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Confiance numérique et normalisation –
Approche théorique et démonstrateur sectoriel

Profiling and motivations of the standardization experts in Luxembourg

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Executive summary

Profiling and Motivation of the Standardization Experts in Luxembourg: Different Players, Different Needs

In line with the standardization strategy for Luxembourg, Public Research Centre Henri Tudor and ILNAS (*Institut luxembourgeois de la normalisation, de l'accréditation, de la sécurité et qualité des produits et services*) joined their efforts to study the motivations for individuals or organizations of being involved in standards development.

The main objective of this research is to profile the characteristics and motivation of Luxembourgish experts participating in standardization activities. The study offers a comprehensive description of standardization participation considering both single experts and the organizations to which the experts belong. The data for the research have been mainly collected through 24 semi-structured interviews with national experts. The description of the characteristics of public organizations and private companies active in standards development enrich and complete the data collected during the interviews.

The main conclusion is that participants in standardization can be classified in two main groups, having different profiles and consequentially different motivations to join standardization committees. The proposed classification is useful to interpret the feedback of experts about difficulties faced during standardization process.

The description of these groups is following.

The first group is composed of experts of large companies. These companies compete in international markets and they are mainly active in standardization of characteristics of goods that are part of their core business. For these companies, standardization is a strategic decision to promote the interest of the company (i.e. lobbying) at national, European and international level. Strategic intelligence (e.g. monitoring market trends) is an important reason for the experts to participate to standardization processes. The experts of this group are generally highly educated, with a solid technical background and generally with a long experience in standardization process.

Experts of **the second group** are affiliated to companies characterized by a small size and local market. As the size decreases, the organization and expert perspectives tend to overlap. In the extreme cases, the expert is self-employed, and organization and expert are the same entity. Participants affiliated to small companies feel as part of a larger community of experts and they are keen to be recognized as experts by other peers (i.e. recognition). Most of the small companies are active in management/service standardization (e.g. quality and IT security). Experts from small companies report that knowledge sharing is an important part of the standardization process. They also tend to be more sensitive towards visibility and recognition for their expertise and function than the first group's experts.

Although participants benefit from standardization, the process requires resources that might put some strain on companies. Training on technical aspects of the standardization

process, financial support and time have a higher priority for the second group than for the first one. Additionally, administrative burdens and limited operational support are perceived as obstacles to the effectiveness of standardization activities by almost all experts.

This study addresses the motivations of experts currently involved in standards development but further researches could investigate companies that are not participating in standardization processes. These companies could potentially benefit from participating in standardization process but may not be aware of standardization activities and their benefits. New companies taking part in standards development could bring their knowledge and expertise to support the development of new markets, especially in the sectors identified in the standardization strategy for Luxembourg.



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1 Context and motivation of the work¹

Today, every professional sector relies on standards to perform its daily tasks in an efficient manner. An obvious example is the standardization of screw shape and size, which is one of the first application domains of standardization. What would happen if each product designer had its own screw dimensions? It is clearly difficult to imagine each user having as many screwdrivers as the number of different products he has.

Using standards is thus seen as a source of benefits in every sector. In general, standards facilitate trades and guarantee some fundamental characteristics such as interoperability, quality, security and risk management. However, in spite of such recognition, advantages related to the involvement in the development process of a standard, also called standardization process, are still underestimated. In terms of added value related to this involvement, we can first mention the anticipation of future technical regulations and best practices. Innovation dissemination, through an active participation in standards development, is another advantage. Standardization is finally a particularly interesting field towards a knowledge-based economy, aligned with EU's growth strategy for the coming decade called *Europe 2020*².

The Grand Duchy of Luxembourg is aware of this context and, in the government program of 2009, it was highlighted that standardization contributes to labor productivity improvement, trade facilitation and development of new markets³. Establishing a standardization strategy for Luxembourg has then become a necessity. ILNAS (*Institut luxembourgeois de la normalisation, de l'accréditation, de la sécurité et qualité des produits et services*), the national standardization body, is in charge of this strategy, and the standardization strategy for Luxembourg was released in June 2010⁴. This strategy targets the 2010-2020 decade and is updated every year. The main idea behind this strategy is that participating in the standardization process leads to the development and valorization of the work of the national experts. This can be summarized in the main principle of the strategy: "*Setting standards means setting the market*".

The standardization strategy for Luxembourg is based on the key concept of *knowledge triangle*. The knowledge triangle refers to the interaction between research, education and innovation, which are considered as a foundation of a knowledge-based society. Thus, ILNAS considers as essential to the development of standardization as a support of the national economy:

- The production of normative knowledge, through the involvement of national experts in the standardization process
- The transfer of this knowledge through training and public awareness
- The use of this knowledge through research and innovation applications

¹ This section is a contribution of ILNAS

² EUROPE 2020 – A European Strategy for Smart, Sustainable, and Inclusive Growth, COM (2010) 2020

³ <http://www.gouvernement.lu/gouvernement/programme-2009/programme-2009/programme-gouvernemental-2009.pdf>

⁴ <http://www.ilnas.public.lu/fr/publications/normalisation/etudes-nationales/ilnas-strategie-normalisation-2010-2020.pdf>

The standardization strategy for Luxembourg consists of 5 pillars:

- A sector-based normative approach as a support for the national economy

In order to support particularly interesting economic sectors in Luxembourg, different sectors will be investigated at the normative level. Examples of such promising sectors are information technology, energy, eco-technologies, biomedicine, etc.

- Innovation and research development in the frame of standardization

Definition and management of research and development projects is a key activity, with regard to the *knowledge triangle* principle. The study presented in this report takes place in the frame of a research project defined within this pillar.

- A sector-based development of the national standards body of Luxembourg

In line with the sector-based normative approach, it is necessary to develop the standardization body of Luxembourg in a sector-based manner, with the aim to propose new products and services to relevant sectors.

- Standardization training and public awareness

Public awareness about standardization is a cornerstone to develop standardization activities. The development of a training program about standardization and information technology at the Master level is one of major objectives for this pillar.

- The establishment and development of the Economic Interest Grouping *Agence pour la normalisation et l'économie de la connaissance*

The objective of this Economic Interest Grouping is promotion, awareness, training and monitoring in the field of standardization, and applied research to support the competitiveness of companies in the Grand Duchy of Luxembourg.

Coming back to research and development activities related to standardization, a first research project has been launched by ILNAS in collaboration with the CRP Henri Tudor. The core topic of this project is *Digital trust and standardization*. The main issue handled is how to improve the knowledge of digital trust in the Grand Duchy of Luxembourg. First, it is necessary to define what digital trust is and what the digital trust underlying concepts are. Then, the project aims at identifying what are the tools and methods helping to improve digital trust in the Grand Duchy of Luxembourg. Some tools were upstream identified as obvious digital trust drivers: PKI management, records management, and Business Continuity Planning (BCP). All of them rely mainly on European and/or international standards. Moreover the process of standardization itself is also identified as a key digital trust driver.

In the frame of digital trust improvement, and in line with the standardization strategy for Luxembourg, it seems thus relevant to promote standardization and study the interests and motivations of experts to be involved in standards development. Standardization expert is the actor involved within the standardization process and producing the normative knowledge. As said earlier, the main principle of the standardization strategy for Luxembourg details "*Setting standards means setting the market*". Naturally, the one who sets standards is the standardization expert. In this frame, it is obviously important

to pay a particular attention to standardization experts, in order to understand their motivations, the added value of their involvement and the difficulties they may encounter.

This research work takes place in this context and aims at profiling current standardization experts in Luxembourg, in order then to implement efficiently the standardization strategy for Luxembourg. More precisely this study targets Luxembourgish participants in both national and international standardization processes (i.e. national mirror committees International and European technical committees).

The rest of the report is organized as following: a brief literature review presents the main results of previous studies, distinguishing between studies related to experts and studies at organization level. The methodological section presents the qualitative research. Results and recommendations are discussed in the last section.



2 Definitions

Technical committee can be defined as a technical group composed of experts in charge of development, drafting or revision of a normative document by applying the principle of consensus.

National mirror committees A national mirror committee is the committee at the national level of an European or international committee (or subcommittee). The goal of national mirror committee is to achieve Luxembourg consensus in specific technical field and to indicate the delegates representing Luxembourg position in international technical committees. According to the rules of international standardization bodies, ILNAS is representing Luxembourg and it is entitled to ballot in the technical committee on the bases of the advices received by the national study committees.

Organization indicates the entity to which an expert belongs. Both public organizations and private companies can participate in standardization process.

Social capital is defined as the value of all social relations within a network. Social capital theory focuses on the cooperation and trust within and between social networks to achieve individual or collective results. The value of social capital is then composed of different social resources that can be tangible or intangible. **Technical knowledge** is defined as the practical skills, know-how, routine and techniques which improve expert capacity to accomplish a particular task in a specific field (e.g. for an informatics expert, using a new programming language).

Strategic information groups all information that has no technical aspects but can influence the success of project of company and/or expert (e.g. market trends, job vacancies, etc...)

Recognition is a social resource is the ability of an expert to be identified by other peers or customers (e.g. being keynote in an international conference).

Lobbying is the process of advocating interest to influence public policy and market structure.



3 Literature review

This section is aiming to present current understandings of literature about participation in standardization processes. Standardization experts materially develop and draft standards but their action is part of the activity of the economic entity they represent. This fact can be very relevant for the standardization process. Indeed, even if several experts of same economic entity can participate in national mirror committee, in case of ballot within the national mirror committees, each entity has only one vote (ILNAS, 2010 p 7). Some studies address participation in standardization from the point of view of the enterprises (Blind, 2006; Mangelsdorf 2009), others focus on the experts sharing their knowledge (Kankanhalli et al. 2005). Current research simultaneously considers both perspectives to offer a complete view of participation in standardization process.

3.1 Experts participation in standardization

The current section focuses on the expert point of view while next is dedicated to the organization point of view.

Despite the importance of experts' contribution to successful standardization, few studies have explicitly addressed the motivations of standardization experts, probably for the lack of data. However, standardization can be considered as particular case of *epistemic community* (Chaudemanche and Kahloul, 2010)⁵.

An *epistemic community* can be defined as « a group of individuals working toward a common goal of sharing knowledge for creation and validation of collective knowledge within the same epistemic framework» (Roth, 2008). The concept of epistemic community is better refined by Merrien (2001) that highlights the status of experts and the authoritative role for their peers. The author defines epistemic community as " a network of professionals with expertise and skills in a particular area who claim, authoritatively, knowledge in development of rules in this area".

Epistemic community is different from other knowledge communities according following dimensions (Cohendet, and Créplet Dupouët 2001):

- shared values and common beliefs, which provide the basis for participation and the building of the epistemic community
- formal or informal procedural authority, that is a set of unwritten rules that define the objectives and the means to achieve them.

Although recruitment in these communities is done by peers, it does not exclude some individual heterogeneity of its members.

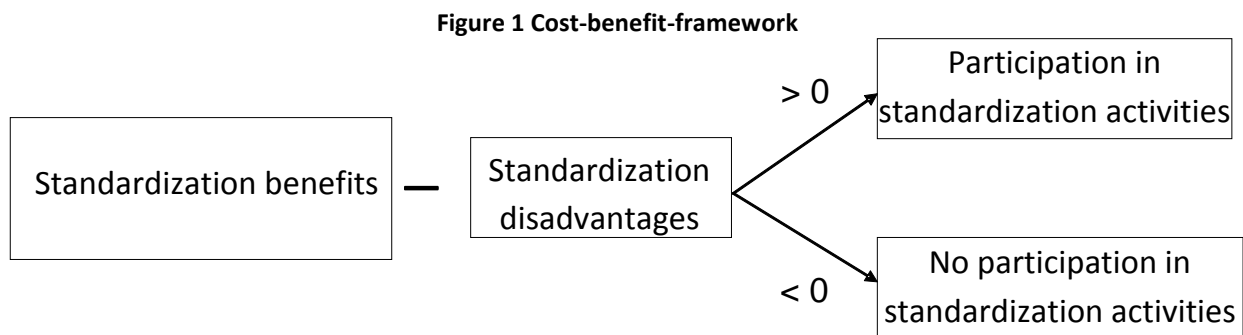
Creating and sharing technical knowledge is not the only dimension of standards committees. Standards can be considered as rules of public policy having an impact on different stakeholders.

⁵ Authors conducted a study in the context of international accounting standard IAS-IFRS (International Accounting Standards - International Financial Reporting Standards) but their claims can be extended to formal standardization.

The work of standardization experts can be extremely important for economic players: *Setting standards means setting the market*. In this sense standards committees are also places of convergence of the economic strategies of firms (Foray, 1993; Atten, 2001). Therefore, experts have a double role: technical and political (Colasse, 2005). These two functions that can sometimes conflict (Maillard, 2001) are:

- a function of knowledge sharing and disclosing. The standardization involves coordination between participants in the standardization process. To achieve coordination, all participants in standardization process (e.g. product designers and end users) have to share some knowledge with other participants, transforming tacit into codified knowledge.
- a function of negotiation because the expert is mandated, delegated by a group or organization which he must defend. Indeed, there are procedures for consultation, successive stages of validation and progressive votes to ensure that the various stakeholders agree with the final product.

The *social capital theory* is particularly useful to investigate the participation of experts in epistemic communities outside the company. The central position of social capital theory is that networks of relationships constitute a valuable resource. Much of this capital is embedded within networks of mutual acquaintance and recognitions. In summary, the theory of social capital defines any individual or organization as a set of tangible and intangible resources used to achieve certain goals. In this perspective, Nahapiet and Ghoshal (1998) notice that an expert participates in knowledge communities to increase his own resources (e.g. technical knowledge, social network and reputation). Each expert compares the advantages to the costs of participation in such a community (Chow and Chan, 2008; Chang et al. 2008) as shown in Figure 1.



Knowledge communities can offer two different types of benefits to their members: strategic information to influence the success of project within the expert field, and technical resources consisting of technical expertise and material items (Burt, 1992; Galunic and Rodan 2004). Kankanhalli et al. (2005) identifies the factors that influence participation of experts in a community of knowledge recognizing the importance of context.

The next section details the benefits, the costs and the context factors identified by Kankanhalli et al. (2005).

3.1.1 Benefits

Organization rewards: Organization rewards is the set of all incentive schemes set up by the organization (autonomy, salary, career) for taking initiatives and increase the social capital of the expert (Bock et al. 2005; Lui and Wei, 2009; Jones et al. 2006; Kankanhalli et al. 2005; Kulkarni et al. 2007; Wang et al. 2009).

Image and reputation: Participation in standardization processes improves his reputation (He and Wei, 2009; Hsu and Lin, 2008; Kankanhalli et al. 2005; Kulkarni et al. 2007; Panteli and Sockalingam, 2005; Shin et al. 2007; Wasko and Faraj, 2005).

Reciprocity: when an expert shares his knowledge, he expects a similar commitment from other experts. Strong reciprocity facilitates emulation in the technical committee and the growth of social resources for each expert. (Bock et al. 2005; Chiu et al. 2006; Lui and Wei, 2009; Hsu and Lin, 2008; Kulkarni et al. 2007; Ma and Agarwal, 2007; Shin and al. 2007; Wasko and Faraj, 2005)

Knowledge self-efficacy: participation in a community of peers is an opportunity to build self-esteem (Constant et al. 1994). If the expert thinks that his own knowledge allow the community to accomplish its objectives, it would be more inclined to participate (Bock et al. 2005, Jarvenpaa and Staples, 2001; Kankanhalli et al. 2005; Kulkarni et al. 2007; Shin et al. 2007; Wasko and Faraj, 2005)

Enjoyment in helping others: Altruism, beyond any personal interest is also an important factor. Even if the expert has nothing to gain, helping others can be a sufficient reason to participate in the standardization processes (Constant et al. 1994, He and Wei, 2009; Hsu and Lin, 2008; Jarvenpaa and Staples, 2001; Shin et al. 2007; Wasko and Faraj, 2005).

3.1.2 Costs

Codification effort: Converting tacit knowledge in explicit knowledge requires time and efforts that may be too high. Thus, when the process of codification of knowledge is too complex, experts tend not to participate (Kankanhalli et al. 2005, He and Wei, 2009).

Loss of knowledge power: Each expert has unique knowledge and know-how. Participating in a knowledge community requires sharing knowledge. The risk of undesired spillover of knowledge (i.e. losing its monopoly) can be a barrier to participation (Kankanhalli et al. 2005; Davenport and Prusak, 1998).

3.1.3 Contextual factors

Trust: Experts are part of competing organizations and nations. Therefore, without trust and fairness among experts the group cannot achieve consensus in both national mirror committees and international technical committees. (Chiu et al. 2006; Chow and Chan, 2008; Lui and Wei, 2009; Hooff and Huysman, 2009; Hsu and Lin, 2008; Panteli and Sockalingam, 2005; Shin et al. 2007)

Pro-sharing culture: Pro-sharing culture is a set of specific values of technical area of the expert. Technical language and a specific scientific reference will facilitate the

involvement of the expert to the project (Bock et al. 2005; Chow and Chan, 2008; Lui and Wei, 2009; Hooff and Huysman, 2009; Hsu and Lin, 2008; Jarvenpaa and Staples, 2001; Kulkarni et al. 2007; Shin et al. 2007)

Identification: Identification is the extent to which the interests of the expert overlap with those of his organization. An expert with a strong organizational identity tends to take more initiatives to serve the interests of the organization (Chiu et al. 2006; Chow and Chan, 2008; Hooff and Huysman, 2009; Hsu and Lin, 2008; Jarvenpaa and Staples, 2001; Kankanhalli et al. 2005; Ma and Agarwal, 2007; Panteli and Sockalingam, 2005; Shin et al. 2007).

3.2 Organization participation in standardization

Section 3.1 reviews the main studies investigating participation in standardization from the expert point of view. The current section focuses on the participation in standardization from the organization point of view to offer a more complete literature review.

Standardization has an impact on the whole society and is relevant for different stakeholders. ISO distinguishes five main groups⁶:

- Industry and industry/trade associations
- Science and academia
- Consumers
- Governments and regulators
- Societal and other interests

However, as noticed by some authors, not all stakeholders are sufficiently represented in the technical committees, especially consumers (De Vries, 2001) and SMEs -Small and Medium Enterprises- (De Vries et al. 2009). Morikawa and Morrison (2004) quantify the representation of stakeholders in standardization processes focusing on the annual plenary meeting of technical committee 207 that is responsible for developing the ISO 14000 standard series on environmental management.

Morikawa and Morrison (2004 pp. 14-15) refine the ISO categories considering consultants (firms that provide services relating to the standards) and national standards organizations. In their study, the authors find that entities whose core business is related to standards setting (standard organizations and c advisors/registrars) attend more international meetings than the potential user of the standards (industry)⁷.

A company can expect to raise its market share or to increase the value of the whole market participating in standardization activities. In some circumstances, standardization can be the prerequisite for the existence of new markets (i.e. GSM, Blu-ray, MP3 etc...). On behalf of the AFNOR (Association française de Normalisation), Miotti (2009) investigates standards and standardization issues finding that the main benefits of standardization

⁶ http://www.iso.org/iso/standards_development/processes_and_procedures/stakeholders.htm

⁷ The study does not consider standardization activities at national level where standards users could be more represented than at international level.

participation are the anticipation of market development and promotion of the companies' interest (Miotti, 2009 p 22).

The standardization process can be seen as a particular form of R&D collaboration (Blind, 2006; Mangelsdorf, 2009). Blind adopts a quantitative method to explain decision of German companies to participate in standardization processes. The author finds evidences that large companies are more likely to join standardization committees than small companies. Moreover, R&D expenses and exports intensity present an inverted U-shape relationship with participation decision⁸. This means that companies with very low or very high levels of R&D expenditure are less likely to take part to standardization activities than companies with average R&D investment. The same relationship is valid for exports intensity.

Focusing on service companies in Germany (Mangelsdorf, 2009) found that company size and export activities are important factors that explain participation in standardization activities.

With a focus on ICT (Information and Communication Technologies), STF367 Special Task Force of ETSI (European Telecommunications Standards Institute) published a recent study on SMEs (companies with less than 250 employees⁹). The study focuses on benefit and barriers of standardization for SMEs, but it provides useful insights for the current research. The authors conclude that the main advantages of taking part to standardization activities *"are related to the visibility, reputation and networking opportunities offered to their company"* (Le Gall & Prager, 2011 p. 9). However, SMEs can experience difficulties due to lack of financial resources. The cost of participating in standardization activities can be too high and larger companies can easily influence standardization activities making the involvement of SMEs less effective. Indeed, Le Gall & Prager, (2011 p. 10) report that the main difficulties for SMEs include the participation of large players and the cost of travel in order to attend international meetings. SMEs (and organizations in general) can face several barriers before benefiting from standards and standardization (De Vries et al. 2009).

⁸ The probability to participate in standardization activities increases with R&D expenditures until a maximum point. Once this point is crossed, the probability to participate decreases.

⁹ Recommendation 2003/361/EC "SME definition"



4 Methodology

The study adopts a multiple case study approach to investigate the drivers of the standardization participation for experts and companies. Most part of the data is gathered through interviews and other public available register data. The construction of a semi-structured questionnaire was performed in two phases.

The first phase (i.e. pilot study) consisted in three open interviews with experts from Public Research Centre Henri Tudor that are active in standards development. The aim of these interviews was twofold:

- collect information about standardization on the field
- develop and refine a semi-structured interview questionnaire

The interview questionnaire has been developed on the basis of the literature review. The proposed questionnaire consists of 10 open questions. Questions are asked by each interviewer in the same order. The interview questions are not rigid but include some flexibility in order to gather the maximum of information from the experts about the topics of interest. The final version of the questionnaire is reported in appendix in section 7 and it has been validated by ILNAS before continuing the research.

During the second phase, 21 interviews were performed¹⁰. This phase has been actively supported by ANEC -*Agence pour la Normalisation et l'Economie de la Connaissance*. ANEC is an Economic Interest Group (EIG) that is promoting, increasing awareness and developing trainings in the field of standardization and applied research in order to support the companies' competitiveness in Luxembourg. ANEC has invited all Luxembourgish experts explaining the goal of the research and the role of ANEC. The interviews were also scheduled and followed by ANEC. Believing that the evidence collected was adequate for the purpose of the research, the interview period ended in May 2011. Eleven of all 21 interviews were specifically conducted to validate the model¹¹. The protocol of analysis is described in next section.

¹⁰ Considering the three interviews of first phase, 24 interviews were performed during the study.

¹¹ Other scheduled interviews were later performed by ANEC alone, focusing more on the role of ANEC in facilitating the standardization processes.

4.1 Protocol of analysis

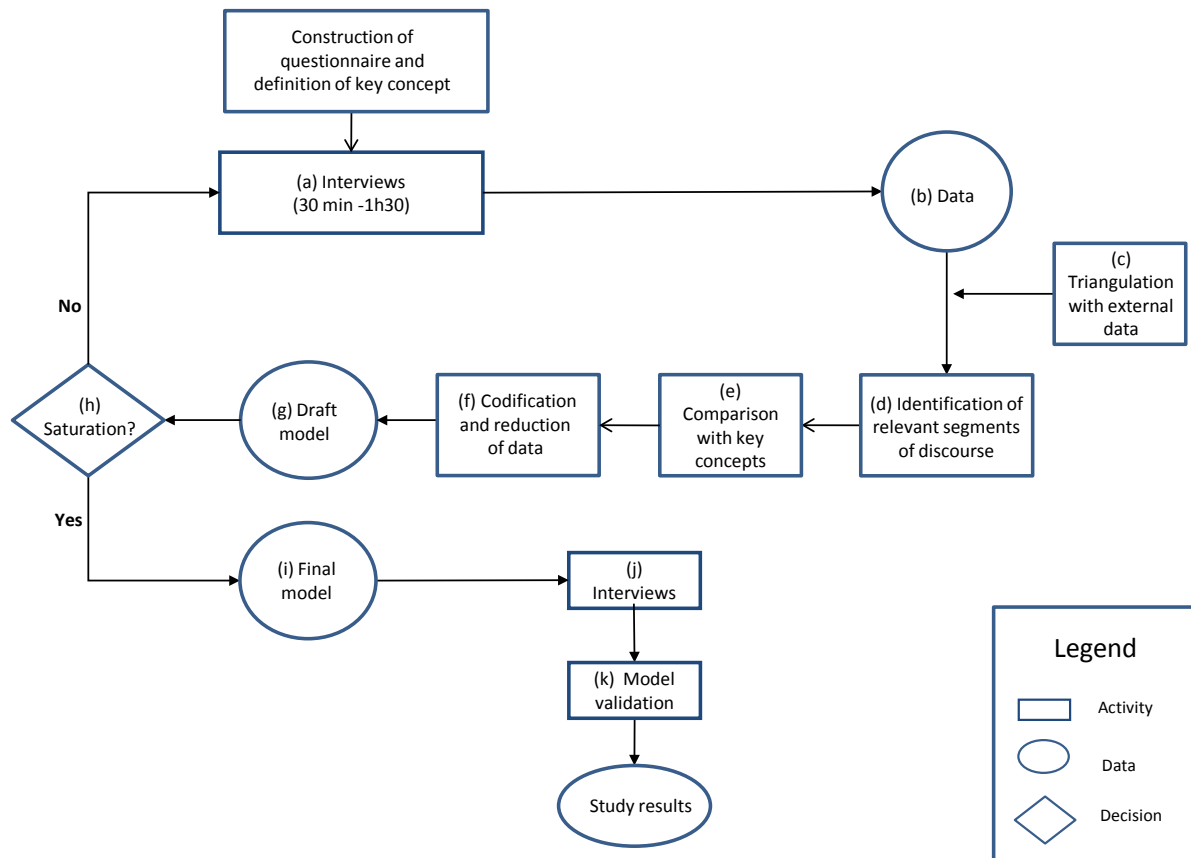
The study adopts a qualitative method to analyze subjective perceptions of the interviewee (experiences and practices). The purpose is to theorize and explain the differences and similarities of evidences. Specifically, qualitative analysis consists of an iterative process marked by frequent feedbacks between the theory and the categorization of raw data and field of research. Based on the review of relevant literature the key concepts of research are identified and questionnaire for interviews is developed. As shown in Figure 2, the analysis is conducted in several steps. The output of each step is the input of following one. Section 5 discusses the results of at the end of the process and description of the steps of data analysis is following.

- a. Conduction of a series of interviews: The interviews are designed to not last more than half an hour.
- b. Interviews were recorded using a voice recorder. The interviews should have been fully transcribed, but due to time constraints, the less relevant parts are not written out. For this reason, the interviews were listened to several times and the most relevant elements were reported in a spreadsheet.
- c. Data gathered with each interview were triangulated with other sources (websites, public registers etc...) to identify contextual elements (characteristics of his organization, characteristics of the technical committee or standard etc...) and increase reliability of information gathered with the interview.
- d. The *relevant segments of discourse* (i.e. part of interview relevant for research purpose) are then identified, in each interview.
- e. The *segments of discourse* are then compared with the key concepts defined by the theory.
- f. *Segments of discourse* are then grouped through categorization to lead to a synthesis of data.
- g. With this synthesis of data, we can draw the *first theoretical inferences* (i.e. draft model) analyzing the redundancy and conceptual linking of categories. The theorization takes place almost every three interviews, paralleling the interview collection.
- h. Each relevant segment that has not been a categorized is a *residue of the interview*. By analyzing these *residues*, it possible to determine whether the research has reached the *saturation* (i.e. that the residuals *no longer* provide meaningful additional analysis). It is considered that saturation has been reached after thirteen interviews¹²
- i. After saturation, the final theoretical model is built based on the data collected.
- j. Eleven interviews were then conducted.
- k. The final theoretical model is validated and tested.

¹² Two interviewees declined to record the interview

The results of the analysis are presented in section 5.

Figure 2 Protocol of analysis



5 Results

This section reports the end results of the analysis conducted according with the methodology presented in section 3. In line with the goals of the study, the results are reported grouped distinguishing between experts (paragraph 5.1) and organizations (paragraph 5.2). According to the theoretical framework in Figure 1, participation in standardization has costs and benefits.

From the perspective of experts, as presented in the literature review, we use the framework of the theory of social capital specifically in terms of resources. These resources are technical knowledge (paragraph 5.1.1) and strategic information (paragraph 5.1.2). Both social resources increase recognition (paragraph 5.1.3) of the expert and its organization. Different types of organization have different reasons to participate in standardization process. Differences between public and private organization are discussed in paragraph 5.2.1. The different importance of technical knowledge and strategic information for small and large enterprises is discussed in paragraph 5.2.2.

5.1 Motivations of experts

5.1.1 Sharing technical knowledge

The technical committees and national mirror committees, seen as networks of experts in the same field, may be vehicles of technical knowledge. A network of experts is indeed a valuable social resource since experts can access complex technical knowledge. If an expert has a technical problem in his field he can find innovative solutions mobilizing its standardization network. Thus, the expert joins the network to acquire and sharing technical knowledge. ISO technical committees are an opportunity for the expert to integrate in the network, and the plurality and complementarities of expert profiles is a particularly valuable asset to achieve standardization project results.

This complementarity is only effective if the exchanges are fluid and consensual. Thus, each expert must bring its contribution to the building, which requires a systematic reciprocity on their part. In addition to this reciprocity, the end result of these exchanges must be the product of a consensus acceptable to its members in national mirror committees and in technical committees. This synthesis activity and exchange is more effective if expert network is intense. A network is said to be intense if the ties that bind experts are strong and many. The intensity of the network and the ambition to share the technical knowledge facilitates the work of the technical committees.

5.1.2 Acquiring strategic knowledge

Standardization processes are not only characterized by technical aspects, but since technology shapes markets, standardization is strategically important for the company.

In general, the expert should have both technical expertise and strategic knowledge to identify and manage the opportunities that standardizations offers. The strategic aspect is particularly relevant when these standards are directly connected to legislation (e.g.

European directives). For example, inflammability of toys standard (e.g. EN 71-2:2011) is referred in the European directive on toy safety (2009/48/EC). The expert is in privileged position to anticipate market trends and new regulations. The time dimension is fundamental to effectively anticipate and influence market changes and adapt dynamically its strategy. The strategic knowledge is used to protect or promote the organization interest. Large firms are particularly proactive to protect their interests especially if their activity is related to ISO standards. In this perspective, standards can be used by companies that contribute to the development of standard to gain important competitive advantage compared to their competitors. Thus, participation in technical committees is an important strategic choice since it can significantly impact the market and activities.

5.1.3 Recognition

We have seen that acquiring strategic and technical knowledge is a good reason to participate in standard development. Standardization committees are within this framework a key source of information. Moreover participation can provide further advantages as technical committees are an opportunity to increase recognition of skills and competences. Participating actively in technical committees, it is possible to demonstrate its expertise to other peers. The expert gains recognition within his own organization (e. g. participation can be important for the carrier). Moreover the external recognition of single expert extends to whole organization. For example, organizations that have an international market use participation in relevant international standards to strengthen their reputation and expertise. The recognition resulting from participation in technical committees also helps to build reputation and therefore build networking that may be particularly relevant for some organizations. Similarly, many experts have pointed out that their active participation at international level allowed them to be identified as a recognized player in their field of expertise in Luxembourg. Finally, we note that the study has not enabled to find evidence that experts would put forward their own interests at expenses of their organization.



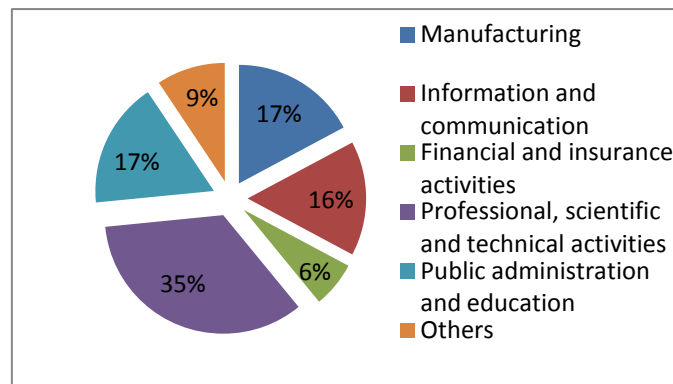
5.2 Motivations and characteristics of organizations

This section presents the analysis of data distinguishing public organizations from private companies. Findings about size of companies are discussed in the next section. Potentially, one company can participate in several technical committees. However, almost all companies are active in the standardization of products and processes related to their core business. For example, companies active in the production of cement participate in the technical committees responsible for cement and building limes. Among participants in the study, only one company reported to be active in the standardization process of a not-core activity of the company. However, the scope of standardization is one of the main tasks of the daily work of the single expert. Since the scope of standardization is not the core activity of this company allocates little time to the expert to participate in standardization processes.

As a first result for this study, the following figure presents an overview of the main characteristics of the Luxembourg organizations participating in standardization process. These figures are obtained by merging the official list of organizations and experts registered at ILNAS together with public data on economic activity and employment available on STATEC web site¹³.

5.2.1 Sector: Public and Private

Figure 3 Luxembourgish companies participating in standardization by main activity (%)



Authors' calculation; source: ILNAS liste des experts version 34 and STATEC (2010a)

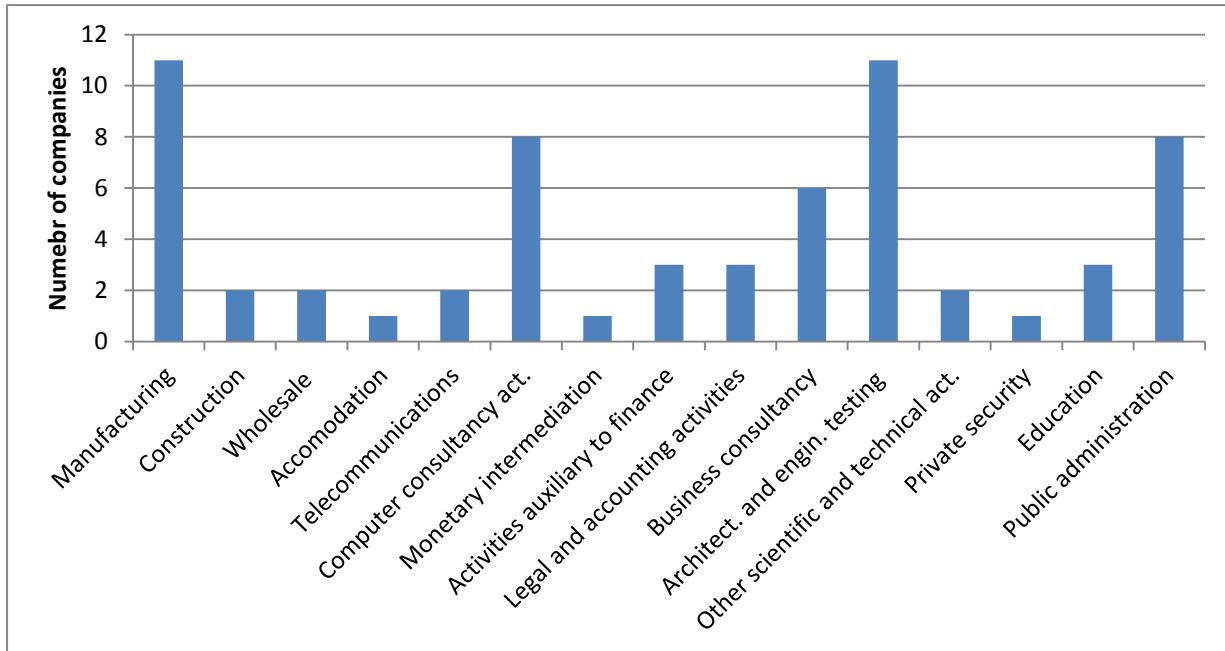
Note: two experts are registered in a personal capacity and are not included in the calculation

As shown in Figure 3, most of the organizations participating in standardization process are performing professional, scientific and technical activities (for example consulting and services to business). They represent 35% of the total. The role of public administration and education (University and Research Centres) is consistent (17% of the total). A more detailed picture about the main activity of organization participating in standardization activities is provided in Figure 4. It appears that architectural and engineering activities (12 companies) and manufacturing industries (11 companies) are the most common

¹³ The list of experts is updated on monthly basis, but the figures are based on the list of experts as reported on ILNAS website in the version 34 updated to 30/03/2011

economic activities of companies participating in standardization. Reading Figure 4, it appears that companies participating in standardization activities are highly heterogeneous also in term of economic activity.

Figure 4 Luxembourgish companies participating in standardization by main activity



Authors' calculation; source: ILNAS - Liste des experts version 34 and STATEC (2010a) Note: two experts are registered in a personal capacity and are not included in the picture

From the analysis of the evidence collected during the interviews, it appears that public organizations and private companies have different characteristics and motivations for the participation in the standardization process. This section focus on public organization and the next section focuses on private companies.

Public Research Centre Henri Tudor appears to be strongly committed to standardization with twelve experts participating in the standardization process, some of them chairing national mirror committees. Amongst them, one expert clearly reported to be hired to deal with standardization issues. Public Research Centre Henri Tudor is particularly active in the standardization activities related to Information and Communication Technology (ICT). Moreover, Tudor appears to work as a *catalyst* for the participation of other companies, especially the small ones. From the point of view of the private sector, there are some evidences that researchers from Tudor can effectively promote the standardization process.

At the date of the study, the other Public Research Centres are not active in the standardization process, and there is only one expert from the University of Luxembourg.

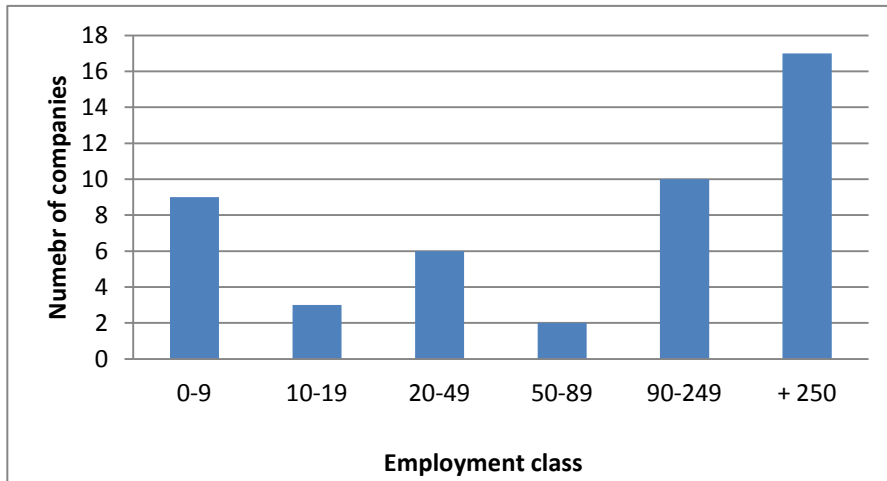
Experts from other public institutions participate in the standardization activities mainly because standards and standardization is part of their business (e.g. performing laboratory testing according standards with legal effect).

5.2.2 Size: Small and Large companies

The previous section presented the analysis for public organization. This section investigates the motivations of private companies focusing on the importance of their size.

As shown in Figure 5, most of the companies participating in standardization activities have more than 250 employees, at least at group level in Luxembourg. Others companies have less than 9 employees. It is important to mention that some experts are self-employed and have no employees.

Figure 5 Luxembourgish private companies participating in standardization by number class of employees



Authors' calculation; sources: ILNAS - Liste des experts (version 34); STATEC (2010b) and business guide Luxembourg (<http://index.paperjam.lu/>)

According to the data collected during the study, large companies take part to standardization activities to influence the standard and defend the company's interest in terms of market share and development of the market (i.e. lobbying). Acquiring strategic information is a common reason to participate for both for small and large companies because it facilitates technical watch and permits to early identify market trends. However large and small companies differ in terms of technical knowledge.

The experts of small companies report to be particularly concerned about sharing and increasing technical knowledge. The reason is that most of small companies that have taken part to this study are consulting companies mainly active in the standardization of management/service standard (e.g. quality and IT security). These companies are often active in the implementation of standards and therefore, both technical knowledge and strategic information are valuable.

The situation is different in the case of product standardization, where companies are usually large and international, and are more focusing on strategic knowledge to set the market. Large companies are operating on international markets and their interests are international. They sometimes have different branches that coordinate their efforts to successfully influence international standards and global markets.

The size of the companies influences the resource that can be dedicated to standardization process. Compared with some years ago, information technology (e.g. the exchange of e-mail and data exchange tools) makes the participation in standardization technical committees less expensive. However, compared to large companies, small companies have less resource to dedicate to standardization and the cost of effective participation can still be excessive for small companies. In some cases, experts participating in standardization are self-employed with no employees. Small companies find it difficult to be deeply committed to standardization activities.

Indeed, no expert from a small company can afford chairing a mirror and technical committee as it demands more financial and time resources. This fact is particularly important because the president is an influential player in the standardization process, as reported during some interviews.

Large and small companies differ in terms of expressed needs to make the participation more effective. Small companies report that lack financial resources and time are the main limitation for an effective participation. Other limitations for small companies includes: lack of specific knowledge about international standardization processes and scarce recognition of the role of standardization expert. Experts of small enterprises expressed need for recognition. Large organizations have fewer difficulties than small companies to dedicate resources to standardization activities. Both small and large companies perceive administrative burdens (like annual reports) as excessive. An expert declared that participation costs are: money, time and administrative burdens. Reducing these costs is perceived as a way to facilitate the standardization process. It can be concluded that the size of private companies influences the motivations to participate in standardization processes.



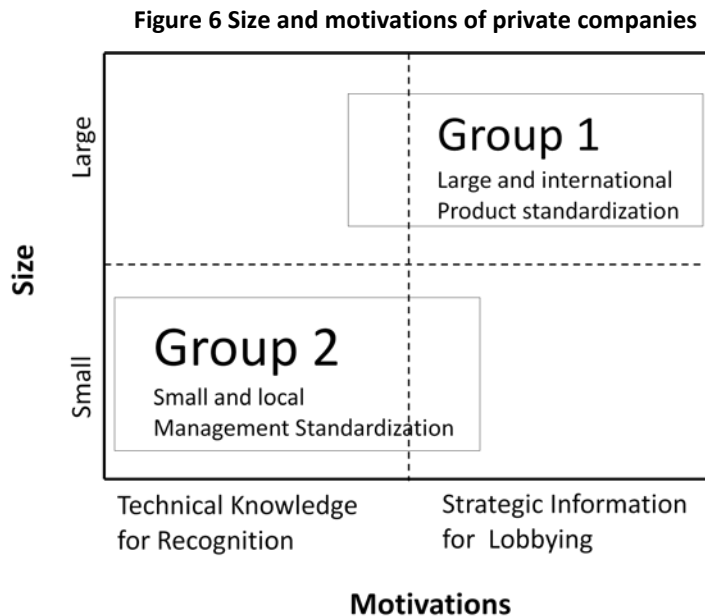
6 Conclusions

Adopting the organization and the expert point of view, the study collected and evaluated data about the participation in the standardization process in Luxembourg. Several considerations can be drawn, but the main conclusion is that participants in standardization can be classified in two main groups, having different profiles and consequentially different motivations to join standardization committees.

The first consideration is that standardization is a complex process and has different players (e.g. producers, regulators, consumers. etc...). However, not all potential stakeholders participate directly in standardization processes. For instance, in line with previous studies, consumers are usually not directly represented in the Luxembourgish standardization process.

Focusing on experts actually involved in the standardization process, it is important to distinguish between experts of public and private sectors. Experts of the **public sector** are affiliated to organization directly involved in standards development (ILNAS) or research institutions (Public Research Centre Henri Tudor, University of Luxembourg) that consider standardization as part of their mission or a useful form of knowledge exchange and knowledge creation. However, other relevant players are still not involved and could potentially contribute to the standardization process.

Regarding the **private sector**, participants in standardization can be classified in two main groups according to the size of companies of affiliation, as shown in Figure 6¹⁴. The classification into two groups is useful to interpret the feedbacks of experts about difficulties faced during the standardization process as reported in section 6.1. A more detailed description of the two groups is following.



¹⁴ The proposed classification is meant to better target the needs of participants to standardization but some borderline cases can have characteristics of both groups.

The first group is composed of experts of large companies. These companies are mainly active in standardization of characteristics of goods that are part of their core business. For these companies, standardization is a strategic decision to promote the interest of the company (lobbying) at national, European, and international level. Strategic intelligence (e.g. monitoring market trends) is an important reason for them to participate to standardization processes. It is important to point out that expert motivations of large companies (i.e. strategic knowledge) are not necessarily identical to the motivations of firms (i.e. lobbying). The experts of these companies are likely to report difficulties in achieving the consensus, especially if different companies or group of companies pursue diverging objectives. Companies' experts have generally a solid technical background with a long experience in the standardization process.

Experts of **the second group** are affiliated to companies characterized by a small size and a local market. As size decreases, the organization and expert perspectives tend to overlap. In the extreme cases, the expert is self-employed, and organization and expert are the same entity. Participants affiliated to small companies feel as part of a larger community of experts and they are keen to be recognized as experts by other peers (recognition). Most small companies are active in management/service standardization (e.g. quality and IT security). Experts from small companies report that knowledge sharing is an important part of the standardization process. They also tend to be more sensitive towards visibility and recognition for their expertise than experts of first group.

6.1 Feedbacks from the experts: Different profiles, different needs

Although participants benefit from standardization, the process requires resources that may put some strain on companies. Training on technical aspects of the standardization process, financial support and time have a higher priority for the second group than for the first one. Additionally, administrative burdens and limited operational support are perceived as limitations to the effectiveness of standardization activities by almost all experts.

Based on the feedbacks of the experts expressed during the interviews, the importance of the needs expressed are summarized in Table 1.

Table 1 Feedback of experts

Need	Importance of the need	
	First group	Second group
Financial and time support	Low	High
Training	Low	High
Reduced administrative burdens and operational support	High	High
Recognition	Low	High



6.2 Limitations and further development

The focus of this study was to identify the motivations of organizations and experts to participate in standardization processes. Based on the study of a large number of companies and experts in Luxembourg this study identifies two main groups of companies participating in standardization activities. The first group is made up of large and international companies. The second group is constituted of small companies active in local market. These results are consistent with previous studies. However, some limitations have to be considered. The study is based on Luxembourgish companies and experts, and conclusion can probably not be easily generalized to other countries.

Moreover, the participation in the study was voluntary and some experts were not willing to participate in the research. Even if the number of respondents is consistent, especially if compared to the size of reference population, potential bias cannot be excluded.

Further researches could include in the analysis companies that are not currently involved in standardization process but could potentially benefits from participating in standardization process or could bring their knowledge and expertise to support the development of new markets. Most of previous researches, including the current study, adopt a cross sectional approach not considering how the standardization participation may change over time. Future studies could investigate how the composition of Luxembourgish experts varies with time. Focusing on the reasons for joining and/or leaving can give guidance to set proper policies.



7 Annex: Interview questionnaire

I would to thank you again for participating in the research on participation to standardization conducted by Public Research Centre Public Henri Tudor and ILNAS. To facilitate my note taking and write down the minutes of our discussion, I would like to tape it. Please consider that according to our protocol all information will be held confidential and available only to the research team for research purpose. Your participation is voluntary and you may stop at any time during the interview. The study does not aim to evaluate your techniques or gather sensitive information about your organization or evaluate your skills.

The anonymous minute could be used to write research paper.

The interview is planned to be complete in not more than 30 minutes.

1. Short description of your organization
 - a. Name of the enterprise
 - b. Sector, main activities
 - c. Group status
 - d. Number of employees
 - e. Exports / Main markets
 - f. Clients: B2B-B2C
2. Does your organization use or participate in the development of standards? If not why? (if not certified)
 - a. Use standards
 - b. Participate in their development
3. If you participate, where do you participate? And why?
 - a. Formal (CEN, ISO etc...)
 - b. Informal (consortium, fora, etc...)
4. Can you describe the process of participation in standards development within your enterprise or group?
5. In your experience, how do you achieve the consensus?
 - a. Management of potential disagreement among members of standardization group
 - b. Mediator vs. technocrat
6. Who participate in standards development?
 - a. professional /educational background and position
7. What are the advantages brought by the elaboration of standards?
 - a. Reasons for participate in standardization process
8. How make your participation more effective?
9. What are the difficulties to develop / participate in standards? How mitigate them?
 - a. Costs
 - b. Lack of specific skills
10. *Does your participation in standardization increase the value of the results of your innovation efforts? How?*

The interview is finished, thank you for your collaboration.

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