipline and institutional norms. At the same time, SDO activities with respect to IPR policies participate in the creation, development and modification of such institutional norms. In this section, we will first analyze how IPR policies reflect the external constraints acting on SDOs, resulting in a widely accepted baseline policy with few examples of SDOs moving beyond the baseline. Second, we will analyze how different activities of SDOs with respect to IPR policies contribute to the evolution of the institutional norms reflected in this baseline policy.

SDO IPR policies have been thoroughly reviewed in a large number of studies, which we briefly surveyed in the previous section. The purpose of our analysis is not to replicate these studies. We therefore mostly focus on policy provisions with respect to SEP licensing, and address these specifically with respect to their governance implications.

[154] See Section 7.1.3.3 above.

For the purpose of analyzing the governance implications of SDO policies on SEP disclosure and licensing, it is useful to distinguish between (1) policies that define common requirements relating to SEP disclosure and/or licensing at a high level of generality, closely following international norms reflected, e.g., in the ISO/IEC/ITU common patent policy and the ANSI essential requirements (which we term "Baseline Policies"), and (2) policies that go beyond the general requirements included in Baseline Policies by creating specific requirements and obligations. For the second group, we distinguish between policies containing specific obligations for designated parties (such as SDO members or participants), and policies containing requirements for the inclusion of patented technology in SDO standards that go beyond Baseline Policy requirements.

7.2.1 Legal Background Rules and Baseline policies

As discussed in Section 4.1.1 above, standardization is covered by international trade agreements, including the Technical Barriers to Trade (TBT) Agreement (part of the WTO Agreement). In parallel, the international standardization bodies – ISO, IEC, ITU-T – have taken an interest in ensuring that standardization does not hinder international trade. Accordingly, in the Joint ISO/IEC Guide 59:1994 (Code of good practices for standardization), one finds under heading 5 "Advancement of international trade", the core of an IPR policy at Article 5.8. ISO/IEC/ITU have developed a joint IPR policy elaborating on that core.

Furthermore, as discussed in Section 4.1.3 above, SDOs are subject to competition law in most developed countries. Generally speaking, competition law does not impose specific requirements with respect to SDO IPR policies. However, a long line of judicial decisions, actions by enforcement agencies and legislative and regulatory enactments have created a relatively well-understood set of competition law principles guiding the behavior of SDOs in the area of IPR.

In general, there are no strict rules regarding the approach that SDOs should take, though it is generally understood that (a) the collective action of market competitors in developing industry standards warrants competition law scrutiny, (b) patents covering widely-adopted standards can confer market power on the patent holders, and (c) granting broad market access to such patents is desirable to mitigate the effects of both collective action by competitors and market power of patent holders. In other words, a failure to make SEPs broadly available to the market after a jointly-developed standard is adopted in the marketplace gives rise to significant antitrust and competition law concerns.

Through the 1990s, the policies of most SDOs were loosely formulated. In its early policies ANSI (including its predecessor organizations) required, among other things, that "[s]tandards should not include items whose production is covered by patents unless the patent holder agrees to and does make available to any interested and qualified party a license on reasonable terms (..)" (Contreras 2015b).

In Europe, competition authorities started to encourage SDOs to take a more proactive role with respect to IPR with the adoption of 2G mobile telecommunication standards (Iversen, 1999), which included significant numbers of SEPs. During the development and initial adoption of 2G standards, several third parties complained about exclusionary cross-licensing practices effectively barring them from implementing the standards (Bekkers et al., 2002). The European Commission intervened with its 1992 Communication on Intellectual Property Rights and Standardization,[155] which contained a set of principles that the Commission strongly insisted ESOs adopt. The Commission strongly influenced the ETSI IPR policy, adopted in 1994.

[155] COM(92)45 (27 October 1992).

As a result, most SDO IPR policies today seek to ensure that SEPs will not be used to give undue market power or leverage to SEP holders. SDOs may seek to accomplish this goal in a variety of ways. Most SDOs require that for a patented technology to be included in a standard, holders of potential SEPs must commit to license their SEPs to implementers of the relevant standard on terms that are fair, reasonable and non-discriminatory (FRAND), and carry either no compensation (royalty-free (RF) or RAND-z) (W3C) or carry compensation that itself is considered FRAND (ETSI, IEEE SA, VITA). In most SDOs, this policy is implemented by requiring that if the SDO or its working groups receive notice that a standard may necessitate the use of patented technology, the SDO should request a licensing commitment from the holder of the potential SEP. Generally (with the exception of IETF[156]), SDOs will only standardize the patented technology if such a commitment is given. For this process to work, SDO policies generally encourage or require their participants to disclose potential SEPs. Depending on the policy, such a disclosure can be held to indicate specific patents, or simply identify known owners of potential SEPs (IEEE). No policy in our sample requires participants to actively search for potential SEPs. Instead, the policies typically rely on good faith disclosure based on personal knowledge (ETSI's IPR policy requires members to use "reasonable endeavours" to inform ETSI of potential SEPs, but also explicitly states that IPR searches are not required).

These policies do not necessarily constitute an obligation on members, participants or other parties to make licenses available. In some policies however, as discussed below, SDO participants may affirmatively be bound to offer licenses under their SEPs to implementers of a standard. In the case of DVB (and other SDOs not included in our sample), a general licensing obligation on members or participants can also replace a policy of requesting licensing commitments from owners of known SEPs. SDOs assuring openness of their standards through a general licensing obligation may dispense with a policy for disclosing SEPs.

These provisions are generally seen as implementing substantive competition and trade law requirements, in line with the general analysis made above under heading 4.1.

In the early 2000s, a series of legal actions involving Rambus, which was alleged to have circumvented the loosely worded IPR policy of the JEDEC, provided the impetus for many SDOs to develop more robust patent disclosure policies (Contreras 2015b; Larouche and Overwalle 2015). In the wake of the *Rambus* and *Qualcomm* cases (Geradin, 2013, 2016; Larouche and Overwalle, 2015), the Commission issued another pronouncement on the application of competition law to IPR policies in its 2011 Guidelines on Horizontal Agreements.[157] According to the Guidelines, '[w]here participation in standard-setting is unrestricted and the procedure for adopting the standard in question is transparent, standardization agreements which contain no obligation to comply with the standard and provide access to the standard on fair, reasonable and non-discriminatory terms will normally not restrict competition within the meaning of Article 101(1)'. The SDOs are thus encouraged by this safe harbor to implement 'a clear and balanced IPR policy, adapted to the particular industry and the needs of the standard-setting organisation in question' (Horizontal Guidelines 2011). 'The IPR policy would need to require participants wishing to have their IPR included in the standard to provide an irrevocable commitment in writing to offer to license their essential IPR to all third parties on fair, reasonable and non-discriminatory terms ('FRAND commitment')'. FRAND commitments should also be subject to a transfer obligation, so that the subsequent owner would be also bound by it. At the same time, the Guidelines do not preclude IPR holders from excluding specified technology from the standard-setting process and the associated obligatory commitment to license,

[156] Though, as noted below, IETF participants have, in many cases, adopted an informal royalty-free approach with respect to many IETF standards.
[157] [2011] OJ C11/1.

though they do reflect an expectation on the part of the Commission that such exclusion take place at an early stage in the development of the standard.

SDOs however have no obligation to assess whether the owners of SEPs offer licenses on FRAND terms, or to offer guidance on the specific obligations arising out of a FRAND commitment. According to the Guidelines, "participants will have to assess for themselves whether the licensing terms and in particular the fees they charge fulfil the FRAND commitment."

The latest authoritative pronouncement is *Huawei* v. *ZTE*, where the Court of Justice of the European Union set out the following 'choreography' for FRAND licensing: (i) the SEP holder specifically alerts the implementer to the infringement of the SEP; (ii) the implementer indicates its willingness to conclude a FRAND license; (iii) following (ii), the SEP holder makes a specific, written offer to the implementer for a license on FRAND terms, including all the terms and conditions normally found in a license, and in particular the amount of royalty and its method of calculation; (iv) the implementer responds in a serious manner to the offer, 'in accordance with recognized commercial practices in the field and in good faith', and particularly without delaying tactics. If it does not accept it, it submits a written and specific counter-offer that corresponds to FRAND terms; (v) if the SEP holder does not accept the counter-offer, the implementer provides appropriate security for the payment of royalties in case it decides to proceed to use the SEP ahead of the conclusion of a license agreement. Only if and when the SEP holder has complied with its duties above, and the implementer failed to do so, can the SEP holder seek injunctive relief without breaching Article 102 TFEU. The implementer would then be an 'unwilling licensee'.

Following *Huawei*, subsequent case-law at national level has further clarified the conditions under which an SEP owner committed to FRAND licensing may seek injunctive relief against a standard implementer under Article 102 TFEU.[158] This cluster of issues is analysed in a growing literature.[159]

Under U.S. law, in contrast, these requirements are less clear-cut. While U.S. antitrust enforcement agencies (DOJ and FTC) have made numerous recommendations regarding standard-setting conduct that are roughly consistent with those of the EU discussed above, and have assessed various standardization arrangements both in litigation and DOJ business review letters, agency guidance in individual cases does not carry the weight of law in the U.S. The EU guidelines go one step further in that they are meant as a generalization from individual cases dealt with by the Commission, and therefore can be used to predict the view of the Commission in future cases. The European Commission can be bound by the statements it makes in Guidelines, but these Guidelines do not bind EU and national courts.

Next to trade law and competition/antitrust law, procurement rules also influence the content of IPR policies. In the EU, for ICT technical specifications produced outside of "traditional" bodies (ISO, IEC, ITU, CEN-CENELEC, ETSI or one of the national standardization bodies) to be referenced for the purpose of public procurement, Annex II of Regulation 1025/2012 requires that "essential" IP be available under a FRAND commitment. In the US, OMB Circular A-119 describes that SDOs "often have intellectual property rights (IPR) policies that include provisions requiring that owners of relevant patented technology incorporated into a standard make that intellectual property available to implementers of the standard on nondiscriminatory and royalty-free or reasonable royalty terms (and to bind

[158] See for instance *Unwired Planet v Huawei* [2017] EWHC 711 (Pat) in the United Kingdom and a number of cases in Germany (for overview see Picht (2017) and Larouche and Zingales (2018) and the Netherlands (Archos v. Philips, Rechtbank Den Haag, 8 February 2017 – Case C/09/505587 / HA ZA 16-206 (ECLI:NL:RBDHA:2017:1025).

[159] Jones (2014), Larouche and Zingales (2014), Contreras (2015b), Larouche and Zingales (2018), Korber (2013), Petit (2015), Picht (2017), Jacob and Milner (2016), Petrovcic (2017), Colangelo and Torti (2017), Zingales (2017).

subsequent owners of standards essential patents to the same terms). In order to qualify as a 'voluntary consensus standard' for the purposes of this Circular, a standard that includes patented technology needs to be governed by such policies, which should be easily accessible, set out clear rules governing the disclosure and licensing of the relevant intellectual property, and take into account the interests of all stakeholders, including the IPR holders and those seeking to implement the standard."

In addition, the ANSI Essential Requirements state that "Participants in the ASD/ANSI standards development process are encouraged to bring patents with claims believed to be essential to the attention of the ANSI-Accredited Standards Developer (ASD)." If an ASD receives such a notice, it shall require that an assurance be made that SEP licenses will be made available "under reasonable terms and conditions that are demonstrably free of any unfair discrimination".

Competition law enforcement guidelines, public procurement rules, regulations, and the requirements of accreditation bodies such as ANSI thus consistently recognize certain key provisions of SDO IPR policies: an obligation for participants to disclose potential SEPs,[160] and a requirement to include patented technology only if the patent holder commits to FRAND or less restrictive licensing terms and conditions. Accordingly, the vast majority of SDOs implement one or both of these provisions in their policies, which constitute the core elements of what we term a "Baseline Policy".

In most cases, these Baseline Policy requirements are stated in very general terms. This degree of generality is not inadvertent. Some SDOs implement these general requirements without additional detail, e.g. in order to avoid protracted disputes regarding the precise contours of patent licensing transactions, which they leave to negotiation among members. In many cases, patents are simply not important enough to the standardization work of the SDO to merit significant debate or discussion.

An important SDO policy that closely follows the Baseline Policy, without adding additional detail, is the ISO/IEC/ITU patent policy. This policy defines the policies for hundreds of SDOs that are members of ISO or IEC, or follow the policies of a national SDO that is member of ISO and/or IEC. In our sample, CEN-CENELEC, DIN and AFNOR directly implement the ISO/IEC/ITU patent policy, with the respective policy documents of these organizations merely offering additional guidance regarding the implementation of this policy, but not creating specific additional obligations. While ECMA is not part of this ecosystem, its own patent policy adopts the provisions of the ISO/IEC/ITU patent policy verbatim-.

ANSI's patent policy, reflected in the Essential Requirements, is quite brief, without adding substantive specific obligations or requirements. While the ANSI-accredited SDOs that we studied have each developed and elaborated their own IPR policies, although remaining within the guidelines prescribed by ANSI, the large majority (more than 90%) of ANSI-accredited SDOs simply adopt the ANSI patent policy verbatim or with only cosmetic alterations (see Contreras (2015b, p.42 n.72)).

There are thus hundreds of SDOs around the world that have similar IPR policies. Many of these SDOs have not developed their own policies, but endorse or implement the language of ISO/IEC/ITU, ANSI or another body practicing a similar policy. Presumably, many of these SDOs did not adopt these policies in pursuit of a specific policy or institutional goal. Implementing this "baseline" policy is often the easiest way for an SDO to operate within recognized legal boundaries, in a situation where IP issues are not looming large within the SDO and its activities, and where accordingly it is not warranted for the SDO and its

[160] Disclosure of SEPs is not required, but merely encouraged, by the ANSI Essential Requirements.

members to invest time and resources into developing a more specific IPR policy for that SDO.

Nevertheless, some SDOs have developed their own policies that address substantive competition law concerns in different ways. In particular, IETF requires specific disclosure of all patents and patent applications that may become essential to a standard, but does not require a licensing commitment for an IETF RFC to include patented technology identified in such a disclosure. RFC 8179 nevertheless notes that "It is likely that IETF will rely on licensing declarations and other information that may be contained in an IPR disclosure and that implementers will make technical, legal, and commercial decisions on the basis of such commitments and information."

However, in practice most holders of SEPs covering IETF standards voluntarily declare either that they will license their SEPs on FRAND or RF terms, or that they will not assert those SEPs against implementers of IETF standards (Contreras 2013a).

It is thus possible for SDOs to develop their own IPR policies, tailored to the SDO's objectives and needs, as long as the policy complies with the substantive requirements of law. IETF has not sought accreditation by ANSI.

7.2.2 Policies going beyond the Baseline Policy

In addition to the many SDOs that have a very general IPR policy along the lines of the Baseline Policy, a number of SDOs have developed their IPR policies further, going beyond this general policy. These developments typically take place in the wake of discussions held within the SDO, as a result of an event or experience that prompted the SDO or its stakeholders to put the IPR policy on the agenda. When this occurs, the SDO and its stakeholders dedicate time and resources to adapting or developing the Baseline Policy in order to address the concern that arose within the SDO. Accordingly, because of that policymaking effort, the IPR policy of that SDO will move off the well-laid path of the Baseline Policy and will feature new provisions. Broadly speaking, with respect to SEP licensing, an SDO policy may then go beyond the Baseline Policy by (1) creating a licensing obligation for specifically designated parties, or (2) defining requirements for inclusion of patented technologies that go beyond requiring a general FRAND licensing commitment.

7.2.2.1 Licensing obligations for members and/or contributors

While all SDO IPR policies that we reviewed (other than IETF's) have provisions seeking to ensure that their standards only include essential IPR if the IPR owner has committed to make licenses available on FRAND or other, less restrictive terms (RF or RAND-z), this does not necessarily imply that a SEP holder has an obligation to make such a commitment. That is, many SDOs (e.g., ETSI, IEEE, IETF, ISO/IEC/ITU) permit contributors to declare that they are not willing to license their SEPs at all, or that they are not willing to license them on FRAND terms (so-called "opt out" licensing provisions (see ABA 2007)). Some SDOs may however require that a licensing commitment be made as a condition of membership, working group participation, and/or contribution to standard development (DVB Project, ECMA, JEDEC, VITA, W3C).

Article 14.2 of the Memorandum of Understanding of the DVB Project states that "each Member hereby undertakes, on its behalf and on behalf of its affiliated companies, that it is willing to grant or to cause the grant of non-exclusive, non-transferable, world-wide licences on fair, reasonable and non-discriminatory terms and conditions under any of such IPRs". A member may refuse to make licenses available "only in the exceptional circumstances that the Member can demonstrate that a major business interest will be seriously jeopardised."

At ECMA, the owner of a SEP may declare that it is willing to grant licenses on a royalty-free basis, it is willing to grant licenses on FRAND basis, or it is not willing to grant licenses to the SEP. With respect to patented technology contributed by a member, the member cannot elect not to make licenses available. In the event that such a member makes no declaration, it still has an obligation to make licenses available on FRAND terms.

At JEDEC, "all companies, as a condition of committee membership or participation, agree to license their Essential Patent Claims on RAND terms and conditions." A JEDEC member unwilling to make SEPs available on RAND terms for standards developed in a JEDEC committee must withdraw from the committee. At VITA, each working group member agrees, on behalf of the VITA member he or she represents, to grant FRAND licenses with respect to all claims essential to the VITA standard developed in this working group.

At W3C, "[a]s a condition of participating in a Working Group, each participant (W3C Members, W3C Team members, invited experts, and members of the public) shall agree to make available under W3C RF [royalty-free] licensing requirements any Essential Claims related to the work of that particular Working Group." Specific claims may be excluded from this requirement by a participant, if that participant indicates its refusal to such specific claims no later than 150 days after the publication of the first public working draft. A participant may also resign from the working group within 90 days after the publication of the first public working draft, and be exempted from all licensing obligations.

ETSI and TSDSI do not obligate their members or participants to offer licenses, but require that when a SEP is brought to the attention of the SDO, the SDO will "immediately request the owner to give … an irrevocable undertaking in writing that it is prepared to grant irrevocable licenses on [FRAND] terms and conditions" (Section 6.1 at ETSI, Section 5.1. at TSDSI). While a patent holder may refuse to comply with this request, a patent holder that is also a member of ETSI must explain this refusal in writing within three months of the request.

Unlike the policies of ISO/IEC/ITU, IEEE and many other SDOs, ETSI and TSDSI thus have member-specific provisions that formulate an increased expectation towards members to give licensing commitments. In other respects, the licensing requirement in their policies is similar to the requirements in other SDOs' IPR policies. In both ETSI and TSDSI, and similar e.g. to IEEE, if the owner of a potential SEP (irrespective of whether it is a member or not) fails to make a licensing commitment with respect to this patent, the relevant committee or working group is authorized to suspend work on the affected standard or remove the patented technology. Furthermore, similarly to ETSI and TSDSI, IETF will request a licensing assurance from a party whose patents are alleged to be essential to an IETF standard if such an assurance has not previously been made.

As discussed in Section 7.1.3.3, in addition to the IPR policy changes mentioned above, a number of SDOs (IEEE, IETF, ISO/IEC, ETSI), as well as ANSI, have added to their IPR policies an obligation on SEP holders to transfer their FRAND commitment along with a SEP, so that the transferee is equally bound by the commitment (NAS 2013).

7.2.2.2 Requirements for inclusion of patented technology extending beyond general FRAND licensing commitment

SDO policies may further define requirements for the inclusion of patented technology in their standards that go beyond requiring a general FRAND licensing commitment. DIN and IETF express a general preference for non-patented solutions. Historically, the policy of IEEE SA included such a provision, even though it is no longer part of the current patent policy. A statement of a general preference for non-patented solutions may imply that the inclusion of any patented solution must be justified on objective technical grounds.

Alternatively, or in addition, SDO polices may generally allow the inclusion of patented technologies in their standards, but require commitments to license these technologies to standard implementers on licensing terms and conditions that are more specific or less restrictive than FRAND. As noted above, some policies (W3C) require royalty-free licensing as the general rule. Other policies require FRAND licensing commitments, but define specific interpretations of FRAND, or impose additional obligations on participants (we term these "Baseline-Plus Policies") (IEEE, VITA).

As noted above, there is no obligation for SDOs to determine specific licensing terms or specific methods or criteria for the determination of FRAND licensing terms. Some SDOs have even issued statements that explicitly state that their policies do not obligate SEP owners to specific licensing terms, or specific methods of determining licensing terms. CEN-CENELEC in a joint statement e.g. stated the view that "FRAND has no precise pricing content, but instead is a 'comity device' designed to promote good faith negotiation between patent owners and prospective licensees."[161] Likewise, IETF states that "The IESG will not make any determination that any terms for the use of an Implementing Technology (e.g., the assurance of reasonable and non-discriminatory terms) have been fulfilled in practice." (RFC 8179, Sec. 4.D).

SDOs may however choose to define more specifically the requirements arising from a licensing commitment in a Baseline-Plus Policy. Thus the patent policy of IEEE SA creates requirements for SEP licensing that are more specific than Baseline Policy requirements. In particular, paragraph 6.1. of the IEEE SA patent policy provides a definition of "reasonable rate", which should exclude "the value, if any, resulting from the inclusion of that Essential Patent Claim's technology in the IEEE Standard." Furthermore, the policy states factors to be considered in the determination of such a rate. In addition, the owner of a potential SEP submitting a Letter of Assurance pursuant to IEEE's patent policy commits not to seek a Prohibitive Order (i.e., an injunction, importation ban or exclusion order) against an implementer of an IEEE standard, unless the implementer fails to participate in a third-party determination of such a rate.

The policy of VITA obligates members to declare the maximum royalty rate they will charge for a disclosed SEP before the standard is approved. The licensing offers made to implementers of VITA standards must be on terms and conditions that are both FRAND, and not more restrictive than the more specific terms and conditions initially announced.

7.2.3 Baseline-Plus IPR Policies and the standardization ecosystem

As we have seen, only a limited set of SDOs develop IPR policies based upon their own identified policy goals. Most SDOs have only Baseline IPR policies, merely translating legal principles emanating from competition law and other legal sources. Few SDOs formulate so-called Baseline-Plus policies, which add additional obligations to the provisions included in the baseline policy, or replace provisions of the baseline policy with alternative means of implementing similar requirements. In our sample, these SDOs can be identified as DVB, IEEE, IETF, VITA, and W3C.

SDOs wishing to go beyond Baseline Policies must often expend both financial resources (legal fees), staff time (diverted from standardization work) and social capital (member goodwill) to adopt Baseline-Plus Policies. They must also incur some degree of legal risk, since Baseline-Plus policies add to the well-understood content of the Baseline Policy. For this reason, Baseline Plus policies are comparatively rare, but when they are adopted they likely represent approaches that have been regarded as important and highly valuable by

[161] https://www.cencenelec.eu/News/Policy_Opinions/PolicyOpinions/EssentialPatents.pdf

the responsible decision-makers within the SDO. Such policy modifications beyond the baseline however can raise significant issues with respect to SDO governance.

Our analysis in Section 4.5 of the different exposition of SDOs to external constraints can contribute to explain the observable variation in IPR policy approaches. First, we observe that Baseline-Plus policies are rare among the most formal SDOs in our sample, such as AFNOR, DIN, CEN, ETSI, IEC, ISO, or ITU-T. Similarly, ANSI's essential requirements stick close to the baseline requirements. Each of these SDOs serves as a focal organization for a number of national or sectoral standardization bodies. Furthermore, in several cases, these SDOs have public functions conferred to them by governmental authorities. Finally, AFNOR and DIN are subject to vertical constraints resulting from their membership in CEN and ISO; and ETSI and TSDSI are subject to the constraints of 3GPP. The policies of these SDOs are characterized by a significant degree of stability and generality. This could be due to the constraints arising from the role that each of these SDOs occupies in their respective networks and the standardization policy of their respective countries or regions.

At the same time, we observe that a number of significantly less formal SDOs also stick very close to the Baseline policy. This is for instance the case of ECMA or JEDEC. These organizations are not bound by the type of formal constraints that apply to the former group. Perhaps the most immediate constraint on their governance is the need to attract and retain membership. In our interview with JEDEC, we were told that JEDEC does not view its IPR policy as a tool to attract potential members; but that SDOs lose membership if they implement bad IPR policies. This statement suggests that SDOs that are most concerned about their competitive position may favor Baseline policies to retain membership. Significantly, many smaller SDOs adopt or copy the IPR policies of larger and/or more established organizations. ECMA's policy for instance follows the ISO/IEC/ITU policy almost verbatim; and most of the ANSI-accredited SDOs adopt the ANSI essential requirements verbatim as patent policy. Such an approach may help smaller and less established SDOs build trust in their policies, in addition to being cost-effective.

While VITA would also fall into the category of smaller and less formal SDOs, the majority of the SDOs whose policies we characterize as "Baseline-Plus" policies tend to be intermediate cases, which are less immediately subject to both formal and competitive constraints. While IEEE and VITA are ANSI-accredited ASDs, DVB, IETF, and W3C are unbound by the formal hierarchical networks of SDOs. Furthermore, these organizations tend to have a well-established technological leadership position in their respective field. Particularly in the case of IETF and W3C, it is precisely this strong competitive position that allows the organizations not to seek ANSI-accreditation, and thus to remain unconstrained by formal requirements.

Table 7.1. – Overview of SDO IPR policies

Requirements for inclusion of patented technology (beyond FRAND)	Licensing obligations (e.g. for members)	Defines policies/ obligations for	Implements policies/ obligations defined by	Which document defines IPR policy?	SDO
-	-	French sectoral bodies	ISO/IEC/ITU, CEN-CENELEC	General policy docum.	AFNOR
-	-	Accredited ASDs	ISO/IEC/ITU	General policy docum. (essentl. reqmts.)	ANSI
-	-	European NSBs	ISO/IEC/ITU	External source (ISO/IEC/ITU policy) and specific guide	CEN-CENELEC
Solutions not subject to SEPs preferred	-	German standardization bodies, public	ISO/IEC/ITU	External source (ISO/IEC/ITU policy) and general policy docum.	DIN
Favors formation of patent pools	Members, unless major business interest	-	-	MoU (agreement with members)	DVB Project
-	Members (for own contributions)	-	-	Specific policy docum.	ECMA
-	Members are requested	-	3GPP	Rules & Procedures (general policy docum.)	ETSI
-	-	Natnl. Standards Bodies	-	Specific policy docum. and guidelines	IEC
LoA pursuant to patent policy	-	-	ANSI ER	SASB bylaws (general policy docum.)	IEEE SA
Solutions not subject to SEPs preferred	-	-	-	RFC 8179 (specific policy docum.)	IETF
-	-	Natnl. Standards Bodies	-	Specific policy docum. and guidelines	ISO
-	-	Natnl. Standards Bodies	-	Specific policy docum. and guidelines	ITU
-	Committee members	-	ANSI ER	"Manual of organization" (general policy docum.)	JEDEC
-	Members are requested	-	3GPP		TSDSI
Declared maximum royalty rate	Working group members	-	ANSI ER	General policy docum.	VITA
Royalty-free	Working group particpt unless specific disclosure	-	-	Specific policy docum.	W3C

7.3 IPR-Policies and Internal SDO Governance Processes

We have identified elements of a Baseline Policy that are common to the policies of a large number of SDOs. The Baseline reflects external constraints on SDO policy making with respect to IPR: as we have seen, the Baseline includes policy provisions usually seen as necessary to conform with legal constraints, and often it has also been approved – or at least assessed – by public authorities. It has also been endorsed by the most established SDOs at the international and regional levels. In that sense, following the Baseline is often the path of least resistance for an SDO that has no specific policy goals or other reasons that would motivate incurring the expense of developing policy provisions that are not required by external constraints.

In addition to conforming with external constraints, SDOs or individual SDO stakeholders may propose IPR policy revisions in response to a perceived need or inadequacy in the existing policies. When SDOs are prompted to revisit their IPR policies, the stakeholders sometimes hold different views as to whether and how the policy should be changed. Indeed, some policy changes have redistributive implications, meaning that some stakeholders stand to gain from them, and others stand to lose. We analyse these IPR policy changes in light of how much they were contested amongst the stakeholders and whether the SDO took a position in this contest.

As a preliminary note, it is not helpful to analyze the controversial character of a policy decision in terms of the degree to which it is "balanced". There is a positive connotation to the degree to which a policy choice is "moderate" or "balanced", leading most SDOs to claim that their position is close to the middle of the appropriate range of policy options. Such classification would be thus heavily influenced by its framing. As perhaps the most salient example, a FRAND licensing requirement is often characterized as a balanced compromise between "proprietary" standards including IPR not subject to licensing obligations, and standards subject to royalty-free licensing policies (e.g. Larouche and Overwalle (2015)). Our proposed classification is orthogonal to the degree to which a policy is "balanced" and implies no value judgement about the appropriateness of the decision.

From the set of policies going beyond the Baseline Policy, as set out above under 7.2.2., we can put forward the following classification, based on whether the potential outcome of the IPR policy discussion was contested or not amongst the membership, and in the latter case, whether the actual outcome reached at the end of the policymaking exercise reflects a commitment on the part of SDO to one or the other side of the debate, or rather an attempt to avoid any commitment:

(i) Uncontested IPR policy changes;

(ii) Contested changes where the SDO commits itself to one side in the outcome;

(iii) Contested changes where the SDO does not commit itself in the outcome.

7.3.1 Uncontested IPR policy changes

As mentioned earlier, many SDOs have policies to ensure that licensing obligations arising out of SDO policies continue to bind any party acquiring an encumbered SEP. SDOs can adopt provisions prohibiting the transfer of an SEP with the intent of circumventing a licensing obligation, requiring committing SEP owners to contractually bind a purchasing party to honor their commitment, or directly stipulating that licensing obligations arising out of the licensing commitment bind any successors of rights (NRC, 2013). The choice among these options (or menus of these options) is mostly a technical legal question. Given that the policy is successful at achieving its objective, all options have comparable redistributive consequences. Such policy questions are relatively uncontroversial, and most easily lend themselves to a technical governance process, whereby experts chosen for their technical/legal expertise design a policy based on its

technical merits (in particular its capacity of dealing with all circumstances and withstanding any legal challenges).

The choice whether to adopt such a policy in the first place however is not a technical question, as a policy allowing a licensing obligation to extinguish with the transfer of the patent is more favorable to SEP owners. Similarly, a policy requiring that licensing commitments are irrevocable offers less options to the SEP owner, but provides greater clarity to implementers. Similarly, an SDO decision to make information on technical contributions available to examiners at patent offices has redistributive effects, because it may lead to more patent applications being rejected (Bekkers et al., 2016). While these decisions thus have redistributive implications, they can still be favorably received by stakeholders with different business models and adopted by consensus or relatively large super-majorities.

Provisions regarding the transferability of licensing obligations are rare examples of non-contested IPR policy changes that have a direct bearing on the policy's licensing requirements. Nevertheless, with respect to other aspects of SDOs IPR policies, such non-contested changes are much more frequent. Several SDOs have thus adopted tailor-made policies on SEP disclosure, or adopted measures intended to facilitate the creation of patent pools. Many of these changes were adopted without significant controversy.

7.3.2 Contested IPR policy changes – Committal and non-committal choices

Many policy questions related to SEP licensing requirements do not allow for such a consensual decision. The questions whether and under what circumstances to require royalty-free licensing of SEPs, whether and how to define FRAND licensing terms, whether to prescribe specific licensing models or forms of dispute resolution, and whether to specify whether licensing commitments require SEP owners to provide licenses at the component level, affect generalized commercial practices and have redistributive implications for a large range of SDO stakeholders. Such questions almost inevitably oppose stakeholders with different business models.

On these questions, an SDO can decide upon IPR policy changes that either commit the SDO to one side of the discussion (committal choice) or seek to avoid making such a commitment (non-committal choice).

A relatively *non-committal* choice is the adoption of a menu of options, including the status quo obligation as the least restrictive option. Baron and Spulber (2018) e.g. document that a number of SDOs requiring SEP owners to commit to FRAND licensing over time adopted polices requiring SEP owners to choose between commitments to FRAND and royalty-free licensing (and sometimes unconditional non-assertion as a third option).[162] By contrast, on the same issue, W3C in 2003 made the *committal* choice of requiring royalty-free licensing of SEPs mandatory for working group participants.

Similarly, in 2006-07 ETSI and IEEE considered policies of ex-ante disclosure of most restrictive licensing terms, and took the *non-committal* choice of explicitly allowing SEP holders to make such announcements at their sole option. ETSI offered to create a database where such ex-ante disclosures could be accessed. In contrast, VITA in 2006 revised its policy to a *committal* choice, to require ex-ante disclosure of most restrictive licensing terms.

A *non-committal* SDO choice regarding policy interpretation means that the SDO takes no stance by either refraining to offer an interpretation of the controversial provision, or offering a broad interpretation encompassing or allowing a variety of differing views. Most SDO IPR policies e.g. do not specify criteria to determine the FRAND-compliance of specific licensing terms and conditions, but also do not specify that the FRAND-obligation arising out of the SDO policy does not entail such criteria. By contrast, the IEEE patent policy of 2015 makes a *committal* choice : it specifies a (committal) definition for the

[162] In many cases, SDOs added corresponding boxes on their SEP declaration form.

reasonableness of licensing rates,[163] and lists more specific (but not limitative) criteria that should be considered to determine licensing rates that comply with the patent owner's obligations under the policy (even though other criteria can be considered as well).[164]

CEN's 2017 position paper on FRAND can be seen as either committal or non-committal. On one hand, the paper explicitly states CEN's non-committal policy stance, according to which CEN leaves the determination of licensing terms to the parties. On the other hand, the position paper can be seen as committal, as it provides a specific and potentially controversial "definition" of the meaning of FRAND. CEN explicitly specifies that in its view a FRAND commitment does not bind an SEP owner to offer licensing terms and conditions in a specific range, but is merely a "comity device".[165]

As discussed, a similar disagreement exists over whether SEP owners committed to FRAND licensing can satisfy their licensing obligation by offering licenses to the makers of standard-compliant end products alone. The *non-committal* choice is exemplified by ETSI, which does not provide an unequivocal definition of standard implementations covered by the licensing commitment in its policy, leading to unresolved controversy: while some argue that the text of the policy decidedly constitutes an obligation to license to all (Rosenbrock, 2017), others interpret the same text such that it "does not and has never required compulsory 'license to all'" (Huber, 2017). IEEE's 2015 policy by contrast represents a *committal* choice, as it adds a definition of "compliant implementation" that explicitly mentions "component". The IEEE policy thus affirmatively requires that a SEP owner make a licensing offer to all interested implementers, including component makers.

[163] Under Art. 6.1. ('Definitions): 'Reasonable Rate' *shall* mean appropriate compensation to the patent holder for the practice of an Essential Patent Claim excluding the value, if any, resulting from the inclusion of that Essential Patent Claim's technology in the IEEE Standard" [emphasis added].

[164] Ibid.: "In addition, determination of such Reasonable Rates *should include, but need not be limited to*, the consideration of…" [emphasis added].

[165] Both the IEEE approach to specify criteria for a FRAND determination and the CEN position paper represent controversial interpretations of FRAND obligations. On average, patent-centric firms are more likely than product-centric firms to agree with CEN's statement that a "FRAND commitment is a comity device and has no specific pricing content" (average of 3.71 for patent-centric and 3.14 for product-centric firms on a scale from 1 [strongly disagree] to 5 [strongly agree]). With respect to the idea of SDOs providing more explicit criteria for FRAND, patent-centric firms overall rather disapprove of such additional guidance (average of 2.79), whereas product-centric firms are more likely to view additional guidance favorably (average of 3.73).

7.3.3 Controversial policy changes and SDO governance

In the following table, we summarize the preceding examples of committal and non-committal IPR policy choices regarding SEP licensing requirements, to relate these policy choices to governance models identified in section 5.

<table>
<tr><td></td><td colspan="2">Committal choices</td><td colspan="2">Non-committal choices</td></tr>
<tr><td colspan="5">Policy choices</td></tr>
<tr><td>Ex-ante disclosure of licensing terms</td><td>Mandatory ex-ante disclosure</td><td>VITA</td><td>Optional ex-ante disclosure</td><td>ETSI, IEEE (2007)</td></tr>
<tr><td rowspan="2">Dispute resolution</td><td>Mandatory ADR</td><td>DVB, VITA</td><td rowspan="2">Leave dispute resolution to parties</td><td rowspan="2">most SDOs (incl. ETSI, IETF, ISO/IEC/ITU)</td></tr>
<tr><td>Restricting right to seek injunctive relief</td><td>IEEE (2015)</td></tr>
<tr><td rowspan="2">Royalty-free licensing</td><td>mandatory RF</td><td>W3C</td><td rowspan="2">optional</td><td rowspan="2">IEEE, IETF, many, other SDOs</td></tr>
<tr><td>potentially mandatory RF</td><td>ECMA</td></tr>
<tr><td colspan="5">Interpretations</td></tr>
<tr><td>FRAND</td><td>Define specific criteria of FRAND</td><td>IEEE (2015)</td><td>provide no position as to what (if any) specific pricing criteria define FRAND</td><td>ETSI, IETF, ISO/IEC/ITU, and most other SDOs</td></tr>
<tr><td rowspan="2">Component-level licensing</td><td>Specific policy provision requiring component-level licensing</td><td>IEEE</td><td rowspan="2">No position with respect to ongoing controversy/ ambiguity of policy</td><td rowspan="2">ETSI</td></tr>
<tr><td>Specific policy interpretation</td><td>ANSI</td></tr>
</table>

Table 7.2. – Committal and non-committal choices

From the table and the preceding discussion, a general picture emerges. Some SDOs, and in particular IEEE, VITA, and W3C, are more likely to make committal decisions. These SDOs make decisions with broad redistributive consequences (royalty-free licensing requirement, mandatory ex-ante disclosure of licensing terms, restrictions of access to injunctive relief), or provide specific (and potentially contested) interpretations of general terms (such as "reasonable" in FRAND, or regarding the scope of the licensing obligation). These SDOs are also characterized by institutional features that we associated with a more autonomous form of decision-making and stronger SDO leadership with respect to stakeholder influence. These institutional characteristics of SDO governance arguably make it easier for these SDOs to make decisions that are opposed by significant stakeholders or stakeholder categories.

Other SDOs tend to favor non-committal choices, meaning that they remain silent on inherently contested policy questions that divide SDO membership or the stakeholder base, or provide policy provisions leaving options to stakeholders, including the general baseline requirement as least restrictive option. Important provisions of the IPR policies of these SDOs remain open to diverging interpretations, and the SDO does not take a position with respect to e.g. the meaning of FRAND, or the extent of licensing obligations at the component level.

While this policy approach is characteristic for many SDOs where SEP-related issues are not particularly important, ETSI, IETF, and ISO/IEC/ITU also follow this approach. These SDOs have a large number of standards subject to SEPs, and SEP controversies regarding their standards are significant. The approach taken by these SDOs is thus more likely to reflect institutional features of the SDO governance. In particular, as we have seen in section 5, all these SDOs are characterized by a more consensus-oriented form of decision-making, with a lower degree of autonomy of the SDO and SDO leadership with respect to stakeholders and participants.

7.4 IPR Policy Changes, Legitimacy and Public Policy

In this section, we apply the analysis of Sections 4.5.2 and 6.2. to IPR policymaking in SDOs. As we have seen in Section 7.2., many SDOs limit their IPR policy to a Baseline Policy implementing legal and other external requirements constraining the SDO. Prompted to spend more time and resources to develop a policy that is more attuned to the needs of the stakeholders, some SDOs adopt IPR policy provisions that develop the Baseline Policy further and go beyond it. In some cases, these provisions reflect a consensus of the SDO's stakeholders. Nevertheless, in other cases, the policy discussions taking place in SDOs are contested, with stakeholders being divided as to their preferred outcome. In these cases, the legitimacy of SDO policymaking becomes salient; all the more so when the SDO adopts a policy change that commits to one or the other side in the debate, and is therefore opposed by some of the SDO's members or stakeholders.

As discussed in Section 6.2, legitimacy is a complicated issue. There are many sources of legitimacy for SDO activities and decisions – consent of the participants, constraints from market forces, democracy, procedure and expertise – all of which can apply to SDOs and none of which is likely to suffice on its own to legitimize SDO activities and decisions. For many of their decisions, SDOs draw from a combination of sources of legitimacy.

Next to the legitimacy of SDO policymaking in individual instances, the effects of such policymaking within the broader standardization ecosystem must also be considered. As a starting point, SDOs define the policies applicable to their own organization and their own standardization processes. However, policy decisions of individual SDOs have an impact on other SDOs, or on the interpretation of general legal principles. This raises the question of whether and how SDO policy changes circulate amongst SDOs, and whether and when such changes would prompt public authorities to intervene in the standardization ecosystem.

Before analyzing the legitimacy of SDO IPR policy changes and their effect on the broader standardization ecosystem, we address the status of SDO policy changes that can be characterized largely as internal "housekeeping" matters.

7.4.1 The nature of IPR policymaking – standardization vs. housekeeping

Some SDO decisions produce external effects on the SDO stakeholder base and beyond, giving them a public dimension that led public authorities to intervene in SDO matters. Standardization itself is such a decision, which has an impact that reaches beyond the SDO membership, sometimes to an entire industry. Because of these external effects, standardization is governed not only by the rules of the SDO, but typically also by outside legal norms, found in the areas of law covered in Section 4.1. These norms have a bearing on SDO governance, including participation in standard-setting, decision-making, etc. Beyond these governance-related norms, sometimes public authorities will even request an SDO to develop a standard, as is the case with European Norms (EN) developed by ETSI or CEN-CENELEC. As regards legitimacy, this implies that standard-setting derives its legitimacy not just from the consent of the participants or the effect of market forces, but also from the interplay with public authorities in a co-regulation model, which generates a mix of democratic, procedural and expert legitimacy that underpins the actions of the SDO.

Other decisions however are more internal to the SDO. They regard the functioning of the SDO as an organization. The canonical case is that of 'housekeeping' SDO decisions concerning, for instance, the frequency and location of meetings. These relatively inconsequential decisions have little or no effect outside of the SDO membership. Hence it would seem that as long as these decisions receive the consent of SDO members, according to the decision-making rules of the SDO, they should be considered as a legitimate exercise by the SDO of its decision-making powers.

Many consequential SDO decisions have significant external effects, but are nonetheless primarily SDO-internal decisions. Whether the SDO primarily funds its activities through membership fees, participation fees, or sales of standards documents is a decision that fundamentally defines the functioning of the SDO as organization. Unlike standardization decisions, SDOs do not typically leave such decisions to a consensus of interested participants in an open process; but to governance bodies of the SDO. Nevertheless, in light of the external effects, these decisions may be subject to some legal constraints and judicial review, and many SDOs attempt to involve affected stakeholders in the process of making such decisions in a variety of ways.

When it comes to IPR policies, it would be tempting to seek to bring 'IPR policies' into either of these two canonical cases, i.e. standardization and internal governance, thus turning the analysis into a simple classification matter. In our view, it is not possible to reach a conclusive answer on the legitimacy of IPR policy-making through such a quick exercise, because the line between external and internal matters is not so clearly drawn, and in any event IPR policy would straddle that line.

To be sure, some IPR policy matters come close to internal housekeeping. For instance, if an SDO chooses to specify particular time periods for the disclosure of patents, or to specify a particular form of letter of assurance, one could argue that these are merely internal matters and that the SDO decision is legitimate because it is adopted by the consent of its membership. Other provisions of IPR policies, such as decisions on how to manage the IP arising out of SDO activities – e.g., copyright on the standard documents– may have substantial external effects and be heavily controversial among SDO stakeholders. At the same time, these decisions still primarily pertain to the functioning of the SDO itself.

More often than not, however, IPR policies venture into matters that are ancillary to standardization, and that have a direct bearing on standardization activities and outcomes. To name but one of the oldest provisions, when IPR policies express a preference against including patented technology in standards, they are directly affecting standardization decisions. The same goes for a requirement not to include patented technology unless it is available on specified licensing terms. In such cases, it would make sense to link the IPR policy provisions with standardization, as the IPR policy has a direct bearing on the standardization outcome. As an illustration of such an approach, the US Standards Development Organization Advancement Act (SDOAA) of 2004, discussed earlier in Chapter 4, expressly includes "actions relating to the intellectual property policies of the [SDO]" within the definition of 'standards development activity' that is put under the rule of reason for antitrust law purposes.[166]

When moving beyond the Baseline policy, for instance in stipulating licensing requirements for SEPs, SDO policies also more directly regulate the conduct of SDO members or participants outside the standardization process itself. They increasingly act as regulators for their stakeholder base; accentuating the external dimension of their policy choices.

Indeed, in many respects, concerns regarding the democratic and institutional legitimation of SDOs' standard setting processes may also be raised with respect to their processes for defining their rules and policies, including their IPR policies (Craig (2014)). This is echoed in our survey, where – as set out above under Heading 5.2.3.1. – the

[166] 15 USC 4301(7).

large majority of respondents (85%) stated that policymaking should be carried out with at least the same if not higher procedural stringency as standardization.

7.4.2 Legitimacy of SDO policymaking

SDO policies find their origin in contractual and corporate relationships. They are defined by the SDO's bylaws, statutes, or similar document, to which a party agrees, or is otherwise bound, upon becoming a member. Similarly, upon joining members explicitly or implicitly agree to the SDO's processes for making changes to these policies. Accordingly, SDO policymaking enjoys legitimacy through the consent of SDO members to the substantive policies of the SDO, or to the processes that were followed for making substantive policy changes. The contractual legitimacy model reaches its limits, however, where SDO policymaking produces effects or reverberations beyond the SDO membership.

In the case of IPR policies, such an external dimension is often present, and there is thus a public policy character to IPR policymaking (Contreras 2017a).

The general approach to SDO legitimacy set out above in Sections 4.5.2. and 6.2. relies on co- or self-regulation: private parties are trusted to act and decide in a way that fosters public policy objectives. As a starting point, public policy should therefore grant some deference to SDOs when they decide on their rules and policies through their processes agreed upon by their membership. The legal constraints imposed on SDOs – as set out above in Section 4 – aim to channel SDO decision-making in a direction that is compatible with public policy objectives. They create the conditions for SDOs to be legitimized through consent, indirect democracy (delegation), market discipline, procedure and expertise.

Most commonly, SDOs implement legal requirements by adopting elements of a widely recognized Baseline policy. We explained above in Section 7.2.1. how relying on the Baseline Policy is efficient in that it reduces transaction costs and creates trust. In addition, from a legitimacy perspective, the Baseline Policy is closely linked to requirements arising from competition law, trade law and public procurement, and as such it is a legitimate exercise of the policymaking power of an SDO.

As we mentioned, however, nothing in law dictates that SDOs adopt the Baseline Policy: it is part and parcel of a self- or co-regulation scheme that an SDO can decide on the appropriate IPR policy for its specific circumstances (as long as it does not overstep legal boundaries). Hence, as will be discussed later, there is no one-size-fits-all IPR policy. Hence it is worth examining in general terms how the various sources of legitimacy play out in the case of IPR policymaking.

As regards *consent* as a source of legitimacy, it is worth noting that many of the IPR changes studied in Section 7.3. are contested amongst the stakeholders, and hence that consent is not a given. Decisions relating to IPR often have distributional effects, in favor of either patent holders or licensees. Resolving the clash between the interests of these two groups of participants is not a mere technical matter, where experts may disagree on the most efficient means for achieving a goal that is not itself particularly contentious. For IPR policy questions with significant redistributive implications, there often is no such agreement on goals, so that policy disagreements are unlikely to be resolved by simply assessing the technical efficiency of different approaches. Of course, as in the case of requirements on the transfer of FRAND commitments and licenses with SEPs, if there is a clear consensus within the SDO, a strong case can be made that the IPR policy change is legitimate. In other cases, in the presence of clashing interests, even consensus or super-majority voting rules may not serve to eliminate all disagreement or controversy over a particular policy change, especially if the policy change has an impact beyond the SDO membership. This does not necessarily mean, however, that the SDO's decisions lack legitimacy.

As always, the devil is in the details: the temporal dimension of an IPR policy change might also play a role. On the one hand, policy changes that are meant to have

retroactive effect might require the clearest form of consent from all the affected parties; actually, retroactive changes might be so consequential that the general interest in legal certainty would be directly affected. On the other hand, changes that modify IPR policy *ex nunc* only, for any future standardization effort, might be more easily legitimized by consent alone. The intuition is that while retroactive changes affect past investments, prospective changes concern situations where no investment has yet been committed. Policy changes that are not truly retroactive, but still indirectly affect existing standards, e.g. in their next generations, fall somewhere in-between.

Other sources of legitimacy can complement consent. *Market constraints*, for instance, also play a role. The evidence gathered from our survey indicates that firms do pay close attention to IPR policies before joining an SDO, because leaving an SDO on account of an undesirable IPR policy (in particular, as it may result from a change) is difficult. Yet our research has unearthed more complex competitive mechanisms – short of leaving an SDO altogether – than had been heretofore assumed in the literature, as described above in Section 4.4. For one, dissatisfied stakeholders can 'step out of the room', form a consortium to work on a satisfactory outcome, and then come back to the SDO to feed that outcome back into the SDO process. Some of these consortia were formed in response to dissatisfaction with IPR policies, and in some cases even opting for open source as an alternative to patent-based technological solutions.

Actually, a closer look at the table included at the end of Section 7.3. reveals a connection between consent and market disciplines. Faced with calls to develop their IPR policy in order to tackle contested issues, SDOs have followed two paths, which can be traced to their governance architecture: some of them went for committal choices, where the IPR policy is changed in such a way as to take one side on the contested issue, while others adopted non-committal choices. For the former, the legitimacy of the committal choice depends on establishing consent despite the contestation. For the latter, the legitimacy of a non-committal choice can also be questioned when the competitive response indicates that some stakeholders "step out of the room" in dissatisfaction and form a consortium to implement their preferred policy option. Indeed, many of the instances of "stepping out" that we listed in Section 4.4. responded to non-committal choices on the part of SDOs. In the end, therefore, SDOs are forced to confront contested issues regarding their IPR policies, whether head-on through a committal choice or by indirectly facing market responses to a non-committal choice.

Furthermore, SDOs can have their IPR policy changes endorsed by public authorities, for various legal reasons (antitrust compliance, accreditation, avoidance of liability). Public authorities enjoy delegated authority from democratic institutions, and they are presumably guided by the public interest. Through their endorsement, they would accordingly confer some *indirect democratic legitimacy* on SDO decisions. For instance, IPR policy development at ETSI has been done in close contact with the European Commission, in order to avoid competition law difficulties. On the basis of its interaction with ETSI and others, the Commission then proceeded to include pronouncements on IPR policy in SDOs as part of its policy guidelines (Horizontal Guidelines 2011), thereby offering a safe-harbour to SDOs that align with those pronouncements. VITA obtained a DoJ Business Review Letter (BRL) for its 2007 changes. Similarly, IEEE obtained a BRL for its 2007 and 2015 IPR policy changes. The BRL does not amount to a positive endorsement of the IPR policy, rather it is a statement that the IPR policy change does not contravene US antitrust laws, in the opinion of the DoJ.

In a similar vein, ANSI-accredited SDOs are required to submit their IPR policy changes to ANSI, in order for ANSI to verify that these policies continue to comply with the ANSI Essential Requirements. While not a public authority, ANSI carries considerable weight in matters of standardization; undoubtedly, a ruling that an IPR policy is compatible with the ANSI Essential Requirements conveys some legitimacy on the policy in question.

Finally, as regards legitimation through *expertise*, IPR policy matters often exceed the bounds of the technical expertise assembled in SDOs. It is true that some matters – for instance the prior art status of disclosures made in working groups – fall within the

bounds of what technical experts can be expected to decide knowledgeably (even then, whether disclosures are really prior art is a legal matter). For the bulk of IPR policy matters, however, many of the technical experts taking part in SDO activities do not possess the requisite expert knowledge.

In the light of the above, SDOs can make legitimate IPR policy changes, taking their IPR policy beyond the Baseline Policy. Depending on the path chosen from those set out in Section 7.3., a combination of consent (according to due process), market discipline, endorsement through public authorities and – to a lesser extent – expertise can ensure that IPR policy changes carry sufficient legitimacy.

7.4.3 Effects of individual SDO policy changes on the broader standardization ecosystem

Legitimacy does not imply unity, however. When SDOs revisit their IPR policies, they are usually prompted to do so by requests from the membership, in light of market or legal developments. Policy changes typically aim to refine and further develop the IPR policy in order to better suit the circumstances of the SDO and the needs of its stakeholders. Considering that the starting point is often the Baseline Policy, which is largely streamlined across SDOs, IPR policy changes will tend to increase the variance in IPR policies across SDOs.

At the same time, as was indicated in Sections 4.3. and 4.4., SDOs are in relation with one another, whether cooperatively or competitively. Furthermore, as our survey indicated, there is a core of firms that are members of a large number of SDOs in the ICT sector. IPR policy changes made in one SDO are therefore bound to be known to other SDOs.

Accordingly, the circulation of IPR policy changes between SDOs takes place against the backdrop of two potentially conflicting dynamics. On the one hand, it is in the nature of the SDO ecosystem that SDOs reach differentiated solutions, since each SDO operates in its specific context, with its specific market realities and specific set of members. On the other hand, there is a broader sense of community as well, that was reflected throughout our interviews, our survey and at the stakeholder workshop: the set of experts on IPR policies is not so large, they meet repeatedly in different fora and they are aware of developments across the SDO ecosystem (at least as regards ICT). Similarly, the academic and public policy communities also tend to look at the SDO ecosystem globally.

The mechanisms by which IPR policy changes circulate from one SDO to the other are not well analyzed, however. In the debates surrounding the W3C move to RF licensing, the IEEE 2015 policy change, or the more recent X9 case before ANSI, we find a common thread, namely the fear by some stakeholders that the policy course chosen by one SDO will become 'contagious' and spread to other SDOs. The debates in the first-moving SDO are amplified and dramatized by a perception that a precedent is being set for other SDOs. When the policy change made by the first SDO is presented as a mere 'clarification' or 'interpretation' of widespread concepts, as opposed to modifications intended to address the specific context of a given SDO, that fear is amplified. In the case of the 2015 IEEE patent policy change, industry experts on both sides agree that the particularly heated debate around the IEEE policy change is in part attributable to the fact that many of the policy change's advocates expected, and many of its detractors feared, that the policy change could produce effects going well beyond IEEE.[167]

[167] One IEEE participant states in defense of the IEEE policy: "I have never believed that the furore around the IEEE policy has much to do with the policy itself but more to do with the concerns that some companies have about contagion. Fundamentally what they're worried about is if what has happened at IEEE spreads beyond the IEEE." Intellectual Asset Magazine May 16, http://www.iam-media.com/Blog/Detail.aspx?g=e8f72d6e-a3f8-45d8-882f-3ebdd3a1d69e. In a recent blog post hostile to the policy change, an industry expert taking the side of the patent holders laments that "The 2015 IEEE patent policy change, endorsed by a BRL from the previous DoJ antitrust head, is dangerously serving as a template for antitrust enforcers worldwide – not only with respect to IEEE standards, but also for other standards such as 3GPP's mobile communications standards." K. Mallinson, "Tide turns in US and EU

As a preliminary matter, not all SDO policy decisions have the potential to become 'contagious'. Some policy changes address perceived idiosyncratic problems or needs of a specific organization. Other policy changes however do address general IPR policy topics that also apply in very similar form at other SDOs. The latter type of policy changes often arises in a context of a broader public discussion, during which various stakeholders (including SDO participants and various public agencies) publicly debate perceived problems with existing IPR policies and possible policy options, or even expressly call upon SDOs to take specific actions.[168]

7.4.3.1 Uncontested IPR policy changes – the case of SEP transfers

There has long been debate over the binding nature of SDO licensing commitments on subsequent purchasers of SEPs. NRC (2013) describes how competition authorities in Europe and the US identified the risk that SEPs transferred to third parties might cease to be subject to SDO licensing commitments as a serious competition law concern and brought enforcement actions when such commitments were not honored (e.g., In re. N-Data and IPCom[169]). In addition, these authorities encouraged SDOs to amend their patent policies to clarify that FRAND obligations bind third parties acquiring encumbered SEPs.

Such policy clarifications can offer guidance to other SDOs regarding the meaning of obligations or provisions included in their policies. That is, even if SDO A has not made a policy change, the clarification made by SDO B to a similar provision in SDO B's policy can inform both the leadership and members of SDO A regarding the interpretation of SDO A's policy. Thus, as a result of various SDO policy changes, in addition to court decisions and antitrust proceedings, SDO patent licensing commitments are now *generally* viewed as being binding upon a party purchasing an encumbered SEP. Policy changes such as these, if they become broadly recognized as desirable, can shift norms and expectations, thereby encouraging other SDOs to adopt similar clarifications. Baron and Spulber (2018) document that an increasing number of SDOs adopted policy provisions relating to the binding nature of SDO licensing commitments over time.[170] In time, as this policy spreads, it might even become part of the Baseline Policy.

This process is thus an example of how SDO IPR policy changes (supported by court decisions and competition authority enforcement practices) can spread very quickly, when the solution adopted is not contested and is rapidly seen as the best option by all stakeholders.

7.4.3.2 Contested IPR policy changes

The 2015 IEEE policy change introduced several policy modifications responding to perceived needs that also apply to other SDOs. The 2015 IEEE policy changes occurred in a context in which many observers and stakeholders publicly stated that existing FRAND licensing obligations were insufficiently defined in SDO policies, and various policymakers explicitly invited SDOs to clarify the licensing obligations arising out of their policies.[171]

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agencies' policies on SEP licensing", IP Finance, December 2017. http://www.ip.finance/2017/12/tide-turns-in-us-and-eu-agencies.html

[168] The simultaneity of the public debate and SDO policy initiatives is not necessarily an indication of causality. Initiatives for SDO policy changes and the public debate (including non-legislative government initiatives) can also be a simultaneous response to a perceived problem, e.g. because of litigation. In any case, the potential for policy changes of individual SDOs to affect institutional norms is strengthened if the policy change takes place in the context of a broader public debate, during which academic writings, public declarations by stakeholders, government communications, or court decisions have stated perceived insufficiencies in existing SDO policies, or expressed support for a specific SDO policy option.

[169] European Commission, "Commission welcomes IPCom's public FRAND declaration" MEMO/09/549 (10 December 2009).

[170] See NRC (2013) for a discussion of different SDOs' approaches to the issue of transferability of the commitment's obligations.

[171] In her 2012 speech at an ITU-T roundtable, former Deputy Assistant Attorney General of the DoJ Antitrust Division, Renata Hesse, made "six small proposals for SSOs before lunch", and inter alia invited SDOs to "Make improvements to lower the transactions cost of determining F/RAND licensing terms. Standards bodies might want to explore setting guidelines for what constitutes a F/RAND rate or devising arbitration

Furthermore, several of the new or revised provisions of the IEEE policy closely reflected preceding court decisions or antitrust investigations (e.g., IEEE's reference to the "smallest salable compliant implementation" as a possible starting point for FRAND determinations mirrors an evidentiary rule developed by the U.S. Court of Appeals for the Federal Circuit. These modifications thus had a potential of affecting established institutional norms.

Some of the new or modified provisions of the IEEE 2015 policy have the character of an explicit policy change (e.g., a qualified waiver of the use of injunctive relief), whereas others are formulated as more specific interpretations or clarifications of the obligations arising out of provisions previously included in the policy (e.g., definitions of general terms such as "reasonable rates" or "compliant implementation"). Similarly, in their position paper on SEPs,[172] CEN and CENELEC profess to interpret the meaning of "FRAND" under CEN's policy,[173] but their statements can be read more broadly as guidance on the meaning of FRAND in general. Unlike the IEEE policy change, this document does not constitute an amendment of CEN's policy adopted under CEN's procedures for policy modifications.

These examples illustrate how SDO policy changes and other activities of SDOs with respect to IPR policies have the potential to inform the interpretation of concepts and terms shared by the policies of a larger number of SDOs, or even generally accepted legal principles. Yet because of the contested nature of the changes, it is important to understand how these policy changes can circulate amongst SDOs.

In this respect, there are two analytical avenues: horizontal circulation amongst SDOs via some form of experiment or emulation mechanism, or a more hierarchical circulation through the intervention of an authoritative institution, via a precedent mechanism.

7.4.3.3 Horizontal circulation – Experiment and emulation

IPR policy changes taking place at individual SDOs, but responding to perceived general needs common to various SDOs, have the potential to serve as experiments for similarly oriented changes at other SDOs.

Innovative SDO policies on IPR can have experimental value. That is, SDOs can implement policies that are discussed e.g. in academic research or abstract policy discussions, but not yet widely practiced. If the adoption of the policy by an SDO is judged successful, the SDO policy establishes a model for other SDOs.

The mechanism by which circulation occurs would resemble the theoretical models of regulatory competition or legal emulation (Larouche (2012)). First of all, as part of the discussion on IPR policy, an SDO and its stakeholders identify the concerns at stake and the aim they want to achieve (e.g. reduction of transaction costs, greater adoption of standards, etc.). Secondly, they consider the experience of other SDOs as potential options that they can choose. Thirdly, they assess the suitability of these options in the light of the concerns and aims that they identified. Fourthly, the SDO comes to a decision. Of course, that decision is a function of the views of the stakeholders, both as expressed internally in the SDO policymaking process and as anticipated by way of competitive response to the option chosen (as detailed in Section 4.4.).

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requirements to reduce the cost of lack of clarity in F/RAND commitments". The same six proposals were made by DoJ officials at a series of conferences. In a speech in December 2012, then-Deputy Assistant Attorney General Fiona Scott-Morton states that "one of the actions we [the DoJ] have taken is to advocate for changes at the SSO level to address the inability of the current F/RAND commitment to protect licensees from holdup."

See https://www.rieti.go.jp/en/events/17120801/pdf/p-6_kallay.pdf for a documentation of similar speeches of DoJ representatives in the course of 2012 and 2013. See also Kühn et al. (2013)

[172] https://www.cencenelec.eu/News/Policy_Opinions/PolicyOpinions/EssentialPatents.pdf

[173] Remarkably, CEN's current policy is to follow the ISO/IEC/ITU common patent policy, with CEN's own policy documents merely providing additional guidance. CEN's interpretation of the meaning of FRAND is thus CEN's interpretation of the meaning of FRAND under the common ISO/IEC/ITU patent policy.

In practice, when W3C adopted a royalty-free licensing policy, this change was vehemently opposed by some stakeholders, who argued that the policy change would produce significant adverse effects on innovation. After the policy change, other SDOs also adopted royalty-free policies. OASIS for instance in 2005 allowed its newly created working groups to select to operate in royalty-free licensing mode, and in 2009 introduced a third, non-assertion mode. In 2011, the American Petroleum Institute (API) adopted a royalty-free policy, leading opponents of this change to challenge API's ANSI-accreditation. In a letter in support of API, two ANSI members argued that the "widespread adoption of policies with default RF licensing rules, including by groups responsible for prevalent standards such as the HTML standard [W3C]" showed that "there is demonstrably no merit to the argument that such policies have discouraged or will discourage innovation". Hence, "ANSI should do nothing to discourage experimentation with different IPR policies and models by accredited standards developers". ANSI found that the RF policies adopted by both OASIS and API complied with the ANSI Essential Requirements. ECMA introduced an "experimental royalty-free patent policy" in 2013. Under this policy, ECMA may designate specific task groups of one of its technical committees as royalty-free groups.

The adoption of other royalty-free patent policies and the reference to W3C in the discussion suggest that the early move by W3C constituted a model for similar policy changes at other SDOs. It provided some empirical basis to analyze the expected effects of making a similar change at another SDO. Nevertheless, policies with default royalty-free licensing rules did not spread widely across all SDOs, but mostly remained confined to SDOs with a similar technological focus on web-based technologies and to smaller technology-specific consortia (e.g., USB, Bluetooth, HDMI). Furthermore, more recent adoptions of royalty-free policies tended to be more limited in scope. Finally, even the more recent changes at API and ECMA were described by the SDOs introducing the policy or by stakeholders defending it as "experimental" policies. This suggests that the effects of policies with default royalty-free licensing rules continue to be perceived as insufficiently understood. Nevertheless, there seems to be some emerging agreement that such policies represent a viable solution in at least some technological areas.[174]

A different example is the adoption of policies providing for ex-ante disclosure of most restrictive licensing terms and conditions (i.e., maximum royalty rates). In 2006, VITA adopted a policy making ex-ante disclosure of most restrictive licensing terms and conditions compulsory; whereas in 2007 ETSI and IEEE added provisions to their policies allowing SEP holders to make such a disclosure on a voluntary basis after mandatory disclosure of such terms was rejected by significant stakeholders at each SDO. Similar to W3Cs adoption of a royalty-free policy, VITA's policy of compulsory ex-ante disclosure was strongly opposed by some stakeholders, who predicted significant adverse effects of the new policy. Contreras (2013a) analyzed the consequences of this policy change, and found no conclusive evidence for such adverse effects. Nevertheless, VITA's example was not followed by other significant SDOs for reasons explored in Contreras (2013a). The probative value of the example may be limited by the fact that VITA is a comparatively small SDO with a limited number of SEPs. Furthermore, there is limited overlap in membership between VITA and other SDOs where SEPs play a more prominent role. Stakeholders in these SDOs thus have limited exposure to VITA's policy in practice.

The policies providing for voluntary ex-ante disclosure of licensing terms at ETSI and IEEE however seem to have been unsuccessful, because SEP holders did not make significant use of the policies. IEEE partly justified its 2015 policy revisions using the fact that the attempt to provide clarity through voluntary means in 2007 did not produce the expected results. Independently of the specific policy provisions at ETSI and IEEE, significant SEP holders made early announcements in 2009 of expected reasonable aggregate royalty levels for patents essential to the LTE standard, and stated what share

[174] Contreras (2016a) discusses how cultural and historical distinctions between Internet-focused SDOs (IETF, W3C) and telecommunications-focused SDOs (ETSI, TIA) have led to different approaches to patents and related policies.

in the aggregate royalty amount they expected for their own SEPs (Contreras 2015a, pp.560-61). In *Unwired Planet v Huawei*, Justice Birss of the UK High Court (Patents) called these statements "self-serving" and of limited value for the determination of reasonable royalty rates, though he did utilize these statements in his calculation of FRAND royalty rates in the case.[175] The limited success of SDO experimentation with ex-ante disclosure of licensing terms, in spite of the theoretical appeal of such policies (e.g. Leveque and Meniere, 2015), thus illustrates how experimentation with a proposed policy can reveal its shortcomings or problems.

Similarly, after or in the wake of the 2015 IEEE policy change, discussions regarding similar changes were held at other SDOs, either as a result of the IEEE policy change, or in response to similar forces that induced the initiative at IEEE. As indicated above under 7.4.3.2, CEN-CENELEC issued a position paper on FRAND, which can be seen as a contribution to the debate, but differs completely from the IEEE policy change on substance.

The preceding examples reveal the essence of this horizontal circulation mechanism: even if the policy change made by one SDO can potentially apply to the policies of other SDOs as well, each SDO controls its own policymaking. Whether an SDO decides to follow the lead of the first-moving SDO is a function of whether, in the specific context of the second SDO, the policy change made by the first-mover is perceived as a success, and whether the circumstances of the second SDO allow for that change to be adopted by the second SDO, as explained above. Given that each SDO evolves within its own context, and stakeholder expectations may vary from one SDO to the other, it should not be surprising that contested IPR policy changes may not circulate so easily, even if members of the first-moving SDO intend its policy change to spread out to other SDOs.

Moreover, next to the variance induced by the specific circumstances of each SDO, the analysis in Section 7.3. would indicate that committal and non-committal choices would co-exist side by side, in line with the different governance architectures present amongst SDOs. What is more, it is entirely conceivable that, on substance, more than one committal choice would be observed, since SDOs could side with one or the other side on a contested issue. Similarly, there are a variety of non-committal choices (menu option, inaction, etc.) that could each be present.

In the end, if and when IPR policy changes are presented as interpretations or clarifications of widely used terms, a confusing picture could emerge, where the term FRAND, for instance, could have a different meaning depending on whether it is used in SDO A or SDO B.[176] While unfortunate, this situation is not unusual in law (see Prechal and Roermund (2008) for an theoretical and practical exploration of "conceptual divergences", against the backdrop of diverging interpretations of the same EU law concepts as between various jurisdictions).

Within the web of horizontal relationships amongst SDOs, and considering the predominantly consent-based understanding within which SDOs and their stakeholders operate (see Section 4.5.2.), there is no theoretical basis for a model of circulation of IPR policy changes that would override the autonomy of each SDO over its own policymaking.

7.4.3.4 Hierarchical circulation – Precedent

If a more constraining model for the circulation of IPR policy changes amongst SDOs is to be found, it would hence require the participation of a hierarchically superior institution that could bind SDOs, following a precedential model – with which lawyers are familiar. Under that model, a pronouncement by that institution would turn the IPR policy change of one SDO into a precedent which the others are bound to heed, if not to follow.

[175] Similar use of these statements was made by the Japanese Patent Court in *Apple Japan v. Samsung* and the U.S. District Court for the Central District of California in *TCL v. Ericsson*.
[176] Much like forking in open source software.

A review of the literature and the data we have gathered throughout our research points to two institutions that play such a precedent-setting role in the development of IPR policies, namely competition authorities and courts applying competition law, as well as ANSI.

Precedent-setting through competition law or antitrust institutions

As was explained in Sections 4.1.3. and 7.2.1, above, competition or antitrust law has had a major influence on both SDO governance principles and on the Baseline Policy in IPR matters.

That influence has been felt through the decisions of authorities and courts applying competition or antitrust law to individual cases. Since these decisions are based on generally-applicable law that affects all economic actors across the board, the reasoning of authorities or courts in applying competition or antitrust law to a case involving one SDO is *prima facie* applicable to other SDOs as well, unless that first case can be distinguished from a subsequent case. Competition authorities and courts are well aware of the precedential effect of their pronouncements, and know how to frame these pronouncements to set out legal boundaries without unduly limiting the autonomy of SDOs.

A review of SDO policies by antitrust authorities can thus confer precedential status to these policies, and clarify the legality of certain SDO policy provisions under antitrust law. SDOs themselves can bring competition authorities and courts to step into a case, through various means. The most direct one is to request a Business Review Letter (BRL) from the US Department of Justice, with the hope that such letter will not only provide an assurance that the DoJ does not currently intend to bring an antitrust enforcement action with respect to a proposed IPR policy change, but also to confer some legitimacy on the change (see Section 7.4.4.) and possibly give it some precedential value. IEEE sought and obtained favorable Business Review Letters from the US DOJ with respect to substantial patent policy amendments in 2007 and 2015, and VITA obtained a favorable Business Review Letter from the US DOJ in 2006.[177] These SDO policy changes thus clarified the antitrust enforcement intentions of the DoJ with respect to such policies. The policies also established a soft precedent, which provides other SDOs with guidance regarding what IPR policies SDOs can adopt under antitrust law and the antitrust agencies' then-current enforcement practices.[178]

Nevertheless, Business Review Letters only provide an indication of the antitrust enforcement priorities of the DoJ as of the date they are issued. In a speech delivered on 10 November 2017, without specifically mentioning IEEE, the DoJ Assistant Attorney General for Antitrust stated that the "Antitrust Division will […] be skeptical of rules that SSOs impose that appear designed specifically to shift bargaining leverage from IP creators to implementers, or vice versa. SSO rules purporting to clarify the meaning of 'reasonable and non-discriminatory' that skew the bargain in the direction of implementers warrant a close look to determine whether they are the product of collusive behavior within the SSO." In light of these remarks, the precedential value established by the 2015 business review letter may be limited.[179]

Beyond that implicit criticism of the BRL issued by the previous administration, the remarks of the Assistant Attorney General also point out a fundamental issue with the intervention of competition authorities and courts in disputes arising out of SDO IPR policies and their implementation. Competition authorities and courts intervene from the

[177] In a similar procedure, ETSI in 1992 sought "negative clearance" of its draft IPR policy from the European Commission, asking the Commission to certify that there are no grounds for action on its part under competition law provisions of the Treaty. The Commission however decided that it did not possess sufficient information for such an assessment (Iversen, 1999). The procedure is no longer available under current EU competition law enforcement practice.

[178] In a related area, Gilbert (2004) analyzes how the positive business review letters for the DVD and MPEG2 patent pools in 1997 and 1999 created a "template" for patent pools not running afoul of antitrust law; and facilitated the subsequent creation of a large number of pools following the same model.

[179] See Contreras, 2018b (discussing implications of DOJ policy shift toward IEEE and SDOs, in general).

angle of competition law and antitrust, which is concerned with a specific set of market phenomena (collusion and agreements in restraint of competition, monopolization and abuses of dominant position), and cannot necessarily deal with all the issues arising in the course of SDO IPR policymaking. The Assistant Attorney General makes it clear that in his view, there should be no collusion within the SDO to affect the terms of bargaining between implementers and innovators. Beyond that, disputes are better left to contract law or property law, which are better able to take into account the specificities of each case. In that sense, the Assistant Attorney General might also have been criticizing earlier advocacy action by the DoJ (in 2012 and 2013), when the DoJ called for SDO policy provisions requiring or allowing ex-ante disclosure of licensing, placing restrictions on access to injunctive relief, and/or clarifying the meaning of FRAND.

Moreover, as the shift at the DoJ shows, the application of competition or antitrust law might be undermined by a lack of consistency over time within a single authority, or a divergence as between authorities in the same jurisdiction (which is e.g. a possibility in the US, where the DoJ and FTC share the responsibility for enforcing antitrust law) or with other key jurisdictions (US, EU, China, among others). These limitations can reduce the precedential value of antitrust authorities' review of specific SDO practices. In some instances, more generally formulated guidance can thus provide for greater stability and predictability of antitrust enforcement practices.

For example, in its 2011 Horizontal Guidelines regarding the application of EU competition law, the European Commission carefully generalizes from its experience to state that SDO rules "would need to ensure effective access to the standard on fair, reasonable and non discriminatory terms", "would need to require participants wishing to have their IPR included in the standard to provide an irrevocable commitment", and "would need to require good faith disclosure, by participants, of their IPR that might be essential for the implementation of the standard."[180] The Commission sets out safe harbour conditions that SDOs can follow in order to avoid breaching EU competition law, and for the remainder the Commission leaves it to individual SDOs to develop their policies accordingly.

Similarly, in *Huawei* v. *ZTE*, the CJEU frames its reasoning in general terms: it discusses SEPs and FRAND commitments by reference to 'a standardization body' and not to ETSI specifically, whose IPR policy was at stake in the case.[181] This indicates that the Court is aware that the ETSI IPR policy is representative of a larger set of IPR policies that are bound to be affected by the ruling as well. In return, however, the Court leaves its ruling relatively open: as commentators have noted, the *Huawei* choreography, while useful and well-received, still leaves many issues open and requires further fleshing out in practice.

Precedent-setting through ANSI

Given its position within the US standardization ecosystem, ANSI is uniquely placed to give precedential value to IPR policy changes put forward within its accredited SDOs. Indeed ANSI accreditation depends on whether an SDO complies with the ANSI Essential Requirements. It is hence possible for an IPR policy change to be challenged before ANSI for failure to comply with the ANSI Essential Requirements. Since the Essential Requirements are the point of reference for all reviews of individual IPR policies, ANSI rulings on the meaning of its Essential Requirements and on the conformity of a specific

[180] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011XC0114(04)&from=EN

[181] CJEU, Judgment of 16 July 2015, Case C-170/13, *Huawei* v. *ZTE*, ECLI:EU:C:2015:477 throughout, including in the operative part of the judgment. While in a preliminary reference proceeding such as *Huawei*, the CJEU will necessarily rule in more general and abstract terms, it could still have limited the ambit of its ruling to ETSI, or even more specifically to the LTE standard that was at stake. The referring court, however, had asked its question in the most general terms, with the intent to challenge the CJEU to break the deadlock between the case-law of the German Supreme Court (*Orange Book*) and the Commission decisions in *Samsung* and *Motorola*: see Larouche and Zingales (2015). The CJEU was well aware of that and chose to take up the challenge from the referring court.

IPR policy with them are liable to have a precedential value across the entirety of ANSI-accredited SDOs.

For example, as both VITA and IEEE are ANSI-accredited SDOs, their amended policies were examined by ANSI to ensure that they continued to comply with the Essential Requirements. ANSI determined in both cases that the amended policies were in compliance with the Essential Requirements, though there was substantial opposition to this conclusion at ANSI by members of these SDOs who had opposed the changes. Similarly, the policies of OASIS and API including default royalty-free licensing provisions led to challenges before ANSI. In all of these cases, ANSI concluded that the policies were in compliance with its Essential Requirements. These policies thus established the precedent that default royalty-free licensing policies are compliant with the ANSI patent policy, which is part of the normative features of the ANSI Essential Requirements.

The precedential value of ANSI examinations of the compliance of modified SDO policies with its Essential Requirements is exemplified in the ongoing controversy regarding the response of the ANSI Executive Standards Council (ExSC) to a question submitted by X9, an ANSI-accredited SDO, regarding the conformity of a letter of assurance (LoA) received by X9 from one of its SEP-holding members. In that letter the SEP owner limits the scope of its licensing commitment to "wholly compliant standard implementations". The ExSC decided that the LoA conforms with ANSI's essential requirements, because absent a definition of "wholly compliant implementation", the scope of the commitment must be understood to be equivalent to the scope of a commitment under the more general language in the ANSI Essential Requirements and X9's patent policy. Nevertheless, in its initial decision, the ExSC also provides a more general interpretation of the meaning of "implementing the standard" under the ANSI essential requirements supported by additional examples and analysis. Importantly, under this interpretation, the scope of a licensing commitment must generally be understood to include both the makers of end products conforming to all normative standard features, and the makers of components used by such end products. If an ANSI-accredited SDO intends a narrower scope of the licensing obligation, it must explicitly define this narrower scope in its policy.

Several parties criticized and appealed the ExSC decision because of the additional examples and analysis. In its appeal decision of February 23, 2018, the ExSC upheld the initial decision and rejected various procedural appeals, but deleted some of the examples and analysis in the initial decision and replaced this text with a more open interpretation of the ANSI Essential Requirements. This interpretation does not unequivocally establish the extent to which the ANSI Essential Requirements constitute an obligation to provide licenses to component makers.[182]

The ANSI ExSC in its appeal decision acknowledged that the added analysis and examples created controversy, as there currently is not consensus regarding the interpretation of the term "wholly compliant implementation". The additional examples and analyses were meant to provide guidance to ANSI-accredited SDOs more generally, going beyond the narrower question submitted by X9.[183] The revision of the decision on

[182] "While the ExSC determined in the IEEE case that such a requirement was not inconsistent with the ANSI Patent Policy, that does not mean that ANSI's Patent Policy requires licensing at the component level. We do not wish to express or imply any such "default" interpretation and we leave it to negotiations between patent holders and implementers to decide what licensing terms are appropriate in particular standards, subject to the terms of an ASD's patent policy.

The ExSC does not accept the arguments advanced at the February 5th hearing … that the ANSI Patent Policy requires only "access" to essential patent claims, as opposed to a "license" to such claims. Nor do we accept arguments that the ANSI Patent Policy cedes unilaterally and unconditionally to patent holders the right to decide "where on the value chain" they choose to license. These words and concepts are not reflected in the current language of the ANSI Patent Policy." ANSI EXECUTIVE STANDARDS COUNCIL SUMMARY DECISION February 23, 2018; https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/ANSI%20Executive%20Standards%20Council%20(ExSC)%20Interpretations/ExSC_087_2017_091417_patent%20policy_022318%20amended.pdf

[183] "In an effort to provide future guidance to ASDs who may confront similar forms of customized assurances, in the Initial Decision the ExSC outlined potential considerations through the use of examples, drawing in

appeal, upholding the specific decision but reducing its potential to impact the interpretation of the policies of other SDOs, illustrates the power of ANSI's capacity to make decisions with a binding precedential value for a larger number of accredited SDOs.

Neither of the institutions discussed in the preceding paragraphs is ideally placed to serve as a precedent-setting authority for IPR policy changes. Competition and antitrust authorities and courts work with a body of law that requires caution in its application, given its strong impact across the board and its focus on a specific set of concerns. Furthermore, consistency across time and jurisdictions may be lacking. As for ANSI, it appears better placed on substance (being a body specializing in standardization, with an IPR Policy Committee where expertise is gathered), but it may not yet have the tools to handle complex, high-stake disputes surrounding IPR policies. ANSI is not a public authority either, in the sense that it is not implementing public policy objectives in its activities. Finally, ANSI covers much of standardization, but not all, since many significant SDOs are primarily based outside of the US and do not require or seek ANSI accreditation, and even some important U.S.-based SDOs such as IETF and W3C, as well as most consortia (Bluetooth, USB, HDMI) have not sought ANSI accreditation.

7.4.4 The role of public authorities in defining SDO IPR policies

7.4.4.1 Public policy objectives in SDO IPR policies

As we have seen, the primary responsibility for defining and modifying SDO IPR policies falls upon SDOs themselves and their respective stakeholders and constituencies. Nevertheless, public authorities may perceive the need to address IPR policy matters so as to settle contested issues that are dividing stakeholders and potentially affecting the flow of innovation. Within the self- or co-regulation model set out above in Section 4.5.2., IPR policymaking suffers from a lack of a focal actor on both the public authority and the private (SDO) side. There is no established tradition for SDOs to make policy decisions as a group to resolve controversial debates. While some focal organizations, such as ISO or ANSI, provide guidance and directions that are used and/or followed by a larger number of SDOs, each SDO remains responsible for the content of its own IPR policy. Nevertheless, as we have seen, the decisions of one SDO can produce direct reverberations for the policies of other SDOs. In addition, policy changes of individual SDOs can indirectly affect other SDOs via the intervention of public authorities or focal organizations (such as ANSI), because policy changes of individual SDOs can serve as experiments or precedents for more generally applicable regulation.

In spite of their primarily SDO-internal, private nature, SDO IPR policies thus often address issues that are also highly relevant for public authorities in their pursuit of more general policy objectives, and public authorities have often taken an active interest in SDO policy discussions. The recent European Commission Communication "Setting out the EU approach to SEPs" illustrates the extent to which the policies defined by SDOs are viewed as instrumental to the pursuit of the Commission's policy objectives:

[T]here is an urgent need to set out key principles that foster a balanced, smooth and predictable framework for SEPs. These key principles reflect two main objectives: incentivising the development and inclusion of top technologies in standards, by preserving fair and adequate return for these contributions, and ensuring smooth and wide dissemination of standardised technologies based on fair access conditions.

While this statement of objectives does not necessarily imply a FRAND regime, it nevertheless describes the objectives that a FRAND regime is typically portrayed to pursue. IPR policymaking must pay attention to the need to have appropriate mechanisms in place to ensure a sufficient and continuous flow of technology into

part on the discussion that occurred at the IPRPC and the ExSC. It appears that this effort and the use of the examples and the discussion of whole versus partial implementations has generated controversy."

standard development, while ensuring that the standard is available for wide implementation.[184]

While the overall attitude of public authorities with respect to SDO IPR policy deliberations has been mostly deferential, there have been various episodes of more active involvement of public authorities in the discussion, definition or modification of IPR policies.[185]

7.4.4.2 Public authorities calling for SDO policy activities

In the IPR realm, there are multiple instances where public authorities *call upon* SDOs to perform certain actions. The latest example is the EC communication on SEPs, stating e.g. that "SDOs should provide detailed information in their databases to support the SEP licensing framework", and that "SDOs should […] provide the possibility and incentives for patent holders and technology users to report the case reference and main outcome of final decisions, positive or negative, on declared SEPs." An example of further calls for SDO policy reform is the 2012 and 2013 DoJ advocacy in favor of SDO policy provisions requiring or allowing ex-ante disclosure of licensing, placing restrictions on access to injunctive relief, and/or clarifying the meaning of FRAND. While such calls have no immediate legal or regulatory significance, they can be indicative of future regulatory action. In the case of DoJ advocacy, the favorable discussion of such policy changes gave a solid indication of the DoJ's enforcement intention with respect to SDOs adopting such policies, even before the DoJ issued a favorable business review letter to IEEE's patent policy incorporating several changes reminiscent of some of the DoJ's proposals.[186]

Public authorities calls upon SDOs to clarify provisions of IPR policies in conjunction with ex post regulatory sanction of SDO policy changes bear elements of delegation: public authorities perceive the need for a solution at a global level. Nevertheless, at global level, there are only loose inter-governmental institutions; and at a national level, governmental regulatory authorities are widely perceived as lacking the expertise to issue specific rules. Public authorities thus recognize that private SDOs are in a better position to address the perceived problems. Nevertheless, public authorities are unwilling to defer entirely to these organizations, because the question to be addressed has clear public implications, and is viewed as within the prerogatives of regulatory authorities. While there is no explicit regulatory mandate in the call upon private organizations to perform any particular activity, these activities gain some official status through a combination of ex ante calls from government and ex post actions by regulatory authorities recognizing and reinforcing the rules issued by the private organizations.[187]

Nevertheless, important elements of regulatory delegation are missing. First, there is no clear recipient of public authorities' repeated calls for action, as there is no focal SDO, and there is controversy which organization may legitimately take the lead. Different SDOs have different processes, and processes within SDOs are evolving, and not all processes are viewed as equally legitimate and appropriate. Second, SDOs are

[184] These two aims cannot be viewed strictly from a static point of view (with reference to a single standard once it has been adopted). Rather, inventors must be incentivized such that they continue contributing to subsequent standards; similarly, availability does not imply success, and the contribution of implementers to the diffusion and adoption of a standard must be recognized as well.

[185] An exceptional case is ITU-T, where national governments directly participate in deliberations on changes to the IPR policy and other SDO policy matters.

[186] Though, of course, it may also be the case that the policy changes advocated by the DoJ are themselves the result of lobbying by private interests, as suggested by former ITC Commissioner F. Scott Kieff (Kieff (2017)).

[187] There are precedents for situations in which such calls from governmental authorities to private actors to perform a certain task in combination with ex post sanction of the decision by regulatory authorities de facto constituted a delegation of a regulatory authority. The International Accounting Standards Board (IASB) e.g. developed international accounting standards after repeated calls by government leaders of WTO and G20 countries. In the interpretation of Joel Trachtman, "this statement signaled the WTO's willingness to delegate regulatory authority (at least in political as opposed to legal terms) to the IASC. 'The WTO [thus] has … "delegated" to specific functional organizations the task of establishing standards to facilitate the free movement of accountancy services.'" Cited from Buthe and Mattli, The New Global Rulers, 2011; p.70-71

confronted with a multiplicity of calls to action from different public authorities with different priorities and preferences, along with stark warnings against overreach and collusion. ETSI's development of its IPR policy in 1993 and 1994 provides an early example of an SDO subjected to opposing political pressures on its IPR policy development from different public authorities.[188] More recently, the pronounced change in the position of the DoJ, evidenced by the contrast between the public speeches of Hesse and Delrahim, as well as the differing approaches by the DoJ and FTC, show that there is a dissonance of politically opposing positions within the U.S. Third, SDOs are designed to create technical standards, which is the activity for which they have uncontested legitimacy. Issuing rules on IPR licensing is an exceptional SDO activity, yet is still formally and procedurally part of the SDO processes for developing internal rules and procedures.

7.4.4.3 Towards public-private cooperation

The EC's 2017 Communication on SEPs takes into consideration a significant number of contested topics, e.g. it considers the importance of "a balanced and predictable enforcement environment" with a framework for the availability of injunctive relief and the availability of alternative dispute resolution mechanisms, and provides general principles of IP valuation to be taken into account in FRAND negotiation. Nevertheless, the Commission does not specifically invite SDOs to take action with respect to these controversial questions. The actions that the Commission explicitly calls upon SDOs to take are more ministerial and administrative: "improving the quality and accessibility of information recorded in SDO databases" and "raising awareness of the FRAND licensing process (particularly for SMEs)." These seem to be questions on which SDOs can develop non-controversial approaches in a consensus-driven manner. In addition, the Commission proposes that SDOs should give parties the "possibility and incentives" to report the outcome of final decisions on declared SEPs. As discussed, such an optional approach is characteristic of consensus bodies' response to controversial topics.

The Communication does not give direction to SDOs, but rather signals the availability of the Commission to engage in a collaborative process: "Working together with all stakeholders will be necessary for a successful implementation of the principles and to ensure concrete results of the actions announced."[189]

[188] The Commission took an active interest in the definition of the policies. The 1993 policy was adopted by 88% of the weighted votes of ETSI members, but did not go into effect because of intense pressure inter alia by the US government. "The European Union is retained on the 'priority watch list' because" [among other reasons] "the European Telecommunications Standards Institute (ETSI) adopted an IPR and standardization policy that differs significantly from that adopted by other countries, and it is considering measures to expel or significantly reduce the membership status of ETSI members who do not accept this policy." US Trade Representative Decision of April 30, 1994. https://ustr.gov/sites/default/files/1994%20Special%20301%20Report.pdf. Iversen (1999) claims that the Clinton administration used pressure on governments of CEPT member countries, and in particular the UK, at the highest government level, in order to persuade them to withdraw their support of ETSI's IPR policy.

[189] "Setting out the EU approach to Standard Essential Patents", Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee

8 Conclusions

8.1 Best practices for interplay of IPR systems and SDOs from a public policy perspective

In this study, we have produced a comprehensive overview of the interplay of IPR systems and SDOs from a public policy perspective, as it occurs in compatibility standardization in the ICT sector. While we have focused on some of the most salient aspects of this interplay, and in particular policy questions with respect to the disclosure and licensing of SEPs, our study of the governance processes of SDOs has implications for many other IPR-related policy discussions, and processes of decision making on the rules for standard development more generally.

Both industry stakeholders and public authorities take an active interest in the interplay of IPR and standardization systems. The details of this interplay are most specifically addressed by the IPR policies of SDOs. While these policies are primarily defined through SDO-internal processes involving SDO members, staff, and leadership, SDO policy choices also respond to the actions taken by public policymakers in pursuit of the public interest. Our study has identified elements of best practices for the interaction between public policymakers and SDOs in the definition of IPR policies for standard development. Even though we have studied a diversity of SDO approaches to decision making on IPR policies, we refrain from evaluating the merits of the approaches taken by different SDOs as that question was outside of the focus of this study, and rather concentrate on recommendations for policy makers on how to most productively pursue public policy aims with respect to IPR policies in the light of the diversity of SDO approaches and stakeholder interests.

We have cast our analysis of the interplay between IPR and standardization in the context of the general regulatory model with respect to standard development. Technical standards respond to a variety of critical societal needs and requirements, and many standardization choices have significant implications for public policy objectives. Public authorities have therefore often taken an active interest in the substance of standard development work. Nevertheless, over the recent decades, both in Europe and to an even larger extent in the US, a consensus has emerged that the public interest is often best served by relying on the existing system of private-industry driven SDOs, ranging from the more established standardization bodies to the more informal SDOs that characterize the ICT sector. The authorities therefore predominantly focus on creating the conditions under which SDO activities and decisions will carry some legitimacy in the public eye and produce results that accord with the public interest. In Section 4, we have chronicled the evolution of regulatory models for standard development and described the prevalence of a self-regulatory scheme which relies on the expertise and the competitive environment in which SDOs operate, and in which the input of authorities bears on institutional and procedural matters, i.e. on SDO governance. In particular, a large body of legal norms and guidance arising out of the application of trade/WTO and competition law enshrines the due process principles of consensus decision making, openness, balance of interests, transparency, and availability of appeal. Public authorities in the EU (Regulation 1025/2012 Annex II) and the US (NTTAA and OMB Circular A-119) have stated their willingness to rely on standards produced by private bodies for public policy objectives, provided these standards are developed in processes respecting these procedural principles.

This general policy approach to standard development, which we refer to as a ***procedural approach***, partly carries over to the development of SDO policies on IPR, which are ancillary to standardization. SDOs have substantial leeway in the definition of their IPR policies. Public authorities usually do not participate directly in the discussion or development of these policies or amendments thereto. Policies are discussed and developed in SDO governance bodies, often based on significant contributions from industry stakeholders. In line with the overall regulatory model sketched out above,

public authorities are willing to defer to industry-led processes drawing on the expertise of private interests for the definition of policies that – like standards – have a significant level of technicality. In Section 6, we have seen that this deference is grounded on the legitimacy of SDO policy making, as it arises from a combination of factors (internal consent, competitive environment, indirect democratic legitimation, due process and expertise); as an important condition for this deference, policy makers and stakeholders generally expect that the processes for defining these rules meet high levels of procedural quality. Nevertheless, there is a dearth of guidance on procedural principles as specifically applicable to the development of SDO policies in general, and the development of IPR policies in particular.

In the specific realm of IPR policies, policy makers have supplemented the general procedural approach with more substantive guidance on the legal boundaries and requirements applicable to the substance of IPR policy choices. We refer to this approach as a ***safe harbour approach***. Under this approach, the policy maker defines and states legal requirements and identifies general SDO practices that usually comply with these requirements. SDOs are responsible for devising specific policies in line with the identified general practices. SDOs can also develop alternative practices if they satisfy the underlying legal requirements. A sizeable number of regulatory instruments follow this approach. In competition law, the Horizontal Guidelines of the European Commission and various business review letters from the U.S. DoJ describe general principles of IPR policies that are seen as usually compliant with competition law. Outside of competition law, Regulation 1025/2012 and OMB Circular A-119 describe the general principles of IPR policies in similar terms. In Section 7, we argue that along with the actions of private organizations, such as the ANSI Essential Requirements and CEN Guides for European National Standard Bodies, these regulatory instruments have contributed to the emergence of a *baseline* IPR policy. While SDOs remain responsible for defining specific aspects of their IPR policies, and some SDOs adopt policies deviating from or going beyond the baseline policy in significant ways, the safe harbour approach resulting in the baseline IPR policy has arguably been the most influential form of regulatory involvement in the definition of SDO IPR policies.

We believe that the interplay of these approaches could serve the public policy interests in SDO policies, while preserving SDO autonomy over their policy development. In addressing any of the shortcomings of the current model for the interplay of IPR systems and SDOs discussed below, we invite policy makers to prioritize strengthening and further developing these approaches over more direct intervention in SDO decision making on IPR policies. Examples of the latter are the adoption of ETSI's IPR policy in 1993 and 1994 under political pressure from various sides, and the shifting policy positions of the U.S. DoJ regarding the IEEE policy amendment in 2015. Both initiatives were of much more prescriptive nature. A strengthening of the procedural and safe harbour approaches may reduce or obviate the perceived necessity for public authorities to directly participate in SDO policy deliberations in such a prescriptive fashion.

8.2 The representation of diverse stakeholder interests in SDOs

The dominating regulatory approach described above thus rests to a large extent on an interplay between public authorities and SDO-internal governance processes, where public authorities define broad procedural and substantive requirements, and SDOs in their interaction with their members and other stakeholders define a diversity of specific policies that implement the regulatory requirements while also responding to SDO-specific needs and objectives. This regulatory model currently faces various challenges. In particular, as a consequence of the increasing spread and importance of ICT, SDO policies on IPR have an increasingly broad societal, legal, and economic impact. This technological convergence, which has recently accelerated in the context of the IoT revolution, raises the question whether the set of stakeholders directly participating in the process of developing specific SDO IPR policies is sufficiently inclusive and representative of the diversity of stakeholders impacted by these policies.

Traditionally, debates on SDO IPR policies have often been dominated by a few industry stakeholders directly impacted by these policies, and in particular the most prominent contributors and implementers of proprietary technology. The set of SDO insiders actively participating in the debate is rapidly evolving, reflecting the pace of technological change and convergence. So-called 'vertical' players (in particular auto makers) are among the stakeholders with more recent engagement with SDO IPR policy debates, along with a diverse range of Asian (and predominantly Chinese) stakeholders. Both groups have rapidly gained influence in SDO governance bodies and the more general governance model. Several Special Interest Groups (such as the Fair Standards Alliance) were also created, combining and coordinating the active efforts of various incumbents and "entrants".

While there seems to be little doubt that large industrial companies in industries recently exposed to SEP licensing issues will rapidly acquire (or already have acquired) the necessary means to influence SDO governance on IPR policies, this is not the case of the much larger constituencies of individually less significant or less affected stakeholders. Many SDOs, especially the more informal and industry-driven ones (e.g. Jedec) acknowledge that the interests of these other stakeholders, and in particular non-commercial interests, are only marginally represented. Our survey responses also indicate that many of the organizations responsible for representing dispersed and non-commercial interests in matters of standardization do not significantly participate in the debates regarding IPR policies. This situation raises the necessary question how societal and dispersed commercial interests are represented in the current governance model.

Consumers and other dispersed interests could potentially have an interest in IPR policies. While consumers and other end users of standardized technologies rarely participate directly in the technology market for SEPs, they may be impacted by the rules in this market through the effects that these rules may have on end product prices, product variety, and technological innovation. Nevertheless, the impact of these policies on consumers and other end users is more ambiguous and certainly more indirect and muted than on the immediate participants on both sides of the market for SEP licenses. This could explain why consumer and other societal groups are not more active in the debates on SDO IPR policies than they are, in stark contrast to the very significant and often highly effective participation of civil society in other debates at the interface of technology and policy (e.g. related to privacy, copyright protection of cultural goods, net neutrality, etc) or in the area of safety, health, consumer protection and environmental standards. While consumer participation in SDOs is generally discouraged by a lack of information/expertise on the issues, disaggregation of the consumer/civil society voice and lack of funding to participate in SDO activities, consumer interests are particularly under-represented in the debates that we have studied.

By and large, we observe that the stakeholders that are most effective at influencing SDO governance simply seem to be the companies that are most willing to devote significant resources to this activity. The willingness to spend is a direct consequence of each company's individual stakes in IPR policy outcomes. The overrepresentation of these companies does not result from absence of openness in the SDO processes, but from their investment in the personnel and expertise that are necessary to be effective in influencing a complex and broad governance system across many relevant SDOs. This is a general characteristic of self-regulation processes, and only warrants government intervention or external pressure on SDOs and their stakeholders if there is evidence that the practical barriers to effective SDO participation (cost, expertise, network, time) have a detrimental impact on social welfare.

The impact of unbalanced representation in SDO governance debates on social welfare is difficult to determine. The predominant regulatory approach seems to rest on the general idea that the interests of the end users of the standardization system are best served by vigorous competition at each layer of the process. Consumers and other end users are influential because standardized technologies need to meet the test of consumer demand. Antitrust authorities have spent significant resources policing the interface

between standards and IPR to preserve free competition in the product and (increasingly over time) the technology markets directly affected by standardization. Our study has furthermore documented a significant array of competitive checks on the power of individual SDOs to impose IPR rules. Perhaps as a consequence of the competitiveness of the industry, there is significant fluctuation in the set of SDO "incumbents" that have dominated SDO governance over time.

Nevertheless, there are specific policy aspects at the intersection of standardization and IPR that do not easily lend themselves to a resolution through competition. One such aspect is access to standards including proprietary technology that are mandated by binding regulation. An example of this is eCall, an emergency communication standard mandated by the European Commission, whereby proprietary technology has been integrated into a standard and made available to all implementers. The regulatory requirement to implement this technology in all vehicles greatly diminishes competitive pressure and raises a legitimate demand for the technology to be most broadly available. More generally, the massive importance of ICT (and in particular the internet) for social and political processes arguably raises a societal demand that these technologies be available to all. This may warrant a regulatory intervention to guarantee low cost access to proprietary technology for people in need. These specific societal demands are not guaranteed to be met by regulatory approaches limited to preserving competition in the market.

These situations may warrant a more explicit representation of consumer and other end user interests in the governance model. Of course, there is a range of measures that can be taken to reach this objective, like financing the participation of certain groups (SMEs, consumers, etc.) in SDO governance activities. The EU already provides some funding for representation of societal interests in SDOs, but it is apparent that present levels of support are inadequate to allow for an effective influence on policy outcomes. Nevertheless, it must carefully be analyzed whether directing further resources into this representation may impair the performance of the system. The current regulatory approach is characterized by a significant extent of self-regulation by the most directly affected stakeholders, which generally hold the highest levels of technical expertise. Infusing a significantly larger degree of participation by remotely affected and dispersed interests may further reduce the speed at which decisions are reached, or simply lead the directly affected stakeholders to create new forums for coordination. Standard development in ICT has witnessed a significant shift from formal and inclusive SDOs to more agile and industry-driven consortia. Imposing even higher standards of inclusiveness in SDOs by incentivizing greater participation of societal interest groups that at present do not exhibit a particular zeal to get involved could further accelerate this evolution.[190]

In the absence of direct representation, consumers and other societal interest groups can be represented by SDO governance bodies with a mandate to take their interests into consideration. Such mandates are not uncommon in SDOs; but there is no track record of how individuals serving on SDO boards interpret their mandate, or how (if ever) the mandate is enforced. In practice, we see the danger that broad reference to the under-defined interests of SDO "outsiders" is a convenient tool that could be used to justify almost any policy decision, even against the explicit resistance of a significant and active constituency. Whether consumer interests are better served by strict royalty-free requirements or by an open-ended royalty scheme is clearly a political choice. Absent a political process, it is difficult to see how a broad mandate to represent consumer or societal interests adds legitimacy to SDO policy decisions and processes.

The only organizations that can speak with legitimate authority on behalf of broader social interests are public authorities. At the same time, given the diverging stakeholder

[190] It should also be noted that in the European political system civil society organizations act autonomously. If consumer groups have chosen to concentrate their resources on other aspects which they deem to be of more immediate relevance or concern to consumers, we do not see at present a strong basis to use political means to redirect their efforts.

interests and the high stakes, public authorities must beware of being instrumentalized by certain stakeholders and must keep their focus the public interest. The orthogonally opposed but invariably active initiatives of the US DoJ before and after the last election provide a vivid example of a public authority directly expressing its interpretation of broader social interests. To many who are disconcerted by the instability that these shifts may create, they also offer a cautionary tale about greater participation of authorities purporting to speak on behalf of the dispersed interests of the silent masses of indirect stakeholders, even when they are vested with the legitimacy of democratic elections. Broad societal interests tend to come in different flavors, depending on who is tasked to represent them.

In this light, we uphold our general statement that the public interest is often best served by a regulatory scheme in which public authorities focus on creating the general conditions most conducive to the functioning of private SDOs. In most instances, public authorities should prioritize providing the appropriate regulatory framework over more direct forms of participation. Competition policy is likely, in general, to continue to be the most salient regulatory instrument to defend consumer interests in sustained technological innovation at low prices. If the Commission identifies societal needs that require specific responses in SDO IPR policies, it is within its mandate to define relevant regulatory requirements (e.g. for the access to standards incorporated by reference into legislation etc.). We have identified several best practices for the interplay of public regulatory approaches with the IPR policy development of SDOs. Following these practices, the Commission could generally leave it up to SDOs to define the specific IPR policies that implement its regulatory requirements.

8.3 Weaknesses of the current model of governance for the interplay of IPR systems and SDOs and general recommendations for possible improvement

Our analysis has revealed the predominance of a regulatory model in which public authorities define broad legal requirements regarding the substance of SDO IPR policies, and defer to SDO-internal processes for developing a diversity of specific policies complying with these general requirements. Under this model, a variety of public authorities have stated that potential SEPs should be publicly disclosed, patented essential technologies should only be incorporated into standards if the patent owners are committed to making licenses available on at least FRAND terms, and provisions should be made for these commitments to also bind any party subsequently acquiring the SEP. For each of these general requirements, many SDOs have developed a significant number of diverse and tailor-made specific policies. Several SDOs have also adopted original additional policies, such as rules for alternative dispute resolution, encouragement of pool formation, voluntary ex-ante disclosure of licensing terms, and other policy provisions related to IPR. Many of these policies were developed at the SDO's or its members' initiative, and often without significant conflict.

While it is difficult to assess the success of the current model of governance for the interplay of IPR systems and SDOs from a social perspective, we see several indicators of an overall well-functioning governance model: In line with the general benefits of self-regulatory processes, many SDO IPR policies were developed within specialized governance bodies vested with a technical expertise that it would be difficult for public authorities to provide. Furthermore, the deference to SDO-internal processes for producing the diversity of specific IPR policies saved scarce resources in the administrative and judicial systems. Finally, private SDOs could develop specific rules that comply with the general requirements formulated by different public authorities from different jurisdictions and with different regulatory mandates. While specific rules may differ considerably from one SDO to the other, the process thus preserves a substantial degree of harmonization across national borders and stability over time.

Perhaps the greatest advantage of the described regulatory model is the diversity of SDO approaches that it accommodates. While we identify a fairly stable baseline policy

practiced by a large number of SDOs, there also is a significant number of SDOs with IPR policies that significantly differ from the baseline policy. Also within the relatively broad confines of the baseline policy, there is a large variety of idiosyncratic specific policy choices. There thus is a rich diversity of policy approaches tailored to individual SDOs and their needs. As a starting point, such diversity is beneficial, if it enables each SDO to entertain the IPR policy that its stakeholders in a process of balanced and inclusive decision making prefer, provided that SDOs respect the applicable legal requirements.

In addition to these classic 'local preferences' benefits, our study has shown that the existing diversity of approaches across SDOs and over time can be beneficial from a policy perspective. As we have shown, diversity in SDO approaches can have experimental value and inform policy makers and stakeholders of the effects of specific policy choices. Through a combination of experimentation and precedent, the existing diversity makes the generally stable governance model more dynamic and responsive to technological or societal change.

Nevertheless, for what is probably the most contentious SDO IPR policy problem – the definition of licensing obligations for SEPs – we observe a significant departure from the overall self-regulatory model for SDOs. In contrast to the general interplay between public authorities and SDO-internal processes described above, most SDOs only provide for a very general FRAND licensing requirement. To an important extent, the specific substantive content of the obligations resulting from a FRAND commitment has been developed and defined by public authorities (and in particular antitrust authorities) and courts. A very substantial case law is currently under development to determine the specific licensing obligations resulting from a FRAND commitment. This case law comprises "some of the longest district court decisions ever written" (Lemley and Simcoe, 2018), and produced criteria for appropriate conduct in licensing negotiations (CJEU in Huawei) or for the determination of FRAND licensing terms (e.g. Unwired Planet, Microsoft v Motorola etc.) that are substantially more specific than any guidance produced through SDO-internal processes.

Among the SDOs that did provide a specific interpretation of FRAND or replaced a general FRAND obligation by more specific and generally more restrictive licensing requirements, these efforts generally led to significant controversies within the respective SDO and beyond. Furthermore, at least for now, these efforts do not seem to have contributed to a clarification of general legal terms or policies common to large numbers of SDOs. Rather than helping to clarify "the" meaning of FRAND, SDO efforts in this respect have contributed to creating a diversity of licensing obligations under different SDO policies (cf Chapter 7.4.2 and 7.4.3.3.).

To the extent that policy makers and society at large have an interest in greater clarity, predictability of licensing costs, resolution of conflicts at lower costs to the judicial system, and overall reduced transaction costs, SDO policy making on licensing obligations has overall not been conducive to this goal. While the SDO governance model for IPR has been good at producing creative solutions for idiosyncratic needs, it has thus not significantly contributed to resolving the essentially redistributive conflict about the specific meaning of the baseline's core policy. This void has been filled by different national courts and public authorities, producing diverse interpretations of the SDOs' general licensing obligations, and thus reducing the international consistency of SDO IPR policies. The process has furthermore placed a considerable burden on the judicial system, especially in the EU Member States concentrating the largest number of SEP licensing disputes. Finally, the specific processes and obligations applicable to SEP licensing were developed and interpreted by generalist courts and authorities, instead of the highly specialized expert bodies that exist within the SDO governance model.

Our detailed analysis of individual SDOs' governance processes provides some insights into the reasons for this relative failure. We observe a dichotomy of relatively more stakeholder- or leadership-driven SDOs, where the former are associated with non-committal policy responses to controversial policy issues. By the nature of their governance model, these SDOs are unlikely to make necessarily contested policy choices.

Leadership-driven SDOs have a variety of idiosyncratic institutional specificities allowing the SDO to make decisions against the resistance of a significant constituency. While these SDOs thus have the ability to make committal choices, these choices often lack legitimacy in the eyes of the stakeholder constituency frustrated by the specific decision.

Indeed there is virtually no guidance from public authorities regarding appropriate processes for policy development. The self-regulatory model of standard development is to a large extent based and conditioned upon the core due process principles of consensus, openness, balance of interests, transparency, and availability of appeal. These principles are enshrined in numerous legal instruments, and a number of bodies exist to review standard development processes against these principles. No such legal instruments or review mechanisms exist for SDO processes for policy development.

The direct applicability of these fundamental principles to policy development itself is disputed. On the one hand, most participants in the debate would agree that each of these principles is generally relevant to the development of SDO policies. Since IPR policies have a direct bearing on standardization decisions, for a standardization process to be fully open, balanced and consensus-based, the processes for making fundamental decisions on IPR policies should arguably follow similar principles. At least the type of highly involved stakeholders that predominantly participated in our survey (and which dominate most policy debates on SDO IPR policies) expressed the view that processes for SDO policy development should reflect each of these principles to a large extent. On the other hand, a strict application of these principles is – as confirmed by our analysis – associated with non-committal choices and a general stability of the status quo in substantive rules, an outcome that is not necessarily desirable, equitable or balanced from the viewpoint of the entirety of stakeholders impacted by SDO policies. Moreover, a uniform application of truly open, consensus-based decision-making processes at all SDOs may result in the same set of highly motivated stakeholders repeating the same discussions with the same non-committal results in each SDO. A meaningful diversity of IPR policy choices on substance arguably requires at least some SDOs to be able to make decisions that are opposed by a significant constituency, in departure of at least the principle of consensus.

As a significant contribution to the strengthening of the self-regulatory governance model of SDOs, **we thus recommend that the European Commission and other public authorities produce guidance on the appropriate procedural principles for SDO policy development** along the following lines**.**

The guidance should be conceived of within the current self-regulatory model, with its general procedural approach and its IPR-specific safe harbour approach. This would represent, in essence, an extension of the procedural approach to clarify the governance principles that apply when SDOs engage into policy development and change. The guidance should state, endorse and clarify the extent to which principles of consensus, openness, balance of interests, transparency, and availability of appeal should be embraced as attributes of SDO policy development processes.

The three-layer model of SDOs developed in Section 4 provides a useful framework for this differentiation. In the third layer, with its large number of competing and sometimes short-lived SDOs, social interests are most likely to be served best by a diversity of approaches. To this end, public policy should be more tolerant of committal policy approaches in these SDOs, but carefully monitor behavior by SDOs or their participants that may reduce competition between SDOs or increase collusion within SDOs. In the first layer however, where SDOs regularly take on a regulatory function delegated by public authorities or are otherwise shielded from meaningful competition in significant aspects of their activity, demonstrated compliance with explicit procedural principles must be the basis for SDO self-regulation. In the second layer, where we observe the most significant departures from the general baseline policy, a case-by-case analysis may be warranted. A high degree of deference to the SDO's internal processes could apply to explicitly experimental policies with narrowly circumscribed direct effects. SDO decisions with significant direct effects should be held against higher procedural

standards, especially if such decisions impact the value of existing property rights or the policies for legacy standards.

While it is up to public authorities, including the European Commission, to propose guidelines they deem most consistent with their public mandates, one path that such guidance might follow is outlined below:

- SDOs in the first layer – i.e. those that fit the traditional, hierarchical model, namely ISO/IEC/ITU, CEN-CENELEC, ETSI and the national standardization bodies – should apply the same principles (though not necessarily the same procedures) to policymaking as they do to standardization activities. In other words, the principles of openness, transparency, balance of interests and consensus decision-making and availability of appeal should apply to their policymaking activities as well;
- As a starting point, SDOs in the third layer – the large number of informal industry consortia that exist and may be created or dissolved at any point in time, including in our sample DVB, ECMA, JEDEC, VITA – should not be held to any specific governance principles in policymaking as they are in standards development. In essence, policymaking would run according to the rules set by each SDO in its constitutive documents. More specifically, policymaking need not be open to participation beyond members, no balance of interests needs be sought, and decisions can be made by majority instead of consensus. In principle, these SDOs are subject to competition from outside, and are likely to face consequences if they adopt policies that are not suitable for their membership (or for the broader set of stakeholders that may decide to join standardization efforts or not). That competitive pressure should suffice to ensure that their policymaking decisions do not run counter to the public interest. In addition, a certain amount of policy diversity could result from the various decisions of the SDOs, enabling knowledge to be gained through experimentation and circulation of ideas. Of course, should it be found that competitive pressure is absent, a closer examination of policymaking at these SDOs might be warranted in a given case.
- Our study has also identified a number of SDOs in a second layer, somewhere between the two layers set out above. This second layer comprises IETF, IEEE and W3C. These SDOs should be treated on a case-by-case basis. Hence, the guidance should put forward criteria identifying circumstances (varying with the nature of the decision) that may warrant a closer scrutiny of procedural principles followed. Decisions that impact existing standards or ongoing standard development warrant decision making procedures engaging broader stakeholder consent than policies explicitly restricted to new projects (e.g. ECMA), or subjected to an additional approval within each working group.[191]

Another reason for the insufficiency of the self-regulatory model of SDOs is the ambiguity and instability of the legal boundaries within which SDOs can safely operate. We observed that conflicts among different public authorities or within the positions of the same authority over time undermine the usefulness of the guidance provided through the safe harbour approach. SDOs would benefit from a greater degree of coordination among the relevant policy makers, such as among competition law authorities through the International Competition Network (ICN). In addition, policy makers should be encouraged to provide reliable and stable guidance that extends beyond the electoral cycle.

The development of substantive policy guidance for SDO IPR policies has taken place almost exclusively in the realm of competition policy (and to a lesser extent trade policy). Nevertheless, other bodies of law also prescribe substantive requirements for SDO IPR

[191] An SDO (not included in our sample) that subjects important IPR policy choices to an individual decision in each working group is OASIS. The IPR policy of OASIS stipulates that "At the time a TC [technical committee] is chartered, the proposal to form the TC must specify the IPR Mode under which the Technical Committee will operate." https://www.oasis-open.org/policies-guidelines/ipr#tcformation

policies, and these requirements often align with the requirements of competition law. EC Regulation 1025/2012 Annex II for example states the necessity for SEP licenses to be available on FRAND terms as a requirement for the use of ICT standards developed by SDOs other than the officially recognized ESOs to be used in procurement and regulation. If the European Commission believes that some SDO policies providing for a generally formulated FRAND requirement may be insufficient to ensure that SEPs are effectively available on such terms, it could provide formal guidance on its application of Regulation 1025/2012 (akin to the Horizontal Guidelines for Competition Law). Consistent with the safe harbour approach, the guidance should not add new requirements to the requirements already listed in the regulation, but could provide a general template of SDO policies that usually satisfy the requirement to ensure that SEPs are effectively available on FRAND terms. It would still be incumbent upon SDOs wishing to have their standards considered for public procurement and/or regulations in the EU to adopt specific IPR policies conforming with these guiding principles, or develop IPR policies that satisfy the underlying substantive requirements of Regulation 1025/2012 through alternative means. As we have discussed in this Report, such a safe harbour approach can usefully contribute to the further development of the baseline policy, while preserving the self-regulatory scheme of SDO policy making on IPR.

8.4 SDO policy coordination

Another challenge to the current governance model results from technological changes in the context of IoT: SDOs are increasingly required to work together on technology standards. Tight technical cooperation often requires compatibility of IPR policies. This raises the question whether SDOs should coordinate their policy development efforts to a greater extent than they currently do. In addition, there is a public interest in legal clarity, which may be served by greater coordination among SDOs on the general meaning of policy terms that are common to their policies.

To address this question, we first observe that coordination among SDOs on IPR policies is neither rare nor recent. Individual SDOs such as DVB that generally wish to have their specifications adopted as standards by another body often consider the IPR policy of the other SDO as a factor when making their own policy choices. SDOs working together on standards can create partnerships with guiding principles on IPR. The most prominent example of such a partnership of SDOs is 3GPP, resulting in virtually identical IPR policies between e.g. ETSI and TSDSI. New SDOs can also be created to craft specifications combining the work of different SDOs (which can be incorporated by reference into the standards of the new body). The new SDO can set its own IPR policy requirements in addition to the requirements already set by the SDOs that developed the incorporated standards. These additional requirements can produce more specific or more stringent disclosures of IPR or set more restrictive or more specific licensing requirements than those of individual SDO policies, thus establishing a common floor for diverse IPR policies. Overall, the system seems to be flexible and capable of responding to diverse standardization needs.

Second, we caution that broader coordination among SDOs as a result of forced harmonization of policies beyond these focused collaborations may have adverse consequences. Our study has shed light on important benefits of diversity of SDO approaches. Stakeholders have strongly emphasized that there is no “one size fits all”, and SDOs need to tailor their policies to their own specific needs. In addition, we have studied beneficial instances of experimentation and emulation.

Nevertheless, there is scope for some beneficial coordination. There is a clear policy interest in legal clarity. The very idea of a baseline policy implies that there is some commonality as between SDOs, even if only with respect to central terms and concepts with which SDOs can design their respective SDO policies. For instance, it would be confusing and costly if FRAND had vastly different substantive meanings across the IPR policies of various SDOs, whereas this concept is at the core of the baseline policy. At the very least, one would expect the set of possible acceptable meanings to be set out clearly

(FRAND-1, FRAND-2, etc.), as is the case now with the choice between RF and royalty-based options.

Clearly, there is a strong public interest in the existence of common principles and terms, so that the case law developed around the IPR policy of one SDO provides guidance for the IPR policy of other SDOs with the same or similarly worded obligations. This public interest cannot override the sovereignty of the SDO over the development of its own policy, and SDO policies can substantially differ from each other if SDOs decide so. A desirable objective is "ordered diversity", where SDOs can tailor their policies to their own specific needs, and competition among SDOs preserves stakeholders' freedom of choice, but there is some agreement on the meaning of common terms and the general process for the interplay of individual SDOs' decision-making (e.g. conflicting obligations resulting from a patented technology being incorporated into standards of multiple bodies).

While we observed instances in which the policy making of individual SDOs contributed to the clarification of policy terms that are common to a larger number of SDOs, there currently is no clear process for this "circulation" of SDO policy clarifications. For one, there needs to be some forum where the SDO-specific solutions can be discussed and their potential circulation can take place, outside of a single SDO and outside of a litigation forum.

The ISO architecture provides a certain degree of policy coherence. The NSBs AFNOR and DIN reported that their policy making efforts are concentrated on participation in the relevant ISO and CEN processes. The NSBs ensure the application of the commonly agreed policy principles at national level, e.g. through accreditation processes (France) or DIN standards on standardization principles that apply to all standardization bodies seeking to comply with DIN processes. This architecture also provides guidance that extends into the ICT world, but there is a substantial number of ICT-related SDOs, including several of the most relevant bodies, that operate outside of this architecture.

There is no similarly explicit architecture for the large number of ICT-related SDOs. Consequently, there is much less coherence in the ICT world. Perhaps the most salient form of policy coordination among a larger number of SDOs (including SDOs with a strong ICT focus) is the ANSI accreditation process. As we have seen, the accreditation process (and the decisions of the ANSI Executive Standards Council) can provide some interpretation of policy language used in the ANSI essential requirements and the policies of a large number of ANSI-accredited SDOs. The process can also give precedential value to the policy choices of individual bodies. There is a fine line between restricting SDOs' sovereignty over defining their own policies, and the provision of authoritative interpretations of policy language, but the process can be helpful. However, it is worth noting that several significant U.S.-based SDOs (IETF, W3C) have voluntarily elected to remain outside the ANSI framework in order to preserve their own rulemaking flexibility.

While there is no similar accreditation process or 'meta-SDO' in Europe, Annex II of Regulation 1025/2012 specifies criteria for ICT standards that are broadly similar to the ANSI essential requirements. The criteria in Annex II include criteria for the standards, and for the SDO processes from which these standards result. While the European Commission, with the help of the Multistakeholder platform, identifies ICT standards that can be referenced under Regulation 1025/2012 (similar to ANSI's accreditation of American National Standards), there does not seem to be an equivalent to the accreditation processes of SDOs comparable to the accreditation of American Standards Developers by ANSI. In view of promoting coordination among SDOs in the ICT sphere, the role of the Multistakeholder platform could be strengthened and expanded, perhaps taking inspiration from the ANSI accreditation process. It is worth noting that ANSI does not have any formal legal authority over accredited SDOs. Its importance results from the effective weight and legitimacy that its accreditation process carries. In addition to the breadth of the represented interests, the technical expertise and high level of commitment of participants in ANSI processes are key ingredients to this effective weight of ANSI accreditation. This example suggests that strengthening the Multistakeholder

platform does not necessarily imply that additional formal competences should be given to it, but rather to draw more intense participation from the most relevant and most competent stakeholders.

Nevertheless, both Regulation 1025/2012 Annex II and the ANSI Essential Requirements are silent on policy development processes or governance in general. The specific policies of SDOs with respect to standardization processes and IPR vary. In addition to assessing compliance of individual standardization processes and IPR policies, it would be useful to reference acceptable processes through which such individual policy decisions are reached. This would allow the 'meta-SDOs' or review bodies to be more deferential towards SDOs for their specific, individual policy choices.

In addition to these review processes, SDOs can further define commonly accepted standardization principles, and provide agreed-upon definitions for common policy language (such as "open"). As example of such a process is the OpenStand initiative, whose scope of activity seems to be quite limited at present.

8.5 The road ahead: the emergence of a "tandem approach"

In its communication "Setting out the EU approach to Standard Essential Patents", the European Commission states an "urgent need to set out key principles that foster a balanced, smooth and predictable framework for SEPs." We have seen in Section 7.4.4.2 that the Communication includes a number of calls on SDOs to adopt specific IPR policies or to take specific policy actions. While the communication thus follows an established tendency of public authorities to advocate specific SDO policy activities, we noted that the specific actions that the Commission invites SDOs to take are mostly ministerial or non-committal.

With respect to the most contested SDO IPR policy problems, the Communication adopts a less directive approach. Rather, the Communication "draws on the responsibility of all actors in the SEP licensing context, and all stakeholders are encouraged to contribute to making this framework work in practice". In particular, with respect to the development of specific criteria for FRAND licensing, the Commission commits to "work with stakeholders to develop and use methodologies, such as sampling, which allow for efficient and effective SEP litigation, in compliance with the industry practice of portfolio licensing." The Commission furthermore announces the creation of "an expert group with the view to deepening expertise on industry licensing practices, sound IP valuation and FRAND determination."

In the light of the analysis set out above, the Commission's approach might be the best available option. On one hand, a more directive approach with respect to SDO IPR policies public would run against the autonomy of SDOs and could potentially deprive SDOs of the benefit of having tailor-made solutions reflecting their specific circumstances, within the broad constraints of the law. Our research has revealed that SDOs and their stakeholders value this autonomy. Furthermore, the diversity of governance models found amongst SDOs is bound to produce a diversity in the means of policymaking, yet all governance models are apt to produce legitimate IPR policy choices. In addition, the Commission recognizes that private industry stakeholders hold the most significant expertise for the development of evaluation methodologies for SEP licenses.

On the other hand, as we have seen, the existing self-regulatory model has failed to produce specific SDO guidance on the substantive content of SEP licensing requirements, in particular as applicable to a larger number of SDO. Consequently, as put by the Commission, "licensing is hampered by unclear and diverging interpretations of the meaning of FRAND". The existing mechanisms for policy coordination among SDOs are insufficient to provide elements of commonly accepted interpretation of policy terms common to a larger number of SDOs. In this context, a collaborative endeavour involving public authorities, SDOs and their stakeholders might be the best vehicle to identify both the scope of the need for an authoritative pronouncement and the substance of such pronouncement.

The Commission's strategy resonates with earlier efforts to address perceived policy problems with respect to SEP licensing obligations. In particular, an emerging consensus regarding the transferability of SEP licensing obligations was clarified in a process that combined policy amendments by individual SDOs and more general pronouncements by public authorities. The general pronouncements of public authorities had an impact on SDO policy development and vice versa, and both processes followed up on a number of studies and a broader stakeholder debate. Overall, the combined effect of these activities was what appears to be an industry consensus regarding the transferability of SEP licensing obligations, though the ultimate ruling on this issue in any given national court remains less than certain.

We see in these examples the emergence of a third regulatory approach, in addition to the procedural and safe harbour approaches. We call this interaction between the activities of policy makers and SDOs the ***tandem approach***: policy makers and SDOs jointly contribute to clarifications of IPR policy ambiguities, where SDO amendments of their own policies and agency or judicial guidance on the applicability of general legal principles jointly contribute to an evolution of general legal and institutional norms, resulting in reduced uncertainty. This is a desirable outcome, but the set of issues that have been successfully resolved in this manner is quite circumscribed.

As the example of FRAND specification shows, before the tandem approach can be extended successfully to more conflictual issues, it needs to be further developed. Providing greater resolution on the transferability of licensing obligations was possible because there was a high degree of convergence of views between stakeholders and public authorities. In the case of specifying FRAND commitments, issues are more contested, so that the details of a tandem approach would need to be better specified, in particular the conditions for public authorities to participate in such an approach. In the procedural and safe harbour approaches, public authorities intervene mostly on the basis of trade and competition law, both of which have specific sets of public policy objectives (fair conditions in international trade, market competition and consumer welfare). In these legal areas, public authorities typically intervene after the fact, in a litigation context. A tandem approach might require public authorities to participate along other more pro-active parameters.

General conclusion

As a general conclusion, we observe the predominance of a self-regulatory approach to the development of SDO IPR policies. Public authorities have primarily participated in this process by clarifying the substantive legal requirements and boundaries of SDO IPR policies. Within these boundaries, SDOs have developed specific policy provisions through SDO-internal governance processes, drawing on the expertise and active participation of directly affected industry stakeholders. Guidance from public authorities has nevertheless contributed to the definition of a baseline policy, a set of core principles of IPR policies that are viewed as generally complying with legal requirements. Some SDOs have adopted IPR policies going beyond this baseline (e.g. DVB, IEEE, Vita, and W3C), presumably in pursuit of their own policy objectives in addition to the more general objective of achieving conformity with legal norms. Some of these SDOs (Vita, W3C and more recently IEEE) have made committal policy choices on contested issues, which were often opposed by a significant SDO constituency. Other SDOs adopted non-committal approaches (most notably ETSI, but also IEEE in its policy revisions prior to 2015) , providing for option-based or openly formulated rules.

From a social perspective, this regulatory model has several advantages. It draws on the expertise and resources of directly involved stakeholders, allows for idiosyncratic policy approaches tailored to individual SDOs' needs, and provides useful opportunities for policy experimentation. Nevertheless, the self-regulatory approach has provided little guidance on the substantive interpretation of FRAND licensing requirements, thus leaving an important gap to be filled by courts and public authorities. We attribute this departure from the otherwise successful self-regulatory model, at least in part, to the dearth of specific guidance on appropriate procedural principles for SDO decision making on

contested issues, the instability and inconsistency in substantive governmental guidance regarding the legal boundaries of SDO decision making, and the weakness of the institutions structuring and coordinating the circulation of policy clarifications among SDOs. Addressing these weaknesses may strengthen the self-regulatory model, and empower it to resolve more controversial policy questions. Overall, this general and rule-based regulatory approach should be preferred over more specific participation by public authorities in the policy development of individual SDOs.

In view of the policy objectives stated in the Communication, we view an opportunity for the Commission's participation in the further development and clarification of existing policies through a tandem approach. Pursuant to this approach, collaborative efforts involving the participation of SDOs, industry stakeholders, public authorities, and independent experts can provide useful guidance regarding the application of general legal principles and policies common to a larger number of SDOs, provided these efforts are in phase with SDOs' internal governance processes and respect SDOs' autonomy over their policies.

Glossary

3GPP	Third Generation Partnership Project. A consortium of seven SSOs in the field of mobile telecommunication, including ETSI.
AFNOR	Association française de normalization
ANS	American National Standard. Standards developed by an ANSI-accredited standard developer in accordance with ANSI's essential requirements and approved by the ANSI Board of Standards Review.
ANSI	American National Standards Institute
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical standardization
CEPT	European Conference of Postal and Telecommunications Administrations
CJEU	Court of Justice of the European Union
DIN	Deutsches Institut für Normung
DoJ	United States Department of Justice (generally referring to Antitrust Division herein)
DVB	Digital Video Broadcasting (Project)
EPO	European Patent Office
ESO	European Standardisation Organisations (CEN, CENELEC, ETSI)
ETSI	European Telecommunication Standards Institute
FRAND	Fair, Reasonable and Non-Discriminatory. Also Reasonable and Non-Discriminatory (RAND). Concept describes the licensing terms to be offered by the owner of an SEP to standard implementers.
FTC	United States Federal Trade Commission
GSM	Global System for Mobile Communications. An ETSI standard describing the protocols for 2G digital cellular networks used by mobile phones. First deployed in 1991
IEC	International Electrotechnical Committee
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers. The IEEE Standards Association (IEEE SA), which is part of IEEE, is an important SDO best known for developing the IEEE 802.11 standard.
IETF	Internet Engineering Task Force
ISO	International Organisation for Standardization
ISOC	The Internet Society, a tax-exempt District of Columbia non-profit corporation, which also provides financial support to IETF.
ITC	United States International Trade Commission.
ITU	International Telecommunications Union
JEDEC	JEDEC Solid State Technology Association

LTE	Long-Term Evolution. Standard for 4th generation high-speed wireless communication for mobile phones and data terminals developed by 3GPP
NSB	National Standards Bodies, such as AFNOR and DIN
NGO	Non-governmental organisations.
OASIS	Organization for the Advancement of Structured Information Standards
OMB	Office of Management and Budget (OMB), part of the Executive Office of the President of the United States
OSS	Open Source Software is software licensed under a license that conforms to a definition maintained by the Open Source Initiative.
PAE	Patent assertion entity. An entity specializing in the assertion of patent rights against infringers.
PAS	Publicly available specification. PAS procedure is an ISO/IEC procedure under which accredited organizations can send their specifications directly for country voting.
SAC	Standardization Administration of China
SAE	Professional association and SDO initially established as Society of Automotive Engineers
SEP	Standards-essential patent. A patent that is essential to the implementation of a standard. Various definitions exist regarding the scope and nature of essentiality.
SDO (also SSO)	Standards Development Organization (also Standard Setting Organization). Organization that develops (sets) technology standards.
SIG	Special-interest group
SME	Small and medium-sized enterprises. Defined in EU recommendation 2003/361 as enterprises with no more than 250 employees and 50 million Euro turnover.
TAG	Technical Advisory Group
TBT	Agreement on Technical Barriers to Trade, commonly referred to as the TBT Agreement, is an international treaty administered by the WTO.
TFEU	Treaty on the Functioning of the European Union
USPTO	United States Patent and Trademark Office
TSDSI	Telecommunications Standards Development Society, India
UMTS	Universal Mobile Telecommunications System. A 3G mobile cellular system for networks developed and maintained by the 3GPP.
VITA	VMEbus International Trade Association
WTO	World Trade Organization
W3C	World Wide Web Consortium

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Annexes

Annex 1. Stakeholder survey questionnaire

Survey on Governance of Standards Development Organizations

To fill in the survey, please use the provided online link. This pdf is for information purposes only and does not show all tables as presented in the survey.

General Instructions

This survey is part of a study commissioned by the Joint Research Centre of the European Commission. It is administered under contract by Tilburg University, which has subcontracted portions of this study to investigators at Northwestern University and University of Utah. Participation in this survey is voluntary and you may discontinue your participation at any time. If you do not wish to answer any question, you may press "NEXT" and you will be taken to the next question. We expect that completion of this survey should take no more than **30**-**45 minutes** of your time.

The study aims at achieving a comprehensive overview of the governance of Standard Developing Organizations (SDOs) with a focus on the interplay of intellectual property right systems and SDOs from a public policy perspective. To this end, we seek to collect information regarding your organization's participation in technical SDOs. This includes national standards bodies, formal SDOs, industry consortia, and other open organizations that develop or accredit voluntary technology standards. We are most interested in your experience regarding the **governance** of SDOs, including questions of membership, participation, transparency, decision making, policy development and dispute resolution. If you feel that you are not the most appropriate person within your organization to respond to this survey, please contact (see below) and let us know the name and e-mail address of a more appropriate person.

If you elect to provide us with your e-mail address, we will send you a link to our final study report when it is completed. Other than this, there is no compensation associated with completing this survey.

Your responses will be used by the investigators to study attitudes and behavior regarding organizational participation in SDOs. Your responses will be aggregated with those of other survey respondents and will not be disclosed or published individually. Your individual responses will not be reported to your employer or to the EC. If you wish to obtain additional information about this survey, or need to authenticate the survey, you can contact searlecenter@law.northwestern.edu.

We thank you in advance for your participation in this important project.

1. Where is your organization primarily based:
    a. Europe
    b. North America
    c. Asia
    d. Other

2. Which best describes your organization:
    a. For-profit firm
    b. Civil society, public interest organization
    c. Trade association
    d. Academic/educational institution
    e. Governmental agency
    f. Other: _____

3. How many employees does your organization have:
    a. 1-10
    b. 11-50
    c. 51-250
    d. 251-1,000
    e. 1,001-5,000
    f. 5,000-10,000
    g. more than 10,000

4. Which of the following sectors/industries does your organization focus on (check as many as applicable):
    a. Telecommunications
    b. Computing and networking
    c. Semiconductors
    d. Automotive
    e. Aviation
    f. Consumer Electronics
    g. Heavy industry
    h. Education
    i. Biomedical
    j. Health care
    k. Civil rights/human rights
    l. Consumer protection
    m. Other: _____

5. In general, how important is technical standardization to the mission of your organization? [scale of 1-5, Very important – Not important]

6. Approximately how many employees at your organization are actively engaged in standards development and/or policy (e.g., by attending meetings, serving as a voting representative, submitting technical contributions, etc.)?
    a. 0
    b. 1-10
    c. 11-50
    d. 51-100
    e. 100+
    f. Don’t know

7. In approximately how many different standards-development organizations (SDOs) does your organization actively participate (e.g., by attending meetings, appointing a voting representative, submitting technical contributions, etc.)?
    a. 0
    b. 1-5
    c. 6-10
    d. 11-20
    e. 21+
    f. Don't know

8. What is your organization's approximate annual budget in Euro relating to SDO participation and other standards-related advocacy, policy and development work?

    (As of June 30, 2017, 1.0 Euro = 1.14 USD.)

    a. below €10,000
    b. €10,000-50,000
    c. €50,000-250,000
    d. €250,000 – 1 million
    e. greater than €1 million
    f. Don't know

9. Please rate the factors influencing your organization's decision to join or participate in a specific SDO [scale of 1-5, with 1 being not important and 5 being very important]
    a. membership cost
    b. relevance to business
    c. geographic location/emphasis of SDO
    d. employee interest in participation
    e. opportunity for leadership positions within SDO
    f. reputation of SDO
    g. size of SDO or working groups
    h. number of competing SDOs/standards
    i. SDO's intellectual property policies
    j. identity of other SDO members
    k. availability of standards
    l. openness of SDO's processes
    m. access to other firms' patented technologies
    n. ease of making technical contributions
    o. relevance of SDO to public policy
    p. other: _____

10. What is the principal role of your organization in standardization processes? (Check the one that best describes your organization)
    a. Active contributor to standards development, and if so
        i. Contributor of patented technology seeking to derive licensing revenue as a primary goal
        ii. Contributor of patented technology <u>not</u> seeking to derive licensing revenue as a primary goal

iii. Contributor of unpatented technology, or active commenter, reviewer or editor of standards documents without significant patented contributions

b. Attendee and observer of SDO proceedings without making significant contributions
c. User of standards that does not actively participate in standards development (e.g. manufacturer or purchaser of standardized products) *[skip directly to question 17]*
d. Stakeholder interested in standardization processes, without being an active participant in SDOs or a user of standards. *[skip directly to question 17]*

11. To what degree are your organization's personnel involved in the formation and/or leadership of SDOs? [scale of 1-5: very/somewhat/not involved]

12. Do employees of your organization currently hold any of the following positions within SDOs (check all that apply):

    a. Chair of an *ad hoc* working group or project group
    b. Chair of a permanent technical working group/committee/division/council
    c. Member of the SDO's governing body (Board of Directors, Steering Board, etc.)
    d. Other: _____
    e. Don't know

13. How does your organization reward employee participation and leadership in SDOs?

    [open ended]

14. Which of the following statements best describes your organization's expectations of employees participating in SDOs? (Select one)

    a. They use their independent expert judgment to contribute to the general interest
    b. They use their independent expert judgment to represent the interests of the organization within the SDO
    c. They use their independent expert judgment to pursue clearly defined goals and strategies of our organization
    d. They liaise with management before taking positions within the SDO
    e. Other: [ ]

15. How does your organization involve attorneys (either in-house or external) in the SDO/standardization process (check all that apply)?
    a. Attorneys participate in SDO committees or working groups on behalf of the organization
    b. Attorneys are available to advise technical participants upon request
    c. Attorneys review technical submissions prior to submission
    d. Attorneys cast votes at the SDO on behalf of the organization
    e. Attorneys review SDO policy and membership documents before the organization approves them

f. Attorneys discuss technical contributions with technical personnel to determine whether patent filings may be made
g. Attorneys submit patent disclosures/declarations to SDOs on behalf of organization
h. Attorneys train/educate the organization's SDO participants on legal issues
Attorneys are not involved
i. Other: _____

16. Does your organization engage external consultants (other than law firms) to advise or represent it on technical standards-development work? [Yes/No]

If YES, please describe what types of firms are engaged and the extent of their involvement.

17. Does your organization engage external consultants (other than law firms) to advise or represent it on SDO policy issues? [Yes/No]

If YES, please describe what types of firms are engaged and the extent of their involvement.

18. From the following list of SDOs, please check those that are important to your organization (check at least one):

[SDO list with check boxes]

19. For each of the SDOs important to your organization *[GENERATES FROM THE ABOVE RESPONSE]*, please rate the effectiveness of the SDO in each of the following technical respects (with 5 being the most effective and 1 being the least effective)
    a. Ease of introducing new standardization projects
    b. Organization of standardization process
    c. Leadership of standardization process
    d. Consideration of member contributions
    e. Speed of standardization process
    f. Quality of standards
    g. Updating of standards
    h. Accessibility of standards to implementers
    i. Usefulness of standards
    j. Compatibility with open source software

20. For each of the SDOs important to your organization [*GENERATES FROM THE ABOVE RESPONSE*], please rate the effectiveness of the SDO in each of the following policy respects (with 5 being the most effective and 1 being the least effective)
    a. General organization and efficiency of SDO administration
    b. Transparency of SDO decision making
    c. Fairness of SDO governance processes
    d. Assessing consensus of SDO members
    e. Openness of participation in SDO governance
    f. Clarity of SDO policies
    g. Ability of members to influence policy decisions

h. Management's explanation of policy decisions
i. Amendment of policies to respond to new situations
j. Processes for approval/voting on policy amendment
k. Addressing minority viewpoints in policy decisions
l. Addressing the public interest in policy decisions

21. In a situation where your organization is not directly represented in an SDO governance body, how likely are the following organizations to adequately represent your organization's interests (through their representatives in that SDO)?.
    a. SDO staff
    b. Trade associations
    c. Government agencies
    d. Non-governmental organizations (NGOs)
    e. Competitor firms
    f. Firms upstream in the market (i.e., suppliers)
    g. Firms downstream in the market (e.g., customers)

22. How effective has your organization found the following means for affecting SDO policy making? [For each item, 5-point scale: very effective/somewhat effective/neutral/somewhat ineffective/very ineffective plus not applicable]
    a. Propose changes to SDO policies
    b. Propose formation of new task force or working group within SDO
    c. Seek leadership role(s) within SDO
    d. Seek to change leadership of SDO
    e. Petition governmental agencies
    f. Seek assistance from trade associations/organizations
    g. Form alliances with like-minded SDO members
    h. Withdraw or disengage from SDO
    i. Publish opinion pieces/articles
    j. Participate in industry discussions/forums
    k. Engage external consultants to represent organization at SDO
    l. Bring or threaten legal action against SDO

23. For the SDOs that are important to your organization, what is the principal source of important policy proposals and amendments at the SDO:
    a. Proposals by your organization
    b. Proposals by other members
    c. Proposals by SDO staff/administration
    d. Influence by government officials
    e. There have been no important policy changes of which we are aware

24. When an SDO is considering a significant new policy or policy change, who should be entitled to participate in the proposal, discussion and adoption of that policy matter:

    Anyone who is interested, whether or not a member of the SDO
    All members of the SDO
    Members of the SDO's governance or policy board

SDO leadership
Does not matter to my organization
Whatever SDO leadership thinks is appropriate under the circumstances
Do not know

25. When an SDO is considering a significant new policy or policy change, to what degree should the SDO seek to ensure that there is "balance of interests" among the persons participating in the proposal, discussion and adoption of that policy:

Ensure balance among different types of stakeholders (e.g. producers, users, general interest stakeholders, or other relevant categories)
Do not make special efforts to ensure balance
Does not matter to my organization
Whatever SDO leadership thinks is appropriate under the circumstances
Do not know

26. How transparent should an SDO make deliberations over significant new policies or policy changes (including e.g. meeting minutes and outcomes of votes)?

Fully visible to the public
Visible only to SDO members
Visible only to members of the SDO governing body/board
Visible only to SDO leadership/management
Does not matter to my organization
Whatever SDO leadership thinks is appropriate under the circumstances
Do not know

27. What appeals process should exist for SDO policy-related decisions?

The same appeals process that exists for technical standards decisions

A more robust appeals process than exists for technical standards decisions
A more limited appeals process than exists for technical standards decisions
Does not matter to my organisation
Whatever SDO leadership thinks is appropriate under the circumstances
Do not know

28. In general, how should an SDO's processes for adopting policy changes compare to its processes for adopting technical standards in terms of factors such as openness, transparency, balance, consensus and availability of appeal?

Processes should be the same or similar
Process for policy changes should be more stringent than for tech standards
Process for policy changes should be less stringent than for tech standards
Does not matter to my organisation
Whatever SDO leadership thinks is appropriate under the circumstances
Do not know

29. What level of approval should an SDO use for the adoption or amendment of *routine* SDO policies and procedures:
    a. Unanimous approval of voting members

b. Consensus (lack of sustained opposition by any stakeholder group)
c. Super-majority vote of voting members (e.g., 2/3 or ¾ majority)
d. Majority vote of voting members
e. Decision of SDO management/administration
f. Depends on the policy or procedure

30. What level of approval should an SDO use for the adoption or amendment of *important* SDO policies and procedures:
    a. Unanimous approval of voting members
    b. Consensus (lack of sustained opposition by any stakeholder group)
    c. Super-majority vote of voting members (e.g., 2/3 or ¾ majority)
    d. Majority vote of voting members
    e. Decision of SDO management/administration
    f. Depends on the policy or procedure

31. What role do you believe *government agencies (other than competition authorities)* such as the European Commission, national ministries, regulatory authorities and regional or municipal bodies should play in technical interoperability standardization (i.e., not health and safety standards)? [*1-5 scale: A leading role, a strong role, a moderate role, small role, no role at all*]

32. What role do you believe *competition authorities*, such as the European Commission's DG Competition, the US Department of Justice Antitrust Division, or national fair trade commissions should play in technical interoperability standardization? [1-5 scale: A leading role, a strong role, a moderate role, small role, no role at all]

33. To what degree should SDOs cooperate with the following types of public authorities: [scale 1 to 5, 1 not at all to 5 very closely]
    a. National ministries;
    b. Research funding agencies;
    c. Competition and antitrust authorities;
    d. Patent offices;
    e. Health and safety regulators
    f. Trade bodies (WTO);

34. Which of the following aspects of technical interoperability standardization should governmental agencies concern themselves with (check all that apply):
    Ensuring that participants in standardization do not engage in anticompetitive conduct
    Ensuring that standards support the best technological features
    Choosing which technological features should be included in standards
    Ensuring that standardized products are available at reasonable prices
    Ensuring that standardized products are available at the lowest possible prices
    Ensuring that standards serve the public interest
    Ensuring that standards serve national interests
    Ensuring that SDO patent policies are fair and balanced
    Ensuring that small businesses are able to participate in developing standards
    Ensuring that standards enable product compatibility at the international level

Ensuring that standards do not impose barriers to free trade

35. How would standardization be impacted by greater participation by individuals representing any of the following groups? [scale 1-5 from very negatively to very positively impacted]
    a. Government competition regulators
    b. Government health and safety regulators
    c. International representative bodies such as the United Nations
    d. Least-developed countries
    e. individual inventors
    f. small businesses
    g. trade associations of users of standardized products and user groups
    h. universities and research institutions
    i. civil society groups (human rights, privacy, consumer protection, environment)
    j. intellectual property attorneys

36. Does your organization participate in open source consortia? [y/n]

37. How compatible are open source licenses with FRAND licensing requirements in standard setting? (1-5, not compatible at all, fully compatible)

38. Does your organization see an opportunity for closer interaction between open source consortia and SDOs? If so, please describe. [OPEN ENDED]

39. What is the key barrier in collaborating with open source projects with respect to standardization activities:
    a. Intellectual property.
    b. Governance.
    c. Difficulty of collaboration.
    d. Sustainability of the results (e.g. limited support by the OSS community).
    e. Different development times
    f. None.
    g. Collaboration with OSS projects is not applicable

    Other: _____

40. In which area(s) would stronger collaboration between SDOs and OSS communities benefit the standardization process? [select up to 3]

    a. Cloud.
    b. Internet of Things.
    c. 5G.
    d. Data economy.
    e. Cybersecurity.
    f. Big Data.
    g. Geospatial technologies.
    h. Internet technologies.
    i. Software engineering.

    Other: _____

41. How significant to your organization is each of the following risks relating to standardization? [scale of 1-5, 1 not significant, 5 very significant]

    a. Exorbitant royalty demands and/or patent litigation

    b. Obligations to make intellectual property available on undesirable terms

    c. Conflicts over intellectual property among different authors of a joint contribution

    d. Losing the ability to protect intellectual property (e.g. apply for a patent) by early disclosure in SDO working groups

    e. SDO participants may file patents on your organization's contributions

    f. Cost of purchasing copyrighted standard documents

The next several questions relate to patents covering standards being developed at an SDO (standards-essential patents or SEPs).

42. Has your organization ever disclosed potential SEPs to an SDO? [YES/NO]

    [IF NO: Has your organization ever participated in a standard development project or working group in which a potential SEP was disclosed? *If YES, SKIP TO Question 46; IF NO, SKIP TO Question 50]*

43. What internal processes exist at your organization to identify and disclose SEPs to relevant SDOs?

    [*OPEN ENDED*]

44. Who at your organization generally files SEP disclosures with an SDO?

    a. Individual SDO participant

    b. Business unit manager

    c. Legal department

    d. Standards department

    e. Other: _____

45. Has your organization ever experienced conflicts over SEPs or SEP disclosures with co-developers/submitters of contributions to an SDO? [Y/N]
    [IF YES] How were such conflicts resolved? [*OPEN ENDED*]

46. What actions has your organization taken in response to specific SEP disclosures by others during the standardization process (check all that apply):
    a. Consult with attorneys
    b. Evaluate product designs for potential infringement
    c. Develop product design work-arounds to avoid infringement
    d. Propose alterations to standard to avoid infringement
    e. Contact SEP discloser regarding available license terms
    f. Withdraw from SDO

g. Change product release plans
h. File your own SEP disclosure
i. File additional patents
j. Consider prior art or other means for invalidating a disclosed SEP
k. None of the above

47. To what degree is your organization aware of SDO working groups that have attempted to work-around or avoid disclosed (or otherwise known) SEPs? [Scale of 1-5: This happens frequently/sometimes/occasionally/never/don't know]

48. How would each of the following impact SDO standardization processes: [1-5: very positively impact to very negatively impact
    a. More guidance from SDO regarding the meaning of licensing commitments
    b. Greater discussion of patent licensing terms among SDO members
    c. SDO determination of aggregate patent royalty rates applicable to particular standards
    d. SDO arbitration of policy disputes between members
    e. SDO formation of patent pools covering standards

49. How strongly do each of the following factors affect your organization's decision whether or not to discuss patent and licensing-related matters within the standard-setting process: [scale of 1-5]
    a. Risk of antitrust/competition liability
    b. Prohibitions in SDO policies
    c. Such discussions will jeopardize current relationships with SEP licensors
    d. Long-term licenses with SEP holders are already in place
    e. Desire not to reveal information to competitors
    f. Lack of legal/patent expertise among SDO participants
    g. Such discussions will hinder/lengthen the standardization process
    h. Such discussions would make the SDO less attractive to major SEP holders

50. Has your organization ever left an SDO, ceased to participate in its activities, or considered doing so, because of its IP policy or because of IP litigation arising out of your participation in this SDO? [y/n – IF YES, please elaborate]

51. How effective do you feel the following methods are for resolving disputes among SDO members regarding SDO policies: [1-5: very/moderately effective/neither effective nor ineffective, moderately/very ineffective]
    a. Private negotiations between the disputing members
    b. Negotiation mediated by SDO staff
    c. Negotiation mediated by external mediator (e.g., JAMS, AAA, etc.)
    d. Formal (binding) arbitration by SDO staff
    e. Binding decision by SDO staff/executive
    f. Formal (binding) arbitration at external institution (e.g, ICC, AAA, LCIA, WIPO, etc.)
    g. Intervention of governmental agencies
    h. Administrative (governmental) procedures or complaints
    i. Court litigation in a single country
    j. Court litigation in multiple countries simultaneously

52. Has your organization ever opposed or voted against adoption of a proposed standard as a result of a SEP disclosure and/or the royalty rate or other licensing terms offered by a SEP holder? [y/n]

53. Is your organization more likely to approve a proposed standard if SEP holders have stated that they will license patents on a royalty-free basis? [y/n]

54. To what degree does your organization monitor SEP disclosures of others that may be relevant to its products or standardization work?
    [scale of 1-5, Significant, some, little, no monitoring + I do not know]

55. In your view, what does the existence of SEPs covering a particular standard indicate (check all that apply):
    l. The standard includes valuable technology
    m. The standard will be more expensive to implement in products
    n. Fewer manufacturers will be able to produce standardized products
    o. Litigation is likely with respect to the standard.
    p. None of the above

56. Do you agree or disagree with the following statements? (1-5; strongly disagree to strongly agree)
    a. SDO policies requiring FRAND commitments have proven generally successful
    b. FRAND ensures an adequate balance between implementers and IPR holders
    c. The terms 'fair' and 'reasonable' are too vague and open to too many conflicting interpretations
    d. A FRAND commitment is a comity device and has no specific pricing content
    e. More guidance would be desirable as to the specific obligations arising out of a FRAND commitment

57. Do you agree or disagree: It would be preferable if SEP owners commit to specific most restrictive licensing terms (1 = strongly agree, 5 = strongly disagree).

58. OPTIONAL: Please provide any other comments or information clarifying or expanding upon any of your prior responses [*OPEN ENDED – 15 LINES*]

59. OPTIONAL: If you wish, please provide your name and email address for follow-up:
    (Your name and e-mail address, if you elect to provide these, will not be disclosed as part of the study results, and will only be used to contact you for follow-up questions and to provide you with a link to our final study report.)

    Name: _____
    Email address: _____

Thank you for participating in this survey!

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