

**TECHNICAL AND PRACTICAL ASPECTS
RELATED TO PATENT QUALITY
IN THE CONTEXT OF
STANDARD ESSENTIAL PATENTS**

- An exploratory case study for WIPO -

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EXECUTIVE SUMMARY

I. STUDY OBJECTIVES

The objective of this exploratory case study, commissioned by WIPO, is to address how IP authorities can enhance the quality of patents that are relevant to technical standards, especially those patents that are pertinent to telecommunication and information technologies and declared as standard essential (SEPs). The study offers a first broad insight into the technical and practical challenges related to the effective use of standard-related documents in patent examination and carves out a set of recommendations on how to overcome such challenges, including a possible role of WIPO in that context. For that purpose, the study draws on the relevant experience of certain patent offices, such as the European Patent Office (EPO) and the Japan Patent Office (JPO), that have been using standard-related documents during patent examination for some time. Recasting the importance of standard-related prior art into the broader context of patent quality, the study also identifies and discusses any other functions of the patent system, or services offered by patent offices, that can further increase patent quality and legal certainty.

II. INTERFACE OF PATENT QUALITY AND STANDARDS

Policy measures to address patent quality: Technological convergence and the increasing economic role of patents pose a series of challenges to patent offices, redefining their traditional roles. An overwhelming quantity of patent filings – coupled with a bursting amount of data and valuable knowledge from nascent and complex technological fields - raise a new set of strategic priorities for patent authorities with regard to patent quality, efficiency, collaboration, transparency, technical expertise and a supporting IT architecture. Especially patent quality emerges as an element of reliability, fundamental for the evolution, sustainability and integrity of the patent system. It is an inclusive term, inextricably linked to content (patent validity requirements, patent data and other technical information), processes (search/examination, operations), infrastructure (IT, databases) and synergies (collaboration, work-sharing). According to WIPO, more than 3 million patent applications were filed worldwide in 2016, up 8.3% from 2015, whereby the patent offices in the United States, China, Japan, the Republic of Korea, and Europe received 84% of the world total. Only the State Intellectual Property Office of the People’s Republic of China (SIPO) received 1.3 million patent applications in 2016 – more than the combined total of the other four top offices. Many patent offices have a variety of policy measures in place that address issues of patent quality on a legal, organizational and operational level.

The special case of technical standards in the context of patent quality: To the extent to which patent systems comply with their patentability conditions in a transparent way, patent quality (and quantity) represents an essential input factor into the standardization system. Granting patents of poor quality exacerbates the already complex interaction between the standardization system and the patent system. Too many and/or weak patents, and the complex

task of determining their validity in the context of litigation have the potential to tilt the negotiation balance, significantly impact transaction costs, and interrupt rapid implementation and innovation via the standardization process. In this respect, patent quality supports legal certainty and – with it – a sustainable co-existence of both systems.

From a patent authority perspective, the interrelation between patents and standards impacts prior art search and touches, by extension, on the knotty issue of patent quality. In view of the rapid development of 5G networks and the Internet of Things (IoT), standard-related documents serve as a primary or sole source of the identification of prior art. The particular nature of standards drafts and their potentially high technical value underline their significance in the evolution of pertinent technologies and, therefore, their pivotal role in patent examination. In other words, access to the databases of standard developing organizations (SDOs) becomes indispensable for the quality of patent search and examination in critical technology fields with widespread, cross-industrial application.

III. LINKING PATENT QUALITY TO THE USE OF STANDARDS DOCUMENTS FOR THE PURPOSES OF PRIOR ART SEARCH

EPO-SDO collaboration: Early on, the EPO recognized that standard-related documentation forms a significant part of the search and examination work in multiple industry clusters such as telecommunications, audio-video-media, electronics and computers. Pioneering collaboration with major SDOs in the field of standards, the EPO has established broad access to standards drafts of European Telecommunications Standards Institute (ETSI), IEEE-SA and International Telecommunications Union (ITU). To ensure quality of access and content, the EPO opted for the creation of in-house non-patent-literature (NPL) databases that import standard-related documentation through direct interlinking of its server to the SDO databases. The primary benefit of investing in standard-specific databases is that they enable the use of a single interface for prior art search through sophisticated organization and indexation of the available documentation. As a result of its linking to the ETSI database, the EPOQUE database contains a wide range of technical contributions, i.e., temporary drafts and working group documentation from the EPO's partner SDOs. By 2015, the total number of documents available at the EPO rose to approximately 2.8 million. Following that steady pace, this number was expected to surpass the 3,000,000 documents mark in 2017.

With regard to improvements in prior art searches, use of standards documents and drafts are estimated to impact roughly 30% - 40% of the cases in certain technical fields, e.g., 35% in the area of wireless telecommunications. The EPO decision to invest in NPL prior art resources in the field of technical standards has had a positive impact: EPO statistics reveal, for example, that the number of 3GPP citations increased from 83 in 2008 to almost 9,000 in 2014 and has been growing exponentially since then. Recent statistics outline a similar upward trend, whereby – at that pace - the number of cited standards documents was forecast to exceed a total of 22,000 in 2017. From a patent office perspective, cleaning up and harmonizing standards documents is an ambitious exercise. There are significant differences across the various SDOs in terms of standards definition, format and publication quality. Despite the technical challenges and costs tied to the acquisition and integration of standard-related information and metadata into the

internal NPL depositories, missing this documentation would lead to unacceptable quality and legal uncertainty of granted patents – especially in the field of wireless communications and audio/video-coding, where up to 60% of the patent search reports include standards documents as pertinent prior art.

JPO-SDO collaboration: At the JPO, more than 1,700 examiner and trial examiners use the internal database as a primary source of prior art. As of October 2016, the internal database contains domestic patent information, foreign patent applications/patents as well as a wide range of NPL documentation, including standard-related documents of both published and preparatory material. NPL documents are managed separately from patent documents, whereby the frequency of updates depends on the type of the stored information. In addition, the JPO subscribes to more than 30 external databases. These databases can be broadly divided into three groups, i.e., databases equipped with a mere abstracts search, databases with access to full-text, and those in which structure or physical properties of substances can be searched. The internal database is not connected to external databases provided by third-party agencies, but operates separately.

Other patent offices: So far, other patent offices have not embarked on a similar path to upgrade their databases with standards-related documentation. This is partly explained by the long history of standardization in Europe, US and Japan, which contrasts with a lack of awareness around the importance of standards in other regions. Other reasons include lack of technical expertise, capacity building, up-to-date IT infrastructure and funding. Finally, there is no consensus about best practices and whether the leading EPO example could be emulated to fit the patent examination purposes of a specific patent office. On a macro level, the various patent authorities have their unique dynamics, political justifications and organizational inertia that render the implementation of policy initiatives a challenging task. On a micro level, aspirations to use the most pertinent standards-related documentation as a source of prior art succumb to the practical difficulty of retrieving that documentation, a reluctance of some formally open SDOs to grant access to their documentation, and a limited interest on the side of patent offices to invest in this area. Albeit without an information exchange in place that emulates the EPO-SDO cooperation practice, a few patent offices around the world, e.g., KIPO, Singapore IPO and Rospatent, have introduced certain patent quality measures that take into account the importance of technical standards for innovation and the local economy.

Collaboration benefits for SDOs: Given that 1/3 of pertinent prior art documents in relation to telecom patent applications stem from standards drafts produced during the standardization process, the mutual benefits of the collaboration between IP authorities and SDOs are non-negligible: from a patent office perspective, high quality patents in the ICT area can best be obtained by giving patent examiners access to standardization information and providing joint training, while SDOs can benefit by updating and completing their patent declarations through access to data from the patent registers through improved automation. Patent-related information flows in both directions, thereby informing the patent grant process as much as the process of standardization. As a result of the EPO-ETSI cooperation, the ETSI IPR database offers a good practice example of how declarations of essential patents are automatically updated with patent data from the EPOQUE database. Also, IEEE-SA is currently developing a new platform for its centralized repository, which will allow interested patent offices worldwide to search, access, and publicly view nearly 40,000 IEEE-SA Working Group contributions via subscription. This so-

called Working Group Data Service will be updated on a daily basis, the main challenge thereby being the development of a schema against which all IEEE Standards Working Group data can be mapped. This schema will define which information and how that information will be accessible to the patent offices so that IEEE-SA can tag, govern and control the data.

Including standards documents into public prior art: Information disclosed by an SDO may constitute prior art in some countries but not in others, the reason being that the definition of prior art is not the same under all national patent laws. Many national laws converge in their definition of prior art as “everything made available to the public” before the filing or priority date whereby the terms “availability” and “public” may be interpreted slightly different within the various legal systems. Furthermore, the WIPO handbook on IPR describes prior art as a notion covering all the written or orally disclosed knowledge that existed prior to the relevant filing or priority date of a patent application whereby disclosure is understood as to information accessible to the public. Hence, while the legal definition of prior art in the national patent law systems is relatively standardized, the interpretation of “public availability” is nuanced and requires clarifications. The debate around the legal status of standards documents becomes more complex in the case of a wide range of preparatory documents, which potentially constitute a primary or sole source for the identification of prior art. In the context of the EPO-ETSI collaboration, the ETSI dissemination policy clarifies that, as a rule, proceedings of the technical bodies and information submitted to a technical body are to be regarded as non-confidential and made available for public inspection. As a result thereof, the EPO regards the acquired standard-related documentation as public prior art, unless otherwise specified.

Transparency: Transparency at the interface of patents and standards refers to the reliability and accessibility of pertinent information about the status of a patent in the field of standardization, notably about the aspects of validity, enforceability, ownership and its essentiality for standards. Therefore, the notion of transparency in this paper addresses both the transparency in the patent system as well as the transparency in the standardization system. In this context, *transfers of SEP ownership* have been flagged as being increasingly relevant and occurring increasingly often. Given that information on patent ownership is fragmented or largely incomplete, an obvious start to collect and organize up-to-date SEP ownership information would be by linking relevant patent office data to SDO databases. Provided that access to such service is desirable, questions arise about the technical specifications as well as the possible role of standards developers, SDOs and patent offices in that context.

Furthermore, current declaration practices across the various SDOs do not clearly convey reliable information on the *essentiality* of declared patents, i.e. SDO databases contain an increasing amount of declarations of patents that are deemed essential to technical standards by the patent holders without sufficient scrutiny regarding that essentiality. This has, primarily, important consequences for the licensing practice of SEPs, but is also tied to the larger debate for increased transparency of the patent system as a whole and the need to efficiently navigate the bulk of patent data by focusing on the quality and accessibility of the recorded information. Against this backdrop, how to manage essentiality checks, i.e., who should perform the essentiality checks at which timing and under which conditions, continues to be one of the discussion points in different fora.

Finally, the increasing importance of litigation outcomes in the area of mobile telecommunication standards raises questions related to legal uncertainty as well as the benefits and costs of SEP disputes. In that context, the potential integration of *alternative dispute resolution (ADR) mechanisms* into the standardization process comes into play. Until recently, ADR mechanisms have been used in a limited manner vis-à-vis SEP-related court disputes and were thus regarded as underutilized in the particular field. This has changed (and may further change) with regard to SEP licensing disputes, as established FRAND¹-specific arbitration frameworks may cater for the needs of those with large patent portfolios and facilitate the resolution of multi-jurisdictional disputes. Arbitration of FRAND-related disputes has been promoted by key players in this area such as WIPO, the Federal Trade Commission (FTC) and the Court of Justice of the European Union (CJEU), whereas courts and authorities in the US and in Europe have identified ADR as a suitable option to facilitate the determination of FRAND-related disputes. In addition, some SDOs have included ADR procedures in their IP policies.

IV. CONCLUSIONS AND POLICY RECOMMENDATIONS

Intensified use of standards documents in prior art search: The experience gleaned from the cooperation of ITU, ETSI and IEEE-SA with the EPO shows that it is possible to increase *transparency and predictability* at several levels. In particular, it is possible to maintain and even improve the quality of patent examination in ICT standards-related sectors, thereby ensuring the legal certainty of granted patents. Further benefits derived from the SDO-patent office collaboration involve the aspect of *informativeness*, i.e., the systematic accessibility and searchability of standards-related (meta-)data that provide examiners with reliable information in a timely manner and through a usable format. In this context, the challenge of managing patent quality and quantity boils down to the ability to manage the quality and quantity of relevant information in a centralized, uniform manner that allows examiners to filter pertinent patent information on prior art out of raw meta-data. Of pivotal importance hereby is to ensure accessibility of valuable technical information from the standardization process for the purposes of patent search. Allowing examiners to access that information in a timely and accurate manner would confer greater legitimacy to patent grants related to those technologies.

Collaboration between patent authorities and SDOs is isolated, but can be replicated: Increasing backlog issues have prompted various joint efforts of patent offices in work-sharing or mutual utilization of work results through bilateral agreements. The consequence of the proliferation of bilateral arrangements such as the patent prosecution highway and the IP5 cluster are designed to reduce costs and duplication of effort by utilizing, wherever appropriate, the result of prior art search and substantive examination done by the other. The regional focus of these collaborations covers alignment of documentation practices pertaining to databases, patent classification and common citation, but it does not extend to information sharing related to standards with global impact. Collaboration on the latter has been thus isolated and, equally, the result of bilateral negotiations between the patent offices (EPO, JPO) and their respective partner SDOs.

¹ The majority of SEPs are declared under FRAND terms, i.e., the commitment to license these patents under fair, reasonable and non-discriminatory terms.

Against this background, there appear to be two options for patent offices interested in accessing standard-related documentation for examination purposes: they could either conduct direct negotiations with local and/or globally relevant SDOs on a one-to-one basis, following the EPO and JPO example; or, in case resources are limited, they could form an alliance that would shape the scope of collaboration with individual SDOs and the terms of use of pertinent documentation on a collective basis. In any case, the regional character of standardization, coupled with the increasing global - if not geopolitical - importance of standards, will dictate the potential and dynamics of such alliances in the future. SDOs representing these regional efforts would arguably play a crucial role in this exercise by allowing access and utilization of standard-related information under specific conditions to the benefit of patent search and examination. Overall, a closer and institutionally backed cooperation between the major standard developing organizations and other patent offices is necessary in order to increase transparency and establish a kind of voluntary co-regulation in this critical field. In the light of the precedent set by the EPO, this type of inter-agency collaboration reveals a range of important aspects (or lessons) to be taken into account:

- a) Patent offices and SDOs should first embark on a policy dialogue that will shape a common agenda. The exchange of information and documentation should result into *mutual benefits for both systems* (prior art search, patent ownership of standard-related technology, digitization of information, upgraded databases, education and promotion activities). Identifying those premises and initiating relevant talks relies strongly on the foresight and engagement of advocates from both sides. According to the history of the EPO-SDO collaboration, the contribution of these experts has been instrumental in raising awareness within their respective organizations and setting the stage for the subsequent high level agreements: increased transparency around IPR was not merely a patent office issue but an imperative equally identified from an SDO perspective;
- b) The efficient, fully implemented use of standards-related documents for the purposes of search and examination is dependent on the definition of prior art in the patent law context, most particularly the *interpretation of "public availability"*. The definition of sharable information should be clarified between the negotiating parties early on so as to include non-confidential (unless otherwise specified) documentation into the notion of public prior art;
- c) An ongoing practical component of the collaboration is the definition of a *common documentation format* that is compatible with the existing IT infrastructure and prior art databases. Many of the technical challenges involved can be mitigated in the long run through uniform templates for standards-based prior art documents, such as early drafts of specifications and published minutes.

WIPO's enhanced role as a global contact point between IP authorities and SDOs: Acting as a global contact point and facilitator in the context of patent information sharing and beyond, WIPO could educate on the benefits of a collaboration between SDOs and patent offices and encourage the latter to include standards documents in the Patent Cooperation Treaty (PCT) minimum documentation for specified technical fields. In this capacity, WIPO could assist in manifold ways:

- a) initiate discussions for information-sharing agreements between IP authorities and major SDOs and coordinate *multilateral efforts* to scale up existing ones;
- b) encourage patent offices to cooperate in the field of prior art documentation within the specific context of standards by *raising awareness* around the benefits of including standards in the prior art search and the subsequent impact on patent quality;
- c) clarify whether and under which circumstances standards contributions and drafts can be considered *publicly available prior art*;
- d) provide technical assistance to patent offices in accessing relevant technical information by developing a *shared universal data format* across all patent offices;
- e) explore the possibilities of an *interagency collaboration between WIPO and globally relevant SDOs* with the purpose of enhancing the contents of PATENTSCOPE and, ultimately, establishing a portal for access to standards-specific information. Similar to the WIPO Digital Access Service (DAS) that has been developed to facilitate the exchange of priority documents between offices in electronic or paper form, an appropriate *one-stop-shop mechanism* may be envisaged for access to early drafts and other standards-related documents. This idea does not necessarily involve the setup of a new database, but leverages on existing, sophisticated standards databases and centralized repositories such as those of ETSI and IEEE in order to achieve information linkages and worldwide interconnectedness;
- f) potential synergies between WIPO and SDOs could extend to other areas. For instance, SDOs could further *promote the use of WIPO ADR* by parties willing to settle their disputes outside the courts;
- g) continue its efforts to support the dissemination of patent information, including prior art citation and further development of WIPO standards to be used in both patent and standardization systems.

Future research and policy action: From a research point of view, the present exploratory study points to significant information gaps regarding our systematic knowledge of the current dynamics across IP authorities worldwide, especially with regard to differences in search and examination practice. Previous research has put emphasis on “best practice” examples from the major patent offices (USPTO, EPO and JPO). Albeit a useful resource, such practices may be difficult to follow by other patent offices or unsuitable for smaller offices or offices with limited resources. Whereas the demand for patents has become increasingly internationalized, only a few IP authorities appear to grasp the impact of the current shifts and the challenges ahead. Future research could help assess the barriers to their further development and the extent of information gaps or ill-understood interactions. Basic descriptive work could shed more light on the patenting process of smaller offices of regional importance and the unique policy issues they face thereby.

Specifically, a systematic review of the prior art search and documentation processes of various patent offices worldwide in selected technical fields, including those of technical standards, could unveil useful lessons and opportunities. It would also emphasize the importance of accessing and

assessing standards drafts in the context of prior art, both to the advantage of patent examination as well as to the benefit of technical and operational processes within the larger organizational context – as the leading EPO and JPO examples demonstrate. This type of research could be embedded in WIPO’s work programs and action plans in which the patent authorities of the member states are invited to reflect upon and exchange information on practices relevant to patent quality in the field of technical standards, including specific metrics, information on prior art search tools, digitization processes, access to NPL, relevant professional training, etc. Furthermore, it is pertinent to receive direct input from the main actors of the patenting process, i.e., examiners, applicants and third parties, who would be invited to share their experiences in the context of various WIPO discussion fora – also, in interaction with SEP holders, standard implementers and other stakeholders.

I. BACKGROUND

A. INTERFACE OF PATENTS AND STANDARDS

Information and Communications Technologies (ICT) standards are the foundation of the interoperability and commercial success of new products and services that interact seamlessly with a vast array of devices, platforms and ecosystems. Technical standards are pervasive in technology markets, particularly computing, networking, semiconductors and telecommunications, and spur the fast-paced development of widely used products. 3G and 4G have enabled network capacity and high data speed rates, boosting the emergence of the internet of things (IoT). At the same time, ICT standards open up new possibilities for traditional business models with both transformative and disruptive effects at a large scale, e.g. in the fields of transportation, manufacturing, healthcare, mobile banking, e-commerce. The cross-border expansion and cross-sector pervasiveness of ICT have boosted market globalization, rendering interoperable products and services indispensable in a hyper-connected world.

In this context, the ICT sector has evolved into a strong indicator of national prosperity and competitiveness.² In order to unfold the full potential of the digital economy, governments are increasingly aware of the need to develop appropriate strategies that support higher uptake of ICT while maximizing their benefits. Responding to larger challenges, the United Nations has reaffirmed its commitment to utilize ICT as an essential tool for achieving the new Sustainable Development Goals. The post-2015 development agenda highlights increased access to internet and ICT technologies towards an inclusive and global digital economy.³

Equally, technological convergence and the critical component of interoperability in a globalized economy have redefined and reinforced the role of patents. This is manifested not only in the exponential growth of patent applications worldwide and the increased patent propensity (more patents per innovation), but also in the emerging markets for monetization and enforcement of Intellectual Property Rights (IPR). The impact of digital technology on consumer lives and

² The WIPO Development Agenda recommendations 24 and 27 also address this aspect; see <http://www.wipo.int/ip-development/en/agenda/recommendations.html>

³ <http://www.un.org/en/development/desa/usg/statements/mr-wu/2014/11/implementing-the-post-2015-development-agenda-enhancing-access-to-and-security-of-icts.html>.

choices has placed greater significance on the strategic-transactional value of patents whereby the management of patent portfolios and the task of licensing have become particularly intricate; patents are no longer simply a defensive shield, but a key weapon of corporate strategy.

The advancement of the digital economy brings along unmatched opportunities, but also a series of challenges for the patent system pertaining to quality, legal certainty and transparency (Pentheroudakis, 2015). IP authorities are namely under the pressure of risking public scrutiny, should they not live up to an increasing number of expectations in a changing landscape: establish and abide by high quality standards, ensure operational and procedural efficiency and facilitate the dissemination of technical information through adequate infrastructure and partnerships.

The difficulties in striking the right balance between strong IP protection as value creator, on one hand, and the imperative to disseminate key technologies for the sake of interoperability, on the other, are particularly pronounced in the area of ICT standards. Standardized technologies in ICT are often protected by patents, the so-called Standard-Essential Patents (SEPs), that cover sophisticated, innovative technologies such as LTE, UMTS, WiFi, DVD, Blue-Ray, MPEG etc. Patents and standards serve common objectives by encouraging innovation and supporting diffusion of technology, but their interrelation is also an antagonistic one. SEP holders have an interest in improving the standard to protect it from becoming obsolete and replaced by rival technologies. They seek widespread acceptance and subsequent application of their standards, which may result in lock-in effects, market fragmentation, strategic patenting, hold-up scenarios and royalty stacking. On the other end of the spectrum, implementers perceive standards as critical technology platforms that should be accessible on affordable terms. In this regard, standardization entails a costly private investment in the research and development (R&D) of a public good. This apparent conflict is resolved by licensing under fair, reasonable and non-discriminatory terms (FRAND) - a commitment made by the SEP holder that seeks to align the conflicting interests of upstream and downstream players, ensure adequate royalties, and mitigate potential anticompetitive risks in the relevant markets.

Albeit subject to different institutional frameworks, patents and standards are part of two concurrent and interdependent processes that are **time-sensitive and knowledge-intensive**:

From the definition of a standard and by the time the embedding product reaches the market, essential patents obtained during the early part of the technology lifecycle may already be 5-10 years old. This explains why technical insights and standards inputs during standard setting predetermine the type of technology, principal interface and architecture of the future - a significant strategic advantage for the companies whose standard gets adopted in the process. Hence, standards need to respond continuously to technological advancements; outdated standards can become an impediment to technological progress. By the same token, the variables of time and access to technical (prior art) information are critical components of the entire patent process – from the innovator’s strategic considerations behind the filing and shaping of a patent application over to the efficiency and quality of the examination from a patent authority perspective.

Further similarities between the processes of standardization and patenting extend to their **regional and collaborative character**:

Despite the aforementioned global and economic dimension of patents and standards, the processes of standardization and patenting maintain a strong national/regional focus and are subject to diverse policies and regulations. From a patent perspective, differences across the national IP legal systems span from the patentability standards and the definition of prior art over to the outsourcing of patent search and the general approach to patent quality; from a standardization perspective, the current landscape counts over 500 public or private standard-setting organizations (SDOs) whereby standard-setting is governed by heterogeneous IPR policies and bylaws. With regard to the underlying collaboration of these processes, standard setting relies on the coordinated action between many interested parties in an industry, including potential competitors, and could therefore be described as a form of “co-ompetition”, i.e., a joint effort among competitors in upstream and downstream markets to bring performance-driven standards to the market. As to the patent grant process, the degree of interaction between applicant and examiner may have a profound impact not only on an operational level but also on the quality and viability of the overall system. In this context, third parties/competitors also get to shape the outcome by leveraging the administrative procedures available to them, e.g., intervention, opposition, appeal, re-examination etc.

Ultimately, both standard-setting and patenting processes converge into increasing welfare gains for the consumer base: the former is set out to ensure that the best available technologies are included in the standards whereas the latter carries the mission to establish enforceable intellectual property rights that benefit society at large through patent-induced improvements in innovation.

B. STUDY OBJECTIVES AND RESEARCH METHODOLOGY

The WIPO Standing Committee on the Law of Patents (SCP) has previously examined the interface of standardization with the patent system and highlighted the central role of standards in enabling economies of scale and competition on a level playing field (WIPO SCP/13/2, 2009). With the view to a deeper analysis that addresses ways in which IP authorities can increase the level of patent quality and legal certainty in the specific area of technical standards, WIPO commissioned the present author to conduct an exploratory case study on the subject. Specifically, the objective of this study is to offer a first broad insight into the technical and practical challenges facing the effective use of standard-related documents in patent examination and make any suggestions or recommendations to overcome such challenges, including the possible contribution of WIPO. For example, even if the prior art effect of standard-related documents is clarified from the legal standpoint, practical utility of such documents in patent search and examination procedures depends on other factors, such as technical access, document formatting and searchability, costs involved and expected benefits derived from the availability of such documents in patent examination.

The study will address those issues in the form of case studies, i.e., analyzing the experiences of certain patent offices, such as the European Patent Office (EPO) and the Japan Patent Office (JPO), that have been using standard-related documents in their substantive examination, as well as of other patent offices that have not done so. The study will also identify and discuss any other functions in the patent system, or services offered by patent offices, which might increase patent quality and legal certainty.

Given the nature of the study as a preparatory step preceding potential large-scale investigation, the results and follow-on recommendations are not conclusive but simply serve to improve the understanding of the situation and the scale of the associated challenges. The content is built on the research and analysis of pertinent bibliographical resources, published information, expert opinions, interviews as well as direct feedback provided by patent offices and SDOs. The purpose is to gather the views of various stakeholders on the subject and encourage reflection through the comprehensive analysis and assessment of specific policies.

Prior to zooming in on the complexities surrounding the **Interface of Patent Quality and Standards**, the study starts from more general premises by reviewing the concept of patent quality from a patent authority perspective. Here, emphasis is added to a variety of policy instruments that major patent offices have in place in order to address issues of patent quality, e.g., incentive-based measures, extensive collaboration with their counterparts in other countries, fee policies, etc. (**Section II.A. Patent Quality and Policy Instruments from a Patent Office Perspective**). From a patent office perspective, the sustainability of the system is intertwined with the notions of quality and transparency: quality of examination, improved lead times to patent grant, improved access to prior art and structural transparency. Clarifying the bigger context of patent quality allows us to frame how the issue of patent quality translates into practice in the particular area of technical standards. Subsequently, **Section II.B. Linking Patent Quality to the Use of Standards Documents** highlights the leading examples of EPO and JPO in the use of standard-related documentation by examiners for the purposes of prior art search. Standard-related documentation is defined as the information revealed during the standard-setting process, including discussions and technical contributions documented with the SDOs. I look at the existing frameworks of patent office-SDO collaboration from both sides, taking into account the unique perspectives of ETSI, IEEE and ITU in the particular field. As a next step, I narrow down the practical and technical aspects of including standard documents in the prior art, i.e., identification of prior art, classification-related aspects, the role of Non-Patent Literature (NPL) deposits, the accessibility and integration of standard documentation as well as the controversies over its legal status. I round up our analysis by tying certain aspects of transparency involving patent transfers and essentiality checks to the enhancement of patent quality and the efficient functioning of the overall system. Finally, I break down **Section III. Conclusions and Policy Outlook** into an assessment of the impact of embedding the use of standard documents into the examination process, the scalability of existing patent office-SDO collaboration, and the potential role of WIPO as global contact point and facilitator. To this end, I carve out a set of research goals and questions that need to be addressed in support of future policy action.

II. INTERFACE OF PATENT QUALITY AND STANDARDS

A. PATENT QUALITY AND POLICY INSTRUMENTS FROM A PATENT OFFICE PERSPECTIVE

The consequences of a globalized economy and the rapid technological speed drive major shifts in IP markets while new entrants (technological, “vertical”, and geopolitical) entrants shake existing structures and institutions regionally and globally in ways that may hinder the pace of technological development and application. Technological convergence and the increasing economic role of patents pose a series of challenges to patent offices, redefining their traditional roles. An overwhelming quantity of patent filings – coupled with a bursting amount of data and valuable knowledge from nascent and complex technological fields - raise a new set of strategic priorities for patent authorities with regard to patent quality, efficiency, collaboration, transparency, technical expertise and a supporting IT architecture. Especially patent quality emerges as an element of reliability, fundamental for the evolution, sustainability and integrity of the patent system. It is an inclusive term, inextricably linked to content (patent validity requirements, patent data and other technical information), processes (search/examination, operations), infrastructure (IT, databases) and synergies (collaboration, essential input factor for other systems).

1. DEFINING AND MEASURING PATENT QUALITY

The definition of patent quality has fuzzy boundaries, its determinants being subject to various perceptions depending on the specific stakeholder’s point of view. There is no universal standard with regard to patent quality. The concept varies from country to country according to the patentability criteria established in the national jurisdictions as well as how well the patent system supports the national industrial and trade policy, i.e., how thoroughly the invention is described in the disclosure, the promptness of examination and grant decisions, the balance of rights between patent owners and others, the amount of economic activity generated by the patents etc. (WIPO Standing Committee on the Law of Patents, SCP/17/10, 2011).

Expert opinions on the meaning of patent quality are equally diverse and ambiguous. Literature has approached the issue in different ways:

Part of the literature has addressed the fundamental role of the patent system in driving the development and disclosure of new technology. Hence, if the primary purpose of the patent system is to force the public disclosure of new technology, then patent quality is a function of the importance of the technology disclosed in issued patents and the extent to which the disclosure facilitates use of the technology by subsequent researchers. At the same time, many aspects of legal validity are largely irrelevant to this perspective. For example, the existence of overbroad claims does nothing to undermine the quality of a patent that discloses an important technology.

A second part of the literature, which bridges finance and legal scholarship, has analyzed patent quality in the sense of economic value. In this framework, difficulties in valuing patents have led to an adoption of proxies for value, e.g., differences between litigated and non-litigated patents, relation between patent portfolio and firm value, etc. (Mann & Underweiser 2012)

Despite ambiguities regarding its definition, patent quality is undoubtedly a dynamic concept, driven and shaped by technological change, market forces and evolving societal values. Given the legal, economic and social attributes of a patent, the notion of patent quality intersects the interests of multiple as much as diverse stakeholders:

From a *systemic perspective*, increased patent quantity, patent office backlogs, patent thickets and aggregation raise legitimate concerns over the quality of issued patents. These concerns also extend to whether low patent quality may compromise innovation and implementation processes, knowledge diffusion and the dissemination of technical content. The resulting legal uncertainty over the validity, scope and enforceability of the patent fuels more patent filings, greater patent propensity and strategic/litigious behavior – a low quality patent system may be perceived as self-reinforcing (Wagner 2009). In the interaction of the patent system with economic factors and the public interest, the most pressing quality concern of patent authorities is to issue patents that are consistent with their institutional responsibilities, thereby meeting reasonable expectations of legal certainty from the other stakeholders within the patent system. For the patentee, quality interests include economic value and enforceability of their patents whereas the public is interested in a patent system that protects socially useful patented inventions, balances that protection against the costs of compliance and monopoly and ensures the efficient administration of adjudication for the sake of legal certainty (Guerrini 2014).

From an *economic perspective*, there is not always a clear distinction between “patent quality” and “patent value”, although it could be said that “patent quality” is often used in relation with the legal and procedural aspects of patent grant as well as with the functioning of the patent system as a whole; by contrast, “patent value” derives predominantly from the informational content of the underlying technology (R&D strategy), transactional considerations (IP evaluation) and market dynamics (competitive strategy). Moreover, in the evolving IP landscape, “patent quality” can be used as a reference to the value of the innovation described by the patent. From a patent authority perspective, a patent of high quality meets the legal requirements of patentability (patentable subject, novel, non-obvious, etc.). From a business perspective, a quality patent is one where the value of the expected protection (monopoly right) exceeds the cost of maintenance and market implementation (Berman 2015). Although there may be an interrelation between value and patent quality, the economic value of a patent depends on factors well beyond those of concern to the patent law, e.g. the size of the relevant market, the relationship between the patent’s scope and a marketable good or service, etc. Some of these factors will suggest the quality of the patent, such as the nature of the advance over the prior art, but others have little or nothing to do with patent quality.

From a *patent law perspective*, patent quality could be interpreted as the ability of a given patent to satisfy the legal patentability requirements - novelty, inventive step and industrial application - and withstand invalidity proceedings in opposition/re-examination proceedings or before the national courts. Apart from the fact that the substantive rules on patentability are broadly accepted

and - to a great extent - consistently applied, patent quality in the pre-grant phase is primarily determined by the legal standards set by the patent offices and the extent to which examiners apply them in a transparent way. Taking into account the interests of various stakeholders, patent offices calibrate their search and examination procedures with the purpose of striking a balance between the reward for the inventor and the interest of the public to have unrestricted access to the invention.

From the *operational (and strategic) perspective* of a patent authority, patent quality depends on the technical competence of the examiners; access to comprehensive, up-to-date prior art information; adequate search tools, and reasonable time to perform the task. Patent authorities are currently confronted with unprecedented challenges: high volume of patent applications (many of them for defensive purposes) and resulting backlogs; long pendency times; informed assessment of patentability; lack of technical expertise in emerging or complex technical fields (EPO Scenarios 2007). In response, major patent offices have introduced various quality initiatives that focus mainly on (a) technical infrastructure development through examiner training, search tools and prior art databases) as well as on (b) process improvement through performance/quality metrics, quality management system and cooperation with other office and institutions (WIPO Standing Committee on the Law of Patents, SCP18/INF2, 2012). These components of operational design support the aforementioned legal layer – ideally, in a coherent manner - and provide useful indicators for patent quality. As part of the operational design, the use of standards documents in identification of prior art recasts patent quality in the particular context of standards.

There is no consistent definition for patent quality measurements. From a stakeholder perspective, proposed measurements include expected patent validity, patent clarity, whether the claims completely and accurately describe the scope of the underlying invention, the social utility and commercial success of the invention (Port et al 2015). Some quality metrics focus, for example, on identifying issued patents that are invalid upon further review, as well as applications that bear markers of invalidity. As to patent clarity and claim scope, there is an inherent contradiction of interest among stakeholders: typically, patentees prefer or broad claims in order to increase leverage in patent suits or pre-suit negotiations, whereas patent authorities, courts, and the users highlight clarity of claims as an effective means to reduce costs associated with litigation.

As to the causality between patent quality and the social utility of a patent, patent offices and courts are generally neutral as opposed to patentees (and their respective competitors) that have to take into calculation not only the social benefits of a new technology, but also investment and market considerations. In this sense, the commercial success of a patent is considered as indicative of patent quality – the more so when the success involves a significant technological leap. Specifically in the area of standard essential patents, the standardized technology may not in the end provide the “best” alternative or reflect superior research. The SDOs imply a procedure to reach and create markets and it is the “tipping” effects of the standard that elevate the technology to a market share which may prove inadequate in reference to the inventive step inherent in the invention, and to the most efficient dynamic competitive equilibrium (Lundqvist 2015).

Economic analyses of patent quality highlight the importance of metrics as a base for sound policymaking (WIPO Standing Committee on the Law of Patents, May 2012). In an effort to develop objective measures of patent quality, economic theory has mainly focused on the design

of patent rights, such as optimal “strength” and “breadth” (Klemperer 1990, Scotchmer 1999, Cornelli & Schankerman 1999, Sampat 2005). However, these two concepts have come under scrutiny due to their limited scope and policy relevance. In addition, output rates like grant rates or litigation rates can be biased by the filing behavior adopted by applicants and are hardly comparable across countries, precisely because of the systemic differences (Van Pottelsberghe de la Potterie 2010). Follow-on literature uses econometric methods to assess how well individual as well as compound indicators perform in assessing patent quality. Specifically, economists explore the link between patent quality and the most commonly used indicators such as (i) forward citations (number of citations received by posterior patents) as proxy for the patent relevance for further research; (ii) backward citations (number of citations made to previous patents) as proxy for the extent to which a patent makes use of the existing prior art; (iii) number of priority claims made in the patent as proxy for the breadth of the technology claimed by the patent holder; (iv) family size (number of international patent applications filed claiming priority from the same parent application) as proxy for the importance of the patent on an international scale; and (v) generality and originality indices (dispersion of cited patents over technology classes) as proxy for the importance of the patent for a broad field of future research (Baron & Delcamp 2010). The latter factor is particularly important for complex patents, including standardized patents, as it seems to capture the effects of cumulative innovation in complex industries.

Overall, the strength of patent quality indicators lies in their ability to predict - with some accuracy - the probability of a patent to be renewed, licensed, litigated (in validation or infringement proceedings) or included into a standard. However, such an assessment comes with certain caveats given that economic phenomena could be affected by factors that are unrelated to patent quality and potentially weaken the link between indicators and patent quality, i.e., strategic considerations, patent pool activity, collective licensing mechanisms etc.

2. INCENTIVE-BASED APPROACH TO PATENT QUALITY

2.1. Patent search and examination

Much of the focus of the recent literature on the economics of patent systems and procedures has been on policy issues of patent quality and application backlogs. From a patent office perspective, unlocking the puzzle of patent quality is not merely a question of stalling bureaucracy or procedural inefficiency, but rather a problem of interlocking incentive structures that impose themselves on the entire patent system. Contrary to the initial static assumption that the quality of patent applications precludes the ultimate legal question of patent validity and – with it – that of patent quality, recent findings reflect a more complex and dynamic conception of the application, under which most applications could be improved through the enhanced interaction between applicant and examiner (van Pottelsberghe de la Potterie 2010). A reliable understanding of patent validity cannot rest on information from the face of patents alone, but instead depends on features of the process that produced the patents in question. Accordingly, the quality of the granted patent is likely to differ from the quality of the application initially filed, and the extent of this difference will depend on what happens during the grant process (Mann & Underweiser 2012).

The strong link between the outcomes of the patent system and the joint effort that the examiner and applicant bring to the process highlights the impact of individual behavior, objectives, incentives and available information on legal validity and patent quality. Empirical work confirms the importance of individual examiner conduct to the output of patent offices, and economic theory outlines how examiners are expected to respond to different managerial incentives that may be set by a patent office. Likewise, applicants can be seen as behaving strategically along multiple dimensions, including decisions regarding whether to reveal private information on the value of their innovations. Empirical evidence highlights the strategic motives of applicants, the importance of individual applicant behavior, and the role of asymmetric information (Eckert & Langinier 2013).

According to Wagner (2009), some critical components of any analysis of patent incentives with significant impact on patent quality are:

a. *Patentee incentives*, including limited resources, information asymmetry and time-related aspects. An applicant has the freedom to draft patent claims, but it does so based on imperfect information. Even when it conducts an exhaustive search, the applicant can never conclusively prove the non-existence of potentially invalidating prior art. At the same time, time-based incentives create strong interests in deferring a careful analysis of the claim scope as long as possible or at least retaining as broad a range of possibilities as long as one can. Deferring clarity offers critical advantages to the patentee, allowing him to capture some value for an invention at an early stage, simply by receiving a grant. It also hedges against the patent being undermined by time and technology factors. In this respect, the scope of patent claims is tied to strategic considerations that impact the likelihood of validity or infringement of the patent and shape patent quality as the ultimate outcome of the grant process. A first large-scale analysis of patent scope changes during the examination process at the USPTO demonstrates that narrower claims at the time of publication are associated with a higher probability of grant and a shorter examination process than broader claims. Furthermore, the examination process tends to narrow the scope of patent claims in terms of both claim length and claim count, and that the changes are more significant when the duration of examination is longer (Marco et al 2016).

b. *Examiner incentives*, including pressure for higher patent output, coupled with reduced pendency times and performance metrics.

c. *Market incentives*, including increased patenting activity, defensive use of patents, patent portfolio strategies, emerging trading practices, patent aggregation etc.: An applicant pursuing a portfolio enforcement strategy might be more interested in obtaining a large number of patents, rather than maximizing the enforcement value of those patents individually. However, it is not clear to what extent a portfolio-based licensing strategy would lead to a preference for overbroad patents with high infringement value over narrow patents with high likelihood of validity: when it comes to maximizing validity, an applicant has the incentive to narrow the claim so that it becomes more difficult for those who challenge patent validity to find prior art anticipating that claim. When it comes to maximizing infringement value, broader claims have better chances of success in demonstrating that the accused infringer is in fact practicing the claim as the standard for infringement requires. Therefore, both the likelihood of validity and infringement of a claim are functions of the scope, moving in opposite directions (Yelderman 2015).

In order to address the aforementioned incentive structures and alleviate concerns over patent quality, several patent offices in Europe have revisited their examiners' incentive system and introduced measurable proxies for patent quality. The following administrative mechanisms are perceived as the most effective (PATQUAL 2011):

- *Examiner training*: Across Europe, examiners are trained both as soon as they are recruited and alongside their career path. Examiners usually hold a master or doctoral degree in a particular technical field. Some patent authorities pay special attention to the industry experience of candidates. New recruits receive special training in patent law and examination procedures. Throughout their careers, most examiners continue their education through training programs that allow them to further hone their skills and enhance their technical competence.
- *Review of search and examination quality*: Across Europe, there are quality assurance mechanisms in place, ensuring that open files (pre-grant) and closed files (post-grant) undergo random checks and any inconsistencies are mitigated accordingly.
- *Preliminary opinion on patentability*: Mechanisms that allow a preliminary opinion on patentability are regarded as the most effective for encouraging early amendment or withdrawal with a positive impact on patent quality. Within the EPC, the participant national patent Offices of first filing that provide a preliminary opinion to the EPO patent examiner are the UK, Germany, Austria and Denmark.

At the EPO, in particular, pre-grant measures focus mostly on the availability of information on prior art and ways in which this information can be searched by applicants and examiners alike. Pertinent areas for improvement include improved patent classification; access to non-patent prior art and the establishment of a centralized common prior-art repository; access to information on the legal status of a patent and its current assignee; translation of patent documents, above all the claims of Chinese, Korean, and Japanese filings; and timely publication of all applications (EPO ESAB 2012).

Across the Atlantic, USPTO reforms reinforce the importance of clarity in the claims, sufficiency of disclosure and identification of prior art. In 2012, the American Inventors Act brought about the most far-reaching revision of patent law of the United States in years. Several provisions have had a positive impact on patent quality by providing greater legal certainty about the validity and value of patent rights in the innovation marketplace. These provisions include the adoption of the First-Inventor-to-File (FITF) system, the setup of an in-house post-grant review process, as well as the greater use of third-party submissions to ensure that examiners get wider access to prior art. This process, sometimes described as crowdsourcing, allows experts and other interested parties to share documents that they believe will support the examination process. This information may include search results from foreign patent offices or publications known to the individual.

Specifically, the identification of prior art is regarded as an interactive process between the applicant and the examiner. This process starts with the drafting of the claims, evolves through amendments and divisionals and ends with the examiner's search report. The USPTO requires

applicants to submit all information known to be material to patentability, including supporting documentation, evidence and prior art citations. According to USPTO policy, examiners will consider this information when reviewing a patent application, which may require reviewing numerous prior art references submitted by the applicant – incoherent terminology and poor translation quality of these citations render the task more challenging. A GAO survey estimates that 82% of USPTO examiners sometimes, often, or always encountered applications with what they considered an excessive number of submitted prior art references in the second quarter of 2016. Further, it is estimated that for most examiners (64%), excessive references make it somewhat or much more difficult to complete a thorough prior art search in the allotted time (GAO 16-479, 2016). According to the same survey, the frequency and quality of prior art search for foreign patent literature, scientific articles or presentations, or foreign-language non-patent literature was statistically associated with the sufficiency of time allotted to examiners to complete the task: 67% of examiners claimed that they had somewhat or much less time than needed to complete thorough prior art searches given a typical workload. In this context, the right classification and routing of applications to examiners with relevant knowledge and experience to understand the invention or relevant prior art supports the efficiency of the examination process in areas of complex and strategic technologies. Appropriate training and continuous education of examiners in evolving technologies contribute to their ability to maintain the technical competence they need to effectively identify relevant prior art.

On a side note, the PCT has established a quality framework for international search and preliminary examination through a minimum set of criteria that each office should use as a model for establishing their individual quality scheme. In this context, the Austrian Patent Office, the European Patent Office, the Spanish Patent and Trademark Office, the National Board of Patents and Registrations of Finland, the Swedish Patent and Registration Office, the Nordic Patent Institute and the Visegrad Patent Institute act as international search authorities and provide, in that capacity, the International Search Report (ISR) as well as the International Preliminary Examination Report (IPER). Both documents contain high-quality assessments, offering a strong basis on which patentees can evaluate their chances of obtaining patents, in the case of the IPER most likely on an amended application, and, if the report is favorable, a stronger basis on which to continue with their application before the national and regional patent Offices.

To the extent that questionable patent quality, patent thickets and patent aggregation may be traced back to the generation, examination, and management of an ever-increasing volume of patent applications and patents, addressing the patent quantity problem becomes central to the policies of patent offices that anticipate a surge of patent applications in a particular field. According to WIPO, more than 3 million patent applications were filed worldwide in 2016, up 8.3% from 2015, whereby the patent offices in the United States, China, Japan, Korea, and Europe received 84% of the world total. Only the State Intellectual Property Office of the People’s Republic of China (SIPO) received 1.3 million patent applications in 2016 – more than the combined total of the other four top offices.⁴ Expert literature that focuses on the problem of patent quantity proposes increase of examiner head count, fee restructuring, enhanced search tools, rigorous approach to the patentability requirements etc. as commonly adopted solutions (cf. Bock 2015).

⁴ http://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2017.pdf

However, economic literature urges caution with regard to the assessment of various policy levers that aim to calibrate innovation incentives. According to Lemley (2016), policy changes in one direction or another have simply been too small or marginal to have a measurable effect. Furthermore, cross-country differences in these outcomes can be difficult to interpret. Differences in patent quantity and quality across the various patent offices are subject to doctrinal, institutional, economic and market-related factors. The analysis of three major economic areas (Europe, the USA and Japan) underlines strong international differences in the extent to which patent systems fulfill their objective. In Europe, for instance, more restrictions on patentable subject matter, higher rigor applied in the identification of prior art, and higher fees, translate into less than half of the number of patent applications than at the USPTO and much fewer patents being in force over the market (about 8 million claims); Japan is in an intermediate position (Chien 2016).

Against this background, it becomes clear that a patent office's efforts to address and "institutionalize" patent quality derive from its individual strategic considerations, mode of governance and examination objectives. A patent grant process with front-loaded inquiry into prior art that puts emphasis on thorough search and substantive examination offers a set of costs and benefits as applicants must endure a costly examination process, but in return are afforded a presumption of validity for the claims that survive that process (EPO model). A cost-effective alternative that allows applicants to file more patent applications subject to a narrow level of scrutiny comes with the trade-off that costs and justification for validity are deferred to the post-grant stage, including an over-reliance on the court system to weed out low-quality patents (USPTO model). By comparison of the two systems, the procedural options at each major patent office differ significantly with benefits that vary from the separation of search and examination at the EPO over to the more flexible USPTO system that allows many procedural options over an essentially infinite time span. Bearing these systemic differences in mind helps us reach the conclusion that no patent office alone can solve the puzzle of patent quality, and that pertinent challenges of time and resources can only be tackled through cooperation and successful synergies (see Section 3.1, below).

This is particularly relevant for the ICT sector, the idiosyncrasies of which add complexity to the search and examination process. In the case of standard-essential patents, research shows that these patents have longer pendency times as well as a higher number of claims and claim amendments. Longer pendency times imply higher frequency of applicants that exploit the flexibility within the patent application process and perform amendments to the claims. This trend could be explained by the chronological concurrence between the development of the standard and the patenting process: if an application is filed in the early stages of the standardization process, the incentives to retard the grant are high since there is a high degree of uncertainty about the specifications of the future standard. These incentives change after the standard specifications are frozen and the willingness to close the application process is now more or less a given (Köhler et al. 2013).

2.2. Fee structure as a policy lever

Most national patent and trademark offices maintain close ties to national ministries and are financed either through fees or a dedicated government budget. Regional offices such as the EPO are controlled by representatives of the member states – usually the heads of national patent offices – within an intergovernmental structure of checks and balances. Most patent systems levy both up-front fees and further renewal fees, paid during examination and after patent grant. Patent offices can either be self-financed through the fees or indirectly financed by the government, which in turn receives the patent fees (EPO Scenarios 2007). Most European national patent offices adopt – with some degree of variation - the traditional fee policy approach: low procedural fees to make the system widely accessible and renewal fees that not only induce patent holders to give up their monopoly rights but also cross-subsidize entry fees. Changes in these policies are highly unlikely due to multitude of institutional players involved and the possibility of misalignment of incentives associated with the complex structures of the European patent system (Europe Economics 2010).

Overall, the mode of governance of patent offices affects the setting of fees and the quality of the examination process. Comparisons of patent fees across a large number of patent offices show a high heterogeneity in the level and the structure of fees. By and large, however, yearly application fees are lower than yearly renewal fees, and renewal fees increase more than proportionally with patent age. A survey of the fee structure adopted across 30 patent offices results into the following key findings (Rassenfosse & van Pottelsberghe de la Potterie 2011):

1. First, the institutional context and the political objectives greatly influence the fee structure adopted by patent offices. There is indeed no such thing as a universally optimal fee schedule, and no consensus emerges regarding the optimal level of application fees. Considerations such as the severity of the backlog or abusive behavior by firms are deemed important when setting the fees schedule. Additional information such as the size of the market covered by a patent system should also be considered, as the value of patent protection is higher in larger markets.
2. Second, econometrics indicate an inelastic demand for patents. This finding highlights that patents are a necessity to business and has important implications for patent offices' budgets. Because an increase in fees lowers the demand by a smaller relative amount, higher fees would actually increase patent offices' net revenues. The fact that a patent is an inelastic good does not mean that patent fees represent an ineffective policy tool. It does, however, mean that a change in fees must be sufficiently large to have observable effects.

Fee policy has attracted more attention in the last years. Recent research has revealed that the fee distribution system could be utilized as a means to control patent quality, in line with the economic function of patents. To a large extent, economic literature proposes an increase in frequency and size of *renewal fees* (typically paid on an annual basis in order to renew granted patents) as an effective means to precipitate the expiration of low-quality patents. As a result, the cost of patent maintenance overwhelmingly falls on innovators with strong patents, rather than on patent assertion entities that exploit weaknesses in the litigation system. Raising maintenance fees, particularly at the end of a patent's life when the inventor has likely already reaped the reward, could hasten the diffusion of the patent's underlying technology without undercutting the

benefits of the exclusion (cf. Love 2016; Tsilikas 2016; Chien 2016). Beyond its support in economic theory, the idea that the optimal structure for renewal fees as an effective sorting device is to increase maintenance costs over time and towards the end of the patent term has found widespread application in practice, as well. In fact, most patent offices apply a renewal schedule with progressively increasing fees, and some apply a zero-charge for the earliest renewal years - where even patent owners may not yet be in the position to assess the economic value of their inventions (Europe Economics 2012).

Contrary to the prevailing take on renewal fees, experts have been more cautious to address the optimal design of *procedural fees* (filing, search and examination fees, etc.) in view of their potential to undermine wide access to the patent system for all innovators. However, recent developments in the patenting landscape, e.g., substantial increase in patent filings, strategic patenting, significant backlogs, legal uncertainty, suggest a re-evaluation of the role that procedural fees play. Schankerman & Schuett (2016) suggest that patent quality screening can be improved through higher pre-grant fees, coupled with a rigorous examination process. The argument for frontloading fees as an effective policy lever to filter out low quality patents is that the applicants' willingness to pay higher pre-grant fees increases with the inventiveness of the patent and the likelihood of legal validity. This result calls into question the traditional fee structure of patent offices that encourages patent filings through low procedural fees while backloading a substantial part of the fees through post-grant charges for issuance and renewal (e.g., USPTO). On the European side, it is proposed that procedural fees could be set at a level that reflects the cost of the service provided (including prior art search) or adjusted to higher or lower levels depending on periodical surges in patenting activity (e.g., when new technologies emerge) or subdued innovation activity during periods of recession (Europe Economics 2012). In practice, a revision of the procedural fee structure is currently put on hold despite general consensus that the European fee system needs "fine-tuning". In any case, fee changes should be based on a clear rationale and take into account possible unintended consequences – an ex-ante cost benefit analysis, coupled with an ex-post impact assessment, should support policymaking thereby ensuring the right balance between the imperative to keep the patent system widely accessible, the reality to control the unprecedented rise in patent filings and the need to preserve the quality of the final output (cf. EPO ESAB report 2012).

The analysis of the role of fees in the context of patent quality is justifiable on the grounds that fee policies have the advantage of being relatively easy to implement. However, empirical evidence has not thus far established a link between fees and patent quality. Empirical studies on patent fees have focused mainly on estimating the price elasticity of demand for patent applications overall, but have not yet looked into the optimal level of fees, the fee sensibility of various types of applicants or the costs and benefits of policy interventions other than fees; nor have they addressed some of the welfare concerns related to patent quality. Furthermore, there is no compelling evidence that the applicants' behavior differs significantly across technologies in a way that would justify different fee levels for different technological fields, most particularly in the ICT sector.

3. COLLABORATIVE APPROACH TO PATENT QUALITY

3.1. Work-sharing initiatives among patent offices

The increasing collaboration of patent offices through shared examination effort and data exchange agreements addresses many of the policy concerns mentioned above, in particular the issues of information access, timely search, examination quality and the reduction of backlogs. Access to prior art search results from foreign patent offices helps examiners identify relevant prior art or sources of prior art, align output for patent application filed in multiple countries, access search reports of unpublished applications in other offices and improve searches for patent and non-patent literature in foreign languages.

Collaboration projects of this kind are carried out at a regional or inter-regional level by the IP5 (i.e., the multilateral forum of the five largest patent offices EPO, USPTO, JPO, KIPO, SIPO), some Latin American Patent Offices (Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Suriname and Uruguay), the ASEAN group (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam) as well as the Vancouver Group (Canada, Australia and the UK). The idea behind these initiatives is that common access to search and examination results of other patent offices through a single source facilitates the seamless dissemination of up-to-date patent information, eliminates unnecessary duplication of work based on work-sharing and provides mutual utilization of results. A useful example in this direction is the WIPO CASE (sharing of search and examination results) system. The latter is currently being extended and integrated with the IP5 “one portal dossier” to complete a key component of the Global Dossier initiative. A growing need for common standards to promote information sharing and interoperability is further supported by the WIPO Standards and Classification systems, as well as the program of services for access to information and knowledge.

This intent is also broadly manifested in the numerous processes developed under the Patent Cooperation Treaty (PCT) and the Patent Prosecution Highway (PPH). Under the PPHs, for instance, when claims are determined to be allowable in the Office of First Filing (OFF), a corresponding application with corresponding claims filed in the Office of Second Filing (OSF) may be advanced out of turn. The OSF can utilize the search and examination results of the OFF, thereby avoiding duplication of work and expediting the examination process in the OSF. However, a convergence of examination results alone cannot ensure patent quality so that caution is urged over the risk of importing and recognizing less informed search and examination outcomes from other patent authorities. It has been argued that, before entering into worksharing processes, patent offices should first converge in their quality of examination and operational design, which requires tackling critical questions related to examiners’ incentives, their education, training and workload etc. (Van Pottelsberghe de la Potterie 2010; cf. Eckert & Langinier 2014).

To this end, the IP5 offices have long engaged in collaborative projects that help them handle together about 80% of the world's patent applications, and 95% of all work carried out under the Patent Cooperation Treaty (PCT). By leveraging the PCT as the principal platform for work-sharing, the leading offices undertook ten so-called Foundation projects with the aim to enhance the quality of patent examination and reinforce the need for an IP5 strategy on timeliness, i.e., the timely provision of first filing search results in order for the office of second filing to be able to

re-use these results. These projects included common mechanisms for documentation, hybrid classification, access to search and examination results, application format, training policy, mutual machine translation, examination practice rules and quality management, statistical parameter system for examination, sharing and documenting search strategies as well as search and examination support tools. Concerning the perceived effects of co-operation mechanisms among patent offices, the results of a PatQual survey suggested that standardized practices on patent quality, information exchange, shared search results, a common classification scheme (supplementary to the IPC) and the use of machine-translated documents are frequently perceived to have a positive impact on patent quality (Calderini et al. 2011).

Since their kick-off in 2008, some of the aforementioned foundation projects have been completed while others have been suspended due to technical or political issues. This led to a realignment of IP5 cooperation activities for the period 2013-2017. There are currently three Working Groups (WGs) dealing with projects and topics in the areas of classification (WG1), global dossier and patent information (WG2) and work sharing and quality (WG3). WG1 is responsible for promoting necessary changes into the IPC under the WIPO framework of the IPC Committee of Experts, including an up-to-date adaptation of granular classification schemes to fast moving technical areas and emerging technologies. WG2 addresses the necessity to develop tools, i.e., file wrapper data in a standardized format, which allow applicants to retrieve information about patents from a single source, as well as to develop approaches that enable simplified subsequent filing of applications at other IP5 Offices. Parallel significant advances within the same working group involve the development of a system in which the barriers to obtaining IP5 patent information are significantly lowered. The free exchange of patent information extends to all types of exchanged data (bibliographic data, coded data, image data, abstracts data, translated data, classification data, statistical data etc.) as set or subset of data of the receiving or providing office. Finally, WG3 consolidates and advances the work achieved through the former foundation projects with particular focus on work sharing via the PCT platform, timeliness (IP5 Patent Prosecution Highway) and quality.

Available JPO statistics underscore the positive impact of work-sharing on patent quality and operational efficiency: The use of the EPO supplementary search report by the JPO has reduced the rate of the occurrence of a trial against an examiner's decision to 5.9% (rate of change 46.3%), which is a 5.2% decrease from the average level of 11.1%. It has also reduced the ratio of inconsistency between JPO and the EPO in terms of examination results to 6% (rate of change is 86%), which is a 36% decrease from the average level of 42% (Yamauchi 2013).

Interagency collaboration among the IP5 offices does not only take place on a multilateral level, but also on a bilateral one. For instance, the USPTO has entered into two pilot programs to jointly examine certain applications. Applicants who file related patent applications with USPTO and either JPO or KIPO may request to enter the pilot known as the Collaborative Search Pilot Program and receive expedited review of their applications. In the pilot with JPO, USPTO examiners consider prior art from both JPO's search results and their own search results before responding to the applicant with the first office action. In the pilot with KIPO, examiners perform independent searches and examinations and subsequently compare results prior to final office actions.

For the special case of technical standards, access and sharing of Non-Patent-Literature (NPL) collections that include documents sourced from SDOs through bilateral agreements has not yet met a sufficient level of enthusiasm in the IP5 context. While the IP5 Offices explored the modalities of a common NPL procurement, including draft technical standards, they concluded that this type of procurement would face a number of difficulties. Whereas patent information originates from a limited and well-defined number of patent offices, non-patent literature is acquired from thousands of sources and not adequately integrated in NPL-databases for automatic retrieval in the context of prior art search.

Among the IP5, the EPO and JPO are the only patent offices that independently access standards and drafts from partner SDOs as an important source of prior art in the field of mobile telecommunication, audio and video and wireless technologies. Whether some of those documents could selectively become accessible by other IP5 offices as part of the common documentation remains open, raising questions about limitations relating to the public availability of this documentation, possible acquisition, integration and sharing mechanisms, scalability of existing cooperation with SDOs to include more offices, coordination of negotiations over agreement types and terms etc.

3.2. WIPO and the path to a global IP infrastructure

The increased collaboration at a regional level, such as the IP5 projects, point to the need for enhanced interconnectedness among patent authorities - from simple technical systems to more sophisticated business systems supporting processes such as collaborative examination and direct online interaction with applicants. Within this framework, access to and dissemination of patent-related data is acknowledged as instrumental to the successful implementation of patent quality measures. The patent system is both a technology disclosure system as well as a system that runs on aggregated information around the scope and term of patent protection, geographical applicability and status of patent ownership. Patent information, namely information disclosed during the patent application, examination, grant and maintenance processes, thus serves as a primary source of technical, business and legal information for all users. In particular, the technological data contained in patent documents allow both applicants and examiners to access a wealth of information related to prior art.

While, traditionally, the demand for intellectual property rights has come mainly from Europe, Japan and the US, the past two decades have witnessed a geographical shift of patent applications towards Asia, which – coupled with increasing levels of internationalization for PCT filings – reflects the underlying trends in economic activity, international trade and the emerging technological prowess of the region (WIPO Report 2011; Kesan et al. 2014). Against this background, there is a growing demand for enhanced IP data, geographical coverage, content quality and improved linkages to other data sources. This requires WIPO's responsiveness and scalability regarding accessibility and availability of patent information on a global scale. However, this task poses a set of challenges involving the digitization and dissemination of patent information, the management high-volume data products, development of patent search tools, training and awareness-raising, etc. (WIPO SCP/14/3, 2009).

Thanks to bilateral cooperation agreements, WIPO provides technical assistance to the participating patent authorities for the digitization, formatting and dissemination of their patent data and documents. For the PCT collection, complete file contents including International Search Reports, Written Opinions and Preliminary Reports on Patentability can be retrieved as well as national phase entry data for more than 40 patent offices. As the latest development, the PCT Regulations have been amended with effect from July 1, 2017 so that designate/elected offices are required to inform the International Bureau of the national phase entry data in relation to each application enter the national phase.⁵ Certain services include a technology focus feature, which offers an overview of trends in certain technology fields, specifically traditional medicine and alternative energy. In addition, PATENTSCOPE contains a very significant number of national and regional patent collections, totaling more than 62 million documents beyond the PCT collection.⁶

However, gaps in the global knowledge infrastructure across many developing countries has prompted WIPO to leverage its role as a global curator of patent information and carve out a set of goals and recommendations that have – for the most part - been implemented in concrete projects. In order to create a level playing field and take into account a greater diversity of IP institutions, WIPO has established agreements with research institutions and private enterprises that allow national patent offices of developing countries to access specialized databases for the purposes of patent searches. The ultimate goal of these agreements is to facilitate both the exchange of data between patent offices around the world and the access of developing countries to the information output of the global IP system (Takagi 2010).

The setup of a global IP infrastructure relies on a wider range of critical components, i.e., from facilities, office equipment, software and consolidation of IP information into centralized databases over to information networks, technical expertise, supporting institutional focal points and, last but not least, sufficient funding. Addressing the need for tools, services, standards and platforms, WIPO's Global Infrastructure Sector (GIS) was set up to provide ICT-enabled services and to coordinate the provision of such services by the key players in the IP world.⁷ GIS assists IP institutions with the digitization of their data according to certain standards, while preserving the integrity and confidentiality of the data. A further step in IP Global Infrastructure involves the creation of a multilateral platform that would interlink participating IP offices and authorities thereby enabling them to perform global transactions, access information and provide globally efficient and seamless services through a “one stop shop” for applicants, examiners and other users (WIPO A54/INF5, 2014).

⁵ http://www.wipo.int/edocs/pctndocs/en/2015/pct_news_2015_10.pdf

⁶ See https://patentscope.wipo.int/search/en/help/data_coverage.jsf. Also, under the project “Intellectual Property, Information and Communication Technologies (ICTs), the Digital Divide and Access to Knowledge”, WIPO has given priority to the digitization and integration of patent records into high-volume patent data services such as PATENTSCOPE that offer access to bibliographic data and abstracts in translation, searchable full-text of patent claims and images of the complete PCT collection.

⁷ ICT-based services provided by GIS include the PATENTSCOPE database as well as the inter-office platforms of WIPO CASE (sharing of search and examination results) and WIPO DAS (secure exchange of priority documents). IP offices use both platforms to support their business processes, in particular the exchange and sharing of documents for IP applications. Further, the GIS would need to link to and support WIPO's Global IP Systems – PCT, Madrid and Hague.

There are several challenges in implementing ICT strategies in the GIS, in particular quality and timeliness of data, stakeholder diversity, competition from other IP institutions and the private sector, complex governance models for global systems, budget and bandwidth constraints, etc. In the long term, however, the quality of the services offered by an IP institution will not be determined by its ICT systems per se, but through the effective utilization of these systems. For WIPO, this means that its ICT strategy in this area needs to take into account the individual business needs of IP institutions and facilitate capacity building in a manner that helps them increase the level of their specific services.

B. LINKING PATENT QUALITY TO THE USE OF STANDARDS DOCUMENTS FOR THE PURPOSES OF PRIOR ART SEARCH

1. INFORMATION SHARING BETWEEN PATENT OFFICES AND STANDARD DEVELOPING ORGANIZATIONS

1.1. Collaboration benefits for patent offices

While cooperation between the Patent Offices and SDOs has been suggested in many fora, it has only been realized to a limited extent. In 2009, the global political climate appeared broadly supportive of efforts to institutionalize information sharing between the two parties: As part of their special IPR agenda, the Global Standards Collaboration Conferences released a series of resolutions⁸, re-encouraging SDOs to cooperate with the relevant patent authorities to provide access to technical information, patent declarations and - provided the respective SDO rules allow – standards drafts and workgroup intermediate documents for the purposes of patent search and examination. The tenor of these resolutions captures the value of information sharing for the involved parties, the interdependencies and the reciprocity in the cause: ITU and ETSI recommendations to agree on a minimum format of standards documentation in order to facilitate identification of prior art during patent examination.

In the meantime, only the EPO has gradually established broad access to standards drafts and other standard-related technical documents held by major SDOs, which could be part of prior art documents that are useful for patent examination. Although there is no full-fledged policy in the field of standards-related patent applications, the EPO has been paying attention to ICT given the ever-increasing number of interaction with other fields, especially in the context of wireless communication, 5G, big data and the Internet of Things (IoT). The particular nature of standards drafts and their potentially high technical value underline their significance in the evolution of pertinent technologies and, therefore, their pivotal role in patent search. Towards a systematic use of these documents in patent examination, the EPO has adopted various approaches on a cooperation and operational level, such as leveraging work of other patent offices on related patent applications, integrating non-patent literature into their search tools, building internal

⁸ See, e.g., Resolutions GSC-12/23 (2007), GSC-13/23 (2008) and 14/23 (2009).

databases of standards documents, introducing specific training etc. The JPO follows a similar example and has devised its own means to address this objective.

In the aftermath of the American Inventor's Act (AIA) - which revamped the US patent law system thereby increasing harmonization at the international level -, the USPTO is currently assessing various options of cooperation with SDOs and whether it would be appropriate for it to pursue membership in private organizations, an element of the EPO's relationship with ITU and ETSI. Although a number of federal government agencies participate as members in organizations such as the American National Standards Institute (ANSI), the USPTO considers an arm's-length relationship to be the appropriate way for a regulatory agency to support the private sector standards development system while avoiding potential conflicts of interest. According to USPTO officials, membership status may have built enough trust in the EPO relationships with ITU and ETSI prior to any arrangements, but it is the process of arriving at the MoU, garnering its benefits and sustaining a fruitful collaboration that fosters the belief that the PTO-SDO arrangements constitute strategic assets.

The information covered in the following sections is based on available bibliography, publicly accessible secondary literature, survey-based input from patent offices and SDOs as well as scheduled interviews with subject-matter experts.

1.1.1. European Patent Office

Ensuring uniform patent protection standards for its 38 member states through a single and cost-effective administrative procedure, the EPO receives and grants hundreds of thousands patent applications per year and carries out more than 40% of all international search and preliminary examination procedures. In the field of telecommunications, EPO statistics available on the organization's website reveal an upward trend. For instance, a comparison of output between 2013 and 2015 demonstrates a steep increase in searches (2013: 13,395 vs. 2015: 18786), a decrease in opposition cases (2013: 87 vs. 2015: 74) as well as a relative increase in patent grants (2013: 5,731 vs. 2015: 6,532). Certainly, a few areas in the telecom field are not related to standards. However, an increased number of filings in standard-related audio-video technologies makes more or less up for the gap. 3GPP standards are relevant to more than half of the standards related applications, followed by JPEG/MPEG/ISO/IEC applications (Audio-Video) and then followed by ETSI, ITU and IEEE-SA standards related applications. Also, the majority of patents opposed were declared as SEPs.

These recent trends validate the EPO's foresight to engage early on in building partnerships with leading SDO and – with it – a competitive advantage in information sharing. As part of a wider strategy to ensure access to comprehensive, conclusive and timely standard-related information in an efficient and transparent manner, the EPO established a cooperation framework for documentation exchange with IEEE-SA, ITU and ETSI.⁹ ETSI is the formally recognized

⁹ Although there are over 800 SDOs active in the standardization process, the most important, most commercially successful and thus most litigated standards are developed by the International Telecommunications Union (ITU), the European Telecommunications Standards Institute (ETSI) and the Institute of Electrical and Electronics Engineers (IEEE), which represents the world's largest professional association in the standards community.

European Institution for standardization in telecommunications and has a global impact due to its important cellular telecommunications standards (GSM, UMTS, LTE). IEEE-SA is responsible for the development of various wireless standards, including the 802.11 standard, whereas ITU's key standards include video coding technologies such as H.264/AVC.

Further cooperation with major SDOs and extension of that cooperation to other institutions is an ongoing process. Pertinent agreements with IEC, World DMB and BSI (*Bundesamt für Sicherheit in der Informationstechnik*) are also in place.

Signed in July 2009, the Memorandum of Understanding (MoU) between IEEE-SA and the EPO was the first of its kind to be concluded between a standard-setting body and a patent office. According to the official statement, closer involvement with SDOs supports the EPO's efforts to increase both transparency and patent quality in rapidly developing technology fields, such as ICT, helping to reduce patent thickets on widely used technological platforms and thus directly benefiting consumers (EPO News release 2009). In the MoU, the two organizations agree to share knowledge, information and documentation on technology and standards, and to collaborate on education related to standards and IP issues. Particular emphasis is added to those cooperation activities that facilitate the participation of EPO representatives in all relevant IEEE Working Groups and utilize the brands of both organizations for education and promotion purposes. Unlike with the other two SDOs, membership with IEEE was not a prerequisite for access to its documentation.

A few months later, on 24 November 2009, a similar agreement with ETSI was signed in Cannes during ETSI's 54th General Assembly. In the case of ETSI, the MoU underlined the already existing co-operation between the two institutions – due to its 2003 membership status with ETSI, the EPO had already been provided some access to restricted documentation as well as a vast range of publications. A key feature of the agreement was to strengthen mutual benefits by linking the ETSI database to the EPO system (EPO News release 2009). According to an excerpt of the MoU provided by an ETSI representative in November 2016, ETSI and EPO entered the agreement with the following goals:

- 1) Exchange from time to time as they may agree, information in areas of mutual interest, such as information on new and emerging technology initiatives and events in selected technology, intellectual property and governance activities to facilitate dialogue and ongoing collaboration;
- 2) Collaborate, where necessary, on ETSI documentation format definition and dissemination policies to align them as much as possible to the EPO prior art search needs, including as set out under the Dissemination Policy section of this MoU;
- 3) Maintain the interlinkage between the ETSI IPR database system and the publicly available EPO database system and their respective features in order to permit online access to patent documentation (e.g. with regard to bibliographic information, patent families and patent number normalization), in order to increase transparency of patent information declared to ETSI in connection with the ETSI standards and technical specifications;

4) Collaborate on intellectual property issues and related educational materials leading to tutorials to be held within the EPO Academy and within ETSI and invite the other party to any relevant official events within the intellectual property field;

5) Contribute articles on intellectual property for appearance in related ETSI and EPO publications.

Similar cooperation arrangements with ITU came to fruition on May 6, 2011. Like with ETSI, EPO maintains a membership with ITU, which acts as the leading UN agency for ICTs with three core sectors, namely radiocommunication (ITU-R), standardization (ITU-T) and development (ITU-D). ITU's membership includes private or public sector entities formally recognized as authoritative national standards representatives. Under its umbrella, government officials from 193 member states coexist and interact with private-sector members from more than 700 corporations, associations and academic institutions. The hybrid public-private character of ITU's governance structure renders it a unique global forum. Its remit is to provide policy responses that strike a balance between the interests of the various stakeholders. Similar to the MoU with ETSI, the linking of the respective IPR databases is the pillar of the cooperation arrangements between EPO and ITU. In this context, the EPO has received access to a large volume of technical contributions and draft ITU-T recommendations stemming from various stages of the standards development process. In return, the EPO assists ITU on the definition and dissemination of a common document format in alignment with EPO prior art search needs. On a wider scale, ITU and EPO join efforts in capacity building activities at the interface of IPR and standardization processes. Strengthening its ties to the other IP5 offices, ITU is currently discussing USPTO membership and will pursue similar arrangements with JPO, KIPO, and SIPO. In addition, ITU-T has over 40 formal partnerships with other standards bodies, including MoU with IEEE and ETSI. Together with ISO and the International Electrotechnical Commission (IEC) – two international non-governmental organizations composed of national standards bodies - ITU forms the World Standards Cooperation (WSC), which was set up in order to strengthen and advance the voluntary consensus-based international standards systems of those institutions. The WSC promotes the adoption and implementation of international consensus-based standards worldwide, and resolves any outstanding issues regarding cooperation in the technical work of the three organizations.

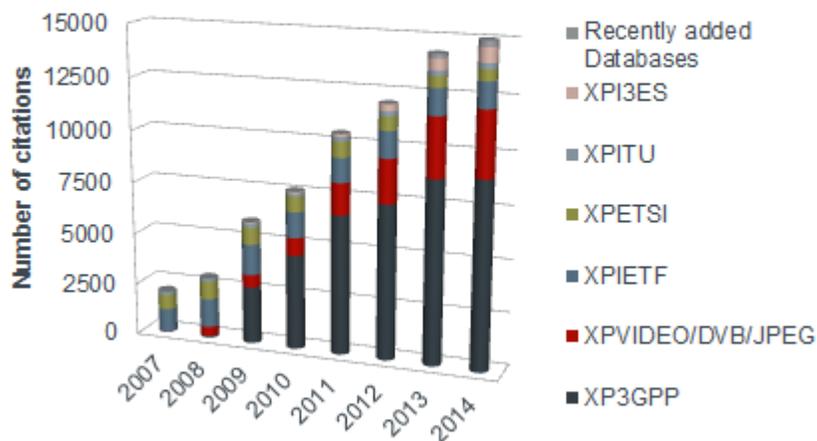
At the heart of the EPO-SDO cooperation lie obligations for information sharing: access to non-confidential standard-related documentation and the interlinking of the SDOs "essential IP" information systems to the EPO public databases. Specifically, the three agreements have several common elements: 1) exchange of information and documentation of mutual interest in the field of standards for the benefit of prior art search; 2) collaboration on documentation format definition and dissemination policies to align them with the EPO prior art search needs; 3) contributions to education activities in the field of standards; and 4) self-funding of expenses associated with the agreements (NAS 2013). The mutual advantage of this exchange consists in the distinct value of data generated and owned respectively by these key institutions: whereas the EPO manages vast repositories of information on pending application and valid patents, the SDOs have exclusive knowledge related to existing standards and the declared IPR relating to these standards. Linking the information troves of both sides yields a unique interface of

complementary information with beneficial effects for patent examiners, users and, ultimately, consumers and the patent system as a whole.

From a patent office perspective, the underlying purpose is clear: mitigating the risk of unduly granted patents through timely access to early drafts, upgraded tools for prior art search and efficient management related resources. The costs of membership, document acquisition, conversion and integration have been significant over the course of the years and during the initial stages of the linkage process. However, these cost are offset by a remarkable increase in the knowledge repository of EPO examiners based on empirical and statistical evidence. With regard to improvements in prior art searches, use of standards documents and drafts are estimated to impact roughly 30% - 40% of the cases in certain technical fields, e.g., 35% in the area of wireless telecommunications (Bekkers et al. 2016).

The EPO decision to invest in NPL prior art resources in the field of technical standards has had a positive impact: EPO statistics reveal, for example, that the number of 3GPP citations increased from 83 in 2008 to almost 9,000 in 2014 and has been growing exponentially since then. This evolution is demonstrated in the following graph (Source: EPO public presentation):

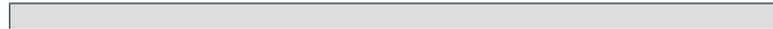
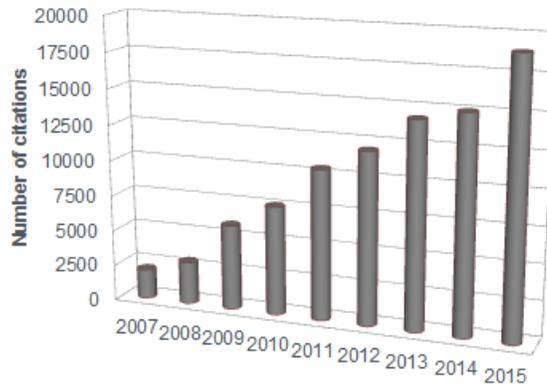
Citation per standards database



The upward citation trend is graphically represented below (Source: EPO public presentation):

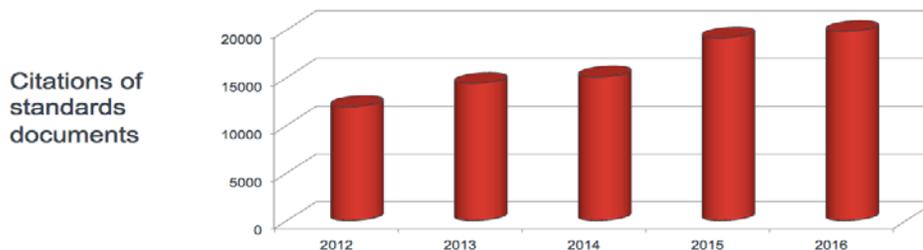


Standards in Patenting Process at the EPO Citation of standards documents



Recent statistics outline a similar upward trend (Source: EPO public presentation), whereby – at that pace - the number of cited standards documents was expected to exceed a total of 22,000 in 2017:

Standards documents increasing in importance:



- Nearly **20 000 citations** of standards documents in 2016, + 66% over 2012
- Up to **60% of search reports** in key fields (Wireless Networks, Digital Video Coding and Compression) contain standards documents relevant to the patent examination

European Patent Office

7

A cost-benefit analysis based solely on the aforementioned indicators does not of course pay sufficient tribute to the manifold ramifications of the EPO-SDO collaboration - not only because the available metrics are insufficient or even incomplete, but also because they overlook the economic, corporate/litigation, reputational and systemic costs prevented by the absence of overlapping or “trivial” patents. What remains as a key take-away from that synergy is the undeniable fact of an ever-increasing dependency of search and examination quality on the use of standards drafts, especially in the areas where 3GPP constitutes a critical component (telecommunications, wireless technologies, IoT). At the case of the EPO, the impact of that evolution on its practice was less noticeable through a modest increase in the number of

specialized patent examiners (there are approximately 60 EPO examiners in the telecom field) or the requested number of searches; rather, it is the intensity of use of standard-related documents in the course of a patent search that renders the EPO-SDO collaboration a condition-sine-qua-non for patent quality.

1.1.2. Japan Patent Office

The Japan Patent Office (JPO) concluded its first cooperation agreement with the International Organization for Standardization (ISO) in 2014. Moreover, ITU, IEEE-SA and 3GPP (Third Generation Partnership Project) have authorized the JPO to store their standard-related documentation in its internal database. However, unlike the EPO, the JPO database is not interlinked with the databases of the various SDOs. Instead, selected standard-related documents are stored in the regularly updated internal database alongside other NPL documentation. According to Japanese officials, maintaining these documents in the internal database allows for the examiner to search the internal database for both SDO drafts and other documents simultaneously; to use advanced retrieval function of JPO's retrieval system including neighbor search method; to use high speed screening of JPO's retrieval system; to search prior art documents without disclosing contents of patent applications during international search and accelerated examination for undisclosed patent applications.

On the downside, the lack of direct linkage between the JPO database and the SDO database comes at a cost due to regular updates of the internal systems and the time lag between the database update and the publication of these documents. In view of these challenges, every new addition to the database undergoes rigorous screening. The selection process for pertinent standards documentation takes place following the recommendation of an internal committee of examiners and officials that assess the usefulness of the documents prior to the decision to include it in the internal NPL repository. Through a similar process, an internal committee also assesses the relevance of NPL-literature accessed through external databases and whether the agreement with the respective provider should be maintained.

The JPO is planning to further expand access to standard-related documents either through its internal system or via commercial databases. As search indexes are assigned to the documents stored in the internal database, the examiners receive appropriate technical training and guidance that helps them navigate their prior art search.

1.1.3. Other patent offices

Other patent offices have not carved out a documented strategy to identify and assess new sources of prior art or the most optimal means of providing access to them – also in the special field of standards. This is true in the so-called latecomer economies which are currently in the process of building their standardization capabilities through a revised national standardization strategy that marries elements of the current government-managed model with market-driven elements of a US-style decentralized standardization system (Ernst et al. 2014). In particular, China is rolling out new policies to encourage a new “group standards” development model. These reforms are

expected to result in significant shifts in the Asian policy landscape, as there will likely be many new stakeholders participating directly in the local standards development activities.

Albeit without an information exchange in place that emulates the EPO-SDO cooperation practice, a few patent offices around the world have introduced certain patent quality measures that take into account the importance of technical standards for innovation and the local economy:

KIPO, the Korean Intellectual Property Office, has already signed a cooperation agreement with the Telecommunications Technology Association of Korea (TTA) that counts among its members 140 Korea-domestic firms including the Korea Institute of multinational companies. However, its implementation lacks certain resources such as funds, time and personnel that would support the stream of standard-related information toward KIPO or other patent offices willing to enter a cooperation agreement.

In Singapore, the IPO already processes patent applications related to ETSI, IEEE and ITU standards, but has not yet sought a substantive cooperation with local or international SDOs. In addition, the IPO does not maintain a separate repository for non-patent literature nor does it import NPL documentation into its internal database. However, the patent office has developed specific search guidelines related to audio coding, video coding and telecommunication standards that assist examiners in identifying sources of relevant prior art. Following a specialized training, the examiners rely on available SDO search engines as well as on EPOQUENet, in particular the XP3GPP, XPIETF and XPJPEG databases, to identify relevant prior art.

In Russia, Rospatent recognizes that the evolving field of standardization may require special attention due to its relevance to prior art search, but does not maintain a specific form of cooperation with local and foreign SDOs. Rospatent does not have any specifically trained clusters processing patent filings related to standards and there is no specific training policy for this particular field. Publicly available patent databases, as well as commercial databases such as STN International, are used for prior art search. The latter is supported by an internal search system called PatSearch, which allows access to patent and non-patent literature. As far as non-patent literature is concerned, PatSearch is linked to external databases that cover a total of 23.5 Million publications. Access to standard-related documentation is enabled via the so-called Techexpert information system, containing more than 1,269,000 from about 450 SDOs. These documents do not get integrated into the internal database.

Overall, the state of internal NPL databases that include standard-related documentation varies significantly across patent authorities, from non-digitized and rarely updated over to highly sophisticated ones. There is typically a mix of internal and external databases (commercial and non-commercial) on which examiners can rely for their search. Acquisition of standard-related documentation with subsequent integration into the existing system architecture is approached with caution due to lack of resources or where a cost-benefit analysis does not justify it.

Collaboration benefits for Standard Developing Organizations

1.2.1. Synergies derived from interlinked databases

Back in 2011, the European Commission and the European Patent Office (EPO) jointly organized a workshop on ICT standards and patents with particular focus on the role, expectations and responsibilities of public authorities in relation to the use of interoperable ICT technologies in support of competitiveness and innovative applications to meet policy objectives. The workshop revealed that transparency and enhanced cooperation between patent offices and SDOs is in the interest of both types of organizations. Given that 1/3 of the important documents in relation to telecom patent applications come from standards-related literature, the synergies are non-negligible: from a patent office perspective, high quality patents in the ICT area can best be obtained by giving patent examiners access to standardization information and providing joint training while SDOs can benefit by updating and completing their patent declarations through access to data from the patent registers through improved automation. Patent-related information flows in both directions thereby informing the patent grant process as much as the process of standardization.

A result of the EPO-ETSI cooperation, the ETSI IPR database offers a good practice example of how declarations of essential patents are automatically updated with patent data from the EPOQUE database. ETSI members benefit from updated information on patent applications/claims and generated automatic identification of classifications and patent families. Building on its cooperation with the EPO, ETSI seized an opportunity to launch the new IPR database in March 2011 and currently counts declarations on approximately 8,500 standards with 16 new declarations on average per month.

The plans of ETSI to reengineer its IPR database can be traced back to the launch of the so-called DATAbase REstructuring (DARE) project in the year 2009. The project introduced some key features including handling of disclosed patent family members as distinct grouping concept of individual patents; default setting of standard declarations as “potentially essential” until notification of patent essentiality is submitted; public access to modification history; visible declaration lifecycles; automated consistency checks and dynamic reporting tool based on user-defined queries. During the restructuring process, ETSI leveraged the collaboration with the EPO in order to “normalize” its data with the EPO data. This synchronization resulted in the single storage of relevant data and generated useful cross-references among previously dispersed data.

The new architecture increased transparency, functionality and user-friendliness by ensuring improved usability of online declaration screens, reliable reporting of query results on standards, patents and ownership status including essentiality information, visual distinction between explicitly disclosed patents and implicitly imported, and the possibility to access information on licensing conditions via a link to the concerned declaration. The estimated cost of these upgrades was 1 Million Euros, or approximately US \$1.3 million (NAS 2013). Based on user feedback, ETSI continues to improve certain technical aspects and enhance transparency. For instance, the improvements allow users to make IPR declarations online through the use of mandatory form sheets of predefined format or obtain statistical overviews and specific details of the information contained in the concerned IPR declarations. All data is captured in a consolidated form in an ETSI special report available twice a year.

Regarding the scalability of the EPO-SDO cooperation model across patent offices, ETSI intends to expand its practice to JPO and KIPO as well as cooperate with USPTO to some degree.

1.2.2. Toward a centralized repository of IEEE-SA documents

From an SDO perspective, a diverse network of partnerships with patent offices and other SDOs worldwide – coupled with a vast repository of valuable data - generate more opportunities to scale up joint activities and devise new modes of content exchange. In that sense, IEEE-SA is well-positioned: counting more than 7,000 individual members, 200 corporate members and approximately 20,000 participants, the IEEE-SA maintains fruitful collaborations and liaisons with many national patent offices and SDOs, including Memoranda of Understanding with CCSA in China, ARIB in Japan, TTA in Korea, BIS in India, etc. IEEE-SA also has agreements with IEC (the IEC/IEEE Dual Logo Agreement) and ISO (the ISO/IEEE Partner Standards Development Organization Cooperation Agreement) whereby IEC and ISO can adopt IEEE standards and the joint development of standards can take place between organizations. IEEE-SA is also a sector member of ITU-T as well as a member of the Global Standards Collaboration (GSC), i.e., a group of twelve organizations dedicated to enhancing global cooperation and collaboration regarding communications standards and the related standards development environment.

With a view to upgrade its continued support to patent offices through access to consistent, high quality and timely data, IEEE-SA is currently developing a new platform for its centralized repository, which will allow interested patent offices worldwide to search, access, and publicly view nearly 40,000 IEEE-SA Working Group contributions via subscription. This so-called Working Group Data Service will be updated on a daily basis, the main challenge thereby being the development of a schema against which all IEEE Standards Working Group data can be mapped. This schema will define which information and how that information will be accessible to the patent offices so that IEEE-SA can tag, govern and control the data.

The planning and requirements building for the above platform have already begun and the new architecture is expected to launch by the end of 2019.

2. INCLUDING STANDARDS DOCUMENTS INTO PUBLIC PRIOR ART

2.1. Defining public prior art: confidentiality of standards documents

2.1.1. Legal status of technical information related to standards

In assessing whether a claimed invention meets the legal requirements for patentability, examiners decide on the novelty and inventive step (or non-obviousness) as those concepts have been defined in patent laws and interpreted by the courts. In this context, determinations are made by comparing information included in the application to other information relevant to the claimed invention. Such information, generally known as prior art, may include patent literature, i.e., prior patents and published patent applications, or publicly available non-patent literature (NPL) describing a technology, such as product manuals, standards established by international organizations, textbooks, periodicals, or conference presentations.

At the interface between patent information available under the patent system and technical information generated and published by the standardization system, information disclosed during the standard-setting process may qualify as prior art from a patent law perspective. However, technical information regarding both adopted standards and standards drafts under discussion is not easily accessible and readily searchable by patent offices at the international level. In addition, information disclosed by an SDO may constitute prior art in some countries but not in others, the reason being that the definition of prior art is not the same under all national patent laws. Many national laws converge in their definition of prior art as “everything made available to the public” before the filing or priority date whereby the terms “availability” and “public” may be interpreted slightly different within the various legal systems (WIPO Standing Committee on the Law of Patents, SCP/13/2, 2009). Furthermore, the WIPO handbook on IPR describes prior art as a notion covering all the written or orally disclosed knowledge that existed prior to the relevant filing or priority date of a patent application whereby disclosure is understood as to information accessible to the public. Hence, while the legal definition of prior art in the national patent law systems is relatively standardized, the interpretation of “public availability” is nuanced and requires clarifications.

On the other end, the majority of SDOs (with the exception of ETSI) have an explicit rule regarding the confidential character of standards documents with significant implications for prior art search, the determination of patentability of subsequent inventions and, ultimately, patent quality. Final standards are typically publicly available and thus constitute prior art, whereas information under discussion within private standard consortia in the field of CD-ROM, DVD and Blu-ray disc is not given that these consortia do not publish the final standards but make them available to the interested circles only under acceptance of a non-disclosure agreement. The debate around the legal status of standards documents becomes more complex in the case of a wide range of preparatory documents, which potentially constitute a primary or sole source for the identification of prior art. The informational value of standards drafts lies in their ability to describe generic technological interfaces in the making and thus capture the essentiality of new technology at an early stage.

The prior art nature of a standards draft is not always clear and the challenge is twofold:

a) Standards drafts are treated like other public disclosures under certain conditions, meaning that to qualify as prior art they must have been made available to the public prior to the patent filing/priority date without the disclosure being subject to a requirement of confidentiality. The latter is subject to the rules or norms of the respective SDO. In practice, compliance with the confidentiality obligation is left to the common-sense determination of each member of a committee, whereby the incentives for SDO members to make early specifications available as prior art are often mixed due to competition concerns;¹⁰

b) Standards drafts come in different formats and there is often no binding reference to the dates of public dissemination or of expiry of confidentiality of the documents (NAS 2013). At the examination stage, ambiguity around confidentiality issues may compromise the use and citation of prior art by the examiners against a patent application; and, at the review/opposition stage or during court litigation at the national stage, ambiguity around confidentiality issues may prevent the use and citation of prior art by the opponent party against a patent grant.

Against this background of legal uncertainty in critical technical fields with global repercussions, practical and policy considerations over patent quality highlight the need to include standards-related information in the notion of public prior art (WIPO Standing Committee on the Law of Patents, SCP/13/2, 2009). Allowing examiners to access that information in a timely and accurate manner would confer greater legitimacy to patent grants related to those technologies. However, the patent-driven imperative to ensure the smooth and wide dissemination of standardized technologies may have to be counterbalanced by standardization-driven considerations that take into account the incentives and balance of powers within the standard setting process, especially in areas where friction arises between the two systems. Among the sources of such distortions are often dissemination and confidentiality regimes, both for input and output documents of the standardization process, which are not always compatible with the patent system, e.g., there is often no binding reference to the dates of public dissemination or of expiry of confidentiality of the documents. Eliminating such ambiguity would help avoid potentially detrimental effects to innovation and the patent system as a whole. And this is where the contribution of SDOs and patent offices come into play, i.e., through clear dissemination policies, established case law, field-specific examination guidelines or any other coordinated effort that restores clarity in critical technical fields with high stakes for the consumer and the society at large. Concrete examples of such practices introduced by EPO and ETSI are presented in detail in the following section.

¹⁰ Some SDOs do not allow circulation of early drafts to those outside the respective working groups, the main concern being that access to a new specification by third parties at an early stage and prior to its formal publication may undermine the standardization process.

2.1.2. EPO approach to confidentiality and ETSI dissemination policy

According to Article 54(2) of the European Patent Convention, the state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or any other way, before the date of filing of the European Patent Application. In application of this rule in the case of standards drafts, the EPO Guidelines for Examination define that these preparatory documents are treated like any other written or oral disclosures, i.e., in order to qualify as prior art they must have been made available to the public prior to the filing or priority date without any bar of confidentiality. The issue of confidentiality and the potential inclusion of accessed standard preparatory documents in the prior art is decided on the basis of general guidelines, directives or principles of the SDO concerned, licensing terms or a *Memorandum of Understanding* resulting from interaction between the SDOs and their members (G-IV, 7.6 EPO Guidelines for Examination).

By common consent of the EPO and the SDO parties to the agreements/Memoranda of Understanding, the scope of the collaboration allows the limited use of standards drafts for the purposes of prior art search and examination. Documents provided to the EPO under the terms of this cooperation framework are presumed to be non-confidential and regarded as such unless otherwise specified; a bar of confidentiality is here the exception, not the rule. So far, there have been no known cases, in which the participating SDO has excluded use of shared information as prior art. If a patent applicant were to contest use of such documents as prior art, the circumstances would be assessed on a case-by-case basis at the opposition or appeal stage.

According to an excerpt of the MoU between the EPO and ETSI provided by an ETSI representative in an exchange dated back in November 2016, the ETSI dissemination policy clarifies that, as a rule, proceedings of the technical bodies and information submitted to a technical body are to be regarded as non-confidential and made available for public inspection. Any information exchange in Committees shall be treated as non-confidential, unless the information is in written or other tangible form; and is identified in writing, when submitted, as confidential; and is first submitted to, and accepted by, the chairman of the Committee as confidential. The EPO shall only use non-confidential ETSI documents for the purposes of the patenting process in all its phases, including for prior art search needs, and the provision of single copies to third parties directly involved in specific patent proceedings, including file inspection.

Recent empirical analysis consistently comes in support of the EPO approach to automatically include standards drafts in the notion of prior art, relevant evidence suggesting that the patent grant process has become more careful and selective after the policy implementation (Bekkers et al. 2015).

Moreover, ETSI has authorized access to its standards and drafts by the other national offices via the EPO server. The EPO is granted the right to reproduce ETSI standards, drafts of ETSI standards and working documents and to further distribute them to other IP5 offices, the EPC member states as well as to third parties such as applicants, opponents, appellants for the purposes of the patenting application process in all its phases, including for prior art search needs. This authorization comes with specific security terms: a) the National Patent Offices have a remote access to the platform containing the XPETSI database located on a secure EPO server; b)

the National Patent Offices access the database via secure liaisons; c) the use of the database is restricted to the staff of the National Patent Offices; d) EPO will inform the National Patent Offices that the Database is strictly limited to internal use and for patent granting purposes only. For evidentiary purposes, the applicant may receive an electronic copy or paper copy of the ETSI citation that precludes the validity of his patent application; and e) EPO will monitor the usage of this database by each National Patent Office and will notify ETSI of any abusive use of the database. This authorization is valid for a period of one year and is renewable upon request. By 2004, the internal XPETSI database was up and running as part of EPOQUE, the examiners' internal search database. Two years later, ETSI authorized access to these standards and drafts by the national patent offices of the EPO member states via the EPO server under the specific conditions laid out above.

Similarly, ITU authorizes the EPO to use the acquired prior art documentation for the purposes of the patent grant procedure, including the compilation and distribution of search reports as well as file inspection. Distribution of IEEE drafts is restricted to participants in the IEEE standardization process unless IEEE grants permission. Through a separate agreement, the EPO has obtained access to documents of specific IEEE working groups not included in the subscriptions.

Moreover, the EPO perceives that its exclusive access to the preparatory documents via subscription, membership or special agreements with the SDOs does not compromise the public, non-confidential character of the cited document. The opposite would challenge the established interpretation of the term "public availability" in the European patent law which extends not only to freely accessed non-patent literature, but also to the subscribed content of commercial databases or academic journals. Whether the information has actually been accessed or not is irrelevant as long as it is accessible by unspecified persons (Bekkers et al. 2015)

The question whether standards drafts and preparatory documents are part of the public prior art has been further clarified in the EPO case law on a case-by-case basis:

If the applicant contests the public availability of the cited documents, pertinent facts and evidence will be assessed in the course of the examination procedure no differently than every submission (requests, facts, evidence) set forth during EPO proceedings. The EPO case law has clarified these aspects as follows:

- In the first constellation, namely when a standards draft qualifying as prior art and thus precluding patentability is *cited by the examiner at the search or examination stage*, the existence of an *explicit* confidentiality obligation must be determined case by case on the basis of the documents allegedly setting forth this obligation (T 273/02 and T 738/04). In case of a general confidentiality clause, i.e., one that is not indicated on or in the specific preparatory document itself, it must be established that the general confidentiality obligation actually extended to the document in question until the relevant point in time. This does not, however, require the document itself to be explicitly marked as confidential (see T 273/02).

- In the second constellation, i.e., whether the standards draft is *cited by the opponent during opposition proceedings* against a patent grant occurs in breach of confidentiality rules, the matter is decided in the light of the facts of the individual case. In general, there is only a small number

of cases involving citations of standard documents and drafts that have reached the opposition stage (an average of 5 to 10 cases per year during the period 2004 - 2012) and they lead either to a rejection or a modification of the patent. Even less cases have reached the EPO appeal stage and addressed the issue of confidentiality thereof. The draft typology in those cases can be summarized as follows:

- A proposal for a standard, which contains the statement “unpublished work” on the first page might contain confidential information and shall be regarded as non-confidential from the date on which the standard is published (see T 273/02).

- A proposal sent to the members of an SDO working group in preparation of their meeting does not usually underlie an obligation to maintain confidentiality and is therefore to be considered as being available to the public. Even when a restricted group was invited to a meeting, the proposal sent together with the draft agenda was available to the public when no obligation to maintain confidentiality existed for the members of the group. The task of a standardization group is to achieve a standard, which has been broadly agreed and corresponds to the recent development on the technical field. This task rules out any confidentiality obligation (see T 202/97; see also T 50/02).

- The previous case, which was built around the question whether the communication of a proposal established public availability should be distinguished from the situation in which it remains unclear whether a specific document had been distributed at all. The opponent’s statement that the proposal at issue was submitted to a formal vote and the result of that vote was positive was not sufficient to establish the availability to the public. The opponent should clearly state which of the many steps in the elaboration of a standard (distribution of printed documents, meetings, public enquiry etc.) constitutes prior art on the basis of evidence available to him (see T 738/04).

The example of the ETSI dissemination policy is unique. The JPO, which has specific arrangements with ISO, has not obtained permission to share the documentation with other IP Offices. To remove any ambiguities, a research study considered the question of whether standards-related documents that are provided to the JPO by ISO fall under the term “distributed publication” or have been “made publicly available through an electric telecommunication line” as prescribed in Article 29(1) (iii) of the Japan Patent Act. In order to determine the legal status of standards drafts as public prior art, the study considered the following criteria: a) the nature, content and purpose of the document, b) the content of the confidentiality obligation, c) the distribution of the document and the authority to access the relevant database, d) the requirements for participating in a committee and e) the publication date. The study committee concluded that ISO's DIS and documents thereafter can be considered as distributed publications and can be cited as prior art documents in the grounds for patent refusal under the Japan Patent Act. Beyond ISO, the study committee considered ITU documents to fall under the same rule, i.e., that they most likely meet the requirement of public availability (Tamura 2015).

From the US perspective, submissions to SDOs under the previous first-to-invent regime were treated as proof of conception rather than as an anticipation of prior art. The implementation of the American Invents Act has since introduced an alignment of the US practice with the European system. In the case of standards drafts, it remains to be seen how the new practice and cooperation arrangements with SDOs will evolve in this respect. According to an official exchange with a USPTO representative taken place in December 2016, there appears to be a presumption of non-confidentiality of preparatory documents among the USPTO examiners, but it has not yet merged into established practice.

2.1.3. Copyright aspects

Further legal aspects emerging at the interface between patents and standards concern copyright ownership over protected contributions to the standard setting process. The question of a copyright infringement may arise with regards to the citation and subsequent public availability of SDO documents as part of the search report and the mandatory publication of the patent file. The ambiguity concerns not only potentially confidential drafts retrieved directly from the SDO server under special PTO-SDO exchange arrangements, but also final standards versions whose publication does not automatically render them public domain.

On this point, the EPO-ETSI arrangements specify that EPO shall notify third parties with which it shares ETSI drafts (national patent offices, parties to the proceedings) that (i) ETSI standards, drafts of ETSI standards and working documents are protected by copyright and shall not be further copied or re-distributed without the written permission of the copyright holder, and (ii) all notices or legends, including, without limitation, notices and legends related to intellectual property rights, shall not be removed from these documents. Similarly, contributions within the IEEE standardization process must comply with the IEEE-SA copyright policy; IEEE may restrict access to some documentation until required permission from IP owners is received. In order to avoid any infringement risk, the EPO does not include relevant prior art documents in the online file and opts, instead, to send a hardcopy to the applicant and other interested parties upon specific request and for evidentiary purposes. By contrast, ITU allows for the distribution of its standard-related documentation as part of the EPO search reports and via the online file inspection.

An interesting reference in this regard is a US copyright infringement case of 2012 in which Wiley, a commercial database of academic journals, accused several law firms of breaching copyright by submitting copies of journal articles to the USPTO during the application process. It should be noted that, according to the US patent law, the submission of prior art is a legal requirement and patent attorneys who fail to submit these documents are subject to ethics breach charges and the associated patents may be held invalid as a result thereof. In view of this, the USPTO issued a memorandum¹¹ indicating its belief that submission of these copyrighted materials to the USPTO for the purposes of complying with patent application rules cannot constitute copyright infringement due to the fair use doctrine; making copies of copyrighted non-patent literature in the course of preparing and prosecuting patent applications and maintaining

¹¹ The USPTO statement can be viewed under http://www.uspto.gov/about/offices/ogc/USPTOPositiononFairUse_of_CopiesofNPLMadeinPatentExamination.pdf

comprehensive files relating to prosecution is fair use under 17 U.S.C. §107. The Intellectual Property Owners Association (IPO) seconded the USPTO position. The USPTO, which intervened in the suit at a later stage, cautioned that negotiating fair use would likely have a negative impact on the efficiency, quality, and cost effectiveness of the patent grant process. Ultimately, three years later, the federal judges reached the same conclusion, namely that submission and limited copies of articles to the USPTO for the purposes of patent prosecution was a fair use of copyrighted material.

Although the facts of the case do not concern the distribution of non-patent literature by patent authorities under their obligation to inform the general public, the case helps draw some parallels as to how potential frictions between copyright and patent law – in general as well as in the case of standards – may have significant repercussions on patent quality and the well-functioning of the patent system as a whole.

2.2. Identifying prior art: Classification-based search and SEP mapping

Identifying information relevant to a claimed invention is tied to a series of challenges that can affect the examiners' ability to complete a thorough prior art search in the time allocated for the specific task: rapid pace of technological innovation, increased quantity of filings, exponential growth of prior art and NPL documentation domestically and worldwide (including foreign-language prior art), lack of clarity in patent applications (including relevance of the cited prior art), inadequate search tools and IT support, lack of sufficient technical competence, performance-related time pressure etc. One of these challenges concerns the identification of patent information as relevant prior art and its support through a classification system that organizes and facilitates access to that information in fairly detailed technical fields.

Given the diversity of technological terminology, classification systems enable accurate retrieval of documents using search strategies that are independent of language and terminology; non-uniform classification and abstracting practices represent an obstacle to the effective search for patent documents. In this regard, WIPO's Standards, Recommendations and Guidelines as well as the International Patent Classification System (IPC) have addressed these critical aspects. In addition, patent examiners use the Cooperative Patent Classification (CPC) system, which is a variation on the IPC classification specifically designed to assist them in the search of prior art - a fine-grained classification system with more than 100,000 different classes. While the IPC classification of standards classifies standards by field of use and thus allows the identification of different standards with similar uses, the CPC classifies patents by the technological and scientific field of the invention, thereby enabling the identification of complementary or potentially complementary technologies. WIPO has successfully created a technology concordance table between patent classes and industry sectors, but there is no systematic mapping of standards to patents based on the CPC. A recent empirical study signals a first attempt to fill that gap through a broader concordance between the different systems of technological classification of patents and standards (Baron & Pohlmann 2015).

Patents related to standards are mainly divided into two categories, standard-essential patents (SEPs) and non-SEPs. SEPs are concentrated in specific technological fields, and represent a very particular relationship between patents and standards. The tensions at the interface of patents and standards arise predominantly in the field of SEPs, of which 98% pertain to wireless communication technologies. These technologies are an output of the standardization process with IEEE, ETSI and ITU. Approximately 90% of all SEP declarations are made to ETSI (which records declarations on behalf of all SDOs participating in 3GPP). Beyond these major SDOs, significant numbers of SEPs exist only in the ISO/IEC Joint Technical Committee 1 with its MPEG standards for video and audio coding. These are mostly used in Consumer Electronics, like BluRay or DVB, but also in wireless communication such as streaming. A comprehensive empirical study has combined the IPC/CPC information of SEP declarations from numerous SDOs with patent statistics from the patent offices in order to draw useful conclusions. The study reveals that declared SEPs are massively concentrated in wireless communication standards such as H04 (Electric Communication Technique) and, in particular, H04W (Wireless Communication Networks) and H04L (Transmission of Digital Information). These classes dominate SEP declarations in all SDOs with significant numbers of SEPs such as ITU, IEEE and ETSI (Baron & Pohlmann 2015)

Next to the IPC, the EPO uses its own classification system to help examiners narrow their searches and find relevant patent literature independent of its language and used terms. The European Patent Classification (ECLA) is a refined version of IPC used by EPO to classify patent documents from many countries into groups that describe specific components of the invention, but also allows for finer distinctions and prior art searches within a certain class. According to EPO officials, ECLA-based search is less dependent on the examiner's choice of specific keywords and can be particularly helpful in the case of Asian prior art. However, the ECLA scheme is not always aligned with the CPC system, causing some challenges with other IP5 offices within their cooperation framework toward enhanced consistency in the area of classification (GAO 16-479, 2016).

Naturally, the use of ECLA as a stand-alone has its limitations and needs to be complemented by appropriate search tools, expert technical knowledge in classification and the development of a comprehensive, up-to-date tagging scheme for standard-related technologies, including subdivision of existing technologies and cross-classification in key technical areas. In the field of non-ICT standards, the EPO worked with IEEE-SA on a joint project concerning patent mapping in the field of Climate Change Mitigation Technologies (CCMT), an area related to several IEEE-SA activities and undertakings. The project focused on smart grid technology and involved participation of IEEE in the development of the Y02 classification scheme.¹² IEEE-SA experts supported the EPO in defining the taxonomy of smart grids under the Y02 scheme and capturing all the patents pertinent to this environmentally friendly technology. The new scheme helped identify standards-related classes in International Patent Classification (70,000 entries) and European Classification (135,000 entries) and classified the patent documents according to those

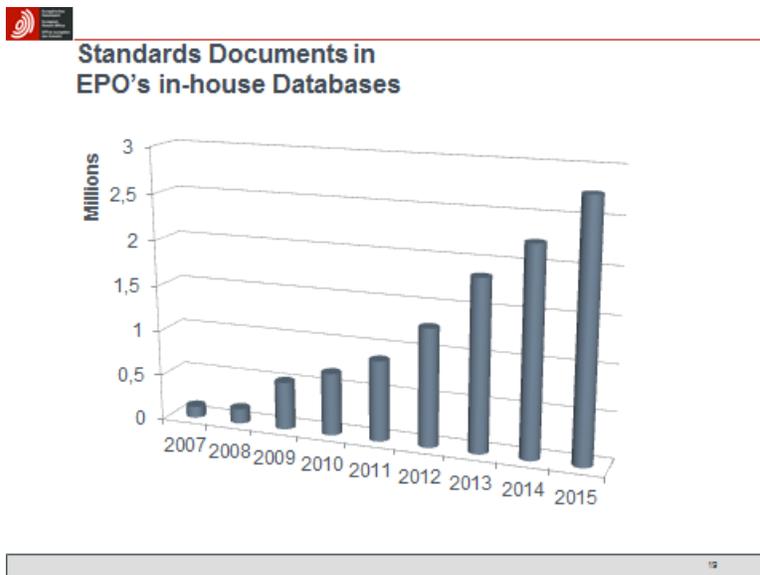
¹² A spin-off of the CCMT scheme, the Y02 tagging scheme for greenhouse gases is available online. The role of IPR in the transfer of climate change technologies is addressed in the 2010 report "Patents and clean energy, bridging the gap between evidence and policy", an EPO project in partnership with United Nations Environment Program (UNEP) and the International Centre for Trade and Sustainable Development (ICTSD). The document can be accessed under <http://www.epo.org/news-issues/issues/clean-energy/study.html>

classes in order to ease the retrieval of information through a single code. The added value of the initiative lies in the identification of prior art for newly emerging, sustainable technologies that tend to span at least four different IPC classification sections (Veefkind et al. 2012).

2.3. Non-Patent Literature (NPL) repositories

Prior art search is conducted based on patent information as well as Non-Patent Literature (NPL i.e., scientific and technical information published in academic journals and research databases. As a rule, access to NPL is enabled via access to external databases of commercial providers, libraries and universities that manage and curate that content in a user-friendly manner. In the specific case of standards, however, prior art documentation is neither systemically organized nor standardized; rather, it is a mix diverse formats, meta-data and undated drafts.

Early on, the EPO recognized that standard-related documentation forms a significant part of the search and examination work in multiple industry clusters such as telecommunications (ETSI, ITU, EIA/TIA, IETF, ATIS, IEEE standards), audio-video-media (MPEG, JPEG, DVB standards), electronics (SEMI standards) and computers. To ensure quality of access and content, the EPO opted for the creation of in-house NPL databases that import standard-related documentation through direct interlinking of its server to the SDO databases. The primary benefit of investing in standard-specific databases is that they enable the use of a single interface for prior art search through sophisticated organization and indexation of the available documentation. As a result of its linking to the ETSI database, the EPOQUE database contains a wide repository of technical contributions, i.e., temporary drafts and working group documentation from all partner SDOs. By 2015, the total number of documents available at the EPO rose to approximately 2.8 millions, as graphically demonstrated below (Source: EPO public presentation). Following that steady pace, this number was expected to surpass the 3,000,000 documents mark in 2017:



These specialized databases are an integral part of the EPO examiners' internal database (EPOQUE), one of the largest repositories of scientific and technical information paramount to

Given the regularly updated standard-related documentation in EPOQUE and the wealth of prior art information contained therein, the main challenge for a patent examiner is to leverage access to that potentially valuable information during patent search while coping with the increased intensity of use of standards drafts. This task is enabled through the use of various technical tools and “viewer” system capabilities that allow examiners to filter out pertinent and citation-worthy documentation out of a steadily increasing number of EPOQUE search results.¹³ The quality of search tools at the EPO is complemented by specialized training that help examiners in ICT and Audio Video Modules navigate a cluster of chosen databases and master the most efficient and reliable searches.

Other major patent offices manage the wealth of NPL information available in SDO databases in different ways:

The USPTO operates a central library facility, the Scientific and Technical Information Center (STIC), which gets updated upon an examiner’s request for a specific document pertinent to the patentability of the invention at issue. STIC provides access to standards documents through a variety of channels, including its non-patent literature website and its subscriptions to the publicly available standards of some SDOs, such as IEEE-SA. In general, these sources are limited to final standards and obtaining additional documents relating to them may entail a significant cost to the USPTO (NAS 2013). STIC has recently enacted a multi-year strategic plan to assess and redefine its business practices in order to support patent examiners and to meet the USPTO’s strategic goals. This plan or Concept of Operations (CONOPS) includes methods of increasing examiner awareness of STIC’s print and electronic resources and services. To ensure the right content is reaching its primary customers, STIC will be using Business Intelligence (BI) tools to provide qualitative and quantitative analysis of the usage of these resources. Identifying specific needs for industry standards will be part of this effort.

At the JPO, more than 1,700 examiner and trial examiners use the internal database as a primary source of prior art. As of October 2016, the internal database contains domestic patent information, foreign patent applications/patents as well as a wide range of NPL documentation, including standard-related documents of both published and preparatory material. NPL documents are managed separately from patent documents, whereby the frequency of updates depends on the type of the stored information. In addition, the JPO subscribes to more than 30 external databases. These databases can be broadly divided into three groups, i.e., databases equipped with a mere abstracts search, databases with access to full-text, and those in which structure or physical properties of substances can be searched. The internal database is not connected to external databases provided by third-party agencies, but operates separately.

¹³ Based on selected indicators provided by senior EPO officials in March 2018, the number of EPOQUE search results in standard-related databases has spiked from roughly 4,000,000 in 2013 to almost 89,000,000 (approx. 77,000,000 thereof are 3GPP-related) in 2017 as a result of the EPO-SDO collaboration. It should be noted that these results do not constitute pertinent information but have to undergo further selection; available technical tools and selection criteria have allowed patent examiners to reduce the aforementioned 89,000,000 (non-pertinent) search results down to approx. 22,000 total citations (16,000 thereof are 3GPP-related) in 2017.

Irrespective of whether the filings are related to standards or not, NPL prior art references are included in the search reports either as a simple listing of citations or supplemented with further useful information (so-called “enriched” prior art search reports). Search reports are either published (i.e., the International Search Report under the PCT and the EPO search reports) or electronically made available through the file/dossier access platforms of the national Offices, such as online registers, Global Dossier, and WIPO CASE. Work sharing programs among IP Offices (PPH, IP5) and the interface of various databases are seen as a credible avenue of improvement in the information exchange of cited documents – albeit not without handicaps, e.g., lack of a common citation format¹⁴, insufficient IT-support, foreign search results may be incomplete/inappropriate if claims are different, copyright restrictions regarding full-content view of related drafts (see above section 2.1.3.), etc. Although many empirical studies have been carried out on examiner patent citations, there is no specific analysis regarding either the obstacles to prior art access or any measurable benefits of pertinent work sharing processes in the area of standards.

2.4. Acquisition and integration of standard-related documentation

The quality of patent information is supported by a uniform structure and format standardization of patent documents, which serves its transmission, exchange, sharing and dissemination. The same applies to NPL information related to standards - SDO documents cannot support patent search and examination efforts to the extent that they remain inaccessible and non-searchable in an efficient and conclusive manner.

The sheer amount of SDO data with the potential to serve as valuable prior art is the first of many challenges: according to a rough estimate, 90 SDOs produce more than 750,000 standards documents, the majority of which stems from the large formal SDOs: CEN and ISO generate more than 100,000 standards documents each, IETF (internet standards) and IEEE (Wi-Fi) fewer than 5,000 each and ETSI more than 85,000 in the area of telecommunications standardization (Baron & Spulber 2015).

Obviously, not all of these documents are relevant for the purposes of prior art. A joint analysis of patents and standards reveals that some patents can be related to specific standards, e.g., because they were declared as standard-essential. However, not all SEP declarations clearly refer to a specific standard document, and declarations that do so, do not necessarily specify the standard version. Many declarations make reference to entire standardization projects (like LTE), consisting in hundreds or thousands of different standards. Furthermore, declared SEPs are not necessarily actually standard-essential, and not all actual SEPs are accurately declared. Finally, the population of patents directly related to a standardization project is estimated to be much

¹⁴ The Common Citation Document (CCD) application is a patent information tool developed by the Trilateral Offices (EPO, JPO, USPTO) to provide a single point access to citation data for their examined patent applications. It consolidates the prior art cited by all participating offices for the family members of a patent application, thus enabling the search results for the same invention produced by several offices to be visualized on a single page. Right from its launch in November 2011, the Trilateral Offices planned that the CCD service would graduate to the IP5 level and extend its coverage to citation data from the two remaining IP5 Offices (China and South Korea). The creation of the CCD application is part of an ongoing process of technical harmonization at the international level aimed at establishing an appropriate infrastructure to facilitate greater integration of the global patent system.

larger than the group of narrowly defined SEPs that are presumed to comply with the specific criteria of standard essentiality (Baron & Pohlmann 2015).

From a patent office perspective, cleaning and harmonizing standards documents is an ambitious exercise. There are significant differences across the various SDOs in terms of standards definition, format and publication quality. Even if the prior art effect of standard-related documents is clarified from the legal standpoint, practical utility of all important metadata (date, authors, title etc.) in patent search and examination is predicated by the efficiency of relevant processes from information transmission and document conversion into a uniform format over to data extraction, indexing and assurance of reliable publication dates; and all this while bearing in mind that the data value does not only lie in the absolute content value of a certain document, but also in its instrumental relative value within the combinatorial structure of an information architecture. Despite the technical challenges and costs tied to the acquisition and integration of standard-related information and metadata into the internal NPL depositories, missing this documentation would lead to unacceptable quality and legal uncertainty of granted patents – especially in the field of wireless communications and audio/video-coding, where up to 60% of the patent search reports include standards documents as pertinent prior art.

The retrieval of standards documents from an SDO server into a PTO-internal NPL database typically involves a series of preparatory steps and technical capabilities to achieve both system efficiency and content quality:

- *Information transmission:* Standards documentation and drafts are either retrieved directly from the SDO server or delivered electronically via a File Transfer Protocol (FTP) Server. The process is supported by an internally developed loading tool (web-crawler), which provides a consistent and reliable way to harvest data scattered over several locations on the SDO server and “pick them up” according to pre-defined parameters almost on a daily frequency.

- *Document conversion:* The uploaded information contains different data formats such as *.XML, *.PDF, *.DOC etc. Each document is converted into a standard application format (XL, ST.33), which allows for three different outputs, i.e., bibliographic, full text and image data. The algorithm-based reconfiguration filters out author, title and date. Depending on the quality of the source data, the conversion is intriguing: only 5-10% of each standards population comprise documentation in very good quality whereas the rest lacks structured bibliographical data or requires a lengthy process of conversion, as it is the case for PDF formats (NAS 2013). This aspect highlights the importance of introducing a common format for all SDO documents well before their final integration in the patent office internal databases.

- *Document reception:* Once uploaded from the SDO server, standard drafts undergo rigorous quality checks: validation of converted data prior to loading, error correction, user feedback, “sanity check” on readability, document mismatch, indexing, missing data. The overall process typically takes a few weeks to complete.

Equally, the JPO generates electronic data following a predetermined format before storing them in its database. One of the main challenges during this process is the lag between the point in time at which the standard-related documents became accessible to the public and the moment when the examiners acquired access to these documents as part of the internal database. Also, long pendency times to obtain approval for the inclusion of requested standards drafts in the JPO database account for delays in the creation of electronic data. Although the purpose of this approval procedure is to mitigate the risk of future disputes with the respective SDOs, later negotiations between the organizations may at times extend significantly.

USPTO's STIC currently provides direct access to industry standards through its print and electronic collections. These collections include standards from the following organizations: ANSI (American National Standards Institute), ASME (American Society of Mechanical Engineers), ASTM (American Society for Testing Materials), ETSI (European Telecommunications Standards Institute), IEEE (Institute of Electronic and Electrical Engineers), IETF (Internet Engineering Task Force), ISO/IEC (International Organization for Standards), ITU (International Telecommunication Union), JPEG (Joint Photographic Experts Group), MPEG (Moving Pictures Experts Group), NIST (National Institute of Standards and Technology), PCI (Peripheral Component Interconnect), SMPTE (Society of Motion Picture and Television Engineers), and 3GPP (3rd Generation Partnership Project). Examiners requiring access to an industry standard not available in the STIC collection may request that it be purchased or obtained through other means. The USPTO faces challenges similar to those of the EPO and JPO with regard to document acquisition of and access to industry standards includes: cost considerations, access restrictions, non-public character of standards drafts and working papers, version control (frequent changes during the development process), etc.

3. TRANSPARENCY

Although patent quality and transparency are often mentioned in one breath, the link between the two is not an obvious one. Whereas patent quality typically involves a debate around the standards of patent examination or the operational efficiency of patent authorities, transparency addresses the information deficit or asymmetries within the patent system as a whole. In this function, greater transparency results in an informed view about the current state of the patent system and where quality work is done. In particular, transparency at the interface of patents and standards refers to the reliability and accessibility of pertinent information about the status of a patent in the field of standardization, notably about the aspects of validity, enforceability, ownership and its essentiality for standards. Among them, transfers of SEP ownership have been flagged as being increasingly relevant and occurring increasingly often; in the rapidly evolving and increasingly fragmented SEP landscape, ownership transfers have become a significant strategic and monetization tool for innovators, implementers and market intermediaries alike (3.1.). In addition, the uncertainty surrounding the definition of essentiality – coupled with the growing number of SEPs - strongly contributes to the lack of transparency regarding SEPs with subsequent consequences for the licensing practice (3.2.). Finally, the increasing importance of litigation outcomes in the area of mobile telecommunication standards raise questions related to legal uncertainty as well as the benefits and costs of SEP disputes with impact on the potential integration of alternative dispute resolution mechanisms into the standardization process (3.3.).

3.1. Patent transfer registers

Changes in patent ownership have become a critical piece of information for those engaged in the standardization process; they should be able to access timely information around the subject, geographic scope and duration of ownership and assignments prior to participation in a standard-setting process. In particular, users, implementers and co-developers have a strong interest in receiving updates about who owns what, where exactly, how long and whether ownership titles have been reassigned. Lack of information on ownership reassignments may prevent participants from making informed decisions, often with serious financial implications (FRAND licensing negotiations, litigation strategy, freedom-to-operate analyses, technology transfer). Transparency of patent ownership could also benefit the SDOs themselves, as it might make it easier for the committees responsible for setting the standard to research patent ownership interests and design the standard and policies related to the standard with an eye to mitigating future conflict.

In the case of SEPs, which serve as a way to secure a market stronghold and are thus frequently traded among different participants, including various Patent Assertion Entities, more than 12% of all SEPs have been transferred at least once (Pohlmann & Blind 2017). In a landscape currently marked by SEP ownership fragmentation, ETSI has by far the largest number of standards that are subject to SEP transfers. A large majority of SEP transfers took place after their declaration to the SDO (69.9 percent of cases) and the official release of the standard (83.5 percent), which suggests that both events may facilitate transfers (Bekkers et al. 2015).

Information on patent ownership is scattered or largely incomplete given that both patent offices and SDOs depend on the voluntary disclosure of ownership transfer. An obvious start to collect and organize SEP ownership information in special registers would be by linking relevant patent office data to SDO databases. There is, however, no clarity around the technical specifications of the target data architecture, the required resources and future maintenance. Participants in various fora¹⁵ explored the role of patent offices, SDOs and individual standards developers. Suggestions included the creation of internet-based standard-related patent registers on the initiative of standardization bodies in joint collaboration with the patent offices. Provided that access to such service is desirable and the specifications clear, questions arise about the possible role of standards developers, SDOs, patent offices and the international IP community in achieving these goals.

The interlinking of the ETSI IPR database with the European Patent Register of the EPO practice provides a useful example in that direction. The European Patent Register is a trove of all publicly available information on European patent applications (more than 70,000,000 documents) as they pass through the grant procedure, including legal status, pending oppositions, information on patent representatives, EPO correspondence, transfer of patent application/licenses etc. (Rules 22 to 24 EPC; EPO Guidelines for Examination, E-XIII). In addition, the European Patent Register includes transfers of ownership, licenses and other rights that occurred in the post-grant period, i.e., were established during the nine-month period for filing an opposition or during opposition proceedings (Rule 85 EPC in conjunction with Rule 22 EPC; EPO Guidelines for Examination, E-XIII). After expiry of the opposition period or - in case of the successful filing of an opposition -

¹⁵ For instance, at a EPO/EU joint workshop in Brussels on November 22, 2010.

at the end of opposition proceedings, information on future transfers and transactions relevant to a European patent should be sought in the national patent registers of the designating states; upon grant, the European patent shall, in each of the contracting states for which it is granted, have the effect of and be subject to the same conditions as a national patent granted by that state, unless otherwise provided in the EPC. Deep links to the national patent offices of the EPC member states provide direct access to information pertaining to changes in the legal status of the national part of the European patent. Recent enhancements of the European Patent Register aim at gathering data on the fly from the national registers on European patents during the national phase. As a result, the number of requests for registration of transfers and rectification of the designation of an inventor has increased.

At the national level, the policies of the patent offices of the EPC member states foresee an obligation to register such transfers whereby the formalities for registering a patent assignment are more onerous in some jurisdictions than others. Although most national Offices do not typically foresee explicit sanctions for non-compliance, the registration procedure for assignments at the UK IPO builds an exception with significant effect on infringement proceedings: Section 68 UK Patents Act provides a partial defense, where assignments or exclusive licenses are not registered with the Office within six months of transaction. In particular, the assignee will not be awarded costs for infringements occurring before the transaction was registered. In a 2011 case, the UK High Court has emphasized the importance of registering assignments and exclusive licenses relating to (UK designating) European patents separately at the UK IPO in order to avoid the penalty imposed by Section 68 for non-registration or unduly delayed registration.¹⁶ The patent transfer at issue was registered at the EPO, but, despite instructions to a UK agent, the transfer was not registered at the UKIPO for some eight years. Consequently, the court clarified that because on grant, a European patent separates into a bundle of national rights, each of which can be assigned independently of each other, registration at the EPO of assignments of granted European patents does not count as registration for the purposes of Section 68. Tracking reassignments of patent ownership can be equally challenging in non-EPC countries, where public inspection of patent registers is not web-based in many patent authorities.

At the international level, the Committee on WIPO Standards established in 2013 the so-called Legal Status Taskforce (LSTF) with the goal to address the difference of national and regional patent laws and IPO practices in handling patent legal status information. LSTF prepared a draft recommendation for the exchange of patent legal status data for consideration and adoption by the Committee as a new WIPO standard. The proposed name of the new standard is “WIPO Standard ST.27 – Recommendation for the Exchange of Patent Legal Status Data”. The proposed standard is intended to promote the efficient exchange of patent legal status data in a harmonized manner between IPOs in order to facilitate access to that data by IPOs, IP information users, IP data providers, the general public and other interested parties. This standard aims at improving worldwide availability, reliability and comparability of patent legal status data in a timely manner.¹⁷

Given the need to access up-to-date, reliable, and understandable legal status information on IP rights – especially in the context of litigation -, two main questions arise: whether disclosure of

¹⁶ *Lundbeck AS v Norpharma SPA & Ors* [2011] EWHC 907 (Pat), 14 April 2011.

¹⁷ http://www.wipo.int/edocs/mdocs/cws/en/cws_5/cws_5_8_rev_1.pdf.

ownership reassignments should become mandatory for patent owners towards both patent offices and their SDO in order to keep the relevant records reliably updated; and, whether a central repository of such information in the specific field of standards is desirable and feasible. In the first scenario, the proposed solution necessitates modifications in the policies of the various patent offices (user incentives, specific fees structures and sanction mechanisms) and, possibly, those of the SDOs. Opponents of mandatory disclosure requirement for patent reassignments argue that it would increase costs for patent applicants and practitioners, though supporters argue that the benefits to the public would outweigh these costs insofar the relevant regulations balance concerns of costs and time, i.e., the cost of recordation is weighed against the need for a timely recordation (Kesan & Hayes 2014). In the second scenario, which focuses on the specific area of standards, doubts are voiced whether a centralized recordation of ownership information would serve transparency to the benefit of all participants in the standard-setting processes, including standards developers.

Some prominent policy actors have expressed public support for the recordation of patent assignments. A 2011 FTC report asserted that legal uncertainty over patent ownership has the potential to complicate patent clearance and interfere with market efficiency. Implementing an executive action, the USPTO undertook an initiative to require mandatory recordation of patent ownership, but abandoned the proposed rule because it would have resulted into substantial costs to patent owners. It ultimately concluded that exercise of legislative authority was the best way to impose this requirement (Davis 2014). Although it did not come to fruition, the USPTO initiative marked the role of patent ownership as a critical determinant of a patent's likely path as well as the relevance of transparency for the patent system, the standardization process and the seamless functioning of the markets. Thus, any voluntary contributions to the USPTO assignments database are welcome in their bid to contribute to legal certainty and a higher degree of transparency that would not otherwise exist.

3.2. From SEP declaration to essentiality checks?

Standard essential patents represent a special case of valuable fundamental technologies that provide the best possible technical solution to standard implementers without the option of viable alternatives. Patents protecting standards can be technologically essential or de facto essential. Technologically essential patents are necessary for the implementation of core functions of the standard or for the implementation of optional features of the standard. The characteristic of essentiality can also be conferred on a patent as a result of the commercial value it builds over time – a de facto essentiality that is dictated by market forces, for instance, popularity (consumer demand) or by the fact that ownership of non-essential patents covering solutions for a particular feature are concentrated in the hands of a single party with control over them (patent aggregation, strategic portfolio).

The aspect of essentiality renders the licensing of the patent indispensable for the accessibility and widespread applicability of the underlying technology for products and services of great social value – in full respect of IPR. It therefore renders the licensing of the patent subject to the principle of FRAND, a set of Fair, Reasonable and Non-Discriminatory terms that ensure a

balance of interests between SEP holders and implementers.¹⁸ Albeit unclear whether de facto essential patents should also be covered by FRAND agreements, technological essential patents come automatically with a FRAND obligation due to the declaration of their essentiality before an SDO. Disclosure requirements for SEPs are a well-established principle in many SDOs – with some variation of the specific policies - and the declaration of essentiality takes place on a voluntary and bona fide basis. These disclosures serve the early identification of IPR ownership of critical technologies, but they remain optional and, as a form of self-declaration, dependent on both the willingness of the SDO member to reveal its SEP ownership status as well as its subjective assessment of the essentiality of the underlying technology. SDO members do not typically carry a duty to conduct a patent search prior to their declarations and identification of individual patents; it is not a prerequisite for the assurance of blanket licensing agreements. The ease in declaring a patent as standard-essential, coupled with the competition dynamics around SEPs, may contribute to the so-called “over-declaration”, because patent holders are required to declare all patents that might be essential – a phenomenon that concerns both the determinants of true essentiality as well as certain aspects of patent quality given that SDOs do not perform checks on the essentiality and validity of the disclosures and are therefore not in a position to provide assurances about the completeness and timeliness of the submitted patent-related data to their databases (cf. van Audenrode et al. 2017).

From a transparency perspective, the large amount of declarations and related patent data exclusively available to the SDO members reinforce information asymmetries in the SEP markets and hinder the understanding of the linkages between IPR and standards.¹⁹ In the midst of these doctrinal discussions, some SDOs have taken steps to address the above information deficits and help reduce the uncertainty related to the licensing of SEPs and adoption of standards.²⁰ Among them, ETSI has been keen that a) all information concerning technical discussions and decision making is archived and identified, b) information on new standardization activities is publicly and widely announced through suitable and accessible means, c) participation of all relevant categories of interested parties is sought with a view to achieving balance, and d) consideration and response are given to comments by interested parties. ETSI’s IPR policy has instituted a call for IPRs at the start of each meeting that acts as a reminder of the member's obligations under the IPR Policy and is performed to foster the disclosure of Essential IPRs in a timely fashion. Despite the fact that “timely” fashion is not explicitly defined, ETSI considers that “Intentional Delay” – as opposed to “timely” - has arisen when it can be demonstrated that an ETSI member has deliberately withheld IPR disclosures significantly beyond what would be expected from normal considerations of "Timeliness". More recently, ETSI has tasked the IPR Steering Committee to work on transparency issues and launch a number of actions toward concrete goals: greater

¹⁸ For a comprehensive analysis on the FRAND licensing terms for SEPs, also with reference to the aspect of essentiality as addressed by the national courts, see Pentheroudakis & Baron 2017.

¹⁹ Based on a wide range of SDO data, recent empirical research points out that declared SEPs are an acceptable representation of the actual population of essential patents. While the claim of standard essentiality is not necessarily accurate, companies are likely to declare patents as standard-essential that have a plausible link to the standardized technology. There may be many errors at the level of individual patents, but observations drawn from large samples of declared SEPs are likely to provide a relatively reliable representation of the technological field of a standard. (Baron & Pohlmann 2015). Other studies show that only a fraction of such self-declared SEPs are really essential to the declared standard.

²⁰ This transparency objective should not be confused with a parallel debate over the clarity of the rules of the SDO IPR policies.

accuracy in the declaration of SEPs, improved matching between SEPs and the portion of standards covered by the SEPs, and the possible setup of an essentiality review process to be performed by the declarant – the relevant discussions are still work in progress.

IEEE-SA has addressed the issue of transparency through a set of rules of engagement for patent holders and prospective standards implementers within its IPR policy: As stated in 6.2 of the IEEE-SA Standards Board Bylaws, individual participants in the standards development process a) have a duty to inform the IEEE (or cause the IEEE to be informed) of the holder of any potential Essential Patent Claims of which they are personally aware and that are not already the subject of an Accepted Letter of Assurance, that are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents; and b) should inform the IEEE (or cause the IEEE to be informed) of any other holders of potential Essential Patent Claims that are not already the subject of an Accepted Letter of Assurance. IEEE encourages early disclosure of the owners of potential essential patents at the beginning of every standards development meeting: Through the Call for Patents process, described in 6.3.2 of the IEEE-SA Standards Board Operations Manual, the chair or the chair's delegate of an IEEE standards-developing working group or the chair of an IEEE standards Sponsor shall be responsible for informing the participants at a meeting that if any individual believes that Patent Claims might be Essential Patent Claims, that fact should be made known to the entire working group and duly recorded in the minutes of the working group meeting.

From a patent office perspective, the concern about over-declaration of SEPs translates into a question of legal validity/enforceability of patent applications claimed as essential and, by extension, a question of transparency. Essentiality checks may represent the right policy option to reduce legal uncertainty and decrease legal disputes outside and inside European courts. The legal validity of these applications has not so far been officially addressed in the cooperation context between patent offices and SDOs. The European Commission published a report on the subject of Patent and Standards in March 2014 and completed a public consultation, the results of which were published end 2015.²¹ The report analyzed a number of measures towards “Improvements to the patent declaration system”, including the routinely checks of essentiality by SDOs on received SEP disclosures.

Against the background of the EPO-ETSI information sharing arrangements, a recent study argues for the introduction of essentiality checks into the EPO search and examination process (Pohlmann & Blind 2017). The benefits and challenges are highlighted as follows:

- *Timing of essentiality checks:* Given that the ETSI SEP declarations suggest that most patent grants accrue after the final standard has been released, EPO examiners can access the full information of the standard specification to check not only if the standard document may be subject to prior art, but also if the claims of the patent application describe an invention that is necessarily essential to the standard. However, the timing of the declared SEP grant and standard release dates may differ as to the specific SDO and its standard setting procedures. In the case of ETSI SEP declarations, the essentiality check could be conducted during the granting process (e.g., after the substantive examination) and thus after the release of the standard. By contrast, such a procedure is less applicable

²¹ Available at ec.europa.eu/DocsRoom/documents/4843/attachments/1/translations/.../renditions/pdf

in the case of ISO/IEC where the granting process often takes place before the standard has been set. Moreover, the assessment of the essentiality may be performed in a “dynamic” way, since some patents are also essential to standards of later generations. Therefore, such service may also be provided after grant, although an essentiality check performed after the substantive search of patents could be the most efficient solution for SEPs.

- *Management of essentiality checks*: Central, independent essentiality checks of declared SEPs may contribute to reduce their costs while at the same time reinforcing their recognition by the stakeholders. A centralized essentiality evaluation carried out by a technically competent and independent entity, recognized as such by all parties, would indeed support the production of more precise and thus informative patent declarations. Such a one-shop-stop could also help avoid duplication of efforts by entities when producing their own claim charts, and ultimately help them in saving costs. Public entities such as the patent offices are potentially capable of carrying out such essentiality checks.

- *Time and cost estimates*: An EPO examiner might need between 1-3 days to check the essentiality of a not yet granted declared SEP. Essentiality checks by patent examiners could cost around EUR 1,000-2,000 per patent application. Technical expertise, patent search reports, access to databases and standardization documents could provide for significant economy of scale and cost advantages. The analysis of costs connected to essentiality checks suggests that carrying out (non-legally binding) essentiality by a central and independent entity with the technical competencies, access to standardization and patent documents and industry recognition could be the most efficient solution.

- *Reputation and expertise*: Ultimately, patent offices have the necessary recognition from industry to carry such a delicate task. The EPO, in particular, is well equipped (resources, tools, technical expertise) to perform accurate, independent and relatively cost-efficient essentiality checks in a centralized manner. Alternatively, essentiality checks could be taken over by SDOs – albeit less likely –, patent pools or court experts. These options are associated with a broad range of costs: EUR 600-1,800 for a first instance analysis by an SDO, EUR 5,000-15,000 per essentiality check by a third party in a patent pool and over EUR 20,000 per essentiality test by an expert in the context of litigation.

Although the EPO has at least discussed internally the option of performing essentiality checks, there is no official position on the matter. EPO examiners with relevant expertise feel competent to perform such checks, but – from an institutional perspective - there are various reasons that render such a commitment a challenging one: summoning the necessary political support, given the intergovernmental character of the organization; lack of a thorough cost-benefit-analysis; other strategic priorities; funding issues; and the need to properly justify the extension of the EPO’s mission and legal mandate to cover a task so closely tied to a specific technical field and a relatively small (albeit prominent) set of patent applications. In any case, this decision cannot be taken without recasting the utility of essentiality checks into the broader context of patent quality – in alignment with established co-operation frameworks and in the spirit of transparency, accountability and legal certainty that permeates all efforts towards a sustainable environment for innovation that serves the society at large.

The determination of the essentiality of SEPs in new and key standards such as 5G has gained momentum in 2018 as part of the 36th Trilateral Heads of Office meeting in Japan, where the EPO, JPO and USPTO heads agreed to discuss SEP-related issues at the IP5 level.²² This commitment is tandem with other recent developments and initiatives regarding essentiality checks:

Specifically, the European Commission had included in its Communication of 29.11.2017 a series of recommendations designed to help smooth FRAND licensing negotiations and reduce litigation. To achieve this, the Commission called for increased transparency over the "existence, scope and relevance" of SEPs; also, it called on standardization bodies to enhance the "quality" of information they record in their SEP databases and to incentivize SEP owners and users "to report the case reference and main outcome of final decisions, positive or negative, on declared SEPs (including on essentiality and patent validity)" in a further effort to boost transparency over litigations involving SEPs; finally, it highlighted the need for a higher degree of scrutiny on essentiality claims. This would require scrutiny being performed by an independent party with technical capabilities and market recognition, albeit such a scrutiny requirement to SEPs should be balanced against the cost. However, an incremental approach, whereby scrutiny takes place at the request of either rightholders or prospective users, calibrating the depth of scrutiny and limiting checks to one patent within a family and to samples, could ensure the right cost-benefit balance of this measure. According to the EC Communication, when considering essentiality checks, patent offices may well be natural candidates for exploiting synergies and reducing costs.²³ In this regard, the feasibility and output quality of essentiality checks raise a number of practical issues regarding, e.g., the disclosure of commercially sensitive information, the reference to the final versions of standard documents as a base for the determination of essentiality, how patent offices would manage the additional workload if they were to perform such a task, etc. Following exchange with pertinent stakeholders, the European Commission is planning to launch a pilot project for SEPs in selected technologies with a view to facilitating the introduction of an appropriate scrutiny mechanism.

In the same spirit, i.e., to facilitate the licensing negotiation and dispute resolution between the parties, the JPO published in March 2018 a "Manual of 'Hantei' (Advisory Opinion) for Essentiality Check" for practitioners requested to perform essentiality checks.²⁴ The so-called "Hantei" system (Art. 71 of the Japan Patent Act) allows the JPO, which was involved in the establishment of a patent right, to express, upon request of any person who has an interest in a patented invention, an official opinion as to the technical scope of the patented invention from a fair, neutral perspective by utilizing its highly specialized, technical knowledge.

²² <http://www.trilateral.net/news/20180302.html>

²³ EC Communication "Setting out the EU approach to Standard Essential Patents", Brussels, 29.11.2017 COM(2017) 712 final.

²⁴ http://www.jpo.go.jp/torikumi_e/t_torikumi_e/files/hantei_hyojun_e/01_e.pdf

3.3. SEP enforceability and alternative dispute resolution

While arbitration has been the standard method of dispute resolution agreement in complex contracts potentially causing multi-jurisdictional disputes for decades, it has been the exception rather than the rule in intellectual property arbitration. Until recently, ADR mechanisms have been used in a limited manner vis-à-vis SEP-related court disputes and were thus regarded as underutilized in the particular field.²⁵ This has changed and may further change with regard to FRAND disputes, as established FRAND-specific arbitration frameworks may cater for the needs of those with large portfolios of world-wide patents to make the resolution of multi-jurisdictional disputes more efficient.²⁶ Arbitration of FRAND-related disputes has been promoted by key players in this area such as WIPO, FTC and CJEU, whereas courts and authorities in the US and in Europe have identified ADR (including WIPO arbitration/mediation) as a suitable option to facilitate the determination of FRAND-related disputes.²⁷ In addition, some SDOs have included ADR procedures in their IP policies.²⁸

Among the leading alternative dispute resolution service providers, the WIPO Arbitration and Mediation Center is a neutral, international and non-profit dispute resolution forum specializing in IP and related commercial disputes. Compared to conventional court-based or multi-jurisdictional IP litigation, the WIPO ADR processes offer certain benefits that include resolution through a single forum of specialized arbitrators/mediators²⁹ that ensure party autonomy, confidentiality as well as time and cost efficiencies. To date, the WIPO Center has administered over 530 arbitration, mediation and expert determination cases; some 34% of WIPO ADR cases relate to ICT patents.³⁰ In this context, the WIPO Center collaborates with standardization bodies such as ETSI and IEEE. SDOs do not determine validity, essentiality, or ownership, so that they cannot take a more active role in this process. For instance, IEEE has a Memorandum of Understanding with WIPO in place to provide access to mitigation or arbitration for SEP owners/implementers on a voluntary basis.

²⁵ That is not the case for mediation, cf. Contreras & Newman 2014.

²⁶ In its 2015 Public Consultation on Patents and Standards, the European Commission addressed the key issue of SEP dispute resolution with particular focus on alternative dispute resolution (ADR). Stakeholders were divided on whether SEP disputes would further rise, including in the mobile telecom industry. But evidence was provided that even though in absolute terms SEP litigation is less frequent, SEPs are more likely to be litigated than other patents - at high costs and with often uncertain or incomplete resolution. While most respondents mentioned arbitration as a useful tool, mediation was also suggested by some as a helpful assistance for parties to reach amicable solutions to disputes. As a particular benefit, it was highlighted that ADR can provide global portfolio and freedom-to-operate arrangements between companies, while litigation is nearly always limited to one jurisdiction and to a small selection of patents. The confidential nature of arbitration was mentioned as an interesting feature that can lead to efficient dispute resolution. Others, however, argued that the outcome should be made public to facilitate benchmarking. Stakeholders noted the benefit of specialist arbitrators familiar with the complexity of SEP disputes. See further http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=7833

²⁷ See reference to the WIPO Center in Motorola Mobility LLC and Google Inc., FTC File No. 121 0120 <http://www.ftc.gov/opa/2013/07/google.shtm>; see also Communication by the European Commission “Setting out the EU Approach to Standard Essential Patents” (COM(2017) 712 final), Section 3.4 Alternative Dispute Resolution <https://ec.europa.eu/docsroom/documents/26583>.

²⁸ See, for example: Digital Video Broadcasting (DVB); Blu-Ray Disc Association (BRDA); Open Mobile Alliance Ltd. (OMA).

²⁹ The WIPO Center maintains a database of over 1,500 independent and neutral WIPO mediators, arbitrators and experts skilled in IP and ADR from more than 70 countries.

³⁰ <http://www.wipo.int/amc/en/center/specific-sectors/ict/>

The WIPO Center also makes available model mediation and arbitration submission agreements that may be tailored by parties to address standards-related disputes involving telecom patents in multiple jurisdictions. Developed in consultation with patent law, standardization and arbitration experts from a number of jurisdictions, the WIPO model submission agreements are designed to enable cost- and time-effective determination of FRAND licensing terms.³¹ To facilitate submission of FRAND disputes to WIPO ADR, the WIPO Center has recently published the Guidance on WIPO FRAND ADR.³² The Guidance aims at helping parties and neutrals to understand and make use of procedural options that are available at different stages of the process.

III. CONCLUSION AND POLICY RECOMMENDATIONS

Conclusion - Intensified use of standards documents in prior art search

To the extent that patent systems comply with their patentability conditions in a transparent way, patent quality (and quantity) represents an essential input factor into the standardization system. Granting patents of poor quality exacerbates the already complex interaction between the standardization system and the patent system. Too many and/or weak patents, and the complex task of determining their validity while negotiating under time or legal pressure have the potential to tilt the negotiation balance, significantly impact transaction costs, and interrupt rapid implementation and innovation via the standardization process. In this respect, patent quality supports legal certainty and – with it – a sustainable co-existence of both systems.

From a patent authority perspective, the interrelation between patents and standards impacts prior art search and touches, by extension, on the knotty issue of patent quality. Continuously upgraded IT infrastructure, highly qualified and regularly trained examiners, adequate classification and access to complete and timely information on prior art are the pillars of excellence in patent examination. Against the background of ever-increasing patent data, not only the publication but also the accessibility of that information via full-text search and statistical analyses becomes mission-critical for patent authorities. Various policy levers allow the patent system to perform its incentive function across a range of constantly changing technologies and market dynamics.

Both the EPO and JPO use similar approaches that help their examiners address challenges in identifying prior art in the field of standards. These approaches include work-sharing (in the IP5 context), creation of internal databases for non-patent literature, advanced patent classification systems and search tools, examiner training, review and audit procedures etc. The EPO takes a step further to include the acquired standard-related documentation into the definition of prior art – more prior art that fully utilizes technological advancements ensures high quality standards in patent grant procedures.

The experience gleaned from the cooperation of ITU, ETSI and IEEE-SA with the EPO shows that it is possible to increase *transparency and predictability* at several levels. In particular, it is possible to maintain and even improve the quality of patent examination in ICT standards-related

³¹ <http://www.wipo.int/amc/en/center/specific-sectors/ict/frand/>

³² <http://www.wipo.int/export/sites/www/amc/en/docs/wipofrandadrguidance.pdf>

sectors, thereby ensuring the legal certainty of granted patents. Further benefits derived from the SDO-patent office collaboration involve the aspect of *informativeness*, i.e., the systematic accessibility and searchability of standards-related (meta-)data that provide examiners with reliable information in a timely manner and through a usable format. In this context, the challenge of managing patent quality and quantity boils down to the ability to manage the quality and quantity of the relevant information in a centralized, uniform manner that filters pertinent patent information on prior art out of raw meta-data. Of pivotal importance hereby is the accessibility of that valuable technical information from within the standardization process for patent search purposes. Although there is good progress at this front, there is still some way to go. Globally relevant SDOs are aware of the importance of this issue. Further, the format and handling of documents, in particular the assignment of a legally binding, unambiguous publication date and reference to the working group, must be improved.

So far, other patent offices have not embarked on a similar path to upgrade their databases with standards-related documentation. This is partly explained by the long history of standardization in Europe, US and Japan, which contrasts with a lack of awareness around the importance of standards in other regions. Other reasons include lack of technical expertise, capacity building, up-to-date IT infrastructure and funding. Finally, there is no consensus about best practices and whether the leading EPO example could be emulated to fit the patent examination purposes of a specific patent office. On a macro level, the various patent authorities have their unique dynamics, political justifications and organizational inertia that render the implementation of policy initiatives a challenging task. On a micro level, aspirations to use the most pertinent standards-related documentation as a source of prior art succumb to the practical difficulty of retrieving that documentation, a reluctance of some formally open SDOs to grant access to their documentation, and a disinterest on the side of patent offices to invest in this area. Albeit without an information exchange in place that emulates the EPO-SDO cooperation practice, a few patent offices around the world, e.g., KIPO, Singapore IPO and Rospatent, have introduced certain patent quality measures that take into account the importance of technical standards for innovation and the local economy.

Policy Recommendation #1 - Collaboration between patent authorities and SDOs is isolated, but can be replicated

Increasing backlog issues have prompted various joint efforts of patent offices in work-sharing or mutual utilization of work results through bilateral and multilateral agreements. The consequence of the proliferation of arrangements such as the Patent Prosecution Highway and the IP5 cluster are designed to reduce costs and duplication of effort by utilizing the results of prior art search and substantive examination done by others. The regional focus of these collaborations covers alignment of documentation practices pertaining to databases, patent classification and common citation, but it does not extend to information sharing related to standards with global impact. Collaboration on the latter has been thus isolated and, equally, the result of bilateral negotiations between the patent offices (EPO, JPO) and their respective partner SDOs.

Against this background, there appear to be two options for other patent offices interested in accessing standard-related documentation: either to conduct direct negotiations with local and/or globally relevant SDOs on a one-to-one basis, following the EPO and JPO example; or patent offices with less resources could form an alliance with their regional counterparts that equally lack access to pertinent documentation and collectively define the terms of a multilateral PTO-SDO collaboration.³³ In any case, the regional character of standardization, coupled with the increasing global - if not geopolitical - importance of standards, will dictate the possibility and the dynamics of such alliances in the future. SDOs representing these regional efforts would arguably play a crucial role in this exercise by allowing access and utilization of standard-related information under specific conditions to the benefit of patent search and examination.

A closer and institutionally backed cooperation between the major standard developing organizations and other patent offices is necessary in order to increase transparency and establish a kind of voluntary co-regulation in this critical field. In the light of the precedent set by the EPO, this type of inter-agency collaboration reveals a range of important aspects (or lessons) to be taken into account:

a) Patent offices and SDOs should first embark on a policy dialogue that will shape a common agenda. The exchange of information and documentation should result into *mutual benefits for both systems* (prior art search, patent ownership of standard-related technology, digitization of information, upgraded databases, education and promotion activities). Identifying those premises and initiating relevant talks relies strongly on the foresight and engagement of advocates from both sides. According to the history of the EPO-SDO collaboration, the contribution of these experts has been instrumental in raising awareness within their respective organizations and setting the stage for the subsequent high level agreements: increased transparency around IPR was not merely a patent office issue but an imperative equally identified from an SDO perspective;

b) The efficient, fully implemented use of standards-related documents for the purposes of search and examination is dependent on the definition of prior art in the standards context, most particularly the *interpretation of "public availability"*. The definition of sharable information should be clarified between the negotiating parties early on so as to include this documentation as non-confidential (unless otherwise specified) into the publicly available documentation used in the examination process. Any other option essentially defeats the purpose of the collaboration;

³³ As an example of the increasingly recognized benefits of work-sharing and re-use of search results in general, the USPTO, KIPO and JPO have decided to expand their work sharing pilots for patent prosecution in various fields, incl. ICT during Fall 2017. Albeit not yet measurable, potential benefits of the enhanced collaboration include improved search quality, reduced pendency, increased consistency of results across offices and legal certainty. The pilots will determine whether the offices can control, to a sufficient extent, the sharing of search information between offices such that applications are not receiving an unnecessary delay in examination; see <https://www.uspto.gov/patents-getting-started/international-protection/collaborative-search-pilot-program-csp>

c) An ongoing practical component of the collaboration is the definition of a *common documentation format* that is compatible with the existing IT infrastructure and prior art databases. Many of the technical challenges involved can be mitigated in the long run through uniform templates for standards-based prior art documents, such as early drafts of specifications and published minutes.

Policy Recommendation #2 – WIPO’s enhanced role as a global contact point between IP authorities and SDOs

In view of the above, institutional initiatives are needed to address the quality of searches carried out by patent offices and the improvements necessary in the scope of technical information accessible to examiners in the critical field of ICT standards. The development and deployment of 5G networks and the cross-sectorial impact of these new technologies underpins the need to establish a global contact point that will promote the importance of accessing standards-related prior art in the larger context of patent quality as well as facilitate cooperation between IP authorities and SDOs.

WIPO offers the possibility of such a forum due to both its intermediary role on the international stage as well as its active engagement in the context of patent information sharing, technical support and ADR. WIPO could lead this effort by promoting the importance of PTO-SDO cooperation and encouraging major patent offices to include standards documents in the PCT minimum documentation for specified technical fields. In this capacity, WIPO could assist in the following:

- a) initiate discussions for information-sharing agreements between IP authorities and major SDOs and coordinate *multilateral efforts* to scale up existing ones. Albeit effective, bilateral agreements without positive spillovers do not foster wide convergence of practice at an international level and thus cannot – in isolation – address long-term issues related to patent quality and the efficiency and sustainability of the overall system;
- b) encourage patent offices to cooperate in the field of prior art documentation within the specific context of standards by *raising awareness* around the benefits of including standards in the prior art search and the subsequent impact on patent quality;
- c) clarify whether and under which circumstances standards contributions and drafts can be considered *publicly available prior art*. Legal certainty on this issue is predicated on understanding first how the interpretation of prior art and public availability varies across jurisdictions;
- d) provide technical assistance to patent offices in accessing relevant technical information by developing a *shared universal data format* across all patent offices. In addition, citation information could be effectively used for linking and clustering standards with most relevant patent search reports and non-patent literature;
- e) explore the possibilities of an *interagency collaboration between WIPO and globally relevant SDOs* with the purpose of enhancing the contents of PATENTSCOPE and,

ultimately, establishing a portal for access to standards-specific information. Similar to the WIPO Digital Access Service (DAS) that has been developed to facilitate the exchange of priority documents between offices in electronic or paper form, an appropriate *one-stop-shop mechanism* may be envisaged for access to early drafts and other standards-related documents. This idea does not necessarily involve the setup of a new database, but leverages on existing, sophisticated standards databases and centralized repositories such as those of ETSI and IEEE in order to achieve information linkages and worldwide interconnectedness;

f) potential synergies between WIPO and SDOs could extend to other areas. For instance, SDOs could further *promote the use of WIPO ADR* by parties willing to settle their disputes outside the courts. As mentioned above, the WIPO Center collaborates with some SDOs including ETSI and IEEE.³⁴

g) continue its efforts to support the dissemination of patent information, including prior art citation, and further development of WIPO standards to be used in both patent and standardization systems. Uniform standards have already been proposed in the area of patent legal status data and the citation of documents produced by SDOs³⁵, but WIPO could extend its activities to explore the functionalities of systems for providing access to publicly available patent information of industrial property offices, as well as future plans with respect to their publication practices.³⁶

Policy Recommendation #3 - Future research and policy action

In view of the above, the path towards awareness raising and interagency collaboration covers a wide range of potential activities with different degrees of involvement, from an intermediary/advocate role over to technical assistance and infrastructure building. Here, it is pivotal for the long term to bear in mind that the study of the technical and practical challenges of patent search and examination in the specific context of standards serves as a magnifying lens for the challenges and efficiencies of the overall patent system. The present study has, in essence, demonstrated the strong links between patent quality and the access to standards-related prior art not merely as another sector-specific research in the light of the pivotal role of ICT on a technological and socio-economic level; rather, through the context of standards, the study has recast the notion of patent quality as equivalent to the creation of a more user-friendly and efficient system - with particular focus on administrative processes and operations that resonate with the pace of technological innovation and the evolving role of patent authorities in an environment of collaboration and transparency.

From a research point of view, the present exploratory study points to significant information gaps regarding our systematic knowledge of the current dynamics across IP authorities worldwide, especially with regard to differences in search and examination practice. Previous

³⁴ More information at <http://www.wipo.int/amc/en/center/specific-sectors/ict/>

³⁵ See, respectively, http://www.wipo.int/edocs/mdocs/cws/en/cws_5/cws_5_8_rev_1.pdf and <http://www.wipo.int/export/sites/www/standards/en/pdf/03-14-01.pdf>

³⁶ Cf. Task No. 52 in the work program overview of the Committee on WIPO Standards (CWS), http://www.wipo.int/export/sites/www/cws/en/pdf/cws_work_program_overview.pdf

research has put emphasis on “best practice” examples from the major patent offices (USPTO, EPO and JPO). Albeit a useful resource, such practices may be difficult to follow by other patent offices or not suitable for developing countries. Whereas the demand for patents has become increasingly internationalized, only a few IP authorities appear to grasp the impact of the current shifts and the challenges ahead. Future research could help assess the barriers to their further development and the extent of information gaps or ill-understood interactions. Basic descriptive work could shed more light on the patenting process of smaller offices of regional importance and the unique policy issues they face thereby. Specifically, a systematic review of the prior art search and documentation processes conducted by these offices in selected technical fields, including technical standards, could unveil useful lessons and opportunities. It would also help raise awareness about the benefits from including standards-based prior art in the patent office databases and use those as a springboard to achieve improvements on a larger technical and operational scale within the organization and beyond the context of standards.

This type of research could be embedded in existing WIPO work programs and action plans in which the patent authorities of the member states are invited to reflect upon and exchange information on practices relevant to patent quality in the field of technical standards, including specific metrics, information on prior art search tools, digitization processes, access to NPL, relevant professional training, etc. Furthermore, it is pertinent to receive direct input from the main actors of the patenting process, i.e., examiners, applicants and third parties, who would be invited to share their experiences in the context of various WIPO discussion fora – also in interaction with SEP holders, standard implementers and other stakeholders. To this point, the conduct of the present study could not have been possible without the valuable insight of interviewed examiners and experts from selected patent offices; their unfiltered view of the actual challenges during search/examination and the possible solutions helped build an accurate assessment of the current landscape that can be projected into informed policy action. Thereupon depends the justification and feasibility of measures toward a set clear-cut goals: adjusting procedures to different technologies, improving access to NPL and assessment to prior art, investing in examiner expertise in the specific technical fields and, ultimately, converging patent examination procedures for globally relevant technologies of high impact – a goal feasible through enhanced work- and information-sharing.

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