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EXIT, VOICE AND LOYALTY: STRATEGIC BEHAVIOR IN STANDARDS DEVELOPMENT ORGANIZATIONS

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ABSTRACT: The protection of intellectual property rights and its limits has spurred controversy in the standardization ecosystem in recent times. While conflicting interests in standard-setting abound over a wide range of pertinent aspects, 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. These concerns revolve around the balance between the interests of innovators and implementers of new technologies. In this respect, SDOs adopt patent policies, which members have to observe in order to participate in SDOs' activities. Similarly 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 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 SDOs' members respond to the amendments of intellectual property rules by offering a taxonomy of strategies that may be adopted by members opposing modifications based on the exit and voice theory by Hirschman (1970). Drawing upon the example of the Institute of Electrical and Electronics Engineers (IEEE) revised Patent Policy, which took effect in 2015, the Article explores how SDO members respond to instances of organizational distress such as an update of intellectual property policies within an SDO, using as proxies stakeholders' willingness to commit to the new licensing rules and previous examples of strategies when misunderstandings around intellectual property arose. At a normative level, this Article further studies the effect that such changes may have on the nature and structure of a given industry and offers a novel classification of reactions to turning points in the standards development realm, thereby contributing to the currently underdeveloped body of literature on strategic behavior in technological standardization.

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I. INTRODUCTION

Standards Development Organizations (SDOs) have been in troubled waters in recent times. Lately, the simmering tensions are growing steadily. In the US, participants in several SDOs complain that their views, positions and interests are not duly taken into account in the SDO's decision-making process.

For instance, only last year NSS Labs filed before the US district court in Northern California an antitrust suit against the Anti-Malware Testing Standards Organization (AMTSO) as well as CrowdStrike, Symantec and ESET, which are some of the most important anti-virus (so-called 'endpoint protection' or EPP) product vendors and AMTSO members.[1] 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 and solutions. Big tech companies such as Symantec, McAfee and Microsoft but also cybersecurity-based companies such as CarbonBlack, CrowdStrike, Kaspersky Lab and FireEye participate actively in AMTSO.

Whereas NSS Labs is an AMTSO member, it argues that the defendants conspired against the antivirus product testing industry to prevent independent testing of EPP products by adopting in May 2018 an AMTSO standard, which entails a testing protocol for anti-malware products.[2] NSS Labs claims that AMTSO's practices unduly favor the interests of vendors, which is then reflected in the testing protocol standard that AMTSO produced. 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 testing by those testing companies which do not comply with that standard. This refusal to deal is bound to hurt independent testing services providers, according to the complainant. Being the result of the standard, 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.[3] Furthermore, AMTSO also has a problematic voting rule which, in its quest for balancing, may not be in line with the basic voting principle of consensus

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[1] *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.

[2] See https://www.amtso.org/wp-content/uploads/2018/05/AMTSO-Testing-Protocol-Standard-for-the-Testing-of-Anti-Malware-Solutions-v1.0.pdf (accessed on 3 August 2019). The relevant standard was updated in June 2019: https://www.amtso.org/wp-content/uploads/2019/06/AMTSO-Testing-Protocol-Standard-for-the-Testing-of-Anti-Malware-Solutions-v1.2.pdf (accessed 3 August 2019).

[3] 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.

that permeates standard-setting.[4] 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 also intervened in the case in June 2019.[5] The DoJ's statement of interest urges the District Court to review AMTSO's mechanics and fundamentals, as it also has doubts regarding the balancing of the relevant interests is made in practice 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 standard in this sensitive market.

On the other side of the Atlantic, no less tension is to be observed. The recent introduction of the Standardization Regulation in 2012[6] has instigated policy reforms relating to standardization within the EU and allegedly paved the way for a more inclusive approach towards standard-setting.[7] However, due process and inclusiveness in the standardization processes is more easily said than done, whereas incumbents in the standardization process may be incentivized to make use of their power in a standardization body.

In *Fra.bo*,[8] 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 after the entry into force of the amendment, as required by the DVGW procedure in place. As 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.[9] 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 because the relevant companies had established a private body which was tasked with

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[4] 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 SSOs would require a super-majority of at least 70 percent of the entire membership for a standard to be adopted.

[5] *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.

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

[7] See P. Delimatsis, *Standardisation in Services – European Ambitions and Sectoral Realities*, 41 EUROPEAN LAW REVIEW 4 (2016), 513, at 528.

[8] CJEU Case C-171/11 *Fra.bo SpA v Deutsche Vereinigung des Gas- und Wasserfaches* [2012] ECLI:EU:C:2012:453.

[9] 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 (Panagiotis Delimatsis ed., 2015).

the creation of standards which would delay the introduction of new technological methods which were manifestly bound to reduce the prices of the relevant products. In addition, these companies agreed to impose a collective boycott by refusing to supply to a competitor, when the latter was granted a big district-heating contract in Germany.[10]

Finally, international courts also dealt with the implications that procedural deficiencies may have on the legality and legal value of a given standard promulgated at the national or regional level. In *US-Tuna II*, for instance, the Appellate Body of the World Trade Organization (WTO) also reviewed the operating procedures 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, thus denying the possibility for this SDO to establish international standards within the meaning of the WTO agreement on technical barriers to trade.[11]

The antitrust lawsuit by NSS Labs and the other cases adjudicated before European and international courts bring to the forefront several recurring issues of organizational, institutional and procedural issues common to the functioning of SDOs where competitors interact in the quest for the best technology but also, inevitably, dominance. 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. Rather, vested interests and power dynamics within the institution, coupled with weak governance rules (or unfair enforcement thereof) can create fertile ground for the creation of a cartel that disfavors certain members (for instance, via a group boycott in US antitrust parlance or concerted action 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 also confirmed the pro-competitive benefits of standardization.[12]

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[10] 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.

[11] See P. Delimatsis, *Global Standard-Setting 2.0: How the WTO Spotlights ISO and Impacts the Transnational Standard-Setting Process*, 28 DUKE JOURNAL OF COMPARATIVE AND INTERNATIONAL LAW 273 (2018).

[12] US Supreme Court, *Allied Tube & Conduit Corp. v. Indian Head, Inc*, 486 U.S. 492, 500, 401, 511 (1988).

According to the relevant legislation in the US[13] and the EU,[14] SDOs are required to secure a proper balancing of interests in their function. Previous studies have scrutinized theoretically and empirically the dynamics that develop within an institutional setting of this type and underscored the difficulty of ensuring in practice and over time that technological rationality will always prevail in the decision-making process of an SDO.[15] 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. Typically, like in most organizations, such complaints 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, but, arguably, all of three of them, will be the result of a meticulous cost-benefit analysis.[16] However, the endogenous flexibility of an institutional setting may create the necessary and sufficient conditions for continuous trust in a particular organization.

Whereas several SDO rules may spur controversy, a highly contentious topic in the realm of standardization has been the way certain SDOs protect intellectual property rights (IPRs). 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 everything but a walkover: when charging excessive licensing fees or attempting to distort standard-setting processes through essential patent claims (that is, claiming that one's patent is essential for a given standard), patent-holders effectively prevent access to the standard and arguably use their technological supremacy to the detriment of innovation. On the other hand, the use of patented components without guaranteeing proper remuneration for patent-holders weakens their incentives to invest

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[13] 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. Office of the President, OMB Circular No. A-119 § 2e(ii), as revised January 27, 2016.

[14] See EU Standardization Regulation, recital 2; also 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, paras 277ff.

[15] See T. Büthe and W. Mattli, *Setting International Standards – Technological Rationality or Primacy of Power?* 56 WORLD POLITICS (2003), 1. S. Greenstein and V. Stango (eds), STANDARDS AND PUBLIC POLICY (2006); M. Weiss and M. Sirbu, *Technology choice in voluntary standards committee: An empirical analysis*, 1 INNOVATION AND NEW TECHNOLOGY (1990), 111; R. Lampe and P. Moser, *Do Patent Pools Encourage Innovation? Evidence from 20 US Industries under the New Deal*, NBER Working Paper 18316, 2012; and Delimatsis, supra note 11.

[16] Cf. Josh Lerner and Jean Tirole, *A Model of Forum Shopping*, 96 AMERICAN ECONOMIC REVIEW 4, 1091 (2006).

in research and development (hereinafter: R&D) and to contribute to standards development, thereby risking constraining technological progress.

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. Along with statutes and working procedures, these patent policies form an integral part of SDOs' operational framework: their acceptance is a *passage obligé* for companies to join SDOs' standard-setting activities.[17] In principle, and given that these policies aim to strike a balance between conflicting interests of technology vendors and implementers to avoid potential 'wars of attrition',[18] SDOs' intellectual property rules should be clear and well-constructed to allow for their unambiguous interpretation. A poorly designed patent policy creates ambiguities, which undermines legal certainty among SDOs' participants and may even create fertile grounds for antitrust violations, eventually resulting in undesirable and lengthy litigation.[19] In a similar vein, any modifications to the SDOs' 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, possibly giving rise to discontentment among those who joined based on expectations juxtaposed against the initial repertoire of rules.

Against this backdrop, this Article seeks to explore how SDO members respond to instances of organizational distress such as an amendment of IPR rules within an SDO. More specifically, we use the 'Exit, Voice and Loyalty' framework of Hirschman (1970) to identify a taxonomy of voice and exit strategies for dissatisfied SDO members. By drawing on the example of the Institute of Electrical and Electronics Engineers (IEEE), a leading SDO of global reach,[20] the Article studies the effect 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 on an SDO.

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[17] Note that in most cases, patent policies do not necessarily imply that the participants *should* make licensing commitments: they remain free to choose not to license their technologies. A handful of SDOs nevertheless sets the requirement to commit to license as a condition of participation. See JRC report analysing VITA, W3C, JEDEC, ECMA and DVB Project) Justus Baron; Jorge Contreras; Martin Husovec; and Pierre Larouche, 'Making the Rules – The Governance of Standard Development Organizations and their Policies on Intellectual Property Rights' (hereinafter 'The JRC Report', 2019, at 45, available at: <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC115004/sdo_governance_final_electronic_version.pdf> (accessed 25 June 2019).

[18] Joseph Farrell and Timothy Simcoe, *Choosing the rules for consensus standardization*, 43 RAND JOURNAL OF ECONOMICS 2 (2012), 235.

[19] 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).

[20] With over 423,000 members worldwide, IEEE is the largest technical professional organization: see https://www.ieee.org/about/index.html (last accessed March 24, 2019). 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 2019, https://www.ieee.org/content/dam/ieee-org/ieee/web/org/ieee-constitution-and-bylaws.pdf, Section. I-107. The board of any organizational unit, referred to as Major Boards listed in IEEE Bylaw I-303, shall be deemed to be a Committee of IEEE within the meaning of the New York Not-for-Profit Corporation Law (last accessed March 24, 2019).

The rest of this Article is organized as follows: Section II deciphers the importance of patent policies in standardization activities, paving the way for Section III where we discuss the challenges that an SDO has to face when it revisits its patent policy, taking the example of the controversial modification of the IEEE patent policy. It further discusses recent studies that sketch the short-term impact of the revision on standardization activity within the IEEE SA based on the number of patent declarations submitted before and after the new policy took effect. The discussion takes into account that, in view of the recent change, no definite conclusion can be drawn as regards the long-term consequences of the new policy. Section IV introduces Hirschman's conceptual framework with a view to better understanding strategies and practices within SDOs in challenging times 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) setting 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. The option and ensuing costs of exit is also discussed, in an attempt to offer a taxonomy of strategies within SDOs in an orderly manner. Finally, the article identifies steps that an SDO could undertake with a view to mitigating and avoiding such a conundrum under this scenario. Crucially, when reviewing the potential strategies and scenarios, we also shed light on the role that competition and other public authorities can play in this equation. Section VII concludes.

II. THE ROLE OF PATENT POLICIES IN STANDARDIZATION ACTIVITIES

SDOs develop standards that contribute to technical advancement in their field of expertise. To achieve their mission, SDOs' processes strive to balance the divergent interests of their heterogeneous membership: after all, most SDOs are expected to offer standard developers a neutral forum for cooperation. The fulfillment of such an undertaking necessitates that the rules and procedures governing standards development do not favor any particular group of contributors, but rather aim to avert or mitigate potential conflicts of interests. From that perspective, consensus building is typically seen as a mechanism to prevent standards development processes from resulting in biased or even discriminatory outcomes, as well to ensure the wide-scale adoption of standards.[21]

Contrary to standards development processes, decisions on SDOs' operational framework are not always carried out by consensus; consequently, a patent policy may not necessarily represent a "general consensus" among SDO's members and participants,[22] but be a product of

[21] For the advantages of consensus-based standard development, see T. Simcoe, *Standard Setting Committees: Consensus Governance for Shared Technology Platforms*, 102 AMERICAN ECONOMIC REVIEW 1, 305 (2012); and J. Pelkmans, *The GSM Standard: Explaining a Success Story*, 8 JOURNAL OF EUROPEAN PUBLIC POLICY 3, 432 (2001).

[22] 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*

deliberations among the SDO's leadership entrusted to develop rules and policies governing the SDOs' activities. Generally, SDOs enjoy a greater freedom to design their rule-making process, as long as those do not contradict the applicable legislation: stakeholders joining particular SDOs are then presumed to have understood and agreed with their rules and processes.

Yet, in the complex world of standard-setting, disagreements are virtually unavoidable, especially when the matter relates to IPR policies. While different approaches regarding the value of a certain technology abound across the industry, avoiding conflicts arising from IP-related issues in a standard or technical specification is one of the essential missions of any resilient SDO. In particular, this applies to organizations operating in the sphere of information and communication technologies (ICT) and developing solutions for technological interoperability, including specifications for internet architecture and wireless connectivity systems. Such standards often rely on technologies protected by patents whose usage requires the "permission" of patent-holders, typically granted in the form of licenses. Without a valid license, any implementation of a patented component (and hence of the standard based on that component) will infringe the relevant IPR claim and deprive the patent-holder of its right to remuneration. On the other hand, when charging excessive licensing fees or strategically raise essential patent claims, theory would suggest that patent-holders may effectively prevent access to the standard and abuse their technological supremacy.[23]

Patent policies within SDOs typically address issues as terms of access to proprietary technologies, licensing commitments, disclosure and enforcement of essential patent claims. They form an integral part of SDOs' statutory framework and, arguably, constitute an important insurance policy. They are binding upon their members and/or participants of their standardization activities.[24] As in the case with all rules and procedures governing SDOs' activities, patent policies should be clear and well-constructed to allow for their unambiguous interpretation. A policy fraught with ambiguities opens up avenues for undesirable conduct and

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Calls: Standards Outsiders and Unencumbered Patents, 12 JOURNAL OF COMPETITION LAW AND ECONOMICS 3, 507 (2016).

[23] This may occur when patent-holders engage in value appropriation through strategic manoeuvring such as patent ambush or hold-up. For related discussions, see J. Farrell; J. Hayes; C. Sharipo; and T. Sullivan, *Standard Setting, Patents and Hold-Up*, 74 ANTITRUST LAW JOURNAL 3 (2007) 603; M, Lemley and C. Shapiro, *Patent Hold-Up and Royalty Stacking* 85 TEXAS LAW REVIEW 1991 (2007). That said, empirical evidence of patent hold-up is rather scarce, K. Gupta, *The Patent Policy Debate in the High-Tech World*, 9 JOURNAL OF COMPETITION LAW AND ECONOMICS 4 (2013) 827; and A. Layne-Farrar, 'Intellectual Property and Standard Setting' (OECD Doc DAF/COMP/WD(2014)84, 18 November 2014); and A. Galetovic and S. Haber, *The Fallacies of Patent-Holdup Theory*, 13 JOURNAL OF COMPETITION LAW AND ECONOMICS, 1 (2017).

[24] To illustrate, Bekkers and Updegrove unveil binding commitments of patent policies of a number of SDOs, see R. Bekkers and 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. (May 2013), available at https://www.nap.edu/resource/18510/Bekkers-Updegrove%20Paper_092013.pdf (last accessed 24 March 2019), at 35. In a recent dispute between TCL and Ericsson, the US District Court of California held in December 2017 that, under French law, a FRAND licensing commitment of ETSI Patent Policy should be seen as a contractual obligation for the benefit of a third party under common law, and is hence enforceable by Courts: *TCL Communications v. Ericsson* (SACV 14-341 JVS (DFMx) and CV 15-2370 JVS (DFMx).

increased susceptibility to antitrust violations, potentially leading to lengthy litigation.[25] This, however, does not prevent patent policies from being sufficiently flexible to adjust to the needs of SDOs' membership and market or legal developments.

In general, patent policies may: (a) require stakeholders to disclose patent claims that, to their knowledge, are infringed by the implementation of a standard ("disclosure obligation"); (b) oblige patent-holders to reveal their licensing terms *prior* to standard's approval by an SDO (*"ex ante* disclosure of licensing terms"); and (c) to commit to license their proprietary technologies on (fair), reasonable and non-discriminator ("F/RAND")[26] or royalty-free terms ("licensing obligation"). A combination of disclosure and licensing obligations is not uncommon.[27] While each of these requirements provoked both criticism and support from the industry, governments and academics,[28] they intend to achieve the ambitious objective of providing rules of thumb that could potentially protect and balance the interests of both the patent-holders and patent-users, while shielding the SDO and its members from potential antitrust violations.

A more recent study on incentives of Standard Essential Patent (hereinafter: SEPs) holders to license their technology on Fair, Reasonable and Non-Discriminatory (hereinafter: FRAND) terms suggests that the value of incorporation of essential technologies into a standard depends on the SDOs' reputation; in this regard, to anticipate whether SEP holders will comply with their licensing commitments they have given to other SDO's participants, one should take into account that in high-tech industries, standard-setting process is often characterized by repeated interaction between SDO members.[29]

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[25] E.g. *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). Industry representatives also mention confusing and opaque policies as one of the blocking factors for their effective participation in standards development, next to time and financial concerns. Interviews with industry representatives on January 16, 2018; January 25, 2018; and February 19, 2018; on file with the authors.

[26] In this Article, FRAND and RAND are used interchangeably.

[27] 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 (27 June 2011), available at https://www.nist.gov/sites/default/files/nistgcr_11_934_empircalstudyofeffectsexantelicensing2011_0.pdf (last accessed 4 February 2019).

[28] See, among many others, U.S. Department of Justice & Federal trade Commission, *Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition* (April 2007), available at www.usdoj.gov/atr/public/hearings/ip/222655.pdf (last accessed 24 March 2019); J. Farrell et al, supra note 23; S. Mutkoski, **'**Government Procurement Policy, Patent Royalties and the Myth of 'Discrimination' Against Free and Open Source Software Developers**'**, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1949832 (last accessed 24 March 2019); J. Tsai and J.D. Wright, 'Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts' 80 ANTITRUST LAW JOURNAL 1, 157 (2015); Y. Ménière, *Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms. Research Analysis of a Controversial Concept.* JRC Science and Policy Report (2015) available at http://publications.jrc.ec.europa.eu/repository/bitstream/JRC96258/jrc96258.pdf (last accessed 24 March 2019). A. Layne-Farrar, *The Economics of FRAND, in* ANTITRUST INTELLECTUAL PROPERTY AND HIGH TECH HANDBOOK (Daniel Sokol ed., 2017).

[29] See P. Larouche and F. Schuett, *Repeated Interaction in Standard Setting*, 28 JOURNAL OF ECONOMICS AND MANAGEMENT STRATEGY 3, 488 (2019); also G. Llanes, *Ex-ante Agreements and FRAND*

Since many standards evolve over time, with several releases succeeding each other and building on the previous generations, repeated interaction create scope for participants to punish a contributor who misbehaved by voting against the inclusion of its technologies in the next generation of the standard, in fact allowing technology contributors to hold other contributors' market power in check and ensure compliance with FRAND commitments. The same study also demonstrated how the procedural rules of some SDOs affect the sustainability of an equilibrium with FRAND royalties by setting the super-majority requirement used by SDOs when voting on the adoption of technologies at a sufficiently demanding level and by discarding proposals that have not received the necessary super-majority. These empirical findings spark a further debate on how SDOs' governance induce patent-holders to comply with their licensing commitments.

Therefore, balanced patent policies are crucial to the successful development of standards of every SDO. To alleviate potential antitrust concerns *ex ante* while ensuring an adequate compensation for patent-holders, SDOs need to create and maintain a harmonious and collaborative environment for standardization activities by adopting an appropriate patent policy – a formal policy that governs matters related to IP and incorporation of patented elements into their standards.

A vivid example of how the requirement to license standard-essential patents (SEPs) operates is provided by IEEE SA. Following IEEE SA's patent policy, a patent-holder should, after having identified their technology as essential to (an) IEEE standard(s), submit a Letter of Assurance (LoA) asserting its licensing intentions.[30] 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).[31] The latter does not automatically lead to the exclusion of the technology at issue - or its owner - from the standards development: however, the absence of a LoA is taken into account during the process of standards approval.[32] A patent-holder may even submit a "blanket" LoA that applies to *all* of its existing and future SEPs, rather than making a FRAND declaration for only specific essential claims: while such a declaration does not identify a specific patent and, arguably, lacks transparency, it ensures that a sometimes substantial amount of patents is subject to the

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Commitments in a Repeated Game of Standard-Setting Organizations, 54 REVIEW OF INDUSTRIAL ORGANIZATION 1, 159 (2019) (suggesting that structured licensing commitments such as price caps are inefficient in a repeated interaction setting).

[30] See the definition of LoA in IEEE SA Bylaws: "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." Article 6.1 of IEEE Standards Association's (IEEE-SA) Standards Board Bylaws (March 2019), available at http://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf (last accessed 24 March 2019).

[31] Article 6.2 of Standards Board Bylaws.

[32] See also Business Review Letter to the Institute of Electrical and Electronics Engineers (30 April 2007), available at https://www.justice.gov/atr/response-institute-electrical-and-electronics-engineers-incs-request-business-review-letter (last accessed 24 March 2019); Business Review Letter to the Institute of Electrical and Electronics Engineers (2 February 2015), available at http://www.justice.gov/atr/public/busreview/311470.htm (last accessed 24 March 2019).

FRAND commitment.[33] Once filled out and signed by the patent-holder, the LoA form is submitted to the IEEE Patent Committee (PatCom) prior to the final approval of the standard at issue by the IEEE SA Standards Board. The signed LoAs are irrevocable and create binding obligations for their submitters to the date that the standard is withdrawn.[34]

Since patent policies may impose constraints on the discretion of stakeholders to set royalty rates, they can also be regarded as an important indirect cost of an SDO membership. However, when a patent-holder refuses committing to such licensing requirements, an SDO has to consider developing standards using alternative technologies,[35] which may result in suboptimal results. Consequently, patent policies exert normative pull on participants faced with technology selection and wield significant influence on the outcomes of negotiations relating to the promulgation of standards.

III. MODIFICATIONS OF PATENT POLICIES

The process of designing, revising and enforcing patent policies is intrinsically a matter of SDOs' governance: regulators typically prefer to undertake a "procedural approach" requiring that SDOs' legal frameworks do not contravene existing laws. Notwithstanding the method followed by an SDO in its governance processes, modifications of its rules and policies, including those on IP, are of crucial importance for the participants in standards development, since they can distort the understanding of costs to benefits analysis when seeking membership of the SDO.[36]

For this reason, rules that significantly affect standards development such as patent policies should be considered as part and parcel of such development. They are as important and relevant for members as the voting procedures for technical aspects of any given standard developed. By the same token, procedural aspects surrounding the functioning of an SDO are of substantive nature.[37] Accordingly, when the rules change, a situation may arise wherein the expectations based on the initial repertoire of rules are not being fulfilled, thus imposing

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[33] In this regard, see T. Pohlmann who suggests that "while blanket declarations can provide broader FRAND assurances, they also can limit the accuracy and usefulness of patent counting", T. Pohlmann, *Empirical Study on Patenting and Standardization Activity in IEEE,* IPlytics GmbH (March 2017), available at https://www.iplytics.com/wp-content/uploads/2018/01/IPlytics_2017_Patenting-and-standardization-activities-at-IEEE.pdf (last accessed 21 March 2019), at 5.

[34] Business Review Letter to IEEE (2007), *supra* note 32, at 7.

[35] E.g. ETSI Intellectual Property Rights Policy, Annex 6 ETSI Rules of Procedure (3 April 2018), available at http://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf (last accessed 24 June 2019), clause 8.

[36] In this regard, see also Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEORGETOWN LAW JOURNAL ONLINE (2015) 48, at 56.

[37] Cf. Delimatsis, supra note 11, 101. Indeed, a smooth functioning of an SDO 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 – and thus on ensuring harmony within the organization. L. Kiser and E. Ostrom, *The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches, in* STRATEGIES OF POLITICAL INQUIRY (E. Ostrom ed., 1982).

constraints and obligations scarcely anticipated by the affected member(s).[38] It would be erroneous to believe that all participants would become SDO members in the first place if they somehow knew in advance that they will have no real say in the modification of such policies. Therefore, the revision of SDOs' operational rules must be undertaken in a balanced manner that seeks to reflect the interests of all stakeholders and interests.[39] This is especially the case when the changes are retroactive and affect previous commitments made by members and in cases where the conflicts of interests are evident such as in the case of AMTSO (antivirus companies versus testing companies) or the IEEE (innovators versus implementers).

A. Iterations of Revisions of Patent Policies

Revisions of SDOs' patent policies may be spurred by new market developments or as a response to critique by governmental authorities. In general, SDOs modify their intellectual property rules about once a year:[40] while most of these changes are rather minor, some substantial modifications include amendments to the rules on transfer of intellectual property and clarifications to disclosure and licensing requirements.[41] Most of these revisions were fueled by concerns of patent ambush and excessive royalty rates set by patent-holders,[42] and aimed to ensure that patent-holders do not wield undue market power because of their ownership of essential technologies.[43]

The history of modifications to SDOs' patent policies is rich in some more 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.[44] The policy change was induced by a series of EC investigations on

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[38] 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.

[39] G. Willingmyre, 'Giving Process its Due When a Standard Development Organization Changes the Rules of the Game' (2017) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2903602 (last accessed 24 March 2019). The JRC report, however, refers to scholarship that stated that coalition of clubs may fail to adopt efficiency-enhancing rules because members may vote against rules that may improve organizational performance if these rules weaken their influence on future policy revision, or they anticipate that they are difficult to reverse; following this reasoning, not all interests should be taken on board when revising the policy. See The JRC Report, at 84.

[40] Tsai&Wright, *supra* note 28.

[41] See JRC report, referencing among others, Layne- Farrar, *supra* note 23; Tsai&Wright, *supra* note 28; J. Baron and D. Spulber, *Technology Standards and Standard Setting Organizations: Introduction to the Searle Center Database*, 27 JOURNAL OF ECONOMICS AND MANAGEMENT STRATEGY 3, at 478 (2018).

[42] Layne-Farrar, *supra* note 23.

[43] The JRC report, p. 139.

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

SEP holders,[45] and was amended in 2004 to include an obligation to disclose essential claims and to commit to licensing on broad FRAND terms.[46] This disclosure obligation was reinforced in the 2005 revision, in response to continuing antitrust concerns expressed by the Commission.[47] However, the subsequent attempt to introduce yet another amendment in 2006, this time stipulating, among others, the requirement to disclose the licensing terms *ex ante*, was not well received by the EC,[48] which led to the adoption of less stringent licensing requirements in 2007.

Also the VMEbus International Trade Association, commonly known as VITA, an SDO developing standards for VMEbus technology and electronic interconnections and systems design,[49] has experienced 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.[50] In 2006, VITA outlined a policy that required, alongside the disclosure of Standard Essential Patents (SEPs), *ex ante* disclosure of the maximum royalty rates a technology vendor would demand for the licensing of its essential patent claims.[51] VITA's proposed rules implied that patent-holders that failed to comply with the disclosure requirement would be obliged to license their technologies on royalty-free basis.[52] The policy was commended by the two authorities in the realm of US standardization: the US Department of Justice furnished a positive Business Review Letter (BRL) in which it concluded on an optimistic note that the new patent policy did not give rise to be challenged on anticompetitive grounds.[53] 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).[54]

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[45] M. Dolmans, *Standards for Standards,* 26 FORDHAM INTL. LJ. 1, 163 (2002).
[46] Ibid.
[47] Ibid.
[48] 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 27, note 61 and accompanied text.
[49] 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 and Updegrove, *supra* note 24, at 8.
[50] Business Review Letter Request of 15 June 2006, from R.A. Skitol to Assistant Attorney General T.O. Barnett, available at https://www.justice.gov/sites/default/files/atr/legacy/2014/06/16/302160.pdf (last accessed 24 March 2019) at 2 and 3.
[51] *Ibid,* at 3 and 4.
[52] *Ibid,* at 2.
[53] More specifically, the DoJ found that "VITA's Patent Policy is an attempt to preserve competition and thereby to avoid unreasonable patent licensing terms that might threaten the success of future standards…delay adoption and implementation after standards are set". Business Review Letter to VMEbus International Trade Association of 30 October 2006, available at https://www.justice.gov/atr/response-vmebus-international-trade-association-vitas-request-business-review-letter (last accessed 24 March 2019). The Business Review Letter provides a non-binding statement that the DoJ does not intent to take any antitrust enforcement action.
[54] See J. Contreras, *An Empirical Study on the Effects of Ex Ante Licensing, supra* note 27, n 42 and 43 and accompanied 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').

In the software industry, the Organization for the Advancement of Structured Information Standard (OASIS), a global consortium mainly administering software standards, initially had a RAND-based Patent Policy ("Legacy IPR Policy"), which however did not receive a unanimous endorsement across different industry fields.[55] A so-called "multi-track" patent policy adopted in 2005 was deemed to be more appropriate considering the broad scope of OASIS activities, since it allowed working groups to choose from three different sets of licensing requirements ("IPR modes"): reasonable and non-discriminatory terms (RAND); royalty free on RAND terms; and royalty-free on limited terms.[56] The amendment introduced a formalized requirement to grant licenses for SEPs through any of the three IPR modes.[57] 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.[58] The subsequent policy modification of 2009 introduced the Non-Assertion IPR Mode,[59] the result being, OASIS patent policy now contains four optional 'tracks'.[60] 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.[61] A revised Policy, adopted in 2003, required all members of its working groups to offer their technology on royalty-free basis, except when the essentiality is established by the Patent Advisory Group (PAG) (consisting of all working group members and the W3C chair), and when other technologies are not available.[62] Despite being still the W3C policy, there were stakeholders who argued that the policy change would produce significant adverse effects on innovation.

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[55] 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, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2535735 (last accessed 24 March 2019).

[56] OASIS, IPR (20 January 2005), available at https://www.oasis-open.org/policies-guidelines/ipr-2005-01-20 (last accessed 24 March 2019).

[57] Ibid.

[58] See i.e. an email from Lawrence Rosen, entitled 'A call to action on OASIS Patent Policy' (22 February 2005) available at https://lwn.net/Articles/124548/ (last accessed 24 March 2019). Anecdotally, the opposition was driven by W3C members who also happened to be members of OASIS and did not favor open software licensing.

[59] 'OASIS Introduces Non-Assertion Mode to Its Intellectual Property Rights Policy for Standards Development' (15 June 2009), available at https://www.oasis-open.org/news/pr/oasis-introduces-non-assertion-mode-to-its-intellectual-property-rights-policy-for-standards (last accessed 24 March 2019).

[60] Current policy was approved in July 2013 and is available at https://www.oasis-open.org/policies-guidelines/ipr (last accessed 24 March 2019).

[61] According to Contreras, the 2,500 comments on patent policy, most of which were negative, have been reviewed by the W3C. J. Contreras, *A Tale of Two Layers: Patents, Standardization and the Internet*, DENVER LAW REVIEW 853, at 877 (2016).

[62] W3C Patent Policy (5 February 2004, updated 1 August 2017) available at https://www.w3.org/Consortium/Patent-Policy-20170801/ (last accessed 24 March 2019).

Thus far, the review of literature 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,[63] with his findings suggesting that the introduction of the 'multi-mode' policy in 2005 is correlated with a significant decrease in the rate of addition of new members. 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.[64] 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' 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.[65]

In the case of VITA, Contreras analyzed the effects of VITA's patent policy revisions on its membership levels and pace of standardization activities.[66] 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 IPR 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: [67] in this regard, Contreras' 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 decrease in its membership after the adoption of its new patent policy. This does not only demonstrate that the revisions of patent policies may affect the membership and composition of SDO, but also that the effects would depend on SDOs institutional context and setup.

B. IEEE Patent Policy Update

1. Substance of revisions

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[63] Stoll, *supra* note 55.
[64] 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 55, at 28.
[65] Ibid.
[66] J. Contreras, *An Empirical Study on the Effects of Ex Ante Licensing, supra* note 27.
[67] As a part of this study, VITA's members were asked to fill in the 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.

The very first version of the IEEE Patent Policy dates back to the 1990 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.[68] The concerns posed by such drawbacks drove the IEEE-SA members to undertake significant revisions to the Policy in 2006.[69] 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.[70] Alongside these novelties, the policy also clarified that the commitments stemming from LoAs were irrevocable and binding upon the Submitter and its affiliates.[71] The DoJ commended the proposed modifications, having observed that it would indeed 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".[72] Upon obtaining a favorable Business Review Letter, the IEEE SA Standards Board adopted the new policy in May 2007.

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,[73] and the lack of clarity on the definition of "reasonable rates" and "non-discriminatory" in FRAND appeared to hinder standards development.[74] Meanwhile, discussions concerning SDOs' patent policies drew the attention of governmental agencies and academics,[75] possibly triggered by the "new wave" of litigation on SEPs.[76] 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

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[68] *Ibid,* at 8.
[69] M.A. Lindsay, Business Review Letter Request to Assistant Attorney General, T.O. Barnett (29 November 2006), available at https://www.justice.gov/sites/default/files/atr/legacy/2014/01/28/302148.pdf (last accessed 24 March 2019), at 3 and 5.
[70] Business Review Letter to IEEE (2007), *supra* note 32.
[71] Business Review Letter Request (2006), at 4.
[72] Business Review Letter to IEEE (2007), *supra* note 32, at 10.
[73] The IEEE-SA only received two LoAs out of 40 in which patent holders accepted to disclose maximum rates: M.A. Lindsay, Business Review Letter Request to Assistant Attorney General, W.J. Baer (30 September 2014), available at https://www.justice.gov/sites/default/files/atr/legacy/2015/02/17/311483.pdf (last accessed 24 March 2019), at 10.
[74] *Ibid.* That lead to diverse interpretation of the 2007 policy, see K. Karachalios, 'Fundamental Uncertainty at the Intersection between Patents and Standards' (November/December 2015) The *Patent Lawyer,* 33.
[75] See, especially, 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 (10 October 2012), available at http://www.justice.gov/atr/public/speeches/287855.pdf (last accessed 24 June 2019).
[76] E.g. cases as *Microsoft Corp. v. Motorola, Inc.,* No. C10-1823, 2013 WL 2111217; *Apple, Inc. v. Motorola Mobility, Inc.* No. 11–cv–178–bbc, 2012 U.S. Dist LEXIS 157525, *Ericsson Inc. v. D-Link Sys., Inc.,* No. 6:10-CV-473, 2013 WL 4046225, and many others.

DoJ to provide a BRL, the IEEE SA submitted four changes[77] it intended to implement in the new patent policy. The first two proposed modifications (that is, first, the prohibition for Submitters of LoAs[78] that have been determined complete and posted on the IEEE SA web site ("Accepted LoAs") to seek, or seek to enforce, injunctions (or, "Prohibitative Order") against implementers unless those fail to participate in, or to comply with the outcome of an adjudication by the appropriate authorities;[79] and, second, 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) introduce explicit changes to the policy. The remaining two points rather 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)[80] 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.[81] The latter point in particular would mean that licenses could be granted for inputs of a particular product (such as chips, screens or transistors) instead for the entire, final product (such as a mobile phone or a car).[82]

The significant departure of the revised policy from common practice did not go unnoticed by a number of scholars and other SDOs:[83] for instance, it has been questioned whether the substance of the new IEEE Patent Policy and the process of its adoption could potentially

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[77] 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; some, however, talk about revisions to highlight the departure of the new policy from previous practice.

[78] Note that according to the language of IEEE Patent Policy, "Submitter" is an individual or an organization providing an LoA, who may not necessarily be the SEP holder.

[79] The reason that policy provides is that there is sufficient compensation for Accepted LOAs.

[80] On SSPPU, see David Kappos and (The Honorable) Paul R. Michel, *The Smallest Salable Patent-Practicing Unit: Observations On Its Origins, Development, And Future*, 32 BERKELEY TECH. L.J. 1433 (2018). This method was deemed a good starting point for FRAND determinations in an evidentiary rule developed by the U.S. Court of Appeals for the Federal Circuit.

[81] Business Review Letter Request (2014), *supra* note 73, at 15 – 17; also IEEE SASB Bylaws clause 6.

[82] 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 dispute that demonstrates how questions of licensing, SEPs and SDO patent policy permeate most, if not all, industrial sectors. At the heart of the claim is the allegation by Continental, a supplier of cellurar components to car manufacturers, that Avanci, a patent poll licensing cellular SEPs, breached FRAND commitments for the SPEs that it offered to license. In essence, according to Continental, Avanci only licensing patents directly to car manufacturers, thereby hitting two birds with one stone: first, inflating its royaltie rate by taking the final vehicle as the basis for such calculation and, second, excludes competition, by refusing to license patents to intermediaries like Continental Automotive Systems that are active in the components market. See *Continental Automotive Systems, Inc. v Avanci, LLC et al*, Case No. 5:2019cv02520, May 10, 2019.

[83] IEEE became the first SDO regulating FRAND royalties, and quite exceptional in referring to commercial – and not only technological – essentiality. Most importantly, a reasonable rate is a commonly specified percentage of the price of a downstream product, rather than of a compliant implementation. See Sidak, *supra* note 36, at 59. Remarkably, similar changes to patent policy were not accepted in ETSI or ITU due to the lack of consensus among SDO members. Recently, IEEE withdrew its request for partnership at 1M2M project co-hosted by ETSI, allegedly due to the incompatibility of IEEE Patent Policy with the one of ETSI. Interviews with industry representatives, January 15, 2018; January 16, 2018 and January 17, 2018; on file with the authors.

breach EU competition law.[84] The suggested alleviation 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.[85] Nonetheless, the proposed revisions were not opposed by the DoJ, which observed that the new policy "brought clarity to the FRAND commitment and hence has a potential to facilitate and improve standards development process".[86]

2. Analyses of Effects of the Updated Policy

Modifications to IEEE Patent Policy generated debate on its effects on the work of the IEEE and on the industry in general. Upon the adoption of the new rules to the SDO's operational framework, various attempts have been made to sketch the (admittedly, short-term) impact of the policy amendments on standardization activity within the IEEE based on the number of submitted LoAs. One of the first reactions was offered by Katznelson, who observed the increased amount of missing LoAs (meaning, LoAs that were not provided by patent-holders despite the request by the IEEE-SA), alongside the overall decrease of submitted LoAs after the policy took effect in March 2015.[87] Katznelson also suggested that the ever-increasing number of negative declarations creates uncertainty about the adoption of a standard, as well as incorporation of IEEE standards by other SDOs, thereby having a chilling effect on technological innovation.

Katznelson's arguments were rebutted by a response from Ohana, who submitted that the policy change in IEEE was driven by concerns in its standardization processes and pointed out the liberty of SDOs to experiment with diverse licensing models.[88] Such diversification, according to Ohana, is beneficial to a broad range of stakeholders, including standard-setters

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[84] N. Zingales and O. Kanevskaia, *The IEEE-SA Patent Policy update under the lens of EU competition law*, 12 EUROPEAN COMPETITION JOURNAL 2-3, 195 (2016); 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).

[85] See Hoffinger, who explained that "the likelihood that the same major IP buyers responsible for the changes in the IEEE policy will likewise boycott the alternative standard and technology incorporated therein unless SEP owners capitulate to their collective demands on price. This will, among other things, make it difficult for a new standardization project to attract a critical mass of SEP owners needed to get the project off the ground"; R. Hoffinger, 'The 2015 DOJ IEEE Business Review Letter: The Triumph of Industrial Policy Preferences Over Law and Evidence' *2 CPI Antitrust Chronicle* (March 2015), at 23.

[86] Business Review Letter to IEEE (2015), *supra* note 32, at 6.

[87] 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); R. Katznelson, 'The IEEE controversial policy on Standard Essential Patents – the empirical record since adoption', most recent version available at http://bit.ly/IEEE-LOAs (last accessed 24 March 2019).

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

and consumers. Another critique of Katznelson's analysis referred to its lack of consideration of submitted "blanket" LoAs, as mentioned in the empirical study of IPlytics.[89]

While the data assessed by IPlytics demonstrates that the major increase in the number of submitted LoAs in 2015 was indeed followed by a dramatic reduction in 2016, IPlytics asserts that "patent counting" may not be the right approach to evaluate IEEE's robustness since it fails to embrace the common practice of submitting blanket declarations, which in turn also cover their IPRs in the successive versions of a standard. Instead, IPlytics uses alternative methods, such as the number of approved standards, citations of IEEE technical specifications and the amount of Project Authorization Requests (PARs), to assess the consequences of the 2015 policy amendment for IEEE standardization activities. The findings of this study indicate the increase of approved standards and PARs in 2015 and 2016 in comparison to the preceding years, and concludes that while the number of LoAs received after the new policy took effect is generally in line with historical fluctuations, standardization activities within IEEE-SA continue to flourish.[90] The drawback, however, of this otherwise thorough analysis is that it does not differentiate between the negative LoAs, declarations containing restatements of patent-holders' commitments given prior to the implementation of the revised policy, and "new" LoAs.

Using the same datasets as Katznelson and IPlytics, Mallinson examined the number of LoAs submitted to the IEEE after the new policy took effect.[91] Mallinson revealed that nearly three quarters of LoAs submitted to 802.11 Working Group, and almost a half of all LoAs submitted to the IEEE in 2016-2017 were negative, whereas more than one third of major contributors to IEEE standardization were unwilling to license their technologies under the new terms. Mallinson concludes on a less optimistic note than IPlytics and warns that the absence of positive LoAs creates greater uncertainty for implementers and may even cripple the future implementation of a standard.

The most recent analysis was provided by Gupta and Effraimidis in 2018, who studied the effect of the modified patent policy 802 LAN/MAN Standards Committee (LMSC), as its Working Groups account for the major share of patented technologies incorporated into standards.[92] Similarly to the previous studies, they analyzed the number of LoAs and PARs submitted before and after the new policy was introduced; they also explored whether and to what extent did the policy revision affect the duration of standardization activities within the

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[89] 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 (last accessed 10 September 2019).

[90] Along similar lines, Contreras concluded that there was an increase in IEEE's standardization activity after adoption of 2007 policy. J. Contreras, *An Empirical Study on the Effects of Ex Ante Licensing, supra* note 27.

[91] K. Mallinson, 'Development of innovative new standards jeopardised 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 (last accessed 24 March 2019).

[92] K. Gupta and G. Effraimidis, *IEEE Patent Policy Revisions: An Empirical Examination of Impact*, 64 THE ANTITRUST BULLETIN 2 (2019), 151.

IEEE. Their findings on LoAs are in line with those of Mallinson and Katznelson and reveal that a large share of LoAs provided by patent holders after the revised policy took effect are either "repeat" or "negative". Next to a slight decline in PARs submission to 802 LMSC, they further observe that the comment resolution process in 802.11 WLAN working group takes, on average, more than three-quarter longer than under the previous policy, and hence negatively affects standards' approval speed. Interestingly, this conclusion is starkly in contrast with Contreras' findings on the consequences of the 2007 policy update as regards the duration of standardization process.[93] Yet, Contreras also suggested that the increase of standardization activities in both VITA and IEEE shortly after the policy revision was not correlated to the amended licensing requirements and could be explained by other factors: following his analysis, the same applies to membership fluctuations of both organizations.[94]

Based on these studies, we submit 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.

IV. EXIT, VOICE & LOYALTY AS A RESULT OF POLICY CHANGE IN AN SDO

A. Introduction to Hirschman's Framework

In his treatise 'Exit, Voice and Loyalty' (1970), Hirschman suggests that when consumers face a decline in the quality of a product or service, they may respond by "voicing" their dissatisfaction to the firm providing those goods or services in the hopes of an improvement, or else opt for exiting or switching to a different provider. Hirschman notes that such a choice is applicable even for non-economic organizations such as trade unions where services are provided to members without 'direct monetary counterpart'.

When consumers or members opt for "voice", firms are alerted to the deficiency and are able to respond to make amends and incorporate learnings. However, if a 'critical mass' of consumers swiftly opt for exit (switching), it may imperil the survival of the firm, or in the case of a membership-driven organization, lower its membership to unsustainable levels. Hirschman recognizes that although markets are seldom perfectly competitive, the function of "loyalty" among the consumers/ members provides a 'regenerative' effect by inducing inertia/ delay on the decision to "exit". The provider is afforded the time and latitude to perceive discontentment and undertake the appropriate course correction.

1. Definition of Voice, Exit and Loyalty

[93] J. Contreras, *An Empirical Study on the Effects of Ex Ante Licensing, supra* note *supra* note 27.
[94] Ibid.

Hirschman defines voice as *"any attempt at all 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"*. Furthermore, he notes that, voice emerges as the "only means" of expressing discontent when there is monopolistic supply (thus no switching option) or if the deterioration in quality occurs simultaneously across all competing service/ goods providers, thus rendering switching futile. Thus, market structure plays a key role in the expression of voice as opposed to exit.

In contrast to voice, Hirschman suggests "exit" to be an act of withdrawing from the organization. With regard to the specific example of a consumer availing a product or a service, an exit without making a fuss carries the allure of being less "messy" or in the words of Hirschman 'a private, "secret" vote in the anonymity of a supermarket' (see page 16, Hirschman 1970). Hirschman also notes the preference for 'neatness of exit over the messiness and heartbreak of voice'.[95] Voice is a costly alternative since it requires effort and time and risks additional delays and free riding.[96]

Exit may thus emerge to be the dominant strategy for members. Even more so, when the desired outcomes are more likely at other fora. The latter, however, presupposes low switching costs, or else reliable alternatives. Hirschman observes that 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'. 'Loyalty', therefore emerges as the factor that compels members to stick around or delay their exit (despite availability of a 'competing or substitute' organization). Hirschman opines that such members moved by "loyalty" are driven by the need to 'do something' by exerting their influence (which necessitates staying on as a member). The alternate motivators being: waiting on their faithfulness whilst hoping that the complaints of *others* may bring about change (italicized by Hirschman), and the inertia to exit given the possibility of reversal of the situation. Given that loyalty emerges as the 'key concept' that impairs the member firm's tendency to exit (and/or slow down the pace of movement towards exit), it is no surprise that Hirschman terms exit as a form of 'disloyalty'.

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.[97] Indeed, Hirschman asserts that the likelihood of voice is commensurate to the degree of loyalty, and that a member with a sense of attachment to the organization would actively seek ways to improve its levels of influence while suffering in silence. Crucially, Hirschman appears to suggest that there are multiple avenues of exercising influence. By choosing to voice their concerns, members can (attempt to) resist policy change from within

[95] Hirschman, at 107.
[96] See also A. Hirschman, *Exit, Voice and the Fate of the German Democratic Republic: An Essay in Conceptual History*, 45:2 WORLD POLITICS 173, at 176 (1993).
[97] S. Gehlbach, *A Formal Model of Exit and Voice*, 18 RATIONALITY AND SOCIETY, 395 (2006).

rather than challenge it from outside (arguably, even in case of low switching costs). 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.[98]

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 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.

2. Previous Applications of Hirschman's Framework

Hirschman's framework has been applied to study responses in "collaborative settings" driven organizations where 'repairable lapse(s)' of judgement cause discontent amongst members. Examples include trade unions, voluntary organizations, or political parties.

A scoping literature review indicates that Hirschman's treatise has been applied across diverse settings – political science, sociology, social psychology, labor economics, and management.[99] The diverse range of applications covers relationships between automobile manufacturers and suppliers in times of industry downturn;[100] modes of expression of dissent under an oppressive regime; [101] and industry self-regulation and inter-organizational relations in the domain of private security company (PSC).[102] Notably, the study by Dowding et al. notes that the application of this framework argument has been "somewhat disappointing" in consideration of the "perceptiveness" of Hirschman's original, and insightful observations. However, O'Donnell's refinement in categorizing voice into "horizontal" and "vertical" voice is noteworthy. "Horizontal voice" refers to communication of dissatisfaction between actors

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[98] See also Heather Gerken, *Exit, Voice and Disloyalty*, 62 DUKE L.J. 1349, at 1360 (2013).

[99] See K. Dowding; P. John; T. Mergoupis; and M. van Vugt, *Exit, voice and loyalty: Analytic and empirical developments*, 37 EUROPEAN JOURNAL OF POLITICAL RESEARCH 469–495 (2000).

[100] J. MacDuffie & S. Helper, *Collaboration in Supply Chains: With and Without Trust*, in THE FIRM AS A COLLABORATIVE COMMUNITY : RECONSTRUCTING TRUST IN THE KNOWLEDGE ECONOMY 417–466 (Heckscher and Adler, eds., 2007). Helper in her comparative study on relationships between US and Japanese automobile majors and vendors, notes 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. Indeed, Helper's observations aligns with Hirschman's observation on the "fundamental schism" wherein exit is relatable to "economics" and that "voice" is relatable to "politics", and that the latter is "political action par excellence". See Susan Helper, *Strategy and Irreversibility in Supplier Relations: The Case of the U.S. Automobile Industry*, 65 THE BUSINESS HISTORY REVIEW 781–824 (1991).

[101] Brian Barry, *Review Article: 'Exit, Voice, and Loyalty'*, 4 BRITISH JOURNAL OF POLITICAL SCIENCE 79–107 (1974) and G. O'Donnell, ON THE FRUITFUL CONVERGENCES OF HIRSCHMAN'S EXIT, VOICE, AND LOYALTY AND SHIFTING INVOLVEMENTS: REFLECTIONS FROM THE RECENT ARGENTINE EXPERIENCE (1986).

[102] Elke Krahmann, *Choice, voice, and exit: Consumer power and the self-regulation of the private security industry*, 1 EUROPEAN JOURNAL OF INTERNATIONAL SECURITY 27–48 (2016).

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). Hirschman in his later work (1986) notes the costliness of vertical voice, and the 'expressive benefits' associated with the usage of horizontal voice.

Given the wide, and albeit potentially inconsistent application of Hirschman's framework, the manifestations of responses of an SDO's member firms might not always comparably coincide with that of the examples by Hirschman and existent literature. To illustrate the variety of definitions adopted in the scholarship,[103] the table below attempts to capture the broader labels 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; D: O'Donnell [104]; EK: Krahmann [105]; SH: Susan Helper[106]	

[103] Dowding et al., *supra* note 99.
[104] O'Donnell, *supra* note 101.
[105] Krahmann, *supra* note 102.
[106] Helper, *supra* note 100.

B. Hirschman's framework in the context of standard setting

This Article argues that Hirschman's framework squarely fits to situations when SDO decisions and policies pertaining to governance and impact on working procedures are negatively perceived as "repairable lapses" by members, and subsequently affect the standardization process, 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. Extant literature notes 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. 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 appears to suggest 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 constraints and challenges – a few demanding agility from the SDO on matters of governance and decision-making, and a few imposing significant impairment on flexibility. The JRC report[107] categorizes these constraints as legal constraints pertaining to requirements of international trade law, competition law, intellectual property law, public procurement law; constraints resulting from diverse relationships with other SDOs; and constraints due to competitive responses to SDO decision-making.[108]

SDOs are thus avowedly "loyal" to the pursuit of their vision and mission, which might emphasize contributing to the technological progress, strengthening efforts towards standardization, and maintaining their strategic roles in the realm of technical standard setting. Therefore, SDOs might be compelled to lobby for certain amendments to working procedures in order to be better equipped in dealing with constraints, or to prevail over worthy contenders and strategies, or to meet conflicting requirements by opting for compromises. In the eyes of the SDO policy makers, 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.

Thus, SDOs run the risk of having well-intentioned policy changes implemented 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 intellectual property) into standards developed at the arena, such reforms could easily cause discontent.

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[107] *Supra* note 17.
[108] *Id.*

For example, Ray Alderman (affiliated with VITA) observes that firms operating in the ICT industry typically improve on profits and product differentiation by adding value in manufacturing; intellectual property and/or service.[109] Alderman notes that manufacturing, and service aspects are susceptible to the vagaries of the market (uncertainty related to market share, and margins). In his view, IP value addition emerges as a favoured means of augmenting profits. However, the ensuing technological development and attempts towards incorporating it in standard(s) could disrupt or be incompatible with the "value-network principles" of the implementing firms. Alderman points out that circumstances could arise where the firm which has generated IP 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. 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 monetising their IP and its timing.[110] Perhaps, such constraints would force firms that score high on IP – also described as "technology sponsors" – to avoid considering membership of said SDOs, thus affecting the credibility of an SDO due to an endorsement deficit.[111] Herein, we see that the amendment of procedures has a tangible impact on strategic considerations of the stakeholders.

Based on the prior example, 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, re-assess the impact of the intended changes vis-à-vis its business model, existent product or service offerings, strategy for the future, and the ability to adequately internalize the costs of the efforts on standardization. If a credible few influential members discern that the intended changes upsets the equilibrium, it then transforms into a turning point within an SDO, acting as a divisive force within the organization, thereby creating two main camps of contrasting views. Be it 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.

A key tenet of Hirschman was that organizations are bound to suffer decay in their performance, regardless of their best efforts at preventing the decline. In such circumstances, and in conjunction with the existence of an imperfectly competitive market, Hirschman's primary concern was that consumers opting for the exit option would simply delay the eventual demise of the firm. However, a far worse scenario, of consumers endlessly moving across equally poorly performing rivals and conveying an imprecise signal to the whole market to keep functioning sub-optimally, troubled Hirschman. From this perspective, if the SDOs were to invest time and effort to facilitate the dissatisfied members towards voicing their misgivings,

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[109] R. Alderman (2009). 'Market inefficiencies, open standards, and patents', at 42 (on file with the authors).
[110] The JRC report notes that when SDOs make amendments to their governance norms, two categories of changes emerge – first being "committal choices" in which the SDOs has committed itself to achieving the outcome and the rest as "non-committal choices", pp. 15, 132.
[111] See also T. Simcoe, *Governing the Anti-commons: Institutional Design for Standard Setting Organizations*, 14 INNOVATION POLICY AND THE ECONOMY 1, 99 (2014).

this could trigger loyalty and overall constitute a welcome development leading to an overall improvement in the standardization ecosystem.

So far, the literature pertaining to standard setting has focussed on the activities undertaken towards a specific standard. In our study, we examine the nature of options specific to the member's perception of retaining membership of the organization in light of "repairable 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 intimate their decision 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.[112]

As much as Hirschman's framework pertains "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".[113] 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. Furthermore, Dowding et al. (2000) note that the 'empirical foundations' of loyalty need to be 'analytically distinguished' to allow for the design of testable empirical hypotheses. Through this contribution, we intend to shed light on responses of member firms from the perspective of Hirschman's framework and their manifestations.

For our purposes, "exit" consists of firm(s) ceasing membership and thereby desisting from participation in the SDO's standardization activities. A relevant example would be when certain members threatened to quit ETSI owing to the 1993 reforms to the IPR Policy,[114] Motorola's exit from VITA, and EFF's exit from W3C.

Additionally, "voice" comprises 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. An example is how Russell describes the response to W3C's proposal on a revised patent policy in 2001 - "angry

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[112] Refer Section 1.4.1 in ETSI DIRECTIVES, 9 April 2019 which states 'A member may resign from membership by giving notice to the Director-General. Provided notice is given before 30 September, the resignation shall take effect at the end of the current financial year, otherwise the membership including the payment of the annual member contribution or Observer fee shall continue until the end of the year following.' Retrieved from https://portal.etsi.org/directives/40_directives_apr_2019.pdf. Accessed on July 19, 2019.

[113] Hirschman, at 2. Hirschman's framework indicates a preference for studying the 'random or more or less easily 'fixable' "repairable lapses' such as 'performance lapses' (Ibid., at 24) or 'lapse from efficiency' (Ibid., at 56, 79, and 120).

[114] E. J. Iversen, *Standardization and Intellectual Property Rights: ETSI's controversial search for new IPR-procedures* (1999), http://nets.rwth-aachen.de/~jakobs/siit99/home.html (last accessed Jun 17, 2019).

protest", and "potentially fatal consequences of a rank-and-file mutiny".[115] Indeed, Russell relies on describing a threat by a participant as "threat to bypass, surpass, and ignore", and refers to Hirschman's framework to illustrate that W3C faced a "strategic turning point" at this juncture – to maintain its leading position, or to throw it away.[116] 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 complains to hierarchically superior bodies.

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.[117] 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, the Article also questions if 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' membership.

V. STRATEGIES OF VOICE WITHIN SDOs

This section attempts to apply Hirschman's framework to the IEEE 802.11 Working Group issuing specifications for Wireless Local Area Networks (WLAN). The experience of this group with the "voice" of discontented stakeholders constitutes an exciting case study where the application of the Hirschman framework comes to bear in full swing. This is because this group develops standards and specifications that account for most IPR declarations[118] and the SDOs' members of this group are most likely to disagree on patent policies due to their conflicting interests and vantage points.

Based on the review of previous case studies and supplemented by interviews with industry professionals, this Article introduces a taxonomy of strategies that could be classified as "voice" under different circumstances in 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) filling an internal appeal to SDOs' governing bodies; e) filling an external appeal to hierarchical bodies or to the competent Courts. It further

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[115] A. Russell, 'The W3C and Its Patent Policy Controversy: A Case Study of Authority and Legitimacy in Internet Governance', 2003, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2056900 (last accessed Jun 24, 2019).
[116] As Russell notes, W3C eventually reformed its decision-making process, and preferred to implement a royalty-free patent policy.
[117] Hirschman, at 55.
[118] 802.11 working group accounts for 61.2% of the contributions: see Gupta & Effraimidis, *supra* note 92.

observes that while the first strategy is mostly employed, it is also subjected the most 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 Working Groups (i.e. chairs, editors) or by increasing or decreasing the number of attendees at the meetings. At first glance, examining fluctuations in the meeting's attendance numbers of the 802.11 Working Groups 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), SDOs and Working Groups with individual-based membership, such as 802.11, require that experts participate in standards development processes in their individual capacity.[119] To what extent this requirement is indeed complied with in practice may significantly vary per company,[120] and is difficult, if not impossible, 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. 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 other factors than companies' reaction on modifications of IPR rules, and measuring attendance will most likely not suffice for the purpose of our analysis.[121]

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. For instance, SDOs with low institutional costs may not be optimal for the establishment of global standards but provide attractive setting for less internationally competitive firms to develop regional standards.[122] Actors aspiring to secure the acceptance of their standards with a formal endorsement are likely to carry out their projects in recognized

[119] Note that IEEE also has entity-based participation.
[120] Some companies appear to align their views internally very well, while employees of others appear to invoke contradicting arguments during working groups' meetings. Interviews with industry representatives on January 12, 2018 and January 25, 2018; on file with the authors.
[121] That said, it may be an interesting topic for future targeted studies on participation in SDOs.
[122] See M.T. Austin and H.V. Milner, *Strategies of European Standardization*, 8 JEPP 3, 411 (2001).

organizations,[123] such as the International Organization for Standardization (ISO), ITU and IEEE,[124] whereas those aiming to rapidly promote their technologies typically favor less systematized consortia or standardization groups, e.g. Bluetooth SIG and USB Implementers Forum. Such "informal" standardization is preferable across the range of ICT and telecommunication technology,[125] although a large number of this type of standards, including Wi-Fi and GSM specifications, are developed and maintained by formal or even semi-governmental standards bodies.

Even when not actually developing a standard, consortia may provide services to facilitate its implementation. The Wi-Fi Alliance, an independent membership consortium, complements IEEE SA' standardization activities by developing certification tests to establish compliance of electronic devices with IEEE 802.11 series.[126] Curiously, the Wireless Gigabit Alliance (WiGig), which became part of the Wi-Fi Alliance in 2013,[127] was initially established as a reaction on IEEE SA's patent policy that did not allow standards development on a royalty-free basis. Specifications developed by WiGig were subsequently brought back to the IEEE.

Seeking endorsement of SDOs that enjoy global reputation has clear motives. While producing standards that inhere to the web of international and European regulation,[128] these bodies are sited at the center of most standardization activities and issue standards that, beyond controversy, penetrate national legal orders and create normative expectations, while preserving their voluntary status.[129] Formal approval by a recognized SDO thus enlarges standard's scope of application and, when a standard has already earned the trust of the market, grants a certain degree of legitimacy to an industry norm that would otherwise had been established in an opaque process. This is not meant to suggest that SDO processes always meet

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[123] See, for instance, N. Brunsson, and B. Jacobsson, *The Contemporary Expansion of Standardization*, in A WORLD OF STANDARDS (N. Brunsson and B. Jacobsson, eds., 2000), 1.

[124] For the purpose of this Article, IEEE is considered a formal organization due to its accreditation by the ANSI as developer of American National Standards (ANS). See ANSI, "Accredited Standards Developers," March 2019, available at https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/ANSI%20Accredited%20Standards%20Developers/MARCH2019ASD.pdf (last accessed 24 March 2019), at 72-74.

[125] See B. Biddle et al., 'The expanding role and importance of standards in the information and communications technology industry,'52 JURIMETRICS 177 (2012); H. Delcamp and A. Leiponen, *Innovating standards through informal consortia: The case of wireless telecommunications*, 36 INTERNATIONAL JOURNAL OF INDUSTRIAL ORGANIZATION 36 (2014); T. Pohlmann, *The Evolution of ICT Standards Consortia*, 93 DIGIWORLD ECONOMIC JOURNAL 17 (2014).

[126] See Wi-Fi Alliance, Who We Are, available at www.wi-fi.org/who-we-are (last accessed 24 March 2019).

[127] https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-and-wireless-gigabit-alliance-finalize-unification (accessed 10 September 2019).

[128] See the definitions in Annex I rec. 6 of the Agreement on Technical Barriers to Trade of the World Trade Organization (TBT Agreement); American National Standard, value of the ANS designation, available at https://share.ansi.org/Shared%20Documents/News%20and%20Publications/Brochures/Value%20of%20the%20ANS.pdf (last accessed 24 March 2019); also EU Regulation 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardization, OJ L 316/12, Annex I.

[129] In this regard, see also the CJEU jurisprudence: Case C-171/11 *Fra.bo*; Case C-613/14 *James Elliott Construction Ltd v Irish Asphalt Ltd,* ECLI:EU:C:2016:821; T-474/15 *Global Garden Products Italy SpA (GGP Italy) v European Commission*, ECLI:EU:T:2017:36; C-219/15 *Elisabeth Schmitt v TÜV Rheinland LGA Products* GmbH, ECLI:EU:C:2017:128.

the transparency standards required; on the contrary, formal standard-setting processes can also raise questions of procedural fairness and stakeholder representation.[130]

In turn, there may be many reasons for stakeholders to interrupt standardization processes of a (formal) SDO for the sake of resuming them elsewhere, often in newly forged consortia. Most common is indeed 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 a 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 goes at the costs of time;[131] the latter 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.[132] 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 setting, collective action failures could be resolved by either a formal SDO or market forces, which, however, are sometimes hard to predict. For instance, the ITU managed to achieve a better result in standardization of 56K modems than two competing consortia due to the support from all major market players and successful resolution of patent issues.[133] In this regard, even though the market success of standards crafted in a committee-based process is equally challenging to predict,[134] 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,[135] leaving standardization "outsiders" to the discretion of the market. Along similar lines, members are

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[130]Delimatsis, supra note 11.

[131] T. Simcoe, *supra* note 21; also A. Dixit, *Governance Institutions and Economic Activity*, 99 AMERICAN ECONOMIC REVIEW 1, 5, at 16 (2009).

[132] R. Werle, 'Institutional Aspects of Standardization – Jurisdictional Conflicts and the Choice of Standardization Organizations" 8 JOURNAL OF EUROPEAN PUBLIC POLICY 3, 392, 404 (2001).

[133] S. Greenstein and M. Rysman, 'Coordination Costs and Standard Setting: Lessons from 56K Modems', Center for the Study of Industrial Organization, Working Paper # 0056 (2004), at 23. VHS won the "standards battle" against Betamax despite the technological supremacy of the latter due to consumer preference.

[134] In reality, only about a quarter of standards developed within one SDO actually gain industry acceptance. Interviews with industry representatives on January 12, 2018; January 15, 2018; January 17, 2018; January 23, 2018; January 25, 2018; February 19, 2018; on file with the authors.

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

under no obligation to stand by the organization they have selected at the outset of a standard-setting activity – at least in theory.[136] Hence, when switching costs are relatively low, the abundance of SDOs make 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.[137] Consortia specifications can be ratified as CEN/CENELEC deliverables in a Unique Acceptance Procedure (UAP) that combines both public enquiry and a voting phase.[138] 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).[139]

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;[140] the Java software, which was proposed by Sun Microsystems as a long-term solution in one of ISO Technical Committees;[141] color management specifications of the International Color Consortium, which served as a blueprint for IEC 61966-series;[142] and the Open Document Format for Office Applications (ODF) created by OASIS, which was formally adopted by ISO in 2006.[143] Remarkably, shortly after the ODF/ISO 26300 standard was presented to the global community, Microsoft submitted a competing proposal for XML-based specifications,

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[136] In practice, participation in an SDO often creates expectations for a company's partners or clients: Interviews with industry representatives, January 25, 2018; on file with the authors.

[137] 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, available at https://portal.etsi.org/directives/39_directives_oct_2018.pdf (last accessed 24 March 2019).

[138] 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, available at ftp://ftp.cencenelec.eu/EN/EuropeanStandardization/Guides/23_CENCLCGuide23.pdf (last accessed 24 March 2019).

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

[140] 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 (last accessed on 24 March 2019)

[141] R. Garud et al., *Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java*, 45 ACAD. MANAGEMENT J. 1, 196 (2002).

[142] IEC standards for Multimedia Systems and Equipment – Color Measurement and Management, can be downloaded against a fee at https://webstore.iec.ch

[143] The recent version of the standard, ISO/IEC 26300-1:2015, Information technology - Open Document Format for Office Applications (OpenDocument) v1.2, can be downloaded against a fee at www.iso.org.

claiming that that ODF/ISO standard did not give due considerations to the legacy of Microsoft Office documents;[144] this led to the emergence of the second ISO-endorsed standard for XML-based file format, the OOXML/ISO 29500, in 2008.[145]

In a similar vein, consortia specifications have been submitted for the formal ratification to the IEEE SA Standards Board. Standards for electronic design automation (EDA), are crafted within the Accellera Systems Initiative and, upon the approval of the consortium, transferred to the IEEE-SA for further considerations and eventually, to the IEEE SA Standards Board for final approval.[146] The IEEE P1801 standard for low power design is a result of this type of ratification.[147] Likewise, Bluetooth specifications for wireless data transfer, developed by the Bluetooth SIG, were approved by the Standards Board as an IEEE 802.15.1 standard.[148] Following the IEEE cooperation program with IEC, an IEEE standard may subsequently be submitted to the IEC for formal recognition.[149]

For this reason, initiating a parallel standardization process in a different SDO, or even in another working group of the SDO that originally hosted the project,[150] may seem a plausible solution from a strategic viewpoint. In practice, however, few companies would agree to duplicate their effort and exploit their resources on two similar projects, despite the flexibility of SDOs' rules of participation;[151] for industry representatives, a single standard-setting process secures efficient allocation of expertise and capital and spares lengthy business deliberations. Empirical evidence suggests that parallel standardization processes have rarely been managed by the same actors.[152]

Accordingly, the most probable scenario to escape formal SDO processes would be setting up a consortium or an interest group, tailored for a specific standardization project. It comes as

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

[145] The electronic version of this standard can be downloaded from http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html

[146] http://accellera.org.

[147] IEEE Standards Association, 1801 – IEEE Approved Draft Standard for Design and Verification of Low Power, Energy Aware Electronic Systems, https://standards.ieee.org/develop/project/1801.html (last accessed 24 March 2019).

[148] IEEE 802.15.1 Current Status, http://www.ieee802.org/15/pub/TG1.html (last accessed March 24, 2019)

[149] R. Schneiderman, MODERN STANDARDIZATION – CASE STUDIES AT THE CROSSROADS OF TECHNOLOGY, ECONOMICS AND POLITICS (2015) at 189 and 190. See also Guide to IEC/IEEE Cooperation, available at https://standards.ieee.org/develop/intl/iec_ieee_coop.pdf (last accessed 5 February 2018).

[150] 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. A similar process in DIN has been criticized for the lack of transparency since, unlike the ISG, it allows SDO members to participate only if they join at the beginning of the project. Interview with an industry representative on January 23, 2018; on file with the authors.

[151] Interview with an industry representative on January 25, 2018; on file with the authors.

[152] As an illustration, HiperLan2, an ETSI-developed standard for wireless LANs, was driven by different actors than those steering 802.11 standardization processes. Although some companies were involved in the development of both LTE and its competitors, the WiMAX, network operators were actively contributing in LTE working groups, which perhaps secured the eventual success if the standard. Interviews with industry representatives on January 15, 2018; January 17, 2018; February 1, 2018; February 7, 2018; February 19, 2018; on file with the authors.

no surprise that this type of strategy was commonly employed by companies that were dissatisfied with the process in SDOs originally hosting their standardization project. Indeed, some evidence from the survey among industry stakeholders, conducted in the JRC report mentioned earlier, suggested that this strategy has been used in practice by stakeholders that did not agree with SDOs' patent policies.[153] At the same time, when resulting 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;[154] 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,* established by the European Conference of Postal and Telecommunications Administration (CEPT) in 1981 and which later evolved into ETSI.[155] 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. In 2015, when a number of companies announced their interest to standardize LTE technology for unlicensed spectrum, they did not launch the project in 3GPP, the body maintaining LTE and 4G specifications, since the use of unlicensed spectrum may not have been supported by all members of the SDO;[156] instead, they set up the MulteFire Alliance, whose operational framework largely mimicked the one shared between ETSI and 3GPP.[157] Interests of mobile operators participating in 3GPP activities were also represented in other consortia such as the Next Generation Mobile Networks (NGMN) and the ORAN Alliance (the latter targeted at fostering the use of open standards in the RAN).

Examples of industry interest groups that have also been formed by members of so-called "private" 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.[158] The emergence of USB specifications and the USB Implementers Forum was in part driven by the licensing rules of

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[153] See above note 17.
[154] Lerner & Tirole, *supra* note 16.
[155] GMS AND UMTS. THE CREATION OF GLOBAL MOBILE COMMUNICATIONS (F. Hillebrand ed., 2006), at 15.
[156] Interviews with industry representatives on January 15, 2018; February 1, 2018; February 7, 2018; on file with the authors.
[157] See Page 16 in 'MulteFire and a Balanced Approach to Wireless', https://www.multefire.org/wp-content/uploads/MulteFire_WirelessGlobalCongress_FINAL.pdf (last accessed 24 March 2019)
[158] https://nfc-forum.org/newsroom/nokia-philips-and-sony-establish-the-near-field-communication-nfc-forum/ (accessed 10 September 2019).

the competing FireWire standard promulgated by IEEE.[159] 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.[160] 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.[161]

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.[162] 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.[163] As it was the case for DVB and CI Plus standard, and for standards crafted in WiGig, 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.[164]

Despite its popularity, the recourse to informal standardization methods often appears temporary, since 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

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[159] See Ohana, *supra* note 88, note 19 and accompanied text.
[160] R. Schneiderman, *supra* note 149, at 7.
[161] JRC, supra note 17, at 69.
[162] See R. Tabarés Gutiérrez, *Taking a Glance at the History of HTML5*, in DIGITALIZATION: CHALLENGE AND OPPORTUNITY FOR STANDARDIZATION (K. Jacobs & K. Blind eds., 2017) 351.
[163] On a side note, 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.
[164] J. Contreras, *supra* note 61.

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.[165] 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.[166] The industry was enthralled by the new standard: what lacked was its 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.[167]

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,[168] two were selected: one outlined by the World-Wide Spectrum Efficiency (WWiSE) group and another by the TGnSync.[169] The debate ranged fiercely about licensing of intellectual property embedded in the new standard. Among the supporters of the first proposal, the idea of RAND-zero licensing

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[165] 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).

[166] M. Reardon, 'New Wi-Fi standard delayed again', 15 August 2006, available at https://www.cnet.com/news/new-wi-fi-standard-delayed-again/ (last accessed 24 March 2019).

[167] See Annex I; see also PAR Approval letter of 26 May 2006, available at http://www.ismlab.usf.edu/dcom/Ch8_802-11nPAR.pdf (last accessed 24 March 2019).

[168] The Task Group also received 28 partial proposals, and in total, 62 letters of intent. See 'Status of Project IEEE 802.11n', available at: http://grouper.ieee.org/groups/802/11/Reports/tgn_update.htm (last accessed 24 March 2019). 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, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=903214 (last accessed 24 March 2019).

[169] *Ibid.* 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 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.

pooled much better: largely comprised of the industry "veterans,"[170] 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.[171]

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, 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.[172]

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.[173] 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.[174] 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 authors have also argued that the establishment of the EWC consortium has significantly affected standardization of 802.11n by essentially hijacking the process.[175]

ii. DensiFi in TGax

A more recent incident in 802.11 Working Group that illustrated forum-shifting in the development of 802.11ax standard dealt with the establishment of a Special Interest Group (SIG) named DensiFi by about 20 members of the Working Group.[176] Although the reason to

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

[171] TGnSync project was supported by i.e. Intel, Atheros Communications, Nortel, Samsung, Sony, Toshiba, Qualcomm, Philips and Panasonic. With RAND-Zero, according to an Atheros manager, "reasonable" compensation for intellectual property meant "zero" royalties, DeLacey *et al., supra* note 168, at 15.

[172] The voting was held at May 2006 and July 2006 meetings, see Status of Project IEEE 802.11n, *supra* note 168.

[173] The total of 27 companies included Apple, Azimuth, Atheros, Airoha, Buffallo, Conextant, Cisco Systems, D-Link, Lenovo, LitePoint, Marvell, NETGEAR, SANYO, Symbol Technologies, Sony, and Toshiba.

[174] 184 to 0, with four abstentions.

[175] DeLacey *et al., supra* note 168.

[176] There were three other SIG groups noted in the Chair report, so apparently the practice is not so uncommon. What was uncommon was that SIG was essentially dominating the process against IEEE rules.

bring the discussion outside the IEEE was not directly connected to IEEE's policy revision, this case is a fitting example for the purpose of our research since it sheds some light onto potential antitrust violations arising from forum shifting. DensiFi was allegedly established to expedite the work on 802.11ax standard;[177] 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.[178] 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.[179]

It is the exclusion of some technical proposals because of the voting by DensiFi members that was the ground for a complaint from a Task Group member.[180] 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*" with the effect of excluding viewpoints of non-SIG participants from "*fair and equitable consideration*" within the 802.11ax Task Group.'[181] As a remedy, IEEE SA restricted the voting rights of DensiFi members in TGax to a single collective vote,[182] and when therefore, many companies started to withdraw from the SIG; DensiFi was finally disbanded in 2016. Curiously, the matter also gained the attention of the DoJ for antitrust concerns related to an attempt to exclude technologies from incorporation into standards; in particular, 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

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[177] See https://mlexmarketinsight.com/insights-center/editors-picks/antitrust/north-america/doj-probes-role-of-special-interest-group-in-new-wifi-standard (accessed on 20 September 2019). Note that there is no public website or public information on DensiFi. Report: 802.11ax dominance complaint, para 4.

[178] See *In the Matter of the Appeal of Ericsson, Graham Smith and InterDigital*, Appellant's Appeal Brief, 5 January 2017, A-3, available at: http://www.ieee802.org/appeal_decisions/Ericsson_Smith_InterDigital_17_0106/Appeal_Brief_and_Appendix_SASB_Appeal_(2017.01.05).pdf (accessed on 20 September 2019).

[179] From the Report on the 802.11ax dominance complaint (Investigation), November 2016, p. 13 (available at: https://mentor.ieee.org/802.11/dcn/16/11-16-1519, accessed on 20 September 2019): "All individuals interviewed indicated that they were **not** instructed to vote a certain way by the SIG or by their affiliated companies. Several individuals commented that there was an implicit expectation that once a document was agreed in the SIG, that members would act in accordance with the interest of the group and not argue anymore about it, and support it in IEEE 802.11. It was also noted that once members had been part of the discussion around a document, they would naturally be more likely to support the included proposal".

[180] See *supra* note 178; Dominance allegation in TGax, 16 June 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 (accessed on 20 September 2019).

[181] See *supra* note 178, at A-3.

[182] Ibid, 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.[183] 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 SA soared dramatically with the introduction of 802.11n.[184] As the standard embedded a significantly high number of patent claims, disagreements on licensing terms for 802.11n essential technologies were not unexpected. Repeated calls for missing LoAs during working group's meetings,[185] cases as *Ericsson v D-Link, Microsoft v Motorola Mobility,* and the famous "patent troll" *In re Innovatio IP Ventures*[186] illustrate the legal skirmishes over 802.11n patents, which exerted a significant effect on the wireless industry.

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. What it did, however, was resolving a collective action problem: once the workable solution was on the table, all stakeholders seemed to approve it, which is 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 XTML project[187] and EWC, similarly to DensiFi, in fact, never intended to pursue 802.11 standardization in isolation from the IEEE process. At present, members of MulteFire do not exclude the option of bringing their technical specifications under the consideration of 3GPP.[188]

Hirschman's framework anticipates that upon perceiving a drop in quality, 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

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[183] 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.

[184] 75 LoAs were submitted for 802.11n, against 19 for 802.11g. Some of them cover multiple standards and were submitted later in time. See also Annex II.

[185] See as an example the minutes of Minutes of the IEEE P802.11 Full Working Group meeting of 22 July 2007. All meetings of 802.11 WG are available at https://mentor.ieee.org/802.11/documents (last accessed 24 March 2019).

[186] In re Innovatio IP Ventures, 921 F.Supp.2d 903 (2013).

[187] R. Tabarés Gutiérrez, *supra* note 162. 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.

[188] Interviews with industry representatives on January 15, 2018 and February 7, 2018; on file with the authors.

several aspects of the standardization process, while they maintain their SDO membership status: in principle, nothing precludes both memberships from coexisting.[189] Third, this strategy appears to be invoked when 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".[190] Fourthly, 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 some 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, even if an SDO faces no competition from SDOs currently active in its field. 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 processes[191] and hence may breach the relevant antitrust provisions prohibiting conspiracy 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 new rules

Although rules of SDOs are binding once participants sign a membership agreement, expulsion from membership 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 rules of intellectual property. This obligation also applies, all thing being equal,

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[189] The opposite may even give rise to antitrust concerns. EC Horizontal Guidelines, for instance, give meaning to voluntary that a company should be able to participate in standardization activities of other SDOs.

[190] See *supra* section IV.A.2.

[191] See the discussion earlier on DeniFi and cases such as the NSS Lab and the Allied Tube discussed in the introduction of this article.

once those rules have been modified. However, SDOs typically do not consider the refusal to follow new licensing rules as a reason for expulsion: stakeholders that do not commit to license their technology risk that their technology will not be adopted into a standard,[192] as well as reputational consequences.[193] On the 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.[194] These studies use the fluctuations in the amount and nature of submitted LoAs as a prong 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 – 2017 (which counts for all LoAs submitted in 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.[195]

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. 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.[196] The number of negative LoAs has indeed surged as of 2016, which appears to be the start of a period of increased 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.[197]

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

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[192] Contreras on W3C case (VoiceXML, see infra.)
[193] Reputational losses may many times determine behavior in relational markets. See also R. Benabou and J. Tirole, *Incentives and Prosocial Behavior*, 96 AMERICAN ECONOMIC REVIEW 5, 1652 (2006).
[194] i.e. negative LoAs from Nokia, Ericsson and Qualcomm.
[195] See Annex II.
[196] The LoA at issue is available at https://standards.ieee.org/about/sasb/patcom/loa-negative-802_11v-Ruckus-13oct2010.pdf (last accessed March 24, 2019). The company was acquired by Brocade Communications System in 2016 and then by Arris Group in 2017.
[197] In the next sub-heading we offer at least three explanations for this delay.

the transition period between the former and the latest 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,[198] which in a way strengthens the assumption that the increased number of LoAs in 2015 is attributable to the IEEE patent policy change.[199] The fact that since September 2014, when the Ad Hoc Committee of PatCom has already been drafting the new patent policy, outstanding LoAs became a frequent topic of the full 802.11 working group meetings likewise exemplifies stakeholders' reluctance to accept modifications to licensing rules.[200]

That said, negative licensing commitments, although naturally causing uncertainty among the members in the working group, do not by definition 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 follow the patent policy of W3C, the working group nevertheless decided to proceed with the adoption of the standard; despite the lack of licensing commitment, the patent-holder has never actually sought royalties for that particular technology.[201] 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.[202]

2. *LoAs as Voice*

If one views the submission of negative LoAs through the prism of Hirschman's theory, such action could be regarded as yet another articulation of a voice strategy, and closer to a 'faint grumbling' rather than a 'violent protest'. At the same time, it is a form of complaining

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[198] Annex I and the IEEE 802.11 Working Group Project Timelines, available at http://www.ieee802.org/11/Reports/802.11_Timelines.htm (last accessed 24 March 2019), which demonstrate no significant milestone in standards development that was reached in 2015, with an exception of two PARs for 802.11ay and 802.11az approved in March and September, respectively. The largest number was submitted in 2013 (36), 802.11ac was also approved in 2013; again, no direct correlation with the months when the most LoAs were submitted, or when documents were approved, can be observed. However, a more thorough study of technical discussions within the working group and its task groups is needed to draw any conclusions from these data.

[199] Although not exactly relevant for this Article, an interesting observation can be made that in the years before the new policy, companies typically submitted LoAs in one particular month: Broadcom in August 2013; Marvell in May 2014; etc. However, since the amount of LoAs is relatively low, we cannot make the same observation for 2016 and 2017, although some data may suggest that it is still the case (Samsung July 2015); (Orange May 2017). This also may indicate that submission of LoAs is driven by companies' business models rather than IEEE activities.

[200] See Annex III. Outstanding LoAs means LoAs that were by chair but not submitted.

[201] J. Contreras, *supra* note 61, at 878.

[202] See K. Gupta and G. Effraimidis, *supra* note 92; also Annex I and Annex II.

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 LoA's 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 does not seem to be readily available or rather is too expensive.[203]

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 (Annex II), as one would expect negative LoAs to be submitted already in 2015. A possible explanation is that members only submitted such LoAs at that time because earlier there was no need to submit one, which would mean that 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 here, if not the consideration of voice for now, and postponement of exit.

An alternative explanation would be that the turn in the patent policy heralded a period of confusion as to which IP-related legal framework applies to each standard project that is ongoing or was concluded prior to the patent policy change. Indeed, the most 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 potential ways to address potential misunderstandings with a view to clarifying the licensing landscape.[204] 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 attempt to influence or instigate well-calculated change instead of exiting the organization.[205] In order for such change to occur, a 'wait-and-see' approach may be employed, whereby inert members create the necessary cushion for repairing performance lapses. Interestingly, inertia can also 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.

Yet another, but related to the previous although less benign, explanation could have to do with 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

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[203] 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 with over 420'000 members originating in 160 countries. 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.

[204] See minutes, under Item 7, available at: https://standards.ieee.org/content/dam/ieee-standards/standards/web/governance/sasb/06132019sasbmin.pdf (accessed 25 September 2019).

[205] See also *supra* Section IV.A.1.

developing organization when there is a policy chance).[206] Only when this external period of litigation ended, discontented IEEE members relocated their voice-related efforts internally, by filling LoAs as a final resort to express their opposition to the policy.

It is submitted that filling 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, 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.[207]

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 these standards 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.[208] 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 companies, including Nokia, Ericsson, and KPN, refused to license their SEPs 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. In the short run, it appears that a broader discussion has started about the compatibility with the broader ANSI patent policy of ASD IP policy relating to so-called 'custom LoAs', i.e. LoAs with custom restrictions not explicitly stated in the ANSI patent policy, but also, quite crucially, the very meaning of some of the most controversial terms in ANSI's patent policy.[209] 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.

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[206] See the discussion *infra*, under D.

[207] 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 (accessed 25 September 2019).

[208] For the Notice of Disapproval, see ANSI Standards Action, Vol. 50, Issue 9, 1 March 2019, p. 15.

[209] 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 (accessed 25 September 2019).

3. *Refusal to Participate as Voice*

Silent abstention from active participation in the proceedings of the working group would also be a form of voice or 'suffering in silence', which however would seem to be a precursor of potential exit in a subsequent time period. The latter could in principle still be avoided not only due to 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 but also 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.[210] Similarly, it was implied that the late adoption of 802.11n was in a part caused by companies owning patents for 802.11g, but whose technologies were not implemented in the future standards version.[211] 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 not only for those who try to lobby for the fitness of their own technology but also for the buyers of this technology.

In further considerations, 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 one hand, standardization that takes place before the industry has adopted to new technologies risks low

[210] See Katznelson, *supra* note 87; Gupta & Effraimidis, *supra* note 92.
[211] See B. DeLacey *et al., supra* note 168.

rate of standards implementation;[212] on the other hand, standards adopted later than industry expectations 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 owners, since its failure may result in revenue loss, but also for implementers who have to redesign their products 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 to the detriment of short-term, opportunistic behavior by any stakeholder.

At this point, there is no clear evidence that the authors are aware of which shows that this strategy has been used by stakeholders opposing the licensing model of an SDO. Moreover, the timeline of 802.11 working group suggests that standards development time became lengthier as technologies evolved.[213] This perhaps also could explain the internal drivers for loyalty; especially as Hirschman cautions that "the most loyalist behavior" holds the possibility of retaining an "enormous dose of reasoned calculation". With this lens, we may ignore the members who are insensitive to the changes to the patent policy, or lack the capability to perceive the impacts of such changes. However, for other discerning members the "reasoned calculation" could be driven by multiple considerations, a few being: 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 SA, as the members are expected to act in personal capacity or on behalf of the SDO's objectives; perhaps an exhibition of restraint as it could add to 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

[212] For instance, IPv6 protocols are only gradually implemented, and open source specifications are still "not ripe" to be used by industry. IP Multimedia Sub-System (IMS) specifications have been developed by 3GPP about a decade ago started to be adopted only recently. Moreover, the EDGE standard, which was an enhancement to the 2G radio standard, did not get any market attention at all. Interviews with industry representatives on January 23, 2018 and February 19, 2018; on file with the authors.
[213] See also Annex I.

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.[214] Such procedures are significant for the rule of law and due process within an SDO, as the recent DensiFI episode discussed at length earlier has amply demonstrated. 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 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 voiced twice their objections internally based on this right to appeal: once in August and another in September 2014. The IEEE 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 the rules pertaining to governance such as the rules on the IPR policy applicable in the organization, 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 to the maximum extent possible.

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.[215] 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

[214] See IEEE SA Standards Board Bylaws (2016), Art. 5.4.
[215] Note that accreditation by ANSI is not a mandatory requirement for SDOs. Notably, W3C and IEFT are not ANSI-accredited.

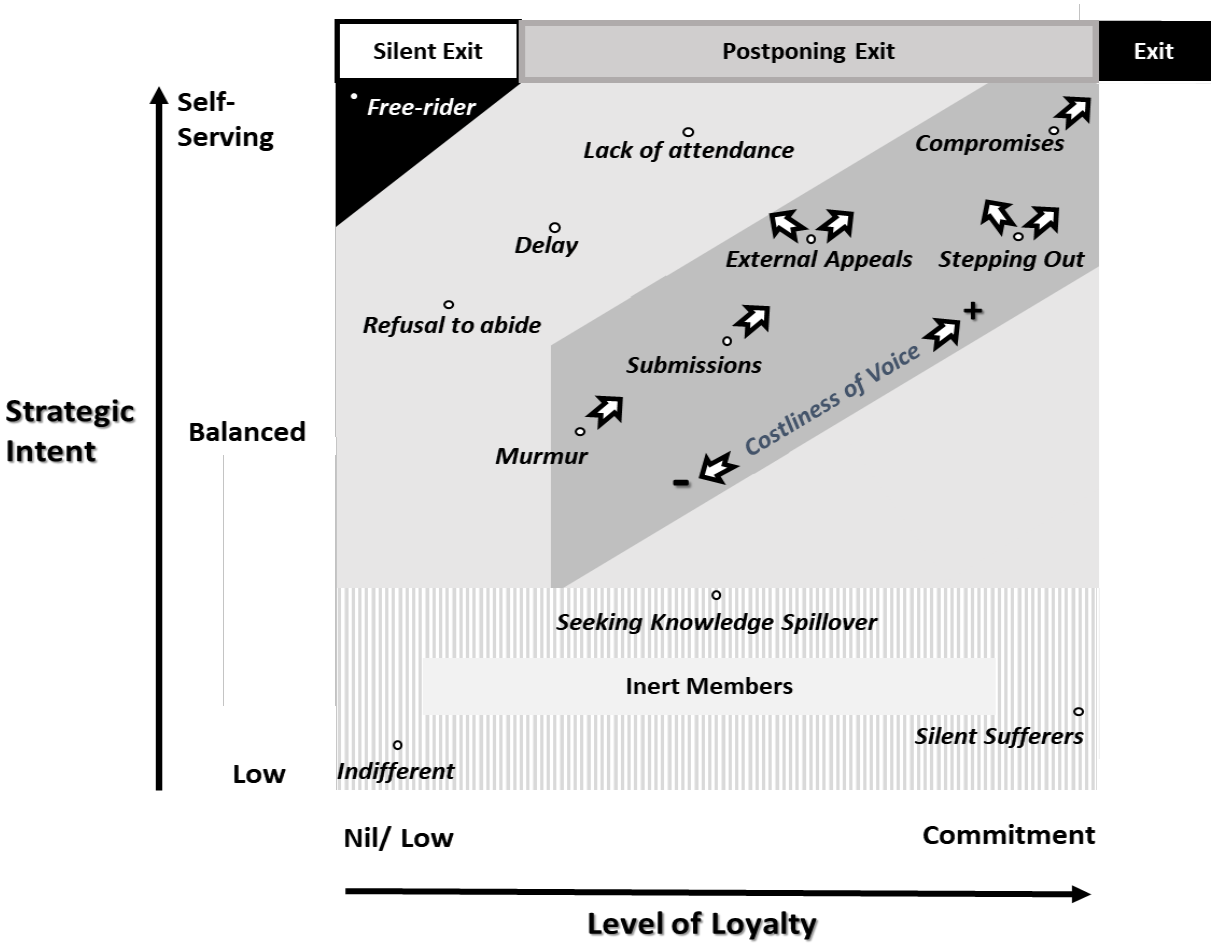
IEEE's reaccreditation, notably by agreeing that the ANSI Essential requirements do not apply to the development of an ASD's procedures such as its patent policy but only relate to standards development processes. As noted earlier, the most recent activity shows some intensification of the internal pressure once again, this time through the filing of negative LoAs.

E. Taxonomy of Voices

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 striking 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 back 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 firms relationship strategies,[216] we believe that the examples of responses of members can be vividly displayed in the graph we present below. 'Strategic intent' is displayed along the vertical axis, and 'level of loyalty' along the horizontal one. In addition, 'strategic intent' has been graduated from low, to balanced to self-serving. Note that 'self-serving' captures members who intend to 'free-ride' who are distinct from members who are 'indifferent' to or 'ignorant' of the expressed dissent over proposed reforms. Furthermore, the level of loyalty has been graduated from low to 'commitment' (for members that seem to indicate an insistence on 'sticking with the organization'). Finally, we present a visual means of corresponding increase in the costs associated with exercising certain voice options (and revisited owing to the nature of repeated interactions) in the realm of standard setting vis-à-vis the option to exit given that it is a wide-open possibility.

[216] Helper, *supra* note 100.



As noted earlier, a crucial element that may well determine the strategy chosen relates to a member's given influence. Members with significant influence 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 outright refusal to abide with the reformed policy, procrastinate when taking otherwise required action, or exercising tangible means of expression such as lowering in attendance. Members with influence are more likely to organize complaints and protests in cooperation with other members, which presupposes some organizational effort, because they know that only then voice can be most effective. Voice entails a romantically optimistic behavior but can be severely undermined through exit. The latter is a lonely, silent and rather cost-effective strategy.

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 it out hoping to 'free-ride' on the voices of others, or in cases where suitable, 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.[217] In both cases (high or low level of influence), loyalty can delay voice but also exit. Loyalty can also backfire in an organization that desires to change route or policies

[217] See Hirschman, supra note 96, at 194.

fundamentally: for instance, in the case of IEEE, requiring loyalty by its members (in that they act in the interest of their organization rather than the interests of their company or their 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 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" as seen in the observations by van de Kaa and de Bruijn[218] on incentives for member firms to display commitment for the organization despite burdensome decision-making process. The five incentives identified are - 'the perspective of future gain', the perspective of enduring gain', 'strong voting rules', 'a sense of urgency', and 'an incentive to compromise'. 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 Schuett[219] in their study on voting rules in SDOs show that standard-setting efforts that span over generations of technologies are characterised by repeated interaction with a few core members being the dominant IP related contributors in each successive generation. Seen in conjunction with the observation of Fleming and Waguespack[220], and Larrain and Prufer[221], that small firms (downstream implementers) 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.

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[218] Geerten van de Kaa & Hans de Bruijn, *Platforms and incentives for consensus building on complex ICT systems: The development of WiFi*, 39 TELECOMMUNICATIONS POLICY 580–589 (2015).
[219] See Larouche and Schuett, *supra* note 29.
[220] David M. Waguespack & Lee Fleming, *Scanning the Commons? Evidence on the Benefits to Startups Participating in Open Standards Development*, 55 MANAGEMENT SCIENCE 210–223 (2008).
[221] Maria Jose Larrain & Jens Prufer, 'Membership, Governance, and Lobbying in Standard-Setting Organizations', https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3303724 (last accessed Jul 29, 2019).

VI. Strengthening the Voice in SDOs: Certain policy suggestions

Hirschman notes that 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 of significant resources on grievance redress mechanisms to lower the 'costs' of voicing of discontent, and ultimately dissuade the member firms from approaching towards 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.[222] Addressing demands for legitimacy and credibility sufficiently could in fact be a great means to strengthen mutual trust, tame voice in a manageable level and ultimately nourish 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, due process and careful balancing of interests are quintessential for channeling members towards voice (rather than exit), streamlining voice and avoiding public interference.

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. As noted by Kaa and Bruijn,[223] and in the JRC report,[224] member firms with a strategic outlook are particularly keen on having their personnel occupy posts of significance within the SDOs. 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. As noted earlier by Kaa and Bruijn, and Dowding,[225] by the use of repeated interaction, the actors essentially commit to an incremental increase in cost – both in tangible and intangible forms. For example, Kaa and Bruijn note that for the purposes of consensus based standard-setting, the sudden withdrawal of a member firm after having taken 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. Conversely, if an SDO were to refer to members who voiced objections to policy changes in an unsavoury manner, the rest of the members subject to forces of internal coordination and information exchange (horizontal voice), are bound to take notice, and prefer non-voice options.

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[222] F. Cafaggi, 'A Comparative Analysis of Transnational Private Regulation: Legitimacy, Quality, Effectiveness and Enforcement', EUI Research Paper No. 2014/145.
[223] van de Kaa and de Bruijn, *supra* note 218.
[224] *Supra* note 17.
[225] Dowding et al., *supra* note 168.

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 realise 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. Indeed, Kaa and Bruijn note the importance of horizontal voice acting as a catalyst of improvement in cooperation between member firms and that it needs to be empirically analyzed as well.

In addition, as a matter of theoretical constellation, in a highly competitive environment such as the standards development ecosystem, one would expect a more careful look into the governance structures and the need for due process in the short term. For a consensus-driven organization, for instance, it is not always possible to distinguish with sufficient clarity the procedural (eg., governance) from the substantive (eg., 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 because they have a significant impact on the achievement of the objectives of the organization itself. Thus, if consensus or supermajorities are required for the substantive issues then one can require no less for the procedural ones.[226]

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 oft be measured through the yardstick of technical contribution.[227] The more the number of such member firms, the higher the effectiveness of the exit option, and its emergence as a credible deterrent for the SDOs.[228] 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 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.

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

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[226] For this argument, see H. Lindahl, *ISO standards and authoritative collective action*, in Delimatsis, *supra* note 9, at 42.

[227] In this regard, see IPlytics GmbH, *IEEE's Empirical Record of Success and Innovation Following Patent Policy Updates,* (April 2018), available at https://www.iplytics.com/wp-content/uploads/2018/04/IPlytics_Report-on-IEEE-activities_2018.pdf (last accessed 21 March 2019) (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).

[228] Cf. Cafaggi, *supra* note 222, at 34.

uncommon for member firms of one SDO to be members of rival SDOs, consortia, and other alliances. It is therefore natural that some members might harbour 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, a phenomenon that the JRC report coined as 'contagion'.[229] 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). Take the case of how IEEE SA obtained a favourable endorsement by a BRL from the DoJ's antitrust division for its 2015 patent policy change. This also shows that the SDO is adept at anticipating challenges in a specific segment, and is able to bring about the required adaptations despite facing significant erosion in support.

VII. Conclusion

This Article's objective has been to advance 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 quite apposite for offering an explanation for some of the most complex types of behavior that we find in highly collaborative environments such as the one relating to technical standard-setting.

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, rapidly evolving and increasingly interdependent ecosystem of ICT standardization. At the empirical level, it identifies instances of distress and how these were overcome or not (but also the reasons for such failure) in various SDOs, which allows to identify 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. More fundamentally, the Article offers some significant insights that justify continuity but also much-needed charge or 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 attempted to contextualize

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[229] The JRC Report, at 138. See also Intellectual Asset Magazine, May 16, "I have never believed that the furor around the IEEE policy has much to do with the policy itself but more to do with the concerns that some companies have about contagion. Fundamentally what they're worried about is if what has happened at IEEE spreads beyond the IEEE.", available at: http://www.iammedia.com/Blog/Detail.aspx?g=e8f72d6e-a3f8-45d8-882f-3ebdd3a1d69e.

such strategies by using the exit and voice theory by Hirschman (1970). 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, also because the phenomenon of multi-organization membership is pervasive – and probably for good reasons.

At the same time, in delving a bit deeper into the IEEE recent update of its patent policy, we noticed that internal mechanisms and flexibilities emerge to be quite important to accommodate the opponents of specific changes. Such mechanisms, while imperfect, 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. Similarly detailed research within other SDOs should be encouraged with a view to enriching (or, potentially, rebutting) 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.

Annex I: Timeline WLAN 802.11 Specifications[230]

Standard	Date approval PAR	Date WG Final Approval	802 EC Approval	Date SB Approval	ANSI Approval	Published/ Withdrawn[231]
802.11ah	04/10/2010	01/09/2016	01/10/2016	07/12/2016	07/12/2016	10/05/2017
802.11ai	08/12/2010	01/09/2016	01/10/2016	07/12/2016	07/12/2016	31/12/2016
802.11af	09/12/2009	01/11/2013	01/11/2013	11/12/2013	11/12/2013	21/02/2014
802.11ac	26/09/2008	01/11/2013	01/11/2013	09/12/2013	11/12/2013	18/12/2013
802.11ad	10/12/2008	01/07/2012	01/07/2012	23/10/2012	28/12/2012	28/12/2012
802.11aa	27/03/2008	28/01/2012	17/02/2012	01/06/2012	29/05/2012	29/05/2012
802.11ae	09/12/2009	20/01/2012	17/02/2012	01/03/2012	31/03/2012	06/04/2012
802.11s	13/05/2004	01/07/2011	01/07/2011	01/08/2011		01/03/2012
802.11u	08/12/2004	01/11/2010	01/11/2010	25/02/2011		01/03/2012
802.11v	08/12/2004	01/11/2010	01/11/2010	09/02/2011		01/03/2012
802.11z	22/08/2007			01/10/2010		01/03/2012

[230] Highlighted elements represent main standards. This table does not take into account accumulated maintenance changes.
[231] Standards are withdrawn as of 802.11ac.

802.11p	23/09/2004			15/07/2010		01/03/2012
802.11w	20/03/2005			11/09/2009		01/03/2012
802.11n	11/09/2003			11/09/2009		01/03/2012
802.11y	16/03/2006			06/11/2008		01/03/2012
802.11r	25/05/2006			09/05/2008		01/03/2012
802.11k	11/12/2002			09/05/2008		01/03/2012
802.11e	30/03/2000	22/07/2005	22/07/2005	22/09/2005		08/03/2007
802.11j	11/12/2002			23/09/2004	02/02/2005	08/03/2007
802.11i	30/05/2001			24/06/2004	14/02/2005	08/03/2007
802.11h	07/12/2000			11/09/2003	29/12/2003	08/03/2007
802.11g	21/09/2000			12/06/2003	20/10/2003	08/03/2007
802.11d	26/06/1999			14/06/2001	25/10/2001	08/03/2007
802.11b	09/12/1997			16/09/1999		08/03/2007
802.11a	16/09/1997			16/09/1999	04/02/2000	08/03/2007
802.11c	09/12/1997					04/02/2000

Annex II: Submitted LOAs 2013 -2017[232]

Month/year	Patent-holder	LOAs	Standard
Jan-19	Siemens	Positive	802.11ax
Nov-18	InterDigital	Negative	802.11ba
Nov-18	InterDigital	Negative	802.11ay
Nov-18	Ericsson	Negative	802.11ai
Oct-18	Orange	Negative	802.11n
Jun-18	Koninklijke KPN	Negative	802.11ah
Jun-18	Nokia of A Corp	Negative	802.11ac
May-18	Endiio GmbH	Positive	802.11ba
Mar-18	Intel	Positive	802.11ax
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
May-17	Orange	Negative	802.11n
May-17	Orange	Negative	802.11n
Mar-17	InterDigital	Negative	802.11ax
Nov-16	IHP	Positive	802.11az
Oct-16	Nokia Tech Oy	Negative	802.11ai
Oct-16	Nokia Tech Oy	Negative	802.11ah
Sep-16	LM Ericsson	Negative	802.11ax
Sep-16	LM Ericsson	Negative	802.11ah
Aug-16	ETRI	Positive	802.11ax
Apr-16	Microsoft	Positive	802.11ai
Mar-16	Nokia Tech Oy	Negative	802.11n
Jan-16	Nokia Tech Oy	Negative	802.11ad
Jan-16	Nokia Tech Oy	Negative	802.11af
Oct-15	Broadcom	Positive	802.11ai
Jul-15	Samsung El	Positive	802.11af
Jul-15	Samsung El	Positive	802.11ac
Jul-15	Samsung El	Positive	802.11ad
Jul-15	Samsung El	Positive	802.11n
Jul-15	Intel	Positive	802.11

[232] 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 March 2015, the LoA, after having been received and processes by the PatCom, was published on the IEEE-SA website in the beginning of April. Negative LoAs are highlighted.

May-15	Intel	Positive	802.11r
Mar/Apr-15	Intel	Positive	802.11.2
Mar/Apr-15	Intel	Positive	802.11ai
Mar/Apr-15	Intel	Positive	802.11ah
Mar/Apr-15	Intel	Positive	802.11af
Mar/Apr-15	Intel	Positive	802.11ad
Mar/Apr-15	Intel	Positive	802.11ac
Mar/Apr-15	Intel	Positive	802.11aa
Mar/Apr-15	Intel	Positive	802.11z
Mar/Apr-15	Intel	Positive	802.11y
Mar/Apr-15	Intel	Positive	802.11w
Mar/Apr-15	Intel	Positive	802.11v
Mar/Apr-15	Intel	Positive	802.11u
Mar/Apr-15	Intel	Positive	802.11s
Mar/Apr-15	Intel	Positive	802.11r
Mar/Apr-15	Intel	Positive	802.11n
Mar/Apr-15	Intel	Positive	802.11n
Mar/Apr-15	Intel	Positive	802.11k
Mar/Apr-15	Intel	Positive	802.11
Mar-15	Nokia Tech	Positive	802.11
Mar-15	Nokia Sol &Net	Positive	802.11
Mar-15	AT&T	Positive	802.11
Mar-15	Newracom	Positive	802.11ax
Mar-15	LG EL	Positive	802.11aq
Jan-15	Samsung El	Positive	802.11n
Dec-14	Marvell	Positive	802.11ai
Dec-14	ATA&T	Positive	802.11/802.11n
Oct-14	Thomson Licensing	Positive	802.11
Sep-14	Nokia	Positive	802.11
Aug-14	Thomson Licensing	Positive	802.11aa
Jul-14	Wi-Fi One	Positive	802.11a/b/e/f/g/h/i/n/ac
Jun-14	Toshiba	Positive	802.11ad
Jun-14	Toshiba	Positive	802.11ac
May-14	Siemens	Positive	802.11ai
May-14	Marvell	Positive	802.11ah
May-14	Marvell	Positive	802.11af
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
Jan-14	Sony Corporation	Positive	802.11-2012
Jan-14	Cisco Systems	Positive	802.11ai
Oct-13	InterDigital	Positive	802.11ai
Oct-13	InterDigital	Positive	802.11ah
Oct-13	InterDigital	Positive	802.11af
Aug-13	Qualcomm	Positive	802.11ai
Aug-13	LG	Positive	802.11ai
Aug-13	LG	Positive	802.11ah
Aug-13	Ericsson	Positive	802.11ac
Aug-13	Broadcom	Positive	802.11ah
Aug-13	Broadcom	Positive	802.11af
Aug-13	Broadcom	Positive	802.11ad
Aug-13	Huawei	Positive	802.11ai
Aug-13	Huawei	Positive	802.11ah
Aug-13	Huawei	Positive	802.11ac
Aug-13	Huawei	Positive	802.11i
Jul-13	Cisco	Positive	802.11ak
Jun/Jul-13	ETRI	Positive	802.11ai
Jun/Jul-13	ETRI	Positive	802.11ah
Jun/Jul-13	ETRI	Positive	802.11af
May/Jul-13	Intel	Positive	802.11ai
May/Jul-13	Intel	Positive	802.11ah
May/Jul-13	Intel	Positive	802.11ad
May/Jul-13	Intel	Positive	802.11ac
May/Jul-13	Intel	Positive	802.11aa
May/Jul-13	Intel	Positive	802.11n
May/Jul-13	Intel	Positive	802.11-2012
May/Jul-13	Intel	Positive	802.11af
Mar-13	Research In Motion	Positive	802.11ae
Mar-13	Research In Motion	Positive	802.11aa
Mar-13	Research In Motion	Positive	802.11z
Mar-13	Research In Motion	Positive	802.11ad
Mar-13	Research In Motion	Positive	802.11-2012

Jan-13	KPN	Positive	802.11-2012
Jan-13	KPN	Positive	802.11u
Jan-13	NEC	Positive	802.11ad
Jan-13	Nokia	Positive	802.11ad

Annex III: Patent Issues Raised during 802.11 Full Working Group Meetings 2013-2017

Month/Year	Patent Issues
Jan-13	No
Mar-13	No
May-13	No
Jul-13	No
Sep-13	LOA request sent TGai
Nov-13	LOA requests sent
Jan-14	9 LOA Requests sent
Mar-14	No
May-14	No
Jul-14	No
Sep-14	Outstanding LOAs
Nov-14	LOA requests with no response
Jan-15	4 LOAs requests sent
Mar-15	Outstanding LOAs
Jul-15[233]	5 outstanding LOAs
Sep-15	LOAs request sent Texas A&M University
Nov-15	5 outstanding LOA
Jan-16	3 outstanding LOAs
Mar-16	2 outstanding LOAs
May-16	No
Jul-16	2 outstanding LOAs
Sep-16	LOA request sent TGaz
Nov-16	1 outstanding LOA
Jan-17	No
Mar-17	1 outstanding LOA
Jul-17	1 outstanding LOA
Sep-17	Clarification sought to which parts of standards LOAs apply
Nov-17	1 outstanding LOA
Jan-18	No
Mar-18	1 “holder notification” received
May-18	1 outstanding LOA
Jul-18	2 outstanding LOAs
Sep-18	2 outstanding LOAs
Nov-18	No

[233] First meeting under the new patent policy.

Annex IV: List of Interviews[234]

1. SDO's Board member and standards policy director of an innovator-company (skype) on January 15, 2018.
2. IP policy director of an innovator-company (telephone) on January 16, 2018.
3. SDO's staff member (skype) on January 12, 2018.
4. SDO's Board Member and IP expert formerly employed by multiple manufacturers and innovators (WebEx) on January 17, 2018.
5. SDO's staff member, January 18, 2018, skype call.
6. Technical executive specialist of an innovator-company (WebEx) on January 23, 2018.
7. Manager of Innovator Company (personal meeting) on January 25, 2018.
8. Research engineer of an innovator company (skype) on February 1, 2018.
9. Head of standardization unit of an innovator-company (skype) February 7, 2018.
10. Former head of standardization/IP technology unit of an innovator-company/independent IP expert (skype) on February 19, 2018.

[234] It was agreed with interviewees not to disclose their personal names or the name of the company. All interviews were given in interviewees' personal capacity, and may not necessarily represent the views of the companies.