

STRATEGIC BEHAVIOR IN STANDARDS DEVELOPMENT ORGANIZATIONS IN TIMES OF CRISIS

PANAGIOTIS DELIMATIS*, OLIA KANEVSKAIA† AND ZUNO VERGHESE‡

ABSTRACT

Recent cases such as *Continental v. Avanci* and *FTC v. Qualcomm* drew attention to the limits of protecting intellectual property rights (IPR) in the standardization ecosystem. While conflicting interests in standard setting abound, considerations regarding the inclusion and subsequent treatment of proprietary elements in a technical standard hold the lion's share of concerns that Standards Development Organizations (SDOs) have to deal with. To balance the interests at stake, SDOs adopt patent policies that members have to observe in order to participate in SDOs' activities. Similar to other rules governing the work of SDOs, patent policies may be modified following the prescribed procedures. However, any subsequent changes to an organization's operational framework, including its intellectual property (IP) rules, may distort prior expectations and "lock in" members to rules that they never intended to abide by. Against this backdrop, this Article seeks to explore how SDO members respond to IP-rule amendments by offering a taxonomy of strategies that are adopted by members opposing modifications. Drawing upon the example of the Institute of Electrical and Electronics Engineers (IEEE) revised Patent Policy of 2015, this Article studies how IEEE members responded to instances of organizational distress such as an update of IP policies within an SDO, by using stakeholders' willingness to commit to the new licensing rules and previous examples of strategies in other SDOs when misunderstandings around IP arose as proxies. At a normative level, this Article further discusses the effect that such changes may have on the nature and structure of a given industry and offers a novel classification of reactions to tipping points in the standards development realm. In doing so, this Article contributes to the currently underdeveloped body of research on strategic behavior, institutional dynamics, and crisis management in technological standardization.

* Professor of Law, Tilburg Law and Economics Center (TILEC), Tilburg Law School, the Netherlands. This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (Grant Agreement No 725798). For its work on innovation, competition and standardization, TILEC has received funding from Qualcomm, Inc. The research on which this article is based was conducted in accordance with the rules set out in the Royal Dutch Academy of Sciences (KNAW) Declaration of Scientific Independence. Previous drafts of this Article were presented at the 23rd EURAS Conference in Dublin (June 2018) and at Northwestern University (May 2019). The authors would like to thank in particular Jorge Contreras, Pierre Larouche, Kirti Gupta, Georgios Effraimidis, Florian Schuett, Jens Prüfer, Justus Baron, Brad Biddle and two anonymous reviewers at the EURAS conference for their insightful comments. Contact: p.delimatis@tilburguniversity.edu.

† Postdoctoral Fellow, KU Leuven Center for IT and IP Law (CiTiP) & Global Postdoctoral Emile Noël Fellow (2020-2021), The Jean Monnet Center for International and Regional Economic Law & Justice, NYU School of Law.

‡ PhD Candidate, Tilburg Law and Economics Center (TILEC), Tilburg Law School, The Netherlands.

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I. INTRODUCTION

Standards Development Organizations (SDOs) have been in troubled waters in recent times. As member-driven institutions contributing to technical advancement in their field of expertise, SDOs strive to balance the often-divergent interests of their heterogeneous membership and aim to avert or mitigate potential conflicts of interest. Lately, however, the simmering tensions among companies developing standards are growing steadily. In the United States, participants in several SDOs complain that their views, positions, and interests are not duly taken into account in the SDO’s decision-making process. In 2019, NSS Labs, an anti-virus testing company, filed an antitrust suit against the Anti-Malware Testing Standards

Organization (AMTSO), CrowdStrike, Symantec, ESET, which are among the most important anti-virus (so-called “endpoint protection” or EPP) product vendors, and AMTSO members.¹

NSS Labs argued that the defendants conspired against the antivirus product testing industry to prevent independent testing of EPP products by adopting an AMTSO standard in May 2018.² In NSS Labs’ view, the testing protocol standard for anti-malware products that AMTSO produced unduly favored the interests of vendors.³ More specifically, NSS Labs accused the defendants of conspiring to effectively implement a group boycott, as vendors can rely on the newly adopted AMTSO standard to deny being tested by those companies which do not comply with that standard. According to NSS Labs, this refusal to deal, which was the immediate result of the adopted AMTSO standard, was bound to hurt independent testing services providers. In NSS Labs’ view, the group boycott has the effect of unreasonably restraining competition in violation of Section 1 of the Sherman Act, as AMTSO is dominated by the EPP vendors which outnumber the testing companies.⁴

Furthermore, NSS Labs claimed that AMTSO’s voting rule, in its quest for balancing, nonetheless contravenes the basic voting principle of consensus that permeates standard setting.⁵ In NSS Labs’ view, even if the restraint’s negative impact on competition is not regarded as per se unlawful, a rule of reason analysis would still demonstrate that AMTSO’s practices (and, in fact, its very existence) impose an unreasonable restraint on competition and has no pro-competitive effect. The US Department of Justice (DOJ) also intervened in the case

¹ NSS Labs, Inc. v. Symantec Corp., No. 18-CV-05711-BLF, 2019 WL 3804679 (N.D. Cal. Aug. 13, 2019). AMTSO is a non-profit organization created in 2008 by 25 companies, which currently has over 60 members. Its membership encompasses the most important players in the cybersecurity industry, including both vendors and testing labs. AMTSO’s main objective is to improve the business conditions regarding the development, use, testing and rating of anti-malware products. Big tech companies such as Symantec, McAfee and Microsoft but also cybersecurity companies such as CarbonBlack, CrowdStrike and Kaspersky Lab participate actively in AMTSO.

² NSS Labs participated in the drafting of two versions of AMTSO’s ‘Testing Protocol Standard for the Testing of Anti-Malware Solutions’—for version 1.0 of May 2018, it was on the ‘Standards Working Group’ (SWG), whilst for version 1.1 of October 2018, it was not a part of the SWG. *See* ANTI-MALWARE TESTING STANDARDS ORG., TESTING PROTOCOL STANDARD FOR THE TESTING OF ANTI-MALWARE SOLUTIONS V. 1.1, 4 (2018), <https://www.amtso.org/wp-content/uploads/2018/11/AMTSO-Testing-Protocol-Standard-for-the-Testing-of-Anti-Malware-Solutions-v1.1.pdf> [hereinafter AMTSO TESTING PROTOCOL STANDARD V. 1.1]. *See also* ANTI-MALWARE TESTING STANDARDS ORG., TESTING PROTOCOL STANDARD FOR THE TESTING OF ANTI-MALWARE SOLUTIONS V. 1.0, 4 (2018), <https://www.amtso.org/wp-content/uploads/2018/05/AMTSO-Testing-Protocol-Standard-for-the-Testing-of-Anti-Malware-Solutions-v1.0.pdf> [hereinafter AMTSO TESTING PROTOCOL STANDARD V. 1.0].

³ *See* AMTSO TESTING PROTOCOL STANDARD V. 1.0. The relevant standard was updated in June 2019. For the updated standard, *see* ANTI-MALWARE TESTING STANDARDS ORG., TESTING PROTOCOL STANDARD FOR THE TESTING OF ANTI-MALWARE SOLUTIONS V. 1.2 (2019), <https://www.amtso.org/wp-content/uploads/2019/06/AMTSO-Testing-Protocol-Standard-for-the-Testing-of-Anti-Malware-Solutions-v1.2.pdf>.

⁴ AMTSO admitted that this indeed is the case: NSS Labs, Inc. v. CrowdStrike, Inc.; Symantec Corporation; ESET, LLC; Anti-Malware Testing Standards Organization, Inc.; and Does 1–50, Inclusive, No. 5:18-CV-05711-BLF, Doc. 51, AMTSO’s Motion to Dismiss, at 5.

⁵ According to AMTSO’s bylaws, a decision is taken if 50 percent of the vendor companies and 50 percent of the testing companies vote for the proposal. However, typically SDOs would require a super-majority of at least 70 percent of the entire membership for a standard to be adopted.

in June 2019,⁶ urging the District Court to review AMTSO's mechanics and fundamentals, as it also had doubts regarding the balancing of the relevant interests within that SDO. Clearly, a lot is at stake from a market and a legal viewpoint alike: adequate and independent testing of antivirus products can uncover security vulnerabilities, whereas the DOJ would not welcome a judgment that allows for concealing potential antitrust violations within an organization that aspires to set standards in a sensitive area for national security.

On the other side of the Atlantic, no less tension is to be observed. The introduction of the Standardization Regulation in 2012⁷ has instigated policy reforms relating to standardization within the European Union (EU) and allegedly paved the way for a more inclusive approach towards standard setting⁸ but also strengthened private involvement in regulating the market.⁹ However, achieving due process and inclusiveness in standardization processes is a continuous endeavor, whereas incumbents in the standardization process may be incentivized to make use of their power to unduly promote their interests within a standardization body.

In *Fra.bo*,¹⁰ for instance, the Court of Justice of the European Union (CJEU) had to review a claim by an Italian company against a standard regarding copper fittings adopted by a private SDO (the *Deutsche Vereinigung des Gas- und Wasserfaches – DVGW*) which would require that the elastomeric waterproof joints of fittings had to withstand an immersion test in boiling water for 3,000 hours. *Fra.bo* had complied with the previous standard but failed to comply with the new requirement. Importantly, *Fra.bo* was not involved in the promulgation of the standard. In addition, it did not apply for additional certification by DVGW within three months of the entry into force of the amended standard as required by the DVGW procedure in place. Because *Fra.bo* did not meet the additional requirement imposed, it could not receive the necessary compliance certificate from DVGW, which, according to German law, was required in order for *Fra.bo* to get access to the German market.¹¹ Several years earlier, in the *Pre-insulated pipes* case, the European Commission had fined a large-scale cartel in the market of pre-insulated pipes. The companies involved had established a private body tasked with the creation of standards which would delay the introduction of new technological methods, which are manifestly bound to reduce the prices of the relevant products. In addition, these companies

⁶ *NSS Labs, Inc. v. CrowdStrike, Inc.*; *Symantec Corporation*; *ESET, LLC*; *Anti-Malware Testing Standards Organization, Inc.*; and *Does 1-50, Inclusive*, No. 5:18-CV-05711-BLF, Doc. 91, Statement of Interest of the United States.

⁷ Regulation 1025/2012 of the European Parliament and of the Council (Oct. 25, 2012) O.J. (L 316) 12 [hereinafter: EU Standardization Regulation].

⁸ See P. Delimatsis, *Standardization in Services – European Ambitions and Sectoral Realities*, 41 EUR. L. REV., 513, 528 (2016).

⁹ See generally THE LEGITIMACY OF STANDARDIZATION AS A REGULATORY TECHNIQUE – A CROSS-DISCIPLINARY AND MULTI-LEVEL ANALYSIS (Mariolina Eliantonio & Caroline Cauffman eds., 2020).

¹⁰ Case C-171/11, *Fra.bo SpA v Deutsche Vereinigung des Gas- und Wasserfaches*, ECLI:EU:C:2012:453, ¶¶ 3–11 (July 12, 2012).

¹¹ See also Harm Schepel, *Between standards and regulation – On the concept of ‘de facto mandatory standards’ after Tuna II and Fra.bo*, in THE LAW, ECONOMICS AND POLITICS OF INTERNATIONAL STANDARDIZATION (P. Delimatsis ed., 2015).

agreed to impose a collective boycott by refusing to supply to a competitor when the competitor was granted a big district-heating contract in Germany.¹²

The antitrust lawsuit by NSS Labs¹³ and the other cases adjudicated before European and international courts¹⁴ bring to the forefront several recurring organizational, institutional, and procedural concerns common to the functioning of SDOs, where competitors interact in the quest for the best technology and, by implication, dominance in technology markets. Regarding procedures in particular, some SDO members may claim that insufficient procedural safeguards are in place that undermine the SDO's objective to achieve a pro-competitive industry consensus.¹⁵ Rather, vested interests and power dynamics within the institution coupled with weak governance rules (or unfair enforcement thereof) can lay a fertile ground for the creation of a cartel that disfavors certain members (for instance, via a group boycott in US antitrust parlance or concerted actions that amounts to a restriction by object in the EU competition parlance) for the benefit of the few dressed in the garb of standard setting. Indeed, the importance of procedural fairness within SDOs has been previously recognized by US courts, which have acknowledged the existence of economic incentives for SDO participants to restrain competition but have also confirmed the pro-competitive benefits of standardization.¹⁶

According to the relevant legislation in the US¹⁷ and the EU,¹⁸ SDOs are required to secure

¹² European Commission's Decision 1999/60/EC relating to a proceeding under Article 85 of the Treaty [now 101 of the Treaty on the Functioning of the European Union] – Case No IV/35.691/E-4: Pre-insulated Pipe Cartel) (January 1, 1999), O.J. (L 24) 1. The decision was subsequently appealed without success: Joined Cases C-189/02 P, C-202/02 P, C-205/02 P to C-208/02 P and C-213/02 P, ECLI:EU:C:2005:408.

¹³ In December 2019, NSS Labs announced that it withdrew its antitrust claim. However, the case is far from over, as AMTSO now seeks compensation for attorney fees, claiming that NSS Labs intentionally pursued a complaint that had no factual or legal basis. We also discuss infra what we consider as the potential reasons that led NSS Labs to withdraw its claim. (Note that the NSS Labs ceased its operation in October 2020 after being acquired by Consecutive earlier that year, see Z. Whittaker, *Security Testing Firms NSS Labs ceases operations, citing coronavirus* (Oct. 20, 2020) available at <https://techcrunch.com/2020/10/20/nss-labs-ceases-operations-coronavirus/>).

¹⁴ In *US-Tuna II*, for instance, the Appellate Body of the World Trade Organization (WTO) also reviewed the operating procedural guarantees of a regional SDO to find that an SDO with a 'by invitation only' policy of participation is not a body that adheres to the principle of openness, which is a fundamental aspect of due process within SDOs. See P. Delimatsis, *Global Standard-Setting 2.0: How the WTO Spotlights ISO and Impacts the Transnational Standard-Setting Process*, 28 DUKE J. COMPAR. & INT'L L. 273 (2018).

¹⁵ See O. Kanevskaja, *Governance of ICT Standardization: Due Process in Technocratic Decision-Making*, 45 N.C. J. INT'L L. 549 (2020).

¹⁶ *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 500–501, 511 (1988).

¹⁷ The Standards Development Organization Advancement Act (SDOAA) of 2004 defines an SDO as an organization that “plans, develops, establishes, or coordinates voluntary consensus standards using procedures that incorporate the attributes of openness, balance of interests, due process, an appeals process, and consensus in a manner consistent with the Office of Management and Budget Circular Number A-119, as revised February 10, 1998, 15 U.S.C. § 4301(a)(8).” Balance of interests would require that a meaningful involvement from a broad range of parties exist, with no single interest dominating the decision-making. See OFFICE OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, OMB Circular No. A-119 § 2e(ii), as revised January 27, 2016.

¹⁸ See EU Standardization Regulation, recital 2; European Commission Communication, Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (14 January 2011), O.J. (C 11) 1, ¶ 277ff.

a proper balancing of interests in their function.¹⁹ Previous studies have scrutinized theoretically and empirically the dynamics within an institutional setting of this type and underscored the difficulty of ensuring that, in practice and over time, the decision-making process of an SDO is purely based on technological rationality.²⁰ However, very little academic research has looked into the strategies used by firms to overcome what they consider as “glitches” in the standardization processes of a given SDO that undermine the “balancing of interests” requirement. By the same token, scholars have routinely neglected the institutional design and responsive strategies that SDOs themselves adopt to overcome crisis events that may jeopardize the smooth functioning of the organization and eventually lead to the SDOs’ collapse.

Typically, critical junctures of organizational nature that question the resilience of an SDO will arise either when the rules of the game are amended or when a given (controversial) standard is adopted by the SDO. In that case, it appears that firms have three (not necessarily mutually exclusive) options: the first is to litigate; the second is to work with their counterparts within the organization to address their concerns; and the third is to exit the organization and strive for building a new coalition that protects their interests better. The third option, or arguably all of three of them, will be the result of a meticulous cost-benefit analysis.²¹ However, the endogenous flexibility and crisis management strategy of an institutional setting may create the necessary and sufficient conditions for continuous trust in a particular organization, allowing for the latter’s survival.

Against this backdrop, this Article seeks to explore the politics and strategic calculi within SDOs and thus shed light on the institutional dynamics of the currently most important global business organizations. We do this by looking into how SDO members respond to instances of organizational distress, taking as an example the amendment of patent policies within an SDO. More specifically, we use the “Exit, Voice and Loyalty” framework of Hirschman (1970) to identify a taxonomy of responses and strategies for dissatisfied SDO members, and their manifestations. By drawing on the experience of the Institute of Electrical and Electronics Engineers (IEEE),²² the biggest private standard-setter globally,²³ the Article critically

¹⁹ See J. Baron, J. Contreras and P. Larouche, *Balance Requirements for Standard Development Organizations: A Historical, Legal and Institutional Assessment* (Jan. 18, 2021) available at https://privpapers.ssrn.com/sol3/papers.cfm?abstract_id=3806876, who unpack the notion of balance in the US and EU SDO regulations.

²⁰ See T. Büthe and W. Mattli, *Setting International Standards – Technological Rationality or Primacy of Power?* 56 *WORLD POL.* 1 (2003); STANDARDS AND PUBLIC POLICY (S. Greenstein and V. Stango eds., 2006); M. Weiss and M. Sirbu, *Technology choice in voluntary standards committee: An empirical analysis*, 1 *INNOVATION & NEW TECH.* 111 (1990); R. Lampe & P. Moser, *Do Patent Pools Encourage Innovation? Evidence from 20 US Industries under the New Deal*, NBER Working Paper 18316, 2012.

²¹ See also J. Lerner & J. Tirole, *A Model of Forum Shopping*, 96 *AM. ECON. REV.* 1091 (2006).

²² While standards development activities are taking place in the Standards Association of the IEEE (shortly, IEEE-SA), this Article uses the terms IEEE and IEEE-SA interchangeably.

²³ With over 423,000 members worldwide, IEEE is the largest technical professional organization: see <https://www.ieee.org/about/index.html>. Through its Major Boards, including the IEEE Standards Association, the Institute engages in numerous activities with the purpose of fostering technological advancement. IEEE Constitution and Bylaws 2021, <https://www.ieee.org/content/dam/ieee-org/ieee/web/org/about/corporate/ieee-constitution-and-bylaws.pdf> Sec 1-2 and Section I-107 (6),

discusses the effects that a turning moment (from an organizational viewpoint) within an SDO may have on the behavior of participants but also, by implication, on the overall performance of an SDO. As our analysis unfolds, important lessons will be drawn with regard to strategic behavior in a collaborative setting as well as adaptive strategies used by SDOs to strengthen their resilience in times of distress.

The remainder of this Article is organized as follows: Section II deciphers the importance of patent policies in standardization activities and discusses the challenges that an SDO faces when it revisits its patent policy, taking the example of the controversial modification of the IEEE patent policy. Section III then introduces Hirschman's conceptual framework for understanding strategies and practices within SDOs in times of crisis that are triggered by a policy change or unsatisfactory performance. The main part of the Article, Section IV, maps the strategies that the patent-holders may adopt in the case that the revised policy is perceived to be not catering to their interests: (1) set up an informal consortium *outside* SDO's working group and offer a standard developed within that consortium for a fast-track adoption by the SDO at issue; (2) refuse to comply with the new licensing rules; (3) delay or interrupt a standards development process due to vague or arbitrary licensing requirements; and (4) litigate. At this juncture, the option and ensuing cost of exit is also discussed to offer a comprehensive taxonomy of strategies within SDOs in an orderly manner. Finally, Section V identifies steps that an SDO could undertake to mitigate criticism and avoid collapse. Crucially, when reviewing the potential strategies and scenarios, we also review the role that public authorities can play in this equation. Section VI concludes the Article.

II. PATENT POLICIES AND THEIR MODIFICATIONS

A. The Role of Patent Policies in SDOs

While standards development evinces an array of conflicting interests, considerations regarding the inclusion and subsequent treatment of proprietary elements in a technical standard hold the lion's share of concerns that SDOs have to grapple with. Balancing of interests, notably in IP-intensive technological areas, is a delicate exercise. To alleviate possible antitrust concerns while offering adequate compensation for patent-holders, SDOs adopt formal policies that govern matters related to IPR issues and the incorporation of patented technologies into standards. Such patent policies typically require patent holders to disclose their Standard Essential Patents (SEPs) and/or licensing terms, as well as to commit to license their proprietary technologies on fair, reasonable, and non-discriminatory ("F/RAND") or royalty-free terms ("licensing obligation").²⁴ They form an integral part of SDOs' statutory framework and provide rules of thumb that could potentially protect and balance the interests

respectively. The board of any organizational unit, referred to as Major Boards listed in IEEE Bylaws I-303, shall be deemed to be a Committee of IEEE within the meaning of the New York Not-for-Profit Corporation Law.

²⁴ See J. Contreras, *An Empirical Study of the Effects of Ex Ante Licensing Disclosure Policies on the Development of Voluntary Technical Standards*, conducted for the National Institute for Standards and Technology (NIST), US Department of Commerce (June 27, 2011), https://www.nist.gov/system/files/nistgcr_11_934_empiricalstudyofeffectsexantelicensing2011.pdf.

of both the patent-holders and patent-users, while shielding the SDO and its members from potential antitrust violations.²⁵ Moreover, since patent policies may constrain innovators' discretion to set royalty rates, they also exert normative pull on participants faced with technology selection and wield significant influence on the outcomes of negotiations relating to the promulgation of standards,²⁶ becoming in fact part of SDOs' membership costs.²⁷ Nevertheless, acceptance of these policies is a *passage obligé* for companies to join SDOs' standard-setting activities.²⁸

Contrary to standards development processes, where consensus-building is typically seen as a mechanism to prevent biased or even discriminatory outcomes,²⁹ decisions on SDOs' operational framework are not always carried out by consensus. Consequently, a patent policy may not necessarily represent a "general agreement"³⁰ among SDO's members and participants,³¹ but be a product of deliberations among the SDO's leadership entrusted to develop rules and policies governing the SDOs' activities.

On the one hand, SDOs are self-regulatory, membership-driven bodies and enjoy a wide margin for maneuver when designing their rule-making process, meaning that their patent policies can be sufficiently flexible to adjust to the needs of SDOs' membership and market or

²⁵ For the discussion on SEPs, *c.f.*, among many others, J. Barnett, *Antitrust Overreach: Undoing Cooperative Standardization in the Digital Economy*, 25 MICH. TECH. L. REV. 163, 221 (2019); A. Galetovic & S. Haber, *The Fallacies of Patent-Holdup Theory*, 13 J. COMPETITION L. & ECON., 1 (2017); J. Farrell & T. Simcoe, *Choosing the rules for consensus standardization*, 43 RAND J. ECON. 235 (2012); J. Farrell et al., *Standard Setting, Patents and Hold-Up*, 74 ANTITRUST L.J. 603 (2007); M. Lemley & C. Shapiro, *Patent Hold-Up and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007).

²⁶ For instance, when a patent-holder refuses committing to such licensing requirements, an SDO has to consider developing standards using alternative technologies, possibly leading to sub-optimal outcomes. *See, e.g.*, ETSI Intellectual Property Rights Policy, Annex 6 ETSI Rules of Procedure (April 2019), available at <http://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf>, clause 8.

²⁷ *See* D. Melamed & C. Shapiro, *How Antitrust Law Can Make FRAND Commitments More Effective*, 127 YALE L. J. 2110 (2018) (arguing for effective FRAND commitments).

²⁸ Although in principle, patent-holders remain free to choose not to license their technologies, a handful of SDOs nevertheless requires a commitment to license in FRAND terms as a condition of participation. *See* JUSTUS BARON ET AL., MAKING THE RULES – THE GOVERNANCE OF STANDARD DEVELOPMENT ORGANIZATIONS AND THEIR POLICIES ON INTELLECTUAL PROPERTY RIGHTS (EU Joint Research Center 2019) 45, http://publications.jrc.ec.europa.eu/repository/bitstream/JRC115004/sdo_governance_final_electronic_version.pdf (analyzing VITA, W3C, JEDEC, ECMA and the DVB Project) [hereinafter THE JRC REPORT]. By way of illustration, Bekkers and Updegrove unveil binding commitments of patent policies for various SDOs: *see* R. BEKKERS & A. UPDEGROVE, IPR POLICIES AND PRACTICES OF A REPRESENTATIVE OF STANDARD-SETTING ORGANIZATIONS WORLDWIDE, REPORT COMMISSIONED BY THE COMMITTEE ON INTELLECTUAL PROPERTY MANAGEMENT IN STANDARD-SETTING PROCESSES. NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C., 35 (May 2013), https://www.nap.edu/resource/18510/Bekkers-Updegrove%20Paper_092013.pdf.

²⁹ For the advantages of consensus-based standard development, *see* T. Simcoe, *Standard Setting Committees: Consensus Governance for Shared Technology Platforms*, 102 AM. ECON. REV. 1, 305 (2012).

³⁰ *See* the definition of consensus in ISO/IEC Guide 2:2004, Standardization and Related Activities – General Vocabulary, updating Guide 2:1991, cl. 1.7.

³¹ Indeed, SDOs are generally membership-based, but some operate according to non-membership model (IETF) or allow technological contributions from non-members. *See also* Jorge Contreras, *When a Stranger Calls: Standards Outsiders and Unencumbered Patents*, 12 J. COMPETITION L. & ECON., 507 (2016).

legal developments. On the other hand, SDOs' IPR rules are expected to be clear and well-constructed to allow for their unambiguous interpretation. This is in line with these policies' objective to strike a balance of conflicting interests to avoid potential "wars of attrition."³² A poorly designed patent policy creates ambiguities, which in turn undermines legal certainty among SDOs' participants and may even create fertile grounds for antitrust violations, eventually resulting in undesirable and lengthy litigation.³³

Given that procedural aspects surrounding the functioning of an SDO are of substantive nature,³⁴ any modifications to the SDO's patent policy, even when deemed necessary in the light of market developments, may impinge upon the understanding of terms of acceptance for SDO membership and the foundational basis for the decision-making, imposing constraints and obligations scarcely anticipated by the affected member(s).³⁵ As discussed below, this may give rise to discontent among those who joined the SDO based on their prior legitimate expectations vis-à-vis the initial repertoire of rules. Therefore, this Article is premised on the view that the revision of SDOs' operational rules must be undertaken in a balanced manner that seeks to reflect the interests of all stakeholders.³⁶ This is especially the case when the changes are retroactive and affect previous commitments made by members and in cases of manifest conflicts of interest such as in the case of AMTSO (antivirus companies versus testing companies) or the IEEE (patent-holders versus patent-implementers).

B. Iterations of Revisions of Patent Policies

Revisions of SDOs' patent policies may be spurred by new market developments or a response to critique by governmental authorities. In general, SDOs modify their IP rules about once a year.³⁷ While most of these changes are rather minor, some substantial modifications include amendments to the rules on IP transfer and clarifications to disclosure and licensing

³² See J. Farrell & T. Simcoe, *Choosing the rules for consensus standardization*, 43 RAND J. OF ECON. 235, 235 (2012).

³³ An example where the alleged ambiguity of IP rules was closely associated with antitrust violations is the *Rambus* case. In re *Rambus, Inc.*, No. 9302, 2006 WL 2330117 (F.T.C. Aug. 2, 2006), *rev'd*, 522 F.3d 456 (D.C. Cir. 2008).

³⁴ See L. Kiser & E. Ostrom, *The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches*, in STRATEGIES OF POLITICAL INQUIRY (E. Ostrom ed., 1982) (arguing that the smooth functioning of an organization is ensured when the operational rules, collective-choice and constitutional-choice rules are viewed as a pool of interconnected levels of rules that cannot change without having significant effects on the other sets of rules).

³⁵ By analogy, see E. Ostrom, GOVERNING THE COMMONS. THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990) (explaining how the changes at each level of institutional rules may increase uncertainties among members of an institution).

³⁶ G. Willingmyre, *Giving Process its Due When a Standard Development Organization Changes the Rules of the Game*, IP-WATCH INSIDE VIEWS (Jan. 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2903602. See *contra* The JRC Report, *supra* note 27, at 84 (suggesting that due to opportunism by incumbents, taking all interests onboard when revising the policy may be suboptimal).

³⁷ See J. Tsai & J.D. Wright, *Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157, 170 (2015).

requirements.³⁸ Most of these revisions are fueled by concerns of patent ambush and excessive royalty rates set by patent-holders and aim to ensure that patent-holders do not wield undue market power because of their ownership of essential technologies.

The history of modifications to SDOs' patent policies is rich in various remarkable examples. With a strong influence and political pressure from the European Commission (EC) in the development of 2G, the European Telecommunications Standards Institute (ETSI) was one of the first EU-based SDOs to use as a basis for its patent policy the FRAND licensing requirement since 1994.³⁹ The policy change was induced by a series of EC investigations on SEP holders.⁴⁰ The policy was amended in 2004 to include an obligation to disclose essential claims and to commit to licensing on broad FRAND terms. This disclosure obligation was reinforced in the 2005 revision in response to continuing antitrust concerns expressed by the Commission. However, the subsequent attempt to introduce yet another amendment in 2006, this time stipulating, among other things, the requirement to disclose the licensing terms ex ante, was not well received by the EC, and led to the adoption of less stringent licensing requirements in 2007.⁴¹

VITA (originally the VMEbus International Trade Association), an SDO developing standards for VMEbus technology and electronic interconnections and systems design,⁴² has also undertaken revisions of its IPR rules fueled by the late disclosure of essential patent claims and demanding royalty rates that were unexpectedly high according to the VITA community, and created risk of hold-up and ambush.⁴³ In 2006, VITA outlined a policy that required, alongside the disclosure of SEPs, ex ante disclosure of the maximum royalty rates a technology vendor would demand for the licensing of its essential patent claims.⁴⁴ VITA's proposed rules implied that patent-holders that failed to comply with the disclosure requirement would be obliged to license their technologies on a royalty-free basis. The policy was commended by the two authorities in the realm of US standardization: The US DOJ furnished a positive Business

³⁸ See The JRC report, *supra* note 27 at 137–38 (referencing among others, A. Layne-Farrar, *Intellectual Property and Standard Setting* (OECD Doc DAF/COMP/WD(2014)84, November 18, 2014); J. Baron & D. Spulber, *Technology Standards and Standard Setting Organizations: Introduction to the Searle Center Database*, 27 J. ECON. & MGMT. STRATEGY, 478 (2018)).

³⁹ See ETSI/GA20 (94) 20; ETSI/GA20 (94)22 Rev. 1. In contrast, the International Telecommunication Union (ITU), the leading technology SDO of that time, merely had a vague IPR Code of Conduct. See E.J. Iversen, *Standardization and Intellectual Property Rights: ETSI's controversial search for new IPR procedures*, in STANDARDIZATION AND INNOVATION IN INFORMATION TECHNOLOGY. PROC. 1ST INT. CONF. ON STANDARDIZATION AND INNOVATION IN INFORMATION TECHNOLOGY (K. Jakobs & R. Williams eds., 1999).

⁴⁰ M. Dolmans, *Standards for Standards*, 26 FORDHAM INTELL. L.J. 163, 185 (2002).

⁴¹ See the letter of 21 June 2006 from A. Tradacete Cocera, Director - Information, Communication and Media, European Commission Competition Directorate-General, to Karl Heinz Rosenbrock, ETSI Director General, in J. Contreras, *supra* note 24, at n.61 and accompanying text.

⁴² Setting of standards does not take place in VITA itself but in the Vita Standards Organization VSO. In this Article, we follow the approach of many academic studies and refer to the SDO by its informal definition. See Bekkers & Updegrove, *supra* note 28, at 6.

⁴³ Business Review Letter Request of 15 June 2006, from R.A. Skitol to Assistant Attorney General T.O. Barnett, at 2, 3 (Jun. 15, 2006) (on file at <https://www.justice.gov/sites/default/files/atr/legacy/2014/06/16/302160.pdf>).

⁴⁴ *Id.* at 3–4.

Review Letter (BRL), which concluded on an optimistic note that the new patent policy did not raise anticompetitive concerns.⁴⁵ Furthermore, ANSI re-accredited VITA as an American Standards Developer (ASD) that complies with the ANSI Essential Requirements (although this was vehemently objected to by Motorola).⁴⁶

In the software industry, the Organization for the Advancement of Structured Information Standard (OASIS), a global consortium mainly administering software standards, initially had a “reasonable and non-discriminatory terms” (RAND)-based Patent Policy (“Legacy IPR Policy”), which however did not receive a unanimous endorsement across different industry fields.⁴⁷ A so-called “multi-track” patent policy adopted in 2005 was deemed to be more suitable considering the broad scope of OASIS activities, since it allowed working groups to choose from three different sets of licensing requirements (“IPR modes”): RAND, royalty free on RAND terms, and royalty-free on limited terms.⁴⁸ The amendment introduced a formalized requirement to grant licenses for SEPs through any of the three IPR modes. While commended for offering stakeholders a greater flexibility, the new policy generated consternation amongst the free software and open source developers over concerns of encouraging holders of large patent portfolios to enter private agreements among themselves.⁴⁹ The subsequent policy modification of 2009 introduced the Non-Assertion IPR Mode,⁵⁰ the result being that OASIS patent policy now contains four optional “tracks.”⁵¹ OASIS patent policy was as well endorsed by ANSI for its compliance with ANSI Essential Requirements.

In the realm of web standards, the first version of the World Wide Web Consortium’s (W3C) Patent Policy, drafted in 1999, encompassed the requirement to disclose essential patents and license them to all implementers on royalty-free or RAND terms. This requirement was vehemently opposed by open source software developers.⁵² A revised policy, adopted in 2003, required all members of W3C working groups to offer their technology on a royalty-free

⁴⁵ See Business Review Letter to VMEbus International Trade Association (Oct. 30, 2006), (on file at <https://www.justice.gov/atr/response-vmebus-international-trade-association-vitas-request-business-review-letter>). The Business Review Letter provides a non-binding statement that the DOJ does not intend to take any antitrust enforcement action.

⁴⁶ See J. Contreras, *supra* note 24, n.42, n.43 and accompanying text. ANSI accredits SDOs to a set of procedural requirements contained in the *ANSI Essential Requirements: Due process requirements for American National Standards* (‘Essential Requirements’).

⁴⁷ See, among others, T. Stoll, *Are you still in? The Impact of Licensing Requirements on the Composition of Standards Setting Organizations*, MAX PLANCK INSTITUTE FOR INNOVATION AND COMPETITION RESEARCH PAPER No. 14 18, (2014), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2535735.

⁴⁸ OASIS, IPR (Jan. 20, 2005), <https://www.oasis-open.org/policies-guidelines/ipr-2005-01-20>.

⁴⁹ See Lawrence Rosen, *A call to action on OASIS Patent Policy*, LWN (Feb. 22, 2005), <https://lwn.net/Articles/124548/>. Anecdotally, the opposition was driven by W3C members who also happened to be members of OASIS and did not favor open software licensing.

⁵⁰ *OASIS Introduces Non-Assertion Mode to Its Intellectual Property Rights Policy for Standards Development*, OASIS OPEN (June 15, 2009), <https://www.oasis-open.org/news/pr/oasis-introduces-non-assertion-mode-to-its-intellectual-property-rights-policy-for-standards>.

⁵¹ The current policy was approved in July 2013. *Intellectual Property Rights (IPR) Policy*, OASIS OPEN (2013), <https://www.oasis-open.org/policies-guidelines/ipr>.

⁵² The 2,500 comments on patent policy, most of which were negative, have been reviewed by the W3C: See J. Contreras, *A Tale of Two Layers: Patents, Standardization and the Internet*, DENV. L. REV. 853, 877 (2016).

basis, except when the essentiality is established by the Patent Advisory Group or PAG (consisting of all working group members and the W3C chair), and when other technologies are not available.⁵³ Despite still being the W3C policy, there were stakeholders who argued that the policy change would produce significant adverse effects on innovation.

Thus far, the literature review suggests that the responses ensuing from the revisions of patent policies have been examined in detail in only a few studies. In the case of OASIS, Stoll empirically analyzed whether the shift from a RAND to royalty-free licensing requirements had a significant impact on the SDO's membership and composition, and his findings suggest that the introduction of the "multi-mode" policy in 2005 is correlated with a significant decrease in the rate of addition of new members.⁵⁴ Stoll studied the profiles of new members after the revision of the policy and noted that the share of not-for-profit stakeholders and system integrators (whose main source of income was unrelated to licensing revenues) significantly increased, whereas the share of software producers decreased.⁵⁵ He found that in contrast to the situation under the RAND-policy, producers of physical goods retained their OASIS membership status for a longer time. This study also demonstrated that OASIS's new policy did not face much opposition from stakeholders: in 2014, the vast majority of technical committees operated either in royalty-free or non-assertion modes. While only two committees maintained the initial RAND licensing requirements, the majority of newly established technical committees operated on the non-assertion mode.

In the case of VITA, Contreras analyzed the effects of VITA's patent policy revisions on its membership levels and pace of standardization activities.⁵⁶ Contrary to predictions, Contreras observed a net increase in VITA membership in the three years following the adoption of the new policy (albeit adopted with two negative votes – with one of the negative voters, Motorola, having publicly opposed the new IP rules and subsequently withdrawing from VITA). Moreover, the majority of VITA members perceived the revised policy to have had a positive impact on VITA's standardization activity.⁵⁷ In this regard, Contreras's study shows that the licensing terms and the behavior of patent holders has a significant influence on the members' willingness to participate in VITA's standards development. Contrary to VITA, W3C experienced a decrease in its membership after the adoption of its new patent policy. This not only demonstrates that the revisions of patent policies may affect the membership and

⁵³ *W3C Patent Policy of 5 February 2004*, W3C (Aug. 1, 2017), <https://www.w3.org/Consortium/Patent-Policy-20170801/>.

⁵⁴ Stoll, *supra* note 47.

⁵⁵ According to Stoll, "one explanation for the lower share of software producers in new SDO members can be the aforementioned disappointment of the open source and free software community." Stoll, *supra* note 47, at 28.

⁵⁶ J. Contreras, *supra* note 24.

⁵⁷ As a part of this study, VITA's members were asked to fill in a survey that included questions regarding their experience in VITA prior and after the policy modification. Variables measured included speed of standards-development at VITA, length of time spent by the respondent on VITA standards-development and quality of VITA standards. Additional questions asked for information regarding the respondent's actions taken in response to *ex ante* licensing disclosures, and to the adoption of the VITA *ex ante* policy.

composition of SDO, but also that the effects would depend on SDOs institutional context and setup.

C. IEEE Patent Policy Update

1. *Substance of revisions*

Perhaps the most intriguing patent policy modifications in the history of SDOs took place within the IEEE. The very first version of the IEEE Patent Policy dates back to 1990s and was merely based on FRAND commitment and *ex ante* disclosure of essential claims. This policy, however, suffered from deficiencies: the FRAND obligations were ambiguous, and no mechanism existed to allow for a discussion of licensing terms or the undertaking of a comparative assessment of the costs of proposed technologies.⁵⁸ The concerns posed by such drawbacks drove the IEEE-SA members to undertake significant revisions to the Policy in 2006.⁵⁹ Similar to the ETSI, the revised patent policy allowed (but did not require) patent-holders to disclose their maximum licensing terms *ex ante* and, to a certain extent, enabled participants of standards development to discuss licensing costs prior to standards adoption.⁶⁰ Alongside these novelties, the policy also clarified that the commitments stemming from the Letters of Assurance (LoAs) that patent-holders were required to provide as an assertion of their licensing intentions⁶¹ were irrevocable and binding upon the Submitter and its affiliates.

Similar to the case of VITA, the DOJ commended the proposed modifications, noting that it would facilitate working groups' members in taking "better informed decisions" and "could lead to faster development, implementation and adoption of a standard as well as fewer litigated disputes after a standard is set."⁶² Upon obtaining a favorable Business Review Letter, the IEEE SA Standards Board adopted the new policy in May 2007. But despite the acclaim of the DOJ Antitrust Division, the 2007 Update did not offer a panacea for the alleged challenges of the IEEE SA Patent Policy: the opportunity to disclose maximum royalty rates was not eagerly seized by patent holders,⁶³ and the lack of clarity on the definition of "reasonable rates" and

⁵⁸ *Business Review Letter to IEEE (2007)*, JUSTICE 1, 4 (2007), <https://www.justice.gov/atr/response-institute-electrical-and-electronics-engineers-incs-request-business-review-letter>.

⁵⁹ M.A. Lindsay, *Business Review Letter Request to Assistant Attorney General, T.O. Barnett* 1, 3 (Nov. 29 2006), <https://www.justice.gov/sites/default/files/atr/legacy/2014/01/28/302148.pdf>.

⁶⁰ *Business Review Letter to IEEE (2007)*, *supra* note 58.

⁶¹ An LoA is defined in IEEE SA Bylaws as: "a document, including any attachments, stating the Submitter's position regarding ownership, enforcement, or licensing of Essential Patent Claims for a specifically referenced IEEE Standard, submitted in a form acceptable to the IEEE-SA." IEEE-SA Standards Board Bylaws, Article 6.1 (November, 2019), http://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf. A patent-holder can choose to (1) license the SEP on RAND or royalty-free terms; (2) not to enforce the SEP against technology implementers; (3) declare that it is not aware that it holds any (potential) SEPs; or (4) refuse to provide any commitment about its licensing intentions (a "negative" LoA), (art 6.2) or submit a "blanket" LoA that applies to all of its existing and future SEPs. The absence of an LoA does not necessarily exclude the patent-holders from the standardization process, but is taken into account during the process of standards approval. *Id.*

⁶² *Business Review Letter to IEEE (2007)*, *supra* note 58, at 10.

⁶³ In only two out of forty LoAs that IEEE-SA received did patent-holders accept to disclose maximum rates: M.A. Lindsay, *Business Review Letter Request to Assistant Attorney General, W.J. Baer*, 10 (Sept. 30, 2014), <https://www.justice.gov/sites/default/files/atr/legacy/2015/02/17/311483.pdf>.

“non-discriminatory” in FRAND appeared to hinder standards development.⁶⁴ Meanwhile, discussions concerning SDOs’ patent policies drew the attention of governmental agencies and academics,⁶⁵ possibly triggered by the “new wave” of litigation on SEPs.⁶⁶ In the wake of these events, the IEEE SA introduced a second revision of its IPR rules.

This time, amendments of the patent policy were more extensive and preliminarily sought to mitigate the concerns for alleged patent hold-up and royalty stacking. In its request to the DOJ to provide a Business Review Letter, the IEEE SA submitted four changes it intended to implement in the new patent policy.⁶⁷ The first proposed modification related to the prohibition for Submitters of LoAs⁶⁸ that have been determined complete and posted on the IEEE-SA website (so-called “Accepted LoAs”) to seek or seek to enforce injunctions (or “Prohibitive Order”) against implementers, unless those fail to participate in, or to comply with the outcome of an adjudication by the appropriate authorities.⁶⁹ The second modification concerned the permission for patent holders to require reciprocity in licensing *only* with regard to the patents that are essential to a single standard, and *only* when the reciprocity relates to a SEP. Both changes introduce explicit changes to the policy. The remaining two changes took the form of clarifications: first, the option to determine the “reasonable rate” based on the value of the relevant functionality of the smallest saleable patent practicing unit (SSPPU)⁷⁰ compliant implementations of the SEP; and, second, that IPRs shall be licensed for “any Compliant Implementation”, meaning any product or service that conforms to any mandatory or optional portion of a normative clause of an IEEE Standard.⁷¹ The latter point in particular would mean that licenses could be granted for inputs of a specific product such as chips, screens or transistors rather than for the final product such as a mobile phone or a car.⁷²

⁶⁴ That lead to diverging interpretations of the 2007 policy: see K. Karachalios, *Fundamental Uncertainty at the Intersection between Patents and Standards* THE PATENT LAWYER, November/December 2015, 33.

⁶⁵ See R. Hesse, Deputy Assistant Att’y Gen., Antitrust Div., U.S. Dep’t of Justice, Six ‘Small’ Proposals for SSOs Before Lunch, Remarks as Prepared for the ITU-T Patent Roundtable, 13 (Oct. 10, 2012), <http://www.justice.gov/atr/public/speeches/287855.pdf>.

⁶⁶ See, e.g., *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013); *Apple, Inc. v. Motorola Mobility, Inc.*, 886 F.Supp.2d 1061 (W.D. Wis. 2012); *Ericsson Inc. v. D-Link Sys., Inc.*, No. 6:10-CV-473, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013), *aff’d in part, vacated in part, rev’d in part*, 773 F.3d 1201 (Fed. Cir. 2014).

⁶⁷ Those are sometimes termed by IEEE as “specifications”, highlighting that no major changes were made and suggesting that the more specific obligations of the version after 2015 apply retroactively, that is, also to commitments made before 2015.

⁶⁸ According to the IEEE Patent Policy vernacular, “Submitter” is an individual or an organization providing an LoA, who may not necessarily be the SEP holder.

⁶⁹ The reason for this modification was that the policy provided sufficient compensation for Accepted LoAs.

⁷⁰ See David Kappos & Hon. Paul R. Michel, *The Smallest Saleable Patent-Practicing Unit: Observations On Its Origins, Development, And Future*, 32 BERKELEY TECH. L.J. 1433 (2018).

⁷¹ Business Review Letter Request (2014), *supra* note 63, at 15–17; IEEE SASB Bylaws clause 6.

⁷² The legality of this practice has spurred controversy and was more recently the subject of a complaint launched by Continental Automotive Systems against Avanci, a licensing platform acting on behalf of a number of SEP owners, and some of its members. Avanci was accused of breaching its FRAND commitments by only licensing SEPs directly to car manufacturers (and not, for instance, intermediaries that are active in the component market), thereby inflating its royalty rate by taking the final vehicle as the basis for such calculation and excluding competition. See *Cont’l Auto. Sys., Inc. v. Avanci, LLC et al.*, 485 F. Supp. 3d 712 (N.D. Tex. 2020) (note that Continental partially withdrew the injunction motion for Nokia,

The significant departure of the revised policy from common practice did not go unnoticed by scholars and other SDOs.⁷³ For instance, it has been examined whether the substance of the new IEEE Patent Policy and the process of its adoption could potentially breach EU competition law.⁷⁴ The argument that patent-holders may avoid the amendments by declining to submit an LoA appeared to lack practical considerations, and so did the allegation that licensors remain free to enforce their IPR claims once the violation has been established by a Court and the licensees have failed to accord with the outcomes of the litigation.⁷⁵ Nonetheless, the proposed revisions were not opposed by the DOJ, which found that the new policy clarified the FRAND commitments and would strengthen the standards development process.⁷⁶

Fig. 1 about here

In 2018, three years after the IEEE Patent Policy Update took effect, it was proposed, for projects initiated before March 2015, to include an option of providing a positive LOA under the previous IEEE patent policy.⁷⁷ The proposal was fueled by requests of members to inform the relevant parties that, despite having submitted negative LoAs, they will provide licensing assurance under the 2007 IEEE Patent Policy, and arguably also alleviate the confusion as to when and for which standards the policy takes effect. This proposal has not been accepted; instead, it was decided to no longer permit submission of blanket negative LoAs – an amendment that passed unanimously and took effect in June 2019.⁷⁸ After a series of speeches

one of the Avanci's co-defendants, in so far as it relates to parallel cases in Germany). This case ran in parallel with a bigger lawsuit launched by FTC against Qualcomm in 2017, which recently led to a unanimous decision by the US Court of Appeals for the Ninth Circuit, finding that Qualcomm's practice not to license competing suppliers of baseband processors but exclusively end-product manufacturers does not amount to a violation of Section 2 of the Sherman Act: *See Fed. Trade Comm'n v. Qualcomm Inc.*, 969 F.3d 974, 1005 (9th Cir. 2020).

⁷³ IEEE became the first SDO regulating FRAND royalties, and quite exceptionally in referring to commercial – and not only technological – essentiality. *See* Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEO. L.J. ONLINE 48, 59 (2015). Remarkably, similar changes to patent policy were not accepted in ETSI or ITU due to the lack of consensus among SDO members.

⁷⁴ N. Petit, *The IEEE-SA Revised Patent Policy and Its Definition of "Reasonable" Rates: A Transatlantic Antitrust Divide?*, 27 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 211 (2017); N. Zingales & O. Kanevskaia, *The IEEE-SA Patent Policy Update Under the Lens of EU Competition Law*, 12 EUR. COMPETITION J. 2–3, 195 (2016).

⁷⁵ *See* R. Hoffinger, *The 2015 DOJ IEEE Business Review Letter: The Triumph of Industrial Policy Preferences Over Law and Evidence*, 2 CPI ANTITRUST CHRON. (March 2015), at 23 (suggesting that the changes will make it difficult for a new standardization project to attract a critical mass of SEP owners).

⁷⁶ Business Review Letter to IEEE (2015), available at <http://www.justice.gov/atr/public/busreview/311470.htm>, at 6.

⁷⁷ Minutes of the IEEE Standard Board Patent Committee meeting, June 12 2018, available at <https://standards.ieee.org/content/dam/ieee-standards/standards/web/governance/patcom/618patmins.pdf>.

⁷⁸ Minutes of the IEEE Standard Board Patent Committee meeting, December 3 2018, available at <https://standards.ieee.org/content/dam/ieee-standards/standards/web/governance/patcom/1218patmins.pdf>; and <https://app.box.com/s/te9kuytczpv94zdmaipn5e0d2szomum>.

warning about the perils of patent “hold-out” for innovation,⁷⁹ the DOJ updated its positive BRL in September 2020, with a supplemental letter encouraging IEEE to re-assess its current Patent Policy.⁸⁰ This has likely contributed to the recent request of the BOG to IEEE Standards Board to review the Patent Policy regarding the definition of the “reasonable rate” and provisions pertaining Prohibitive Orders.⁸¹

2. *Analyses of Effects of the Updated Policy*

Upon the adoption of the new rules to the SDO’s operational framework, various attempts have been made to sketch the short-term impact of the IEEE Patent Policy modifications on standardization activity within the IEEE (and, by implication, on the industry, in general) based on the number of submitted LoAs.

Studies supporting the amendments referred to the increase of submitted “blanket” LoAs⁸² and of approved standards and Project Authorization Requests (PARs) in 2015 and 2016⁸³ in the IEEE, and appealed to SDOs’ liberty to experiment with diverse licensing models, underscoring that policy diversification is beneficial to a broad range of stakeholders, including standard-setters and consumers.⁸⁴ In turn, opponents observed the growing amount of missing or negative LoAs after the policy took effect in March 2015,⁸⁵ which, together with the

⁷⁹ E.g. Remarks of Makan Delrahim, Asst. Att’y Gen., U.S. Dep’t of Justice, Antitrust Div. as prepared for Delivery at USC Gould School of Law – Application of Competition Policy to Technology and IP Licensing, “Take it to the Limit: Respecting Innovation Incentives in the Application of Antitrust Law” (Nov. 10, 2017) available at <https://www.justice.gov/opa/speech/file/1010746/download>.

⁸⁰ Letter from Makan Delrahim, Asst. Att’y Gen., U.S. Dep’t of Justice, Antitrust Div., to Sophia A. Muirhead, Gen. Counsel & Chief Compliance Officer, IEEE re: Business Review Letter to IEEE (Sept. 10, 2020) available at <https://www.justice.gov/atr/page/file/1315291/download>. For the further analysis, see D. Kallay, *The DOJ 2020 Business Review Letter to IEEE: Balance Restored*, CPI Antitrust Chronicle (Dec. 2020).

⁸¹ Minutes of the IEEE Standards Board Patent Committee, March 23, 2021, available at <https://standards.ieee.org/content/dam/ieee-standards/standards/web/governance/patcom/321patmins.pdf>, clause 6.1. See also K. Vasant, *Qualcomm, Apple, Huawei clash over patent policy at historic IEEE committee meeting* (Mar. 24, 2021) available at <https://mlexmarketinsight.com/news-hub/editors-picks/area-of-expertise/antitrust/qualcomm-apple-huawei-clash-over-patent-policy-at-historic-ieee-committee-meeting>.

⁸² Iplytics, ‘Empirical Analysis of Technical Contributions to IEEE 802 Standards – Ongoing Technical Engagement and R&D for IEEE 802 Standards Development After IEEE’s Patent Policy Updates’, January 2019.

⁸³ See J. Contreras, *supra* note 24 (concluding that there was an increase in IEEE standardization activity after the adoption of the 2007 policy).

⁸⁴ G. Ohana, ‘Diversity in standards development: A response to Katznelson’, IEEE 9th International Conference on Standardization and Innovation in Information Technology (SIIT) (2015).

⁸⁵ E.g., R. Katznelson, ‘Perilous deviations from FRAND harmony – operational pitfalls of the 2015 IEEE Patent Policy’ IEEE 9th International Conference on Standardization and Innovation in Information Technology (SIIT) (2015) (available at <http://bit.ly/IEEE-LOAs>). Many of these negative LoAs are from major contributors: K. Mallinson, ‘Development of innovative new standards jeopardized by IEEE Patent Policy,’ article commissioned by 4iP Council (September 2017), available at http://www.4ipcouncil.com/application/files/6015/0479/2147/Mallinson_IEEE_LOA_report.pdf; also K. Gupta & G. Effraimidis, *IEEE Patent Policy Revisions: An Empirical Examination of Impact*, 64 THE ANTITRUST BULLETIN 2, 151, 169 (2019).

expansion of the comment resolution process in some IEEE working groups,⁸⁶ arguably created uncertainty about the adoption of standards by the IEEE and other SDOs incorporating IEEE standards, thereby having a chilling effect on technological innovation.

Based on these studies, it appears that neither contrasting the 2007 and 2015 revisions of IEEE Patent Policy nor comparing policy modifications within OASIS, VITA and IEEE would result in a sufficiently robust analysis. This is due to the fundamental difference in their institutional architecture and operational fields. Nevertheless, despite providing mixed evidence on the actual impact of new patent policies, all mentioned studies prove to be tremendously useful for analyzing members' reactions on modifications of patent rules as an expression of the dynamics of the standardization ecosystem. Such analysis will allow drawing broader conclusions about strategic behavior of SDO members; SDO institutional design and inherent flexibility and adaptability; and the resilience of SDOs in general.

III. EXIT, VOICE AND LOYALTY AFTER POLICY CHANGES IN AN SDO

A. Introduction to Hirschman's Framework

In his treatise "Exit, Voice and Loyalty" (1970),⁸⁷ Hirschman deliberates on the choice of a consumer or a member of an organization who is facing deterioration in the quality of a product or service. Hirschman notes that such situations are also to be found in non-economic organizations and situations in trade unions, voluntary associations, or political parties where members avail services without "direct monetary counterpart." The choice is between "voicing" the dissatisfaction to the producer firm or organization in the hope of an improvement, or to opt for an "exit" or switch to a different provider or organization.

Hirschman defines "voice" as "*any attempt to change, rather than to escape from, an objectionable state of affairs, whether through individual or collective petition to the management directly in charge, through appeal to a higher authority with the intention of forcing a change in management, or through various types of actions and protests, including those that are meant to mobilize public opinion.*"⁸⁸ Voice is a costly alternative since it requires effort and time and risks additional delays and free riding.⁸⁹ However, the market structure plays a key role in the expression of voice. For instance, it becomes imperative in case of monopolistic supply (thus no switching option) or if the deterioration in quality occurs simultaneously across all competing suppliers, thus rendering switching futile.

⁸⁶ Gupta and Effraimidis observed the extension of comments resolution processes and the related decrease in standardization speed, in 802 LAN/MAN Standards Committee (LMSC), one of the most patent-intensive committees. Interestingly, policy changes in other SDOs did not have the similar effect, presumably because fluctuations of speed and membership were not related to licensing issues: See J. Contreras, *supra* note 24.

⁸⁷ A.O. Hirschman, EXIT, VOICE AND LOYALTY. RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES 4–5 (HARVARD UNIVERSITY PRESS 1970).

⁸⁸ *Id.* at 30.

⁸⁹ See also A.O. Hirschman, *Exit, Voice and the Fate of the German Democratic Republic: An Essay in Conceptual History* (part 2), 45 WORLD POL. 173, at 176 (1993).

In contrast to voice, Hirschman suggests “exit” to be an act of withdrawing from the organization. He observed a “fundamental schism” wherein exit is relatable to “economics” and that “voice” is relatable to “politics.” For a consumer availing a product or a service, a reticent exit carries the allure of being less “messy.”⁹⁰ Exit may thus emerge to be the dominant strategy for members, especially when the desired outcomes are more likely in other fora, presupposing low switching costs, or else reliable alternatives.

When consumers or members opt for “voice,” organizations are alerted to the deficiency, thus inducing the scope for undertaking measures to make amendments and incorporate learnings to institutional memory. Crucially, Hirschman appears to suggest that there are multiple avenues of exercising influence. By choosing to voice their concerns, members can (attempt to) resist changes from within rather than challenge them from the outside (arguably, even in case of low switching costs).⁹¹

However, given the inherent costliness of voice, if a “critical mass” of consumers were to swiftly opt for exit, it may imperil the survival of the firm, or in the case of a membership-driven organization, lower its membership to unsustainable levels. Hirschman’s concerns stemmed from his perception that in real-world situations involving “quasi-perfect competition,”⁹² the brutal efficiency and abruptness of exit would be welfare-decreasing. Indeed, a far worse scenario troubled Hirschman, that of consumers endlessly moving across equally poorly performing rivals and conveying an imprecise signal to the whole market to keep functioning sub-optimally.

From that perspective, Hirschman observed that “loyalty” emerged as *the* factor that could compel members to voice, or at least stick around and delay their exit (despite availability of a “competing or substitute” organization). According to Hirschman, when exit is a “wide-open option” co-existent with “voice,” two crucial determinants sway the decision making of members towards that of opting for “voice”: (a) member's willingness to “trade-off certainty of exit against the uncertainties of an improvement,” which Hirschman relates to “loyalty”; and (b) “an estimate on the ability to influence.” Such members moved by “loyalty” are driven by the need to “do something” by exerting their influence (which necessitates staying on as a member) and thus taking up the role of “quality-makers.” Notably, Hirschman cautions that loyal behavior, while intrinsically psychological, retains an “enormous dose of reasoned calculation” and increases a member’s propensity to choose voice over exit.⁹³

Even the most loyal member retains the freedom to exit, a fact that can, depending on the context, enhance the bargaining power of that member within the deteriorating organization. Notwithstanding that insignificant members could indulge in “cheap talk,” a potential exit of a truly loyal member will not be costless for the member, since the organization itself may also

⁹⁰ Hirschman, *supra* note 87, at 107.

⁹¹ An important, additional concept that is of help to understand such a construct is agency and the way it can affect the mechanics and dynamics in an evolving organization. Cf. H. Gerken, *Exit, Voice and Disloyalty*, 62 DUKE L.J. 1349, at 1360 (2013).

⁹² Hirschman, *supra* note 87, at 25.

⁹³ Cf. S. Gehlbach, *A Formal Model of Exit and Voice*, 18 RATIONALITY & SOC’Y 395, 411 (2006).

make exit quite costly (both for the loyal and the disloyal members) by imposing high penalties for exit but also high fees or other barriers for (re-)entry.⁹⁴ Seen in this light, loyalty may be perceived as an ethereal, tempering agent affecting the “algebra” of computing the “exit/voice calculus,” a crucial aid to self-reflection and prodding members to take “efforts to mix, negotiate and *choose* between courses (exit and voice)”, pertinent to situations which are inherently “exit-prone” or “voice-prone,”⁹⁵ which are symptoms of organizations in crisis. Loyalty contributes to a mutation causing a “regenerative” effect or a “recuperation” mechanism: affording the time and latitude to perceive discontent and undertake the appropriate course leading to correction. It exhorts for the strengthening of the institutional mechanisms for voice. Under such trying times, the role of loyalty in choosing to voice or exit may profoundly influence the nature of the developments with the potential to *change* the course of any institution.

A scoping literature review indicates that Hirschman’s treatise has been applied to study responses in “collaborative settings” driven organizations where “repairable lapse(s)” of judgement cause discontent amongst members across diverse settings—political science, sociology, social psychology, labor economics, and management.⁹⁶ An indication of the framework’s versatility is seen in a few examples such as relationships between automobile manufacturers and suppliers in times of industry downturn;⁹⁷ or industry self-regulation and inter-organizational relations in the domain of private security.⁹⁸ The prior applications of the framework for SDOs in the ICT context include Winn’s assessment of the regulatory competition between the US and EU in setting standards,⁹⁹ Brunsson and Jacobsson’s perspective talking of the choice between exit and voice for the end user of a standard who is

⁹⁴ Hirschman refers to ‘re-entry’ when a member boycotts an organization, the organization subsequently undertaking remedial action, and the member re-joining the organization. Hirschman, *supra* note 87, at 86.

⁹⁵ See A. Hirschman, *‘Exit, Voice and Loyalty’: Further Reflections and a Survey of Recent Contributions* (pt. 3) 58 THE MILBANK MEMORIAL FUND Q. 430, at 438 (1980).

⁹⁶ See K. Dowding, P. John, T. Mergoupis & M. Van Vugt, *Exit, Voice and Loyalty: Analytic and Empirical Developments*, 37 EUR. J. POL. RES. 469, 469 (2000) (noting that the application has been ‘somewhat disappointing’ in consideration of the ‘perceptiveness’ of Hirschman’s original and insightful observations).

⁹⁷ See J. Paul MacDuffie & S. Helper, *Collaboration in Supply Chains: With and Without Trust*, in THE FIRM AS A COLLABORATIVE COMMUNITY : RECONSTRUCTING TRUST IN THE KNOWLEDGE ECONOMY 418–19 (C. Heckscher & P. Adler, eds., 2007); see also Susan Helper, *Strategy and Irreversibility in Supplier Relations: The Case of the U.S. Automobile Industry*, 65 BUS. HIST. REV. 781, 799–811 (1991) (noting in her comparative study on relationships between US and Japanese automobile majors and vendors, that the US majors used ‘exit’ as a competitive means to arrive at lower cost vendors, whilst Japanese majors showed a preference for “community based efforts” to develop competitiveness over long term).

⁹⁸ See E. Krahnemann, *Choice, voice, and exit: Consumer power and the self-regulation of the private security industry*, 1 EUR. J. INT’L SECURITY 27 (2016).

⁹⁹ See Jane K. Winn, *Globalization and Standards: The Logic of Two-Level Games*, 5 J. L. & POL’Y INFO. SOC’Y 185, 208 (2009) (describing the EU system as one being kept in check through systems of “voice” accountability enforced by long-term processes, whereas the U.S. system relying on the harsher discipline of “exit” accountability enforced by markets).

dissatisfied with its poor quality,¹⁰⁰ and notably Russel's observations on the responses to W3C's 2001 proposal on revising its patent policy.¹⁰¹

An illustrative compilation of the variety of preferred attributes under the labels of exit and voice in scholarship is presented in Table I.

Table I about here

B. Hirschman's Framework in the Context of SDOs' Institutional Change

This Article argues that Hirschman's framework squarely fits to situations when SDO governance decisions that affect the standardization process are negatively perceived as "repairable lapses" by members—albeit with some caveats. Given that SDOs claim to be "producers" and "enablers" of standards, the SDOs may be treated as service providers in the context of consensus based formal technical standard setting. Indeed, we identify closely with Russel's study which takes note of the "angry protest," and "potentially fatal consequences of a rank-and-file mutiny," including a "threat to bypass, surpass, and ignore." Russel notes that during the change of its patent policy, the W3C faced a "strategic turning point" at this juncture—to maintain its leading position in the "market for Web standards," or to abandon it.¹⁰²

Extant literature observes that when potential member firms deliberate on SDO membership; they take into account the amenability, viability, and certainty associated with the decision-making processes of the SDO with their identified needs.¹⁰³ The member firms not only bear the direct costs of membership fees, but also the indirect, intangible costs of time and ensuing effort put in by their personnel towards representation and participation in such arenas.

Hirschman's framework implies that declines in the performance of organizations could be corrected with the right balance of information, incentives, and flexibility of response. However, SDOs operate under a specific set of legal, cooperative, and competitive constraints—a few demanding agility from the SDO on matters of governance and decision-making, and a few imposing significant impairment on flexibility. SDOs are thus avowedly "loyal" to the pursuit of their vision and mission, including to: contribute to the technological progress; strengthen efforts towards standardization; and maintain their strategic roles in technical standard setting. Therefore, SDOs might be compelled to pursue certain amendments

¹⁰⁰ See N. Brunsson & B. Jacobsson, *The Contemporary Expansion of Standardization*, in *A WORLD OF STANDARDS* (N. Brunsson and B. Jacobsson, eds., 2000), at 11 (emphasizing the inherent flaw in the 'impersonal and voluntary' nature of standard-setting which induces a 'kind of irresponsibility among standardizers' resulting in poor quality standards).

¹⁰¹ See Andrew L. Russell, 'Constructing Legitimacy: The W3C's Patent Policy. Laura DeNardis *OPENING STANDARDS: THE GLOBAL POLITICS OF INTEROPERABILITY* (2011).

¹⁰² *Id.* The W3C eventually reformed its decision-making process and opted for a royalty-free patent policy.

¹⁰³ See also Benjamin Chiao, Josh Lerner & Jean Tirole, *The rules of standard-setting organizations: an empirical analysis*, 38 *RAND JOURNAL OF ECONOMICS* 905 (2007).

to working procedures to be better equipped in dealing with constraints, to prevail over worthy contenders and strategies, or to meet conflicting requirements by opting for compromises. For SDO policymakers, it is a change that constitutes “growing pains,” and is as such a necessary bitter pill. However, if the communication of the reasoning of such tectonic shifts in policy matter(s) is inadequate, such changes run a risk of being perceived as “repairable lapse(s)” by constituent members.

Hence, SDOs run the risk of introducing well-intentioned policy changes implementing mechanisms riddled with “repairable lapses” and thus upsetting the delicate balance between the costs and benefits for certain member firms. Each member firm reserves a unique perception and quantification on costs of membership and on the certainty associated with norms (for example, on terms of inclusion of IP) into standards developed at the arena. Such reforms could easily cause discontent.

For example, Ray Alderman (affiliated with VITA) points out that circumstances could arise where the technology-owning firm would prefer to pursue standard setting at a venue, depending on the maturity of the technology, preferences on pace of standardization, and at times owing to preference for control and flexibility for avenues of monetization of the IP.¹⁰⁴ Thus, if the patent policy of the SDO were to be amended, and were to incorporate additional binding elements (i.e. its rigidity), the more severely constrained are the set of choices that firms could exercise on monetizing their IP and its timing. Perhaps, such constraints would force technology sponsors to avoid considering membership to that SDOs, thus affecting the credibility of an SDO due to an endorsement deficit.¹⁰⁵ Herein, we see that the amendment of procedures has a tangible impact on strategic considerations of the stakeholders.

Based on the prior example and given the importance of IPR policy for SDOs’ functioning, a significant revision to IPR rules represents a moment for a member firm to take a pause and re-assess the impact of the intended changes on its business model, existent product or service offerings, strategy for the future, and its ability to adequately internalize the costs of the efforts on standardization. A turning point within an SDO would emerge when a few credible influential members discern that the intended changes upset the equilibrium, thereby acting as a divisive force within the organization. Be that as it may, the “exit” of a significantly influential member under such conditions imposes a considerable “cost” on the SDO in terms of lowering its credibility, attractiveness or reputation for current members and potential new ones. From this perspective, if the SDOs were to invest time and effort to facilitate the dissatisfied members towards voicing their misgivings, this could trigger loyalty and overall constitute a welcome development that strengthens the standardization ecosystem.

So far, literature pertaining to standard setting has focused on the activities undertaken towards a specific standard. In this Article, we examine the nature of options specific to the member’s perception of retaining membership of the organization in light of “repairable

¹⁰⁴ R. Alderman, *Disintermediation of the Standard’s Value Chain*, in THE STANDARDS EDGE 41, 42 (Sherrie Bolin ed., 2002).

¹⁰⁵ See also Timothy Simcoe, *Governing the Anti-commons: Institutional Design for Standard Setting Organizations*, 14 INNOVATION POL’Y & ECON., 99 (2014).

lapses.” Of course, it would be a lot easier to make the process of exit simpler; however, administrative procedures are seldom simplistic. For example, ETSI recommends that members who wish to stop their membership should notify the SDO at least by September of the given year, to give enough time for the preference to be enforced by the start of the next year.¹⁰⁶

As much as Hirschman’s framework pertains to “missteps” by organizations, we dwell on certain types of “repairable lapses” that Hirschman tackles by referring to the reasoning of economists—that firms fall behind “for a good reason.” In this study, we are mindful of Hirschman’s implicit assumption that the organization has undertaken a wrong move, and that at this critical juncture, an indication from the members would allow it to recognize its failings, and compel it to get back on track. Furthermore, we also study responses under “repairable lapses” that could be driven by deficiencies in the mechanism to capture voice or to convey strategic intents, i.e., deficiencies in governance-related working practices.

For our purposes, “exit” consists of firm(s) ceasing membership and thereby desisting from participation in the SDO’s standardization activities. Relevant examples would be when certain members threatened to quit ETSI owing to the 1993 reforms to the IPR Policy,¹⁰⁷ Motorola’s exit from VITA, and Electronic Frontier Foundation’s (EFF) exit from W3C as a consequence of the controversy around the DRM standard approval.¹⁰⁸ “Voice” includes strategies adopted by SDO members to express their discontent, and influence the outcome of standardization processes under new rules to make the SDO re-consider the changes or intervene in the course of events.

We further distinguish between “horizontal voice,” wherein affected members coalesce to initiate an action with an intent to influence their peers’ behavior, and “vertical voice,” typically vocalized through appeals to governance authorities or complaints to hierarchically superior bodies. A refinement by O’Donnell, “horizontal voice” refers to communication of dissatisfaction between actors that share some form of collective identity (such as fellow citizens, friends, neighbors), and “vertical voice” refers to communication of dissatisfaction between actors at differing levels of hierarchy (consumers to firms, employees to employers).¹⁰⁹ Hirschman in his later work underscored the costliness of vertical voice, and the “expressive benefits” associated with the usage of horizontal voice.¹¹⁰

The manifestations of responses of an SDO’s member firm might not always comparably coincide with that of the examples by Hirschman and existent literature. Being a new type of

¹⁰⁶ ETSI Rules of Procedure (Nov. 30, 2020), https://portal.etsi.org/directives/42r1_ETSI_directives_30_nov_2020.pdf § 1.4.1.

¹⁰⁷ Eric J. Iversen, *Standardization and Intellectual Property Rights: ETSI’s controversial search for new IPR-procedures*, (K. Jakobs & R. Williams eds., 1990); SIIT’99 PROCEEDINGS (IEEE Conference on Standardization and Innovation) (1999).

¹⁰⁸ C. Doctorow, *Boring, complex and important: a recipe for the web’s dire future* (Sept, 21, 2017) available at <http://www.wired.co.uk/article/w3c-eff-open-standards-web-cory-doctorow?platform=hootsuite>.

¹⁰⁹ G. O’Donnell, *On the Fruitful Convergences of Hirschman’s Exit, Voice, and Loyalty and Shifting Involvements: Reflections from the Recent Argentine Experience*, Kellogg Institute for International Studies Working Paper #58(1986).

¹¹⁰ See A. O. HIRSCHMAN, *RIVAL VIEWS OF MARKET SOCIETY AND OTHER ESSAYS* (1986).

institution that is “neither market nor hierarchy,”¹¹¹ SDOs may seemingly defy such categorization. An SDO is no political party or firm. However, an influential SDO member is no ordinary member or shareholder either given its augmented ability to be influential and the choice to be deferential. To borrow another of Hirschman’s groupings, an influential SDO member may fit the categorization of an institutional investor to a greater degree than that of an ordinary shareholder, and thus be voice-prone when it comes to taking steps to influence the SDO and playing the role of a “quality-maker” rather than a “quality-taker.”

Crucially, this Article assumes that, due to repeated interactions in SDOs; practical difficulties to relocate initiated standardization processes to other organizations; as well as the uncertainties regarding whether and when disclosed patents will become essential, members’ “exit” remains very limited. Rather, members prefer to employ different “voice” strategies to influence SDOs’ decisions while they continue to take part in SDOs’ work. Indeed, Hirschman notes that in cases where members are faced with a supplier of services with a monopoly, the member is seemingly “locked in,” and thus more inclined to exercise voice.¹¹² This is all the more the case if exit comes with relatively high transaction costs and the SDO at issue provides sufficient flexibility to allow for reducing the costs of compliance with any internal policy changes, as we explain below. In this context, this Article also questions whether loyalty is indeed the main factor precluding voice or exit in standardization, suggesting that voice can also be prevented by other constraints exogenous to the relations among SDOs’ members.

IV. TO SPEAK UP OR SUFFER IN SILENCE? STRATEGIES OF VOICE WITHIN SDOs

This section applies Hirschman’s framework to the IEEE 802.11 Working Group (WG) issuing specifications for Wireless Local Area Networks (WLAN). This group develops standards and specifications that account for most IPR declarations¹¹³ and the SDOs’ members of this group are most likely to disagree on patent policies due to their conflicting interests and vantage points. Therefore, the experience of this group with the “voice” of discontented stakeholders constitutes a riveting case study for the application of the Hirschman framework.

Based on the review of previous case studies, this Article introduces a taxonomy of strategies that could be classified as “voice” under different circumstances in WG 802.11, namely a) developing a standard (or part thereof) in a different forum and bringing it back to the SDO; b) refusing to follow new rules; c) delaying the standardization process; d) filing an internal appeal to SDOs’ governing bodies; and e) filing an external appeal to hierarchical

¹¹¹ P. Genschel & R. Werle, *National Hierarchies to International Standardization: Modal Changes in the Governance of Telecommunications*, 13:3 J. PUB. POL’Y 203, 204 (1993) (quoting Powell, *Neither Market Nor Hierarchy: Networks Forms of Organization*, in RESEARCH IN ORGANIZATIONAL BEHAVIOR at 295 (1990)).

¹¹² Hirschman, *supra* note 87, at 55.

¹¹³ Gupta & Effraimidis, *supra* note 85, at 158 (Noting that 802.11 working group accounts for 61.2% of the contributions).

bodies or to the competent Courts. It further observes that while the first strategy is most commonly employed, it is also most subjected to antitrust concerns.

It should be noted from the outset that this Article does not include the option of firms to voice their disagreement with SDOs' patent policy revisions by either increasing or decreasing their participation in standards development meetings. In theory, such strategy can be exercised by companies, for instance, by acquiring or giving up leadership positions in WGs (i.e., chairs, editors) or by increasing or decreasing the number of attendees at the meetings.¹¹⁴ At first glance, examining fluctuations in the meeting's attendance numbers of WG 802.11 seems plausible due to the public availability of the relevant IEEE data. Yet, we believe that such prong for analyzing members' "voice" strategies will be inaccurate for the following reasons.

Firstly, while in some SDOs members represent the views of the entity with which they are affiliated (i.e. ISO, ETSI, W3C), there are also SDOs and WGs which allow experts to participate in standards development processes in their individual capacity.¹¹⁵ Actual compliance with this requirement may significantly vary per company and is difficult to verify. Secondly, it is common for companies involved in standardization to employ experts that have been affiliated with other companies. This "hire away" practice may be motivated by companies' strategies to enter the new markets, as well as by the ambitions of individual experts to advance their career.¹¹⁶ Thirdly, participants may have personal reasons not to attend standardization meetings, other than the "protest" strategy of the company of their affiliation. Hence, fluctuations in meeting attendance are likely to be explained by factors other than companies' reaction to IP policy modifications.

A. Circumventing SDO's Standards Development Process through Consortia

1. *Standardization and Forum-Shifting*

Strategies and motivators to join standardization platforms tend to vary according to firms' incentives, size, and competitive position, but also their anticipation of industry advancement and market forces. Depending on the intended standardization outcomes, companies may opt to join SDOs that are either global or regional,¹¹⁷ recognized in regulatory frameworks (such as the International Organization for Standardization (ISO)), or informal standardization groups or consortia, the latter being preferred across the range of ICT and telecommunication

¹¹⁴ See J. Baron and O. Kanevskaia Whitaker, *Global Competition for Leadership Positions in Standard Development Organizations* (Mar. 31, 2021) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3818143.

¹¹⁵ The requirement of participation in individual capacity is very much apparent in IETF and in IEEE individual-based working groups such as 802.11.

¹¹⁶ See E. Gifford; M. Holgersson; and S. Bagchi-Sen, *Tapping into Western Technologies by Chinese nationals: Greely's purchase of Volvo Cars and Huawei's hiring of Ericsson employees in Sweden*, in INNOVATION SPACES IN ASIA: ENTREPRENEURS, MULTINATIONAL ENTERPRISES AND POLICY (M. McKelvey and S. Bagchi-Seb, eds, 2015); K.J. Schaefer, *Catching up by hiring: The case of Huawei*, 51 JOURNAL OF INTERNATIONAL BUSINESS STUDIES 1500 (2020); also Baron & Kanevskaia Whitaker, *supra* n 114.

¹¹⁷ See M. T. Austin & H.V. Milner, *Strategies of European Standardization*, 8 JEPP 3, 411 (2001).

technology.¹¹⁸ Standards developed by such informal platforms may be later endorsed by global and recognized SDOs, increasing their legitimacy and normative power and enlarging their scope of application.

There may be many reasons for stakeholders to interrupt formal standardization processes for the sake of resuming them elsewhere, often in newly forged consortia. Most common are the instinctive reaction to a slow and time-consuming standards development process, reluctance of fellow standardizers to implement a tiebreaking rule, and a sense of collective action failure. This is especially the case in formal organizations with large and diversified membership, where getting the majority of stakeholders on the same page demands a frantic effort and often comes at the cost of time,¹¹⁹ and time is often a scarce resource in the realm of technology. Opting for a faster process may hence increase the likelihood of standard's technical appropriateness and wide acceptance.

Companies wishing to bypass rigid operational rules of formal SDOs have three options at their disposal: promoting their proprietary specifications as *de facto* standards; initiating a parallel standardization procedure in another existing SDO; or creating a new consortium.¹²⁰ Companies opting for the first strategy may run the risk of lacking critical mass for industry-wide proliferation of their standard, especially when competing technologies are available. In such settings, collective action failures could be resolved by either a formal SDO or market forces, which, however, are sometimes hard to predict.¹²¹ In this regard, even though foreseeing the market success of standards crafted in a committee-based process is equally challenging,¹²² the mere fact that multiple companies have invested in standard's definition increases its network effects, and hence its chances of wide industry endorsement.

Amid the trade associations and societies of professionals, standardization bodies have proven intriguing from an institutional standpoint; driven by collaborative efforts of their voluntary membership, SDOs lack any dire punishment for abandoning their fora,¹²³ leaving standardization "outsiders" to the discretion of the market. Hence, when switching costs are

¹¹⁸ See Brad Biddle et al., *The expanding role and importance of standards in the information and communications technology industry*, 52 JURIMETRICS 177 (2012); H. Delcamp & A. Leiponen, *Innovating standards through informal consortia: The case of wireless telecommunications*, 36 INT'L J. INDUS. ORG. 36 (2014); Tim Pohlmann, *The Evolution of ICT Standards Consortia*, 93 DIGIWORLD ECONOMIC JOURNAL 17 (2014).

¹¹⁹ See also Avinash Dixit, *Governance Institutions and Economic Activity*, 99 AM. ECON. REV. 5, 16 (2009).

¹²⁰ R. Werle, *Institutional Aspects of Standardization – Jurisdictional Conflicts and the Choice of Standardization Organizations*, 8 J. EUR. PUB. POL'Y 3, 29 (2001).

¹²¹ For instance, the ITU achieved a better result in the standardization of 56K modems than two competing consortia due to the support from all major market players and the successful resolution of patent issues. Shane Greenstein & Marc Rysman, *Coordination Costs and Standard Setting: Lessons from 56K Modems*, Northwestern Center for the Study of Industrial Organization Working Paper # 0056, 23 (2004).

¹²² As it was revealed to the authors by many industry experts, in reality, only about a quarter of standards developed within one SDO actually gain industry acceptance.

¹²³ This is unlike the case with other organizations of professionals. See CJEU Case C-1/12 *Ordem dos Técnicos Oficiais de Contas (OTOC) v Autoridade da Concorrência*, ECLI:EU:C:2013:127 (where OTOC, the Portuguese association for Charter Accountants, claimed that the trainings it offered were compulsory).

relatively low, the abundance of SDOs makes for a significant number of alternatives for stakeholders to move to or carry on their interaction.

In more generalized terms, the organizational landscape of most SDOs allows their stakeholders ample room for maneuver. Standards that are proprietary or have emerged in informal processes may be endorsed by recognized organizations in the so-called “fast” or “fast-track” procedure, when a technical document is directly submitted for the final approval, sidestepping technical deliberations in working groups. ETSI Publicly Available Specification (PAS) process allows partner-organizations to propose their technical specification for an adoption as an ETSI Technical Specification or Technical Report.¹²⁴ Consortia specifications can be ratified as CEN/CENELEC deliverables in a Unique Acceptance Procedure (UAP) that combines both public enquiry and a voting phase.¹²⁵ In ISO and in its counterpart, the International Electrotechnical Commission (IEC), with which ISO shares the same operational framework, the draft standard may be presented either at the enquiry stage or at the approval stage (provided that the SDO submitting the proposal is recognized by the ISO Council).¹²⁶

A few notable examples include Linux specifications for operating systems, which were subject to such *ex post* endorsement and converted into the ISO/IEC 23360 standard;¹²⁷ the Java software, which was proposed by Sun Microsystems as a long-term solution in one of ISO Technical Committees;¹²⁸ color management specifications of the International Color Consortium, which served as a blueprint for IEC 61966-series;¹²⁹ and the Open Document Format for Office Applications (ODF) created by OASIS, which was formally adopted by ISO in 2006.¹³⁰ Remarkably, shortly after the ODF/ISO 26300 standard was presented to the global community, Microsoft submitted a competing proposal for XML-based specifications, claiming that that ODF/ISO standard did not give due considerations to the legacy of Microsoft Office documents;¹³¹ this led to the emergence of the second ISO-endorsed standard for XML-based file format, the OOXML/ISO 29500, in 2008.¹³²

¹²⁴ A partner organization may be either a formal or an informal SDO, provided that certain requirements are fulfilled: an SDO needs to be a legal entity; to have an IPR policy compatible with the one of ETSI; and has to sign cooperation agreement with ETSI. See Article 1.6.9 and 1.8.1.2.3 ETSI Technical working procedures (Nov. 30, 2020).

¹²⁵ In this case, CEN/CENELEC Management Center carries out the initial evaluation of the proposal, also including the IPR policy of an SDO submitting it; that SDO should also request a liaison status. See Article 3.1 CEN-CENELEC Guide 23:2013-11, <https://www.cencenelec.eu/standards/Guides/Pages/default.aspx>.

¹²⁶ ISO/IEC Directives Part 1 12th edition (2016), Article F2.

¹²⁷ ISO/IEC 23360-1:2006, Linux Standard Base (LSB) core specification 3.1 -- Part 1: Generic specification, available at <https://www.iso.org/standard/43781.html> (2006).

¹²⁸ Raghu Garud et al., *Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java*, 45 ACAD. MGMT. J. 1, 196 (2002).

¹²⁹ IEC standards for Multimedia Systems and Equipment – Color Measurement and Management, <https://webstore.iec.ch>.

¹³⁰ The recent version of the standard, ISO/IEC 26300-1:2015, Information technology - Open Document Format for Office Applications (OpenDocument) v1.2, www.iso.org.

¹³¹ T.M. Egyedi, *The Impact of Competing Standards: On Innovation and Interoperability for E-Government*, 37 DE GRUYTER 3, 211 (2014).

¹³² <http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html>.

Thus, initiating a parallel standardization process in a different SDO, or even in another working group of the SDO that originally hosted the project,¹³³ may seem a plausible solution from a strategic viewpoint. In practice, however, companies would rarely duplicate their effort and exploit their resources on two similar projects despite the flexibility of SDOs' rules of participation; for industry representatives, a single standard-setting process secures efficient allocation of expertise and capital and spares lengthy business deliberations.

Accordingly, the most probable way to escape formal SDO processes would be setting up a consortium or an interest group, tailored for a specific standardization project. This type of strategy was commonly employed by companies that were dissatisfied with the process in SDOs originally hosting their standardization project and, more specifically, with their patent policies.¹³⁴ At the same time, if it results in “forum-shopping”, switching standardization forum may be an important indicator of inefficiency of SDOs policy design, explaining why SDOs are indeed subject to institutional competition in the market for standard setting;¹³⁵ yet, whether policy making in SDOs is constrained by the existence of alternative standardization platforms is yet to be proven empirically. The examples that follow illustrate the practice of “forum-shifting” in SDOs with different institutional design.

2. *Examples of Forum-Shifting*

At the dawn of standardization of telecommunications technologies, when the attempts of ITU to define a global standard for mobile cellular radio proved fruitless, a group of mobile networks operators joined forces in the *Group Special Mobile* and established the European Conference of Postal and Telecommunications Administration (CEPT) in 1981, which later evolved into ETSI.¹³⁶ It took the experts almost a decade and a half to set up an industry consortium to represent their interests—the GSM Association was formally established in 1995. Since then, ETSI members interested in pursuing other course of actions than the SDO established a number of consortia, among others the MulteFire Alliance for standardizing LTE technology for unlicensed spectrum, the Next Generation Mobile Networks (NGMN) representing the mobile operators in 3GPP, and the ORAN Alliance that aims to enhance the use of open standards in the RAN.

Examples of industry interest groups that have also been formed by members of less formal SDOs or even consortia abound. The Near Field Communication (NFC) Forum was shaped in 2003 by IEEE members (Nokia, Sony and Philips/NXP) in order to develop short-range wireless interaction specifications for electronic devices.¹³⁷ The emergence of USB specifications and the USB Implementers Forum was in part driven by the licensing rules of

¹³³ Such options are provided by many SDOs, for instance ETSI and German Institute for Standardization (DIN). Within ETSI, an Industry Specification Group (ISG) can be formed to accommodate the interests of both ETSI members and non-members.

¹³⁴ See The JRC Report, *supra* note 28.

¹³⁵ Lerner & Tirole, *supra* note 21.

¹³⁶ GMS AND UMTS. THE CREATION OF GLOBAL MOBILE COMMUNICATIONS 15 (F. Hillebrand ed., 2006).

¹³⁷ See <https://nfc-forum.org/newsroom/nokia-philips-and-sony-establish-the-near-field-communication-nfc-forum/>.

the competing FireWire standard promulgated by IEEE.¹³⁸ A number of companies involved in the Internet of Things standardization transferred their work from ICANN to the newly established IPSO Alliance, explaining this shift by ICANN's alleged inability to draft rules that would satisfy the internet community, but also its failure to secure funding from the US government.¹³⁹ Stakeholders that were not entirely satisfied with the DVB Project's work on CI standard created a forum to develop CI Plus specifications, which was subsequently brought back to DVB.¹⁴⁰

Even more remarkable was the switch of HTML mark-up language standardization from the W3C to the Web Hypertext Application Technology Working Group (WHATWG), formed in 2004 specifically for this occasion by the then three web giants, Apple, Mozilla, and Opera.¹⁴¹ The underlying reason was the loss of interest of the majority of W3C membership in the further development of HTML specification, and their focus on its XML-based equivalent, the XHTML; yet, some testimonies also suggest the struggle of W3C community in resolving the frictions around IPR issues.¹⁴² As was the case for DVB and CI Plus standard, the work on HTML5 specification was later on brought back to W3C. Ironically, W3C itself was formed by a group of stakeholders who left web standardization in IETF because of its adverse patent policy, as well as a consensus-driven and cumbersome process.¹⁴³

Despite its popularity, the recourse to informal standardization methods often appears temporary, as SDOs enable submission of matured specifications through the fast-track procedure. Accordingly, forum shifting is not always a compelled course of action, but rather a consequence of careful, strategic calculations: a standard created in multiple platforms will benefit from both fast-track development in informal settings *and* fast-track endorsement by a recognized authority. By holding multi-organizational membership, stakeholders possess the necessary knowledge to anticipate the institutional costs of quitting a formal standardization process and catching the right moment to ratify the standard that has already been shaped. Above all, forum shifting is a strategy worth exploring by stakeholders opposing collective decisions, or failure to take any, by their forum. The remainder of this section describes how this type of approach was employed in the 802.11 Working Group.

3. *Shifting to Consortia Standardization in 802.11 IEEE*

i. The Development of 802.11n

¹³⁸ See Ohana, *supra* note 84, note 19 and accompanying text.

¹³⁹ See R. SCHNEIDERMAN, MODERN STANDARDIZATION – CASE STUDIES AT THE CROSSROADS OF TECHNOLOGY, ECONOMICS AND POLITICS 7 (2015).

¹⁴⁰ See JRC Report, *supra* note 28, at 69.

¹⁴¹ See R. Tabarés Gutiérrez, *Taking a Glance at the History of HTML5*, in DIGITALIZATION: CHALLENGE AND OPPORTUNITY FOR STANDARDIZATION 351 (K. Jacobs & K. Blind eds., 2017); see also A. Harcourt, G. Christou and S. Simpson, GLOBAL STANDARD SETTING IN INTERNET GOVERNANCE 80 (2020).

¹⁴² The XHTML lacked backwards compatibility with previous versions and merely allowed the use of entirely new technologies, whereas HTML5 developed within the WHATWG proved to be a bigger success.

¹⁴³ Contreras, *supra* note 52.

The evolution of Wi-Fi technologies has sparked the interest of academia for quite some time. What started as an unpromising set of specifications operating at a slow speed and supported by scarcely any electronic devices had soon advanced into the leading technology that would reshape the entire wireless industry.¹⁴⁴ The historic breakthrough took place in 2003, when the 802.11g version of WLAN standard was finally ratified. However, even this innovative set of specifications required an update to cope with the dynamic changes in market demand; the 802.11n version was to be delivered in 2007. Unlike its predecessors, the new standard featured Multiple-Input Multiple-Output (MIMO) antennas, enabling silicon chips on which the standard was running to handle multiple data signals simultaneously. As an optional function, it enabled operation on the 5 GHz frequency band, in contrast to the “traditional” 2.4 GHz band, which was shared with household appliances, such as microwaves and the Bluetooth technologies.

Dual-band and MIMO promised faster speed, better operating distance, and superior wireless connection, while being perfectly backwards compatible and following similar principles as previous versions of 802.11. In anticipation of a new standard, some hardware manufacturers and wireless routing companies had already launched the production of compatible devices and obtained certification from the Wi-Fi Alliance, based on what was still merely a draft specification.¹⁴⁵ The industry was enthralled by the new standard. What it lacked was a formal adoption. Yet, endless discussions within 802.11 working group have been to no avail: the ratification date shifted from 2007 to 2008 and eventually, to 2009, when the IEEE SA Standards Board approved the draft standard as an 802.11n Wireless LAN.¹⁴⁶

If the standard was that much awaited, why did its development take so long? Moreover, what was the tiebreaker in the myriad technical meetings? To begin with, *in lieu* of initiating the project from a scratch, the 802.11n Task Group preferred to issue a call for proposals. Out of four complete proposals submitted for the Task Group’s consideration,¹⁴⁷ two were selected: one outlined by the World-Wide Spectrum Efficiency (WWiSE) group and another by the TGnSync.¹⁴⁸ The debate ranged fiercely about IP licensing embedded in the new standard.

¹⁴⁴ See K.J. Negus and A. Petrick, *History of Wireless Local Area Networks (WLANs) in the Unlicensed Bands*, George Mason University Law School Conference, Information Economy Project, Arlington, VA., April 4, 2008.

¹⁴⁵ M. Reardon, *New Wi-Fi standard delayed again*, (Aug. 15, 2006), <https://www.cnet.com/news/new-wi-fi-standard-delayed-again/>.

¹⁴⁶ Email from Jodi Haasz, Program Manager, International Stds Programs and Governance, Standards Activities, to Paul Nikolich (May 26, 2006) [https://web.archive.org/web/20081031005628if_/http://standards.ieee.org:80/board/nes/projects/802-11n.pdf].

¹⁴⁷ The Task Group also received 28 partial proposals, and in total 62 letters of intent. See *Status of Project IEEE 802.11n*, http://grouper.ieee.org/groups/802/11/Reports/tgn_update.htm. For the comprehensive study of 802.11n standards development process, see B. DeLacey *et al.*, *Strategic Behavior in Standard-Setting Organizations*, Harvard NOM Working Paper No. 903214 (2006), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=903214.

¹⁴⁸ *Id.* On the voting, they gained 64.7% and 73.7%. Other proposals were from MITMOT and Qualcomm, gaining 47.4% and 56.8 %, respectively. MITMOT proposal get through the first voting stage in November

Among the supporters of the first proposal, the idea of RAND-zero licensing pooled much better: largely comprised of the industry “veterans,”¹⁴⁹ WWiSE expected zero-licensing policy to level playing field and restore the market position of the 802.11b frontrunners. In turn, RAND-zero would not fit the business model of the “newcomers” from TGnSync, who wished to realize their R&D investments.¹⁵⁰

Technical features of the standard were also a subject of disagreement. While marginally similar, TGnSync proposal was mainly focused on standard’s implementation: it required numerous different link rates and introduced many optional features, such as the increase of the channel size from 20MHz to 40MHz. In contrast, the WWiSE proposal was less comprehensive, and its supporters were more than satisfied with 20MHz channel size and only six mandatory link rates, which also allowed keeping the costs rather low. In the end, the Working Group decided to continue with the TGnSync’s proposal; yet when it came to the voting, the proposal failed to achieve the required 75% of positive votes, receiving only 51% in the first voting round, and 49% in the second.¹⁵¹

As it appeared that the development of 802.11n was foundering, Intel and Broadcom, although belonging to different camps, joined forces to establish a consortium outside the formal Task Group. The Enhanced Wireless Consortium (EWC) was set up in 2005 with the purpose to accelerate the development and ratification of 802.11 and later joined by other chipmakers and consumer electronics manufacturers.¹⁵² Once developed and adopted within the EWC, the new WLAN specification was submitted as a joined proposal to the IEEE 802.11n Task Group where it passed unanimously.¹⁵³ What seems quite jarring is that, while the issue of optional features largely contributed to the Task Group members reaching an impasse, the final specification included even more optional features than the WWiSE and TGnSync together. Although the project eventually resulted in the adoption of a standard, some argued that the establishment of the EWC consortium has significantly affected standardization of 802.11n by essentially hijacking the process.¹⁵⁴

ii. DensiFi in TGax

A more recent incident in 802.11 Working Group that illustrated forum-shifting in the development of 802.11ax standard related to the establishment of a Special Interest Group

2004, but as eliminated in January 2005 voting. After the third voting in May 2005, TGnSync remained the only candidate, but since it did not secure the needed 75%, other proposals were kept into consideration.

¹⁴⁹ The WWiSE project was supported by i.e. Airgo Networks, Broadcom, Motorola, Nokia, France Telecom, Texas Instruments and NTT.

¹⁵⁰ TGnSync project was supported by Intel, Atheros Communications, Nortel, Samsung, Sony, Toshiba, Qualcomm, Philips and Panasonic. With RAND-Zero, according to an Atheros manager, “reasonable” IP compensation meant “zero” royalties: DeLacey et al., *supra* note 147, at 15.

¹⁵¹ The voting was held at the May 2006 and July 2006 meetings. *See* Status of Project IEEE 802.11n, *supra* note 147.

¹⁵² The total of 27 companies included Apple, Azimuth, Atheros, Airoha, Buffalo, Conexant, Cisco Systems, D-Link, Lenovo, LitePoint, Marvell, NETGEAR, SANYO, Symbol Technologies, Sony, and Toshiba.

¹⁵³ 184 to 0, with four abstentions.

¹⁵⁴ DeLacey et al., *supra* note 147.

(SIG) named DensiFi by about 20 members of the Working Group.¹⁵⁵ Although the reason to bring the discussion outside the IEEE was not directly connected to IEEE's policy revision, this case is a fitting example for our purposes since it sheds light on potential antitrust violations arising from forum shifting. DensiFi was allegedly established to expedite the work on 802.11ax standard.¹⁵⁶ The work of the SIG was conducted parallel to, and even ahead of, the work of TGax (the task force in charge of developing the 802.11ax standard).¹⁵⁷ The SIG was identified as being relatively closed and difficult to join by new members and governed by only a few members who determined the course of action. During the Task Group meetings, DensiFi members were voting as individual members of TGax, which allowed them to block other proposals while favoring their own.¹⁵⁸

The exclusion of certain technical proposals because of the voting by DensiFi members led to a complaint brought by a Task Group member.¹⁵⁹ The complaint induced the Working Group chair to commence a formal investigation of the SIG, which found that members breached internal IEEE rules prohibiting dominance of standardization processes through “*superior leverage, strength or representation*,” thereby excluding viewpoints of non-SIG participants from “*fair and equitable consideration*” within the 802.11ax Task Group.¹⁶⁰ As a remedy, IEEE SA restricted the voting rights of DensiFi members in TGax to a single collective vote,¹⁶¹ which led to the withdrawal of many companies from the SIG. DensiFi was finally disbanded in 2016. Interestingly, the matter also gained the attention of the DOJ due antitrust concerns related to an attempt to exclude technologies from incorporation into standards. In particular, the DOJ appeared interested in the role of standards group in policing the alleged abuse of dominance. To this day, the DOJ has not yet issued any statement pertinent to DensiFi activity in TGax.

4. *Forum-shifting as Voice*

The failure to agree on patent policy cannot be considered as the only reason behind the delay of 802.11n standardization. Advancement of wireless industry did not stall or shrink after 802.11g specifications had been adopted. Quite the opposite, the continuous pace of

¹⁵⁵ There were three other SIG groups noted in the related Chair report (see *infra* note 158) so apparently this practice is not so uncommon. What was uncommon was that SIG was essentially dominating the process against IEEE rules.

¹⁵⁶ See <https://mlexmarketinsight.com/insights-center/editors-picks/antitrust/north-america/doj-probes-role-of-special-interest-group-in-new-wifi-standard>. Note that there is no public website or public information on DensiFi. Report on the 802.11ax dominance complaint (Investigation), (Nov. 9, 2016) available at: <https://mentor.ieee.org/802.11/dcn/16/11-16-1519>, at 11.

¹⁵⁷ See In the Matter of the Appeal of Ericsson, Graham Smith and InterDigital, Appellant's Appeal Brief A-3, (Jan. 5, 2017), [http://www.ieee802.org/appeal_decisions/Ericsson_Smith_InterDigital_17_0106/Appeal_Brief_and_Appendix_SASB_Appeal_\(2017.01.05\).pdf](http://www.ieee802.org/appeal_decisions/Ericsson_Smith_InterDigital_17_0106/Appeal_Brief_and_Appendix_SASB_Appeal_(2017.01.05).pdf).

¹⁵⁸ See Report on the 802.11ax dominance complaint (Investigation) 13 (Nov. 9, 2016), <https://mentor.ieee.org/802.11/dcn/16/11-16-1519>.

¹⁵⁹ Dominance allegation in TGax, June 16 2016, complaint by Graham Smith received by WG Chair, available at: <https://mentor.ieee.org/802.11/dcn/16/11-16-0784-00-0000-dominanceallegation-in-tgax.doc>.

¹⁶⁰ See In the Matter of the Appeal of Ericsson, *supra* note 157, at A-3.

¹⁶¹ *Id.* at A-4.

technological development reshaped the industry as it was known in the end of the 20th century, and new players have paved their way for global markets.¹⁶² The 802.11n standard ran on more technologies than its predecessors did: this is not only evident from the complexity of its technical features, but also from the fact that the number of LoAs submitted to IEEE soared dramatically with the introduction of 802.11n.¹⁶³ As the standard embedded a significantly high number of patent claims, disagreements on licensing terms for 802.11n essential technologies were inevitable. Repeated calls for missing LoAs during working group's meetings,¹⁶⁴ cases as *Ericsson v D-Link*, *Microsoft v Motorola Mobility*, and the famous "patent troll" *In re Innovatio IP Ventures* illustrate the legal skirmishes over 802.11n patents, which agonized the wireless industry¹⁶⁵.

The recourse to a consortium during 802.11n development did not put an end on uncertainties around patent licensing for 802.11 standards, nor did it prevent any future disputes on this matter. Rather, it resolved a collective action problem: once the workable solution was on the table, all stakeholders seemed to approve it, as indicated by the high approval rate of the EWC proposal in 802.11n Task Group. Similarly, the creation of WHATWG was driven by the lack of agreement among stakeholders regarding the future of standardization work within the W3C. Yet, both groups eventually returned to the SDO they stemmed from, although for entirely different reasons: WHATWG was invited to bring their work on HTML5 in W3C when the latter realized the failure of the XHTML project¹⁶⁶ and EWC, similarly to DensiFi, in fact, never intended to pursue 802.11 standardization in isolation from the IEEE process.

Hirschman's framework anticipates that upon perceiving a quality decline, a quality-sensitive consumer would be subject to an immediate choice of "creating a fuss" or switching to a comparable service provider. Although at first blush the phenomena of forum switching would be classified as "exit" based on Hirschman's conceptual framework, we argue that this strategy represents "voice," since a formal exit has not been exercised. Many reasons for that could be mentioned. At the outset, such consortia do not intend to replace an SDO; they are tailor-made for specific, limited standardization activity, while SDOs embody numerous standards projects. Second, members create those consortia when they disagree with one or several aspects of the standardization process, while they maintain their SDO membership status: in principle, both memberships coexist.¹⁶⁷ Third, this strategy appears to be used when

¹⁶² For instance, Airgo networks was (for a long time) the only company shipping chipsets for use of MIMO technology; at the time when 802.11n was discussed, this type of chipsets was already produced by Broadcom.

¹⁶³ Seventy-five LoAs were submitted for 802.11n, compared to nineteen for 802.11g. See <https://standards.ieee.org/about/sasb/patcom/patents.html>.

¹⁶⁴ See, eg., the Minutes of the IEEE P802.11 Full Working Group meeting of July 22, 2007. All meetings of 802.11 WG are available at <https://mentor.ieee.org/802.11/documents>.

¹⁶⁵ *In re Innovatio IP Ventures*, 921 F.Supp.2d 903 (2013).

¹⁶⁶ R. Tabarés Gutiérrez, *supra* note 141. On a related note, in 2011, the groups separated once again, this time because the differences in the objectives pursued: while the WHATWG viewed HTML5 as a "Living Standard" subject to constant amendment, the W3C favored a more stable design.

¹⁶⁷ The opposite may even give rise to antitrust concerns. The EC Horizontal Guidelines provide that SDO members should remain free to develop alternative standards, *supra* note 18, ¶ 293.

a limited number of members (often, but not necessarily, belonging to a certain group such as network operators or browser companies) disagree, as it was the case with IEEE 802.11n Task Group, and act upon the “murmurs” of “horizontal voice.”¹⁶⁸ Fourth, such a measure allows for the possibility of “gravitating back” to the SDO, project “vertical voice,” and benefit from the SDO’s ability to provide further validation.

There is indeed anecdotal evidence suggesting that stakeholders who were not happy with patent policies of some SDOs would be moving to other SDOs. Yet, exiting seemed only an available option in the beginning of the standardization activity, since later on, switching costs, path dependence, and IPRs do not allow for an exit as such, and members would prefer to create an alternative forum. 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. On the other hand, standards development may be tied to specific SDOs, and can only migrate 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. However, the value of repeated interaction and reputation are built over time, and cannot be easily reproduced in a different organization, which would imply a type of “lock-in” effect for certain SDOs. 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.

Quite crucially, this type of voice may be prevented by legal constraints under which SDOs operate, such as those imposed by antitrust law, as illustrated by the example of DensiFi. By forming a group outside the SDO and then re-joining the work within SDOs committees, members risk to exert undue dominance in standards development processes¹⁶⁹ and hence may breach the relevant antitrust provisions prohibiting collusion and abuse of dominance. Accordingly, SDO participants willing to “step out of the room” should give due consideration to the applicable legal framework, including the type of margin for maneuver it allows for.

B. Refusal to Follow the New Rules

Although rules of SDOs are binding once participants sign a membership agreement, expulsion from membership in case of non-compliance occurs rarely, if ever. For instance, members and participants of an SDO are expected to disclose and license their technologies within the discretion provided by the SDO’s IP rules. However, once those rules have been modified, SDOs typically do not consider the refusal to follow new licensing rules as a reason for expulsion. Rather, stakeholders that do not commit to license their technology risk that their technology will not be adopted into a standard, as well as reputational consequences.¹⁷⁰ On the

¹⁶⁸ See *supra* section III.B.

¹⁶⁹ See the discussion earlier on DensiFi and cases such as the NSS Lab and the Allied Tube discussed in the introduction of this Article.

¹⁷⁰ Reputational losses may many times determine behavior in relational markets. See also R. Benabou and J. Tirole, *Incentives and Prosocial Behavior*, 96 AM.ECON. REV. 5, 1652 (2006).

other hand, the possibility to disobey or opt out from following the new rules allows dissatisfied stakeholders to remain within the SDO and to try to minimize the impact of the rules with which they disagree.

1. *Submission of LoAs in 802.11 Working Group*

Most studies on the consequences of the new IEEE Patent Policy reveal that the new licensing requirements are not adhered to by all patent-owners. More specifically, companies that were openly opposing the changes seemed to keep their promise not to provide any licensing commitments under the new policy.¹⁷¹ These studies use the fluctuations in the amount and nature of submitted LoAs as a proxy to assess the effect(s) of the revised policy on IEEE standardization activity and the industry.

Drawing upon existing research, we consider refusal to provide LoAs, or submission of negative LoAs, as one of the strategies that stakeholders may exercise to voice their disagreement with an SDO's patent policy. To that end, we examined the LoAs for 802.11 standard series submitted to IEEE SA PatCom in the period of 2013 – 2019 (which counts for all LoAs submitted in and after 2015, and two years prior and after the new rules took effect). Given that the analysis of LoAs has already been performed in the previous studies on the topic, our examination is limited to the identification of positive and negative LoAs, and the stakeholders submitting them.

This exercise allows us to observe the following. First, what stands out when we look at *all* LoAs for 802.11 standard series is the fact that there were almost no negative LoAs submitted to PatCom before January 2016.¹⁷² The number of negative LoAs has indeed surged as of 2016, which appears to be the start of a period of increased internal activism: yet, January 2016 alone may appear as a strikingly delayed moment in time for opponents to express their disagreements in the form of negative LoAs given that the new patent policy took effect already in March 2015.¹⁷³

At the same time, the total number of submitted LoAs was significantly higher in 2015, but more than a half of those LoAs (17 out of 31) were submitted by a single stakeholder during the transition period between the former and the current patent policy. Perhaps, these LoAs might be interpreted as a restatement of support to the IEEE Patent Policy, since the stakeholder that provided them is known to have been openly advocating in favor of the new rules. In general, the number of submitted LoAs does not seem to correlate to any milestones in standards development or approval,¹⁷⁴ which in a way strengthens the assumption that the

¹⁷¹ Negative LoAs from Nokia, Ericsson and Qualcomm.

¹⁷² The only exception was a negative commitment from Ruckus Wireless Inc. submitted in October 2010 for 802.11v and which so far remains the company's only patent claim for 802.11 technology. The LoA at issue is available at https://standards.ieee.org/about/sasb/patcom/loa-negative-802_11v-Ruckus-13oct2010.pdf. The company was acquired by Brocade Communications System in 2016 and then by Arris Group in 2017.

¹⁷³ In the next sub-heading we identify at least three explanations for this delay.

¹⁷⁴ IEEE 802.11 Working Group Project Timelines, http://www.ieee802.org/11/Reports/802.11_Timelines.htm (demonstrating no significant milestone in

increased number of LoAs in 2015 is attributable to the IEEE patent policy change. The fact that since September 2014, when the Ad Hoc Committee of PatCom has already been drafting the new patent policy, “outstanding” LoAs that were requested by chair but not submitted, became a frequent topic of the full 802.11 working group meetings likewise exemplifies stakeholders’ reluctance to accept modifications to licensing rules.

Table II about here

That said, negative licensing commitments, although naturally causing uncertainty among the members in the working group, do not directly lead to stagnation of a standard-setting activity. In the case of IEEE, the negative licensing commitments causes uncertainty owing to differences in opinions on the applicability of the current (2015) or the prior (2007) version of the patent policy (as noted in minutes of PatCom’s June 2018 meeting which was subsequently refined in the December 2018 minutes). When the holder of a patent essential for VoiceXML standard did not commit to provide licenses on royalty-free term, which it should have done following the patent policy of W3C, the working group nevertheless decided to proceed with the adoption of the standard; despite the lack of licensing commitments, the patent-holder has never actually sought royalties for that particular technology.¹⁷⁵ Additionally, the promulgation of new standards, although delayed, did not seem to lose all its traction—indeed, recently, 802.11ai and 802.11ah were adopted despite the negative LoAs submitted for those standards.¹⁷⁶

2. *LoAs as Voice*

Viewed through the prism of Hirschman’s theory, the submission of negative LoAs could be regarded as yet another articulation of a voice strategy. At the same time, it is a form of complaining that exemplifies a quintessential activist behavior inextricably linked to voice, which tests the tolerance and patience of the organization – and its members that are negatively affected. Negative LoAs are also representative of the different attitudes of the diverse members to the patent policy changes, and an indicator of the member’s perception of their influence and bargaining power. For the “quality-sensitive” members who would otherwise be expected to be swift in exiting per Hirschman’s framework, the submission of negative LoAs also appears to suggest that the exit option is not readily available or, rather, is too expensive.¹⁷⁷

This raises the question as to why the LoAs were submitted with a significant delay post the revision of the patent policy, if indeed the members wanted to raise their voice. Indeed, January 2016 seems to present a riddle (Table II) as one would expect negative LoAs to be

standards development was reached in 2015, with an exception of two PARs for 802.11ay and 802.11az approved in March and September, respectively).

¹⁷⁵ Contreras, *supra* note 52, at 878.

¹⁷⁶ See K. Gupta & G. Effraimidis, *supra* note 85.

¹⁷⁷ In the case of IEEE in particular, exit would be an expensive alternative for a firm that has leverage: IEEE is the largest technology association. Thus, legacy, reputation and sheer size make exit a quite expensive option and demonstration of loyalty, combined with voice-related action, a well-calculated strategy.

submitted already in 2015. A possible explanation is that members only submitted such LoAs at that time simply because earlier there was no need to submit one. In other words, members would choose to have their voice heard once there was a need for that, and not when the rules changed. Such a choice would not weaken the strength of their voice nor its effectiveness. To corroborate this view, those who submitted LoAs are still actively involved in the meetings. A combination of voice and loyalty seems to be driving the members in this regard, if not the preference for voice and postponement of exit.

An alternative explanation would be that the turn in the patent policy heralded a period of confusion as to which IPR-related legal framework applies to each standard project that is ongoing or was concluded prior to the patent policy change. Indeed, the recent minutes of the IEEE Standards Board meeting of June 2019 corroborate this view, as it appears that IEEE members were still considering collectively of possible ways to address misunderstandings with a view to clarifying the licensing landscape.¹⁷⁸ Crucially, this collective thinking and mutual, evolutionary learning could also be linked to and be the result of a combination of voice and loyalty. After all, loyalty is a commitment device which, in times of crisis or other turning points, leads members to use voice and try to influence or instigate well-calculated change instead of exiting the organization.¹⁷⁹ In order for such change to occur, a “wait-and-see” approach may be employed. Inertia can be the precursor of evolution or else the creation of a “new normal” or a new equilibrium reached by members through a broad consensus whereby voice faints, exit does not happen, and loyalty is the main driver for evolution or transformation.¹⁸⁰

Another explanation that relates to the previous one, although less benign, relates to the period of out-of-court litigation that followed the patent policy change in 2015 and the ensuing IEEE reaccreditation process (which is mandatory for all ANSI-accredited standards developing organization when there is a policy change).¹⁸¹ Only when this external period of litigation ended, discontented IEEE members relocated their voice-related efforts internally, by filing LoAs as a last resort to express their opposition to the policy.

It is submitted that filing negative LoAs can be an unexpectedly effective manner of raising voice in this area of SEP-dependent standard setting, which could under certain circumstances bring about institutional change and, potentially, return to the previous regime. Although ANSI re-accredited IEEE as a whole in September 2015 and, more recently, in November 2020,¹⁸²

¹⁷⁸ See minutes, under Item 7, available at: <https://standards.ieee.org/content/dam/ieee-standards/standards/web/governance/sasb/06132019sasbmin.pdf>.

¹⁷⁹ See also *supra* Section III.A.

¹⁸⁰ In resilience studies, such a phase is considered as characterized by low connectedness, rapid changes and high uncertainty: See C. S. Holling & L. H. Gunderson, *Resilience and Adaptive Cycles in PANARCHY – UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS* 25, 40ff (L. H. Gunderson & C.S. Holling eds., 2002). (only first few pages found online for free, no full source)

¹⁸¹ See the discussion *infra*, under D.

¹⁸² *ANSI Standards Action*, Vol. 51, Issue 42, Nov. 27, 2021, at 34.

despite the persistent strenuous objections from the Patent Policy opponents,¹⁸³ the continuous voice articulation within the organization had a—surprising for some—turn recently within ANSI. Acting as gatekeeper for standards development in line with basic tenets of due process and, arguably, a powerful, exogenous and neutral arbiter of the overall validity and legal value of standard-setting activity, ANSI Board of Standards Review (BSR) was requested to approve the first two IEEE standards created under the new IEEE patent policy: IEEE 802.11ah-201x, focusing on lower energy consumption and connectivity of IoT devices, and IEEE802.11ai-201x relating to improved connectivity in demanding environments such as stadiums and shopping malls.¹⁸⁴

These two standards build on the primary WiFi standard, 802.11 and reflect years of work by the IEEE engineers and other members. In a highly uncommon move, the BSR declined to approve the two standards and contended that it will not promote them in any international standard-setting forum such as the ISO or JTC1, fueling the existing uncertainty as to the licensing-related landscape in this rapidly evolving and highly volatile area of standardization.¹⁸⁵ While details remain to become known, it appears that ANSI BSR’s decision was premised on the worrisome presence of negative—or even missing—LoAs by crucial SEP holders. For both standards, several SEP holders, including Nokia, Ericsson, and KPN, refused to license on the new terms.

The debate about the role, value, permissible content, and reach as well as effects of statements of assurance by SEP holders becomes increasingly heated.¹⁸⁶ In the short run, it appears that a broader discussion has started about the compatibility with the broader ANSI patent policy of ANSI-accredited Standards Developers’ (ASD) IP policy relating to so-called “custom LoAs,” (that is, LoAs with custom restrictions not explicitly stated in the ANSI patent policy). Such discussion increasingly covers, quite crucially, the very meaning of some of the most controversial terms in ANSI’s patent policy.¹⁸⁷ In an era with an ever-increasing focus on IP protection as a strategic tool for firms and governments globally, the outcome of this discussion could have very important ramifications for many generations of standards to come.

3. *Refusal to Participate as Voice*

¹⁸³ K. Vasant, *IEEE’s reaccreditation by ANSI draws allegations of US antitrust law violations* (Mar. 3, 2021) available at <https://mlexmarketinsight.com/news-hub/editors-picks/area-of-expertise/antitrust/ieees-reaccreditation-by-ansi-draws-allegations-of-us-antitrust-law-violations>.

¹⁸⁴ See also L. Nylen, ‘Electrical engineer institute’s new WiFi measures won’t get American national standard designation’, 11 March 2019, available at: <https://mlexmarketinsight.com/insights-center/editors-picks/antitrust/cross-jurisdiction/electrical-engineer-institutes-new-wifi-measures-wont-get-american-national-standard-designation>.

¹⁸⁵ For the Notice of Disapproval, see *ANSI Standards Action*, Vol. 50, Issue 9, Mar. 1, 2019, at 15.

¹⁸⁶ See generally C. Shapiro & M. Lemley, *The Role of Antitrust in Preventing Patent Holdup*, 168 PA. L. REV. 1 (2020).

¹⁸⁷ See [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](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).

Silent abstention from active participation in the proceedings of the working group would also be a form of voice or “suffering in silence,” which would seem to be a precursor of potential exit in a subsequent time period. The latter could in principle still be avoided due to not only exogenous factors (switching costs) but also endogenous factors (flexibility of the organization’s institutional framework to accommodate such abstentions; the power of loyalty; the continuous existence of leverage within the organization; or a combination of all the above). In addition, refusal to participate may also be a strategic choice by certain stakeholders in the hope that a revision of the policy will be instigated, a precondition to increase participation and approval of processes. For such an activism to be effective, some concerted effort and mobilization may be warranted as well as some consistency, insisting on the validity of the reasons for refusing participation.

Clearly, from a consumer welfare perspective, such a situation is suboptimal if the refusal to participate leads to certain technologies which would otherwise be considered for the standard eventually being left out due to fears that no licensing will occur, or licensing terms would be excessive. By the same token, a refusal to participate may lead to inferior outcomes such as the adoption of lower-quality technologies, thereby failing to incorporate the state of the art in a given standard.

C. Delay of Standards Development—Delays as Voice in IEEE

Standardization activity in IEEE continues in spite of negative LoAs. However, empirical evidence discussed in this Article suggested that the development of 802.11ai and 802.11ah standards took longer than anticipated due to the uncertainty caused by the new patent policy.¹⁸⁸ Similarly, it was implied that the late adoption of 802.11n was in part caused by companies owning patents for 802.11g, but whose technologies were not implemented in the future standards version.¹⁸⁹ In this regard, delay, disruption or interruption of standard-setting process because of adverse IPR rules may be considered as another strategy for actors to raise their voice and protest within an SDO. Such procrastination entails sunk costs for those who try to lobby for the fitness of their own technology and for implementers.

In further consideration, however, the probability that stakeholders will employ this strategy is relatively low. Given that only about a quarter of standards produced by an SDO gain wide market acceptance, the timing of standards adoption is essential. On the one hand, standardization that takes place before the industry has adopted to new technologies risks low rate of standards implementation;¹⁹⁰ on the other hand, standards adopted later than industry expectations in theory may suffer from competition from another standardization project, which is detrimental to stakeholders who bet on it, or may give erroneous innovation signals. This is of particular concern to the patent owners, since its failure may result in revenue loss,

¹⁸⁸ See Gupta & Effraimidis, *supra* note 85.

¹⁸⁹ See B. DeLacey *et al.*, *supra* note 147.

¹⁹⁰ Some examples revealed to the authors by industry experts included the IPv6 protocols, which are only gradually implemented; the IP Multimedia Sub-System (IMS) specifications that have been developed by 3GPP about a decade ago but were adopted only recently; and the EDGE standard, which was an enhancement to the 2G radio standard but did not get any market attention.

but also for implementers who have to redesign their product specifications during the process of standards creation. In other words, by delaying standardization processes, stakeholders may shoot themselves in the foot and negatively affect their own business, which for a long time was based on a collaborative effort within the standardization forum and on a “balance of terror” that would allow for the identification of a broadly acceptable standard despite the temptation of short-term, opportunistic behavior by any stakeholder.

At this point, there is no clear evidence showing that this strategy has been used by stakeholders opposing the licensing model of an SDO. This perhaps could also explain the internal drivers for loyalty. Indeed, as noted earlier, the most loyalist behavior holds the possibility of retaining an “enormous dose of reasoned calculation.” While the members who are insensitive to the changes to the patent policy (or lack the capability to perceive the effects of such changes) can be ignored, for other discerning members the “reasoned calculation” could be driven by multiple considerations, including: the significance attached to contributions in prior standards releases or parallel initiatives; a preference for free-riding; a preference emerging from the cognizance of one’s leverage at the SDO, and the ambit of the SDO, hoping for quick reversal of course; a “fiduciary” commitment to the cause of pursuing the intent of standard-setting activities, which is especially the case in IEEE, as the members are expected to act in personal capacity or on behalf of the SDO’s objectives; or perhaps an exhibition of self-restraint driven by the desirability for holding “policy” functions in the executive bodies in the future.

D. Litigation as Voice (and Expression of Loyalty)

Complaining is a quintessential feature of a voice strategy. Such a feature can find expression in any forum that is available within an organization, be it the board, the general assembly, or an ordinary meeting. Within an SDO, which must abide by certain procedural due process guarantees according to the generally applicable principles of standardization, a complaint can take a formal character through the launch of a formal procedure before an appeal body. Such an action is not only an expression of voice but also an important manifestation of loyalty. Loyalty is here manifested through recourse to the constitutional processes guaranteed under the organization’s relevant formal procedures in case of specific objections.

Within the IEEE, the procedural guarantees in place accommodate a right to appeal to those adversely affected by a standard or by the lack of action in any part of the IEEE standardization process.¹⁹¹ Such procedures are significant for the rule of law and due process within an SDO, as the recent DensiFi episode discussed earlier demonstrates. A right to complain (and by implication) a credible system for resolving disputes is an insurance policy for those negatively affected and notably those who may have relatively little influence and bargaining power within an organization to challenge any potential attempt to capture the standardization

¹⁹¹ See IEEE-SA Standards Board Bylaws (2019), Art. 5.4.

process. At the same time, a dispute settlement procedure and a right of appeal protects the right to be heard and to challenge any frivolous complaints.

Opponents to the patent policy change twice voiced their objections internally based on this right to appeal: once in August and again in September 2014. The IEEE Board of Governors (hereinafter: BoG) Appeals officers rejected both appeals and took issue with the request to form a BoG Appeal Panel, finding instead that, contrary to standards development activities, revising governance rules such as the applicable IPR policy rules, cannot require consensus or in fact the application of the other core values governing standardization activities. Interestingly, the IEEE BoG Appeals officers found that all IEEE governing committees and other bodies have a fiduciary duty of loyalty which requires that they exercise their powers in the best interests of the IEEE, the industry, government, and the public.

Possibilities of having recourse to a quasi-judicial mechanism may be internal to the organization but could also include access to a hierarchically superior organization or even to state courts. Typically, the latter will be the action of last resort, as most members would enjoy the fact that their SDO regime displays a high level of self-containment, insulated by state interference.

Events within the IEEE confirm this theoretical reflection. As noted above, litigation regarding the IEEE revised patent policy soon relocated outside the IEEE, this time before the gatekeeper of the American standardization system, ANSI. Alcatel-Lucent, Ericsson, and Qualcomm, supported by Fraunhofer, InterDigital, Nokia, Orange, Royal Philips, and Siemens, challenged IEEE's re-accreditation process before ANSI on the grounds that the patent policy change constitutes a legitimate basis for ANSI to deny accrediting IEEE as a standards developer, a process that could have interrupted 35 years of continuous accreditation for IEEE.¹⁹² While not mandatory, the reputational damage and signaling effect could potentially be very serious for IEEE.

Eventually, ANSI accepted that the revised IEEE patent policy was conform to the ANSI patent policy in July 2015 and re-accredited IEEE in September 2015; however, the above-mentioned companies appealed the decision. In 2016, both the ANSI Executive Standards Council (ExSC) and subsequently the ANSI Appeals Board dismissed all appeals challenging IEEE's re-accreditation, notably by affirming that the ANSI Essential Requirements do not apply to the development of an ASD's procedures such as its patent policy but only relate to standards development processes. As noted earlier, the most recent activity (namely, the BSR rejection to approve the latest IEEE 802.11 standards) shows some intensification of the internal pressure once again, this time through the filing of negative LoAs.¹⁹³

E. Taxonomy of Voices

¹⁹² Note that accreditation by ANSI is not a mandatory requirement for SDOs. Notably, W3C and IETF are not ANSI-accredited.

¹⁹³ See section IV.B.2.

In what preceded, we identified strategies of voice that members of an SDO could employ in the presence of a challenging triggering point which calls for a rethinking of their participation strategy. We used IEEE as a compelling example where voice strategies but also expressions of loyalty were manifested as responses to the recent patent policy change within that SDO. In following these developments and series of events, we had recourse to Hirschman's theory in an attempt to explain particular practices and choices by members.

Taking inspiration from Helper's extension of Hirschman's framework to analyze customer-supplier relationship strategies,¹⁹⁴ we believe that the examples of responses of members can be vividly displayed in the graph we present below. "Considerations behind voice" is indicated along the vertical axis, and "level of loyalty" along the horizontal one. The considerations driving voice are graduated from "self-serving" (i.e., a preference for nil/ low-cost voice options), to "balanced," to "commitment and/ or efficacy driven" (i.e., considerations that require costlier voicing mechanisms). Note that "self-serving" captures members who intend to "free-ride"; they are distinct from "inert members" who are indifferent to or ignorant of the expressed dissent over proposed reforms. In contrast to considerations behind voice which are visualized more or less as a continuum, loyalty is visualized as polar opposites of "nil/low" to "loyalist" (for members that seem to indicate an insistence on "sticking with the organization"). Finally, we present a visual means of mapping actions and choices reflecting a corresponding increase in the costs (in terms of time, effort, and money) associated with exercising certain voice options (and revisited due to repeated interactions and the propensity to "mix, negotiate and *choose* between courses"¹⁹⁵) in standard setting against the exit option.

Fig. 2 about here

As noted earlier, a crucial element that may well determine the strategy chosen relates to a member's given influence (for instance, monopoly or monopsony power). Influential members will make voice as public as possible; they may attempt to organize others so that protest is more effective and takes less time. If costs of any type (economic, reputational or other) are significant, then, despite their important level of leverage, they may prefer to indicate displeasure through other means such as explicitly refusing to abide with the reformed policy; procrastinate when taking otherwise required action; or exercising tangible means of expression such as lowering in attendance. The means chosen will often be a function of the reaction and responsiveness of the SDO to the voice expressed. Members with influence are more likely to organize complaints and protests in cooperation with other members, which presupposes some organizational effort, to make voice more effective.

Dissenting members with low levels of influence but also low probability of exit could indulge in "cheap talk" to force certain policy decisions or prefer to wait, hoping to "free-ride"

¹⁹⁴ Helper, *supra* note 97.

¹⁹⁵ J. ADELMAN, *WORLDLY PHILOSOPHER: THE ODYSSEY OF ALBERT O. HIRSCHMAN* 438 (2013).

on the voices of others, or else, opt for silent exit. In this respect, exit is a minimalist, noiseless way of expressing dissent; yet it can become noisy if others do likewise. In both cases (high or low level of influence), loyalty can delay both voice and exit but to a varying degree. Loyalty can also backfire in an organization that desires to change route or policies fundamentally: for instance, in the case of a quasi-monopolistic SDO, requiring loyalty by its members (in that they act in the interest of their organization rather than the interests of their firm or special interest) can strengthen the identity of the brand, which thereby becomes a stand-alone entity. Nevertheless, loyalty can increase the likelihood of forceful and long-lasting voice in the case of a potential sharp decline or increasing distrust in the organization or change in substantive policies with important negative spillovers. The latter would essentially trigger voice or exit, depending on the level of loyalty.

For influential firms, in addition to commitment to the organization, loyalty is a by-product of “reasoned calculation,” which considers the following incentives: the perspective of future gain; the perspective of enduring gain; strong voting rules; a sense of urgency; and an incentive to compromise.¹⁹⁶ The prevalence of strong voting rules signals rewarding of active participation, thus keeping the wheels of decision-making well oiled. The sense of urgency pertains to the import of achieving consensus as similar efforts might be underway in competing standard-setting arenas, and that compromises might allow for arriving at a settlement in a swifter manner.

These five incentives pertain to the decision to stick to the consensus-driven process of standard setting despite dissatisfaction with the flaws in the decision-making process. An undesirable change to the governance norms introduces a sense of misalignment pertaining to these incentives, and thus prompting the member firm to re-assess the costs of staying on with a fresh perspective. Of these five, the last three are of significance with respect to our study, as they highlight the operational conditions under which the member firms decide on whether to stay committed to the platform or to make a move for an equally viable “platform.”

Clearly, the contextual landscape or ecosystem will affect how these dynamics play out. For instance, Larouche and Schuett¹⁹⁷ in their study on voting rules in SDOs show that standard-setting efforts that span over generations of technologies are characterized by repeated interaction with a few core members being the dominant IP related contributors in each successive generation.¹⁹⁸ Seen in conjunction with the observation of Fleming and Waguespack,¹⁹⁹ and Larrain and Prüfer,²⁰⁰ that small firms (downstream implementers)

¹⁹⁶ G. van de Kaa & H. de Bruijn, *Platforms and incentives for consensus building on complex ICT systems: The development of WiFi*, 39 TELECOMM. POL'Y 580, 581 (2015).

¹⁹⁷ See P. Larouche & F. Schuett, *Repeated Interaction in Standard Setting*, 28 J. OF ECON. & MGMT. STRATEGY 488 (2019).

¹⁹⁸ As this is about interaction among human beings, engineers for the most part, heuristics (such as the availability heuristic) play a significant role in making this repeated interaction successful without any external intervention. See generally BEHAVIORAL LAW AND ECONOMICS (C. Sunstein ed., 2012).

¹⁹⁹ See D. M. Waguespack & L. Fleming, *Scanning the Commons? Evidence on the Benefits to Startups Participating in Open Standards Development*, 55 MGMT SCI. 210, 221 (2008).

²⁰⁰ M.J. Larrain & J. Prüfer, *Membership, Governance, and Lobbying in Standard-Setting Organizations 1*, 3 (2021), available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3303724.

perceive standard setting as a “source of learning” and a means of gaining from knowledge spillovers, such firms are expected to comprise the “inert” members. Such members attach significance to the presence of marquee, influential IP-driven members, and are thus not prone to exercise voice even if the proposed changes are undesirable.

Hirschman’s deliberation of the paradoxes of “voice-exit reactions” and the “alchemy of mixing and switching of responses” is evident in his assertions that voice and exit were “mixable alternatives not mutually exclusive” that can function as substitutes and complements under differing contexts. Furthermore, in his later writings, he clarifies that voice may well be perceived as a benefit rather than a cost under certain conditions,²⁰¹ notably when the cause is to preserve or pursue the “public good.”²⁰² Under such circumstances, the existence of low cost mechanisms for channeling voice (such as the option to submit negative LoAs, or submission of internal appeals) or hassle-free exit are seemingly crucial towards ensuring the “minimal or floor levels of exit and voice” making for “necessary feedback” regarding SDO performance.

In the latter case, as noted earlier, boycott by a firm against an organization is a borderline case between exit and voice. In this case, the firm’s intent is to eventually re-join the organization once the desired reform takes place. Depending on the importance of the boycotting firm for the SDO and the costs that its boycott entails, the promise of re-entry may instigate change in an SDO. A negative LoA can be perceived as a form of boycott, which incorporates an indirect promise of full participation in and respect of the IEEE rules in case of change. Recall also the NSS Labs case discussed earlier: NSS Labs exited AMTSO and launched an antitrust complaint against the AMTSO standard but crucially also against the AMTSO operational rules. Almost immediately, AMTSO entered into a reform process of its internal functioning, whereby AMTSO together with the security vendor companies-initiated changes in the testing standard at stake towards the direction that NSS Labs indicated. NSS Labs acknowledged the progress and withdrew a potentially costly lawsuit, whereas AMTSO openly invited NSS Labs to rejoin the organization.²⁰³

Such a situation is not only telling about the strategic behavior of participants in the standardization process but also of similar behavior on the side of SDOs. Most SDOs are member-driven and thus any voice of the type that we described earlier may have potentially disruptive consequences, even challenging the survival of a given SDO. SDOs thus face in similar situations a dilemma, which may shake the fundamentals of the organization and test its resilience. According to theoretical work on ecosystems, reorganization followed by a crisis event can lead to appeasement very soon but may also lead to high levels of uncertainty, explosive increase of an unsettling environment and ultimately to a new organization. At this point, adaptive response to unexpected disturbances and maintenance of maximum diversity

²⁰¹ See A. Hirschman, *Introduction: Political Economics and Possibilism*, in *A BIAS FOR HOPE: ESSAYS ON DEVELOPMENT AND LATIN AMERICA* n.8 (A. Hirschman ed., 1971) (arguing that while being costly, in certain situations voice can be computed as a benefit).

²⁰² Hirschman, *supra* note 95.

²⁰³ See *AMTSO welcomes NSS Labs decision to dismiss its lawsuit* (Dec. 3, 2019), <https://www.amtso.org/news/amtso-welcomes-nss-labs-decision-to-dismiss-its-lawsuit/>.

internally and allowing for mutual learning and institutional innovation²⁰⁴ may be decisive for the fate of any SDO and, by implication, any institution.²⁰⁵

V. STRENGTHENING THE VOICE IN SDOs: POLICY SUGGESTIONS

In the long term, the exit of the members that opt to raise voice in lieu of silent exit is deleterious to the welfare of the organization. SDOs could therefore consider strengthening the feedback mechanism and investing significant resources on grievance redress mechanisms to lower the “costs” of voicing of discontent, thereby dissuading the member firms from entertaining an exit strategy. Since those who voice their discontent also look back in the past to determine the approach and behavior of the organization to “voices,” it augurs well to nurture a working environment in which the voices are accorded an avenue to be expressed, deliberated upon, and responded in a collaborative and thorough manner. Such measures would facilitate the voicing of “quality” dissent rather than “cheap talk,” thus furthering legitimacy.²⁰⁶

Addressing demands for legitimacy and credibility sufficiently could in fact be key in strengthening mutual trust, taming voice in a manageable level and ultimately nourishing loyalty. For SDOs, which are subject to exogenous pressure from public organizations (competition authorities, courts), well-functioning mechanisms that respect a certain degree of rule of law and due process are quintessential for channeling members towards voice (rather than exit), streamlining voice and avoiding public interference. The same applies to an active inclusion management by the SDO organs that caters for careful balancing of interests.²⁰⁷

More generally, looking carefully into governance structures within SDOs is a daunting task that many SDOs, including the IEEE, are yet to set in motion. However, member firms with a strategic outlook are particularly keen on having their personnel occupy posts of significance within the SDOs.²⁰⁸ If the processes for expression of grievances is designed well, the member firms would be inclined to voice their reservations in a responsible manner, thereby possibly gaining trust, future support and co-operation of the “silent sufferers,” and contributing to the improvement of the quality of operations within the SDO. Additionally, a neutral perception of the episode would serve as an impetus for the vocal member firms to keep participating.

Through the use of repeated interaction, the actors essentially commit to an incremental increase in cost – both in tangible and intangible forms. For example, for the purposes of consensus-based standard setting, the sudden withdrawal of a member firm after having taken

²⁰⁴ The 2018 amendment to the IEEE policy, mentioned *supra* n 77, which prohibited blanket negative LOAs, is an example of SDO adaptive capacity but also mutual learning and identification of common red lines. In that case, the SDO appeared to make clear that it will accept boycotting of licensing processes but not in the form of a comprehensive, across-the-board *ex ante* decline to license.

²⁰⁵ Cf. Holling & Gunderson, *supra* note 180.

²⁰⁶ F. Cafaggi, *A Comparative Analysis of Transnational Private Regulation: Legitimacy, Quality, Effectiveness and Enforcement*, EUI Research Paper No. 2014/145.

²⁰⁷ See C. Ansell et al., *Understanding inclusion in collaborative governance: a mixed methods approach*, 39 *POL’Y & SOC’Y* 570 (2020).

²⁰⁸ Baron & Kanevskaia Whitaker, *supra* n 114.

on the “path of entering” the process signifies that it was unable to commit to the imminent final decision, thus sowing the seeds of mistrust in peers.²⁰⁹ Conversely, if an SDO were to refer to members who voiced objections to policy changes in an unsavory manner, the rest of the members subject to forces of internal coordination and information exchange (horizontal voice), are bound to take notice of the characterization of the “past voices,” and prefer non-voice options thus potentially disrupting seamless inheritance of patterns of loyalty.²¹⁰

Furthermore, efforts to nurture voice allow for the beneficial effects of horizontal and vertical voice to be leveraged – horizontal voice enables member firms that are “rivals” in marketplace to realize that they are similarly minded when it comes to concerns, and facilitates collaboration, whilst vertical voice displays evidence of formal mechanisms where the claims, pleadings, and responses can be submitted and heard in a measured and calibrated manner. Such efforts inevitably serve as inputs for determination of self-assessment of levels of influence, and growth for influence, and legitimacy for each member thus contributing to a more realistic motive for choosing on consensus, collaboration or compromise on specific technologies as part of the standardization strategy.

In addition, as a matter of theoretical constellation, in a highly competitive environment such as the standard-setting ecosystem, a more careful look into the governance structures and the need for due process in the short term is warranted. For a consensus-driven organization, for instance, it is not always possible to distinguish with sufficient clarity the procedural (e.g., governance) from the substantive (e.g., standards development) issues. Theoretical voices have gone as far as to argue that this dichotomy is erroneous and misleading. Procedural issues are of substantive importance precisely because they have a significant impact on the achievement of the objectives of the organization itself.²¹¹ Thus, if consensus or supermajorities are required for the substantive issues, one can require no less for the procedural ones.²¹² In addition, such an approach would arguably be in line with the spirit of the principle of balance of interests. Indeed, efforts for balance shall permeate the entire SDO functioning, from the adoption of the IP policy to the functioning of the internal dispute settlement mechanism.²¹³

Within a collaborative, member-driven ecosystem, member firms should invest time and effort in making credible contributions in order to be perceived as a voice of significance and credibility in times of distress, for perhaps loyalty can often be measured through the yardstick of technical contribution.²¹⁴ The higher the number of such member firms, the higher the

²⁰⁹ Kaa & de Bruijn, *supra* note 196, at 582.

²¹⁰ Adelman, *supra* note 195, at 442.

²¹¹ See Kanevskaia, *supra* note 15.

²¹² For this argument, see H. Lindahl, *ISO standards and authoritative collective action*, in Delimatsis, *supra* note 11, at 42.

²¹³ By way of illustration, the most recent calls for review of IEEE Patent Policy explicitly mention possibilities to provide input either by verbal contributions, email discussions or written comments on the drafts: See the minutes of IEEE Standards Board Patent Committee, *supra* note 81.

²¹⁴ In this regard, see IPlytics GmbH, *IEEE’s Empirical Record of Success and Innovation Following Patent Policy Updates*, (April 2018), https://www.iplytics.com/wp-content/uploads/2018/04/IPlytics_Report-on-IEEE-activities_2018.pdf (showing empirically that some of the most vigorous opponents of the IEEE patent policy change are among the least active contributors to the 802.11 working group and thus could be deemed as minor players in standards development).

effectiveness of the exit option, and its emergence as a credible deterrent for the SDOs.²¹⁵ This is notably the case for SDOs where two major groups are formed and their common presence is necessary for the SDO to be functional and effective. Thus, how loyalty will influence voice and exit also depends on who triggers voice or exit. While in some SDOs, the exit of an important player could mean that the existence of those SDOs is no longer justified, in others it could well be that the level of interdependence makes voice the only alternative unless a broader level of mobilization for exit is achieved. Even so, however, the case for functional and credible voice mechanisms remains robust, as it increases the trustworthiness of a given system.

More generally, in a collaborative ecosystem, exit may be a perilous path to take because it gives a signal of opportunistic behavior, thereby fueling distrust among peers. It is not uncommon for member firms of one SDO to be members of rival SDOs, consortia, and other alliances. As expected, some members might harbor a fear that the undesirable policy change being considered for adoption in SDO of relevance, might compel the rival SDOs to adopt a similar stance.²¹⁶ In the case of exit, peers may consider that the exiting member no longer deserves to be listened to or supported in its protest. These reputation costs cannot be undermined, giving higher incentives to use voice, instead. Finally, exit may become more (or even too) expensive in the case of a shield by a public authority (be it a gatekeeper or a court).²¹⁷

VI. CONCLUSION

The world of standardization has been at the heart of state and corporate rivalry and this has only accentuated in the current political climate. Its resilience is being tested internally but also via external pressure points. For instance, in the aftermath of Huawei's listing to the Export Administration Regulation (EAR) entity list in May 2019, a strong protest by some 26 standards consortia to the Department of Commerce asking for exempting Huawei's standard-setting activities from the restrictions applied (a request that has been satisfied by the Department's recent clarification permitting US companies to engage with Huawei when developing standards).²¹⁸ In view of Huawei's active participation in this fora and the value of its patent portfolio that Huawei shares in FRAND terms, any disruption of SDO activities by excluding such an important player or obliging it to behave opportunistically could have important repercussions to some of the most important technologies currently developed

²¹⁵ Cf. Cafaggi, *supra* note 206, at 36.

²¹⁶ This phenomenon can be coined as 'contagion.' See The JRC Report, *supra* note 27, at 156.

²¹⁷ Recall the favorable endorsement by a Business Review Letter from the DOJ's Antitrust Division for its 2015 patent policy change, showing how an SDO can anticipate challenges and bring about adaptations despite facing significant erosion in support, *supra* n 76.

²¹⁸ See *Commerce Clears Way for U.S. Companies to More Fully Engage in Tech Standards – Development Bodies*, U.S. DEP'T OF COM. (June 15, 2020), <https://web.archive.org/web/20200617060902/https://www.commerce.gov/news/press-releases/2020/06/commerce-clears-way-us-companies-more-fully-engage-tech-standards>.

collaboratively within these organizations.²¹⁹ The current strenuous political tension also illustrates a paradox: on one side, security-related concerns voiced by governments call for nationalistic solutions and independent development of technologies like 5G whereas technological reality and progress are firmly and resolutely based on global collaboration.

The output of SDOs is a fundamental underpinning of innovation and economic growth and thus the smooth functioning of these organizations is crucial. In this article, we demonstrated that opportunistic behavior by standardization players is not always problematic or shortsighted. Rather, we demonstrated that such behavior may be a healthy expression of concern towards institutional changes and arrangements which, if not addressed, may prove devastating for an SDO's future – and, by implication, technological innovation. This Article advances the empirical literature relating to stakeholders' behavior notably in the wake of important changes relating to the patent policies of the SDO in which they collaborate, and in particular when such changes do not enjoy the support of a critical mass of members. It does so by theorizing about this behavior based on a conceptual framework developed by Hirschman that attempts to predict under which conditions members of an organization in distress will protest (voice), abandon the organization (exit) or will suffer in silence (loyalty). In what preceded, we demonstrated that this framework is apposite for offering an explanation for some of the most complex types of behavior that we find in highly collaborative and dynamic environments.

Such exercise is important and novel both at the theoretical and the empirical level. At the theoretical level, it constitutes a first attempt to conceptualize reactions to a turning point within the highly volatile, ever-evolving and increasingly interdependent ecosystem of ICT standardization. At the empirical level, it identifies instances of distress and how these were overcome – or not – in various SDOs, which allows the identification of the different facets of voice and loyalty (and their interaction) but also shed light on the limits for opportunism and exit in the collaborative ecosystem of ICT standardization.²²⁰ More fundamentally, the Article offers some significant insights that justify continuity but also much-needed reform within SDOs.

The Article relied on an example of the recent change in IEEE patent policy to illustrate certain strategies that members use as responses to the update. We contextualized such strategies by using Hirschman's exit and voice theory. While offering a significant conceptual framework, we underlined important nuances and caveats, which may call for adaptations of this otherwise amenable framework. We concluded that exit may be quite ineffective in certain areas of high R&D expenditure and investment, as the phenomenon of multi-organization membership is pervasive.

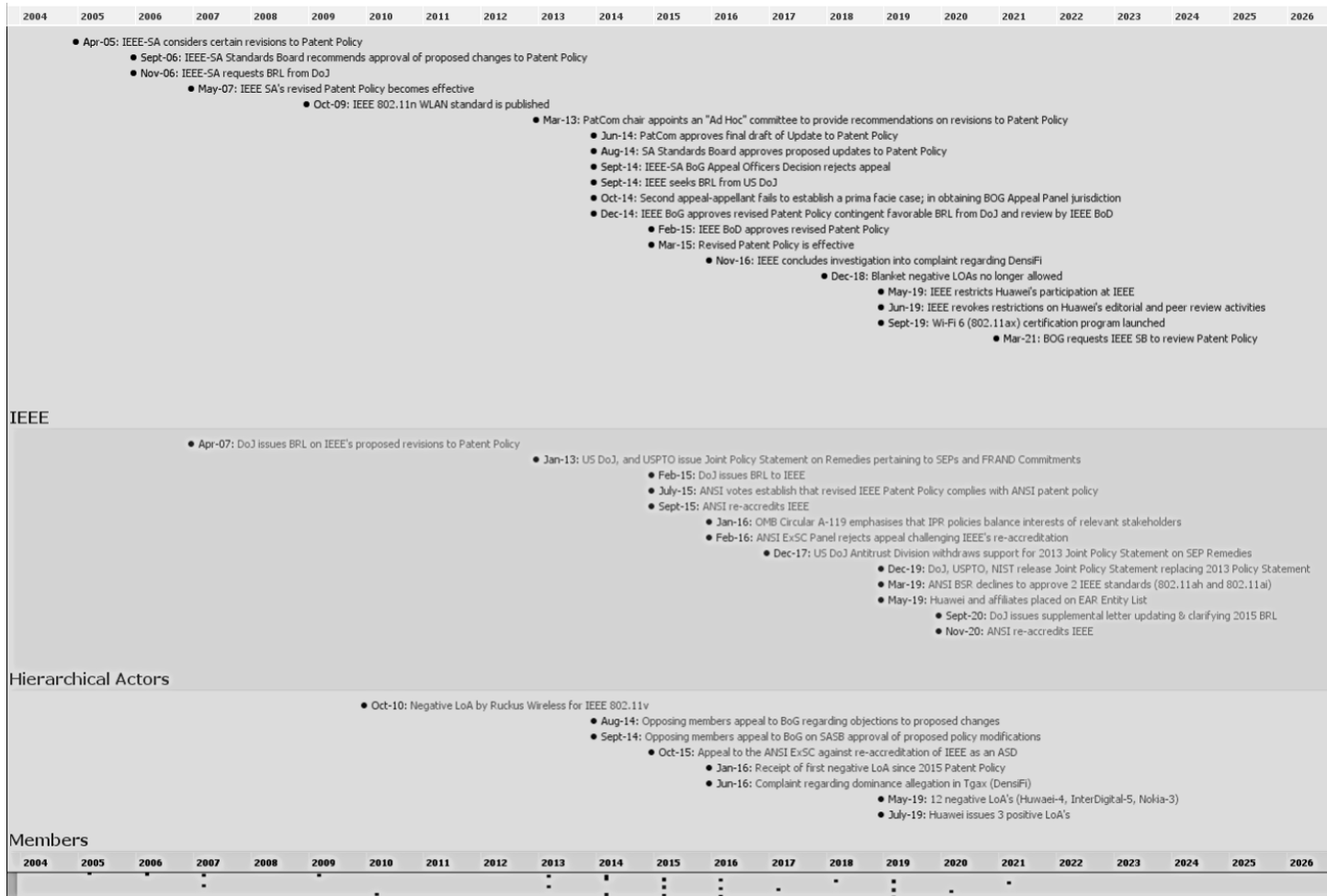
At the same time, in delving a bit deeper into the recent IEEE update of its patent policy, we noticed that internal mechanisms and flexibilities are important features to accommodate

²¹⁹ In the aftermath of the ban, Huawei has submitted negative LoAs within IEEE, in a likely effort to make it clear that it could also use its patent portfolio strategically to protect its corporate interests.

²²⁰ See O. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22:2 J.L. & ECON. 233, 233–36 (1979).

the opponents of specific changes. While imperfect, such mechanisms may under certain circumstances strengthen loyalty to the detriment of exit. In this regard, a thorough discussion of the use of LoAs to circumvent unfavorable changes allowed for a better understanding of how voice and loyalty can work in this particular SDO setting. Such an analysis, while rudimentary in view of the time interval since the policy update, offers significant food for thought as to potential reforms and adjustments within SDOs, notably as far as reaching critical mass and broad consensus within voluntary, member-driven organizations are concerned. Further research within other SDOs would enrich (or, potentially, rebut) the evidence collected in support of the applicability of the Hirschman framework in the standardization ecosystem. This new line of research would ideally incorporate the variable of heterogeneity (both at the stakeholder and organizational level) to better capture developments, evolution and strategies within SDOs.

Figure 1. Timeline of IEEE Patent Policy Revisions ¹



¹ Authors thank the creators of TimeFlow Analytical Timeline Fernanda Viégas and Martin Wattenberg (Flowing Media, Inc.) and Sarah Cohen (Duke University). <https://github.com/FlowingMedia/TimeFlow/wiki/License-and-Credits>.

Figure 2. The Interaction of Voice and Loyalty in an SDO Setting

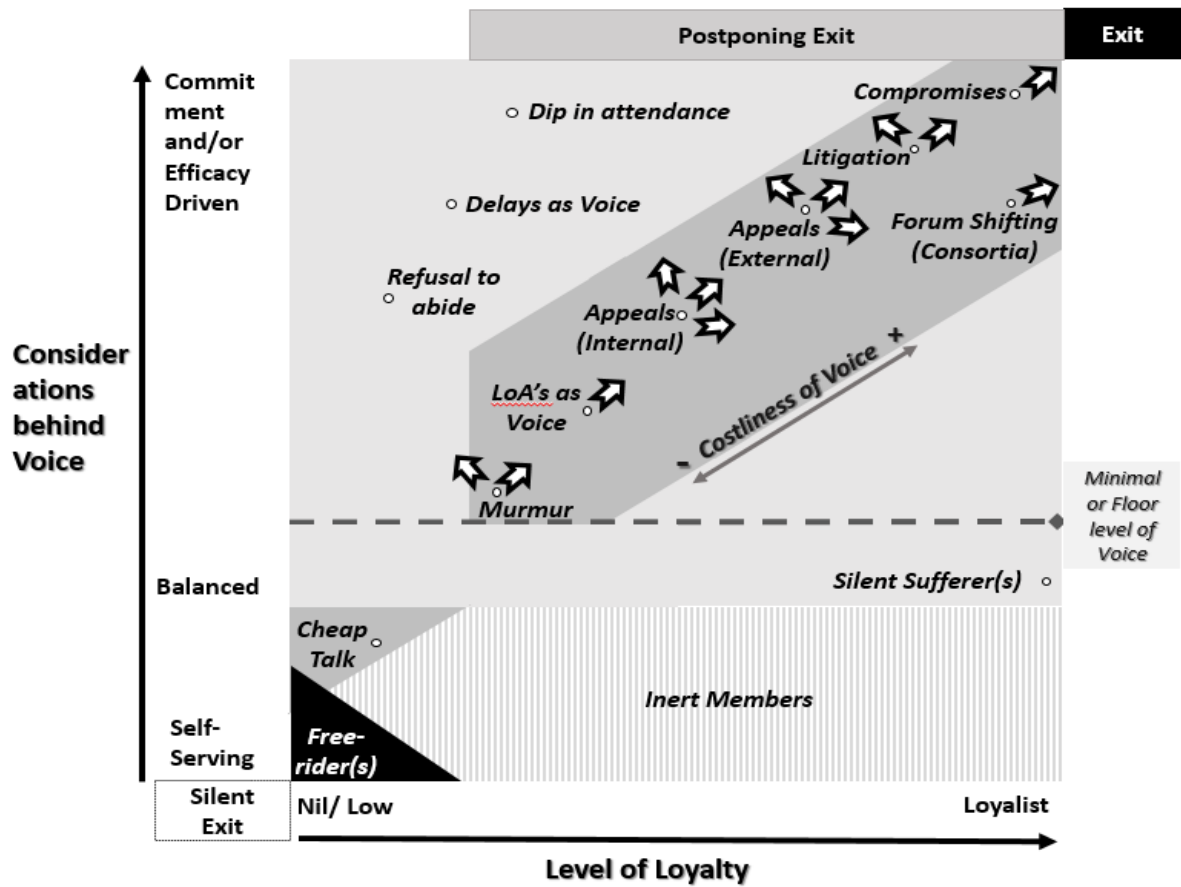


Table I. Attributes of Exit, and Voice

	Exit	Voice
Descriptions	Terminating the relationship, withdrawing (SH)	remedy or redress through communication, deliberation, and complaint (SH)
Defining Attributes	Impersonal (H), Anonymous (H)	Messy (H)
	Avoidance of confrontation (H)	Requires articulation (H)
	Indirect (H)	Direct and straightforward (H)
	Fairly crude (D)	Badly underdeveloped mechanism (H)
	Belongs to the realm of economics, market forces (H)	Belongs to the realm of politics, non-market forces (H)
	Blunt, avoids saying what is wrong (EK)	Provides precise information (EK)
Strategic considerations	Strategic - but less manipulable (D)	'cheap' talk for strategic purposes (D)
	Does not exclude the opportunity to use exit (H)	Excludes the opportunity to use voice (H)
	Effect is negated if the organization acquires new as it loses the old (H)	Assumes influence and bargaining power (H)
Costs	Less costly to Voice, except when loyalty is present (H)	Costlier (H)
Intensity	Dominant reaction to deterioration (H) - powerful (H)	Subtle (D)
Variability	Clear-cut either-or decision-making (H), Binary response (D), dichotomous (D)	Continuous variable (D) - has a scale of graduation (from faint grumbling to violent protest) (H)
Other attributes	Can atrophy the development of the art of voice (H)	Is an art constantly evolving in new directions (H)
		Can be a residual of exit (H), can be a substitute and a complement to exit (H)
Legend	H: Hirschman ¹ ; D: O'Donnell ² ; EK: Krahnmann ³ ; SH: Susan Helper ⁴	

¹ Hirschman, *supra* note 87.

² O'Donnell, *supra* note 109.

³ Krahnmann, *supra* note 98, at 34.

⁴ Helper, *supra* note 97, at 785.

Table II: Submitted LOAs 2013 -2021²²⁸

Month-year	Patent-holder	LOAs (positive/negative)	Standard	Month-year	Patent-holder	LOAs (positive/negative)	Standard
Mar-21	SK Telecom Co., Ltd.	Positive	802.11ax	Oct-20	Cisco Systems, Inc.	Positive	802.11be
Jan-21	NEC Corporation	Positive	802.11-2016	Oct-20	Cisco Systems, Inc.	Positive	802.11ax
Jan-21	NEC Corporation	Positive	802.11ax	Sept/Oct-20	NXP B.V.	Positive	802.11n
Jan-21	WILUS Institute of Standards and Technology Inc.	Positive	802.11ax	Sept/Oct-20	NXP B.V.	Positive	802.11s
Jan-21	MediaTek Inc.	Positive	802.11n	Sept/Oct-20	NXP B.V.	Positive	802.11ac
Jan-21	MediaTek Inc.	Positive	802.11s	Sept/Oct-20	NXP B.V.	Positive	802.11ad
Jan-21	MediaTek Inc.	Positive	802.11ac	Sept/Oct-20	NXP B.V.	Positive	802.11af
Jan-21	MediaTek Inc.	Positive	802.11ad	Sept/Oct-20	NXP B.V.	Positive	802.11ah
Jan-21	MediaTek Inc.	Positive	802.11af	Sept/Oct-20	NXP B.V.	Positive	802.11ai
Jan-21	MediaTek Inc.	Positive	802.11ah	Sept/Oct-20	NXP B.V.	Positive	802.11ax
Jan-21	MediaTek Inc.	Positive	802.11ai	Sept/Oct-20	NXP B.V.	Positive	802.11ay
Jan-21	MediaTek Inc.	Positive	802.11aj	Sept/Oct-20	NXP B.V.	Positive	802.11az
Jan-21	MediaTek Inc.	Positive	802.11ax	Sept/Oct-20	NXP B.V.	Positive	802.11bd
Jan-21	MediaTek Inc.	Positive	802.11ba	Sept/Oct-20	NXP B.V.	Positive	802.11be
Jan-21	ARRIS Enterprises LLC	Positive	802.11ba	Sep-20	KT Corporation	Positive	802.11ah
Oct/Nov-20 ²²⁹	Sony Corporation	Positive	802.11ax	Aug-20	LG Electronics Inc.	Positive	802.11ax
Oct/Nov-20	Sony Corporation	Positive	802.11ay	Mar-20	Google LLC	Positive	802.11-2016
				Dec-19	Apple	Positive	802.11ax

²²⁸ Records of submitted LoAs were retrieved from *IEEE SA Records of IEEE Standard Related-Patent Letters of Assurance*, IEEE STANDARDS ASSOCIATION, <https://standards.ieee.org/about/sasb/patcom/patents.html> (last visited Apr. 08, 2021). Note that although the table takes into account LOAs until 2021 we only study those that were submitted until 2019.

²²⁹ The reference to two months implies that an LoA was submitted in one months and the record of it was published in the following month: i.e. when a company submitted an LoA in the end of October 2020, the LoA, after having been received and processes by the PatCom, was published on the IEEE-SA website in the beginning of November 2020. Negative LoAs are highlighted.

Month-year	Patent-holder	LOAs (positive/negative)	Standard	Month-year	Patent-holder	LOAs (positive/negative)	Standard
Dec-19	Microsoft	Positive	802.11ac	May-17	Orange	Negative	802.11n
Nov-19	Apple	Positive	802.11be	May-17	Orange	Negative	802.11n
Nov-19	Apple	Positive	802.11ba	Mar-17	InterDigital	Negative	802.11ax
Nov-19	Apple	Positive	802.11az	Nov-16	IHP	Positive	802.11az
Nov-19	Apple	Positive	802.11ac	Oct-16	Nokia Tech Oy	Negative	802.11ai
Nov-19	Apple	Positive	802.11-2016	Oct-16	Nokia Tech Oy	Negative	802.11ah
Nov-19	Apple	Positive	802.11-2012	Sep-16	LM Ericsson	Negative	802.11ax
Jul-19	Huawei	Positive	802.11ax	Sep-16	LM Ericsson	Negative	802.11ah
Jul-19	Huawei	Positive	802.11aj	Aug-16	ETRI	Positive	802.11ax
Jul-19	Huawei	Positive	802.11-97/99/07/12/16	Apr-16	Microsoft	Positive	802.11ai
May-19	InterDigital	Negative	802.11be	Mar-16	Nokia Tech Oy	Negative	802.11n
May-19	InterDigital	Negative	802.11bd	Jan-16	Nokia Tech Oy	Negative	802.11ad
May-19	InterDigital	Negative	802.11bc	Jan-16	Nokia Tech Oy	Negative	802.11af
May-19	InterDigital	Negative	802.11bb	Oct-15	Broadcom	Positive	802.11ai
May-19	Huawei	Negative	802.11ba	Jul-15	Samsung El	Positive	802.11af
May-19	Nokia	Negative	802.11ba	Jul-15	Samsung El	Positive	802.11ac
May-19	InterDigital	Negative	802.11az	Jul-15	Samsung El	Positive	802.11ad
May-19	Huawei	Negative	2011ay	Jul-15	Samsung El	Positive	802.11n
May-19	Nokia	Negative	802.11ay	Jul-15	Intel	Positive	802.11
May-19	Huawei	Negative	802.11ax	May-15	Intel	Positive	802.11r
May-19	Nokia	Negative	802.11ad	Mar/Apr-15	Intel	Positive	802.11.2
May-19	Huawei	Negative	802.11a	Mar/Apr-15	Intel	Positive	802.11ai
Jan-19	Siemens	Positive	802.11ax	Mar/Apr-15	Intel	Positive	802.11ah
Nov-18	InterDigital	Negative	802.11ba	Mar/Apr-15	Intel	Positive	802.11af
Nov-18	InterDigital	Negative	802.11ay	Mar/Apr-15	Intel	Positive	802.11ad
Nov-18	Ericsson	Negative	802.11ai	Mar/Apr-15	Intel	Positive	802.11ac
Oct-18	Orange	Negative	802.11n	Mar/Apr-15	Intel	Positive	802.11aa
Jun-18	Koninklijke KPN	Negative	802.11ah	Mar/Apr-15	Intel	Positive	802.11z
Jun-18	Nokia of A Corp	Negative	802.11ac	Mar/Apr-15	Intel	Positive	802.11y
May-18	Endiio GmbH	Positive	802.11ba	Mar/Apr-15	Intel	Positive	802.11w
Mar-18	Intel	Positive	802.11ax	Mar/Apr-15	Intel	Positive	802.11v
Feb-18	Panasonic Corp	Negative	802.11ay				
Feb-18	Facebook Inc.	Positive	802.11ay				
Feb-18	Panasonic Corp	Negative	802.11ax				
Dec-17	ETRI	Positive	802.11ba				
Sep-17	Nokia	Negative	802.11z				
Jun-17	Nokia Tech Oy	Negative	802.11ad				
Mar/Apr - 17	KAIST	Positive	802.11ax				

Month-year	Patent-holder	LOAs (positive/negative)	Standard	Month-year	Patent-holder	LOAs (positive/negative)	Standard
Mar/Apr-15	Intel	Positive	802.11u	Jan-14	Sony Corporation	Positive	802.11-2012
Mar/Apr-15	Intel	Positive	802.11s	Jan-14	Cisco Systems	Positive	802.11ai
Mar/Apr-15	Intel	Positive	802.11r	Oct-13	InterDigital	Positive	802.11ai
Mar/Apr-15	Intel	Positive	802.11n	Oct-13	InterDigital	Positive	802.11ah
Mar/Apr-15	Intel	Positive	802.11n	Oct-13	InterDigital	Positive	802.11af
Mar/Apr-15	Intel	Positive	802.11n	Aug-13	Qualcomm	Positive	802.11ai
Mar/Apr-15	Intel	Positive	802.11k	Aug-13	LG	Positive	802.11ai
Mar/Apr-15	Intel	Positive	802.11	Aug-13	LG	Positive	802.11ah
Mar-15	Nokia Tech	Positive	802.11	Aug-13	Ericsson	Positive	802.11ac
Mar-15	Nokia Sol & Net	Positive	802.11	Aug-13	Broadcom	Positive	802.11ah
Mar-15	AT&T	Positive	802.11	Aug-13	Broadcom	Positive	802.11af
Mar-15	Newracom	Positive	802.11ax	Aug-13	Broadcom	Positive	802.11ad
Mar-15	LG EL	Positive	802.11aq	Aug-13	Huawei	Positive	802.11ai
Jan-15	Samsung El	Positive	802.11n	Aug-13	Huawei	Positive	802.11ah
Dec-14	Marvell	Positive	802.11ai	Aug-13	Huawei	Positive	802.11ac
Dec-14	ATA&T	Positive	802.11/802.11n	Aug-13	Huawei	Positive	802.11i
Oct-14	Thomson Licensing	Positive	802.11	Jul-13	Cisco	Positive	802.11ak
Sep-14	Nokia	Positive	802.11	Jun/Jul-13	ETRI	Positive	802.11ai
Aug-14	Thomson Licensing	Positive	802.11aa	Jun/Jul-13	ETRI	Positive	802.11ah
Jul-14	Wi-Fi One	Positive	802.11a/b/e/f/g/h/i/n/ac	Jun/Jul-13	ETRI	Positive	802.11af
Jun-14	Toshiba	Positive	802.11ad	May/Jul-13	Intel	Positive	802.11ai
Jun-14	Toshiba	Positive	802.11ac	May/Jul-13	Intel	Positive	802.11ah
May-14	Siemens	Positive	802.11ai	May/Jul-13	Intel	Positive	802.11ad
May-14	Marvell	Positive	802.11ah	May/Jul-13	Intel	Positive	802.11ac
May-14	Marvell	Positive	802.11af	May/Jul-13	Intel	Positive	802.11aa
May-14	Marvell	Positive	802.11ad				
May-14	Marvell	Positive	802.11ac				
Feb/Mar-14	KDDI Corporation	Positive	802.11				
Jan/Feb-14	Sony	Positive	802.11af				
Jan/Feb-14	Sony	Positive	802.11ad				
Jan/Feb-14	Sony	Positive	802.11ac				
Jan-14	Broadcom	Positive	802.11p				
Jan-14	Broadcom	Positive	802.11y				
Jan-14	Broadcom	Positive	802.11i				