ICT STANDARDISATION – CO-ORDINATING THE DIVERSITY

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***Abstract**: The complex web of standards setting bodies (SSBs) has triggered the need for co-operation and co-ordination in ICT standards setting at various levels. This paper looks at the co-ordination between SSBs, and proposes some improvements to the current situation. It also argues that SSBs need to co-ordinate with their stakeholders. This need is derived from a small qualitative study, which is briefly presented. It turns out that SSBs need to be flexible enough to constantly adapt to their stakeholders needs. Division of labour and improved transposition processes might help improve the current situation. Moreover, European policy makers might need to re-evaluate their stance towards standards consortia.*

Keywords: Standardisation, co-ordination, SDOs, consortia

JEL Code: L15

1 A Very Brief Introduction

Over the last decades a huge number of consortia and industry fora have entered the ICT standards setting arena. As a result, companies are today faced with an almost impenetrable web of standards setting bodies (SSBs), with complex inter-relations. Each of these bodies has its own membership, works within its own environment, and has defined its own set of rules. The resulting fragmentation of the standards-setting arena, and considerable overlap of the activities of individual SSBs, means that interoperability between standards from different sources cannot necessarily be assumed. Accordingly, improving co-ordination in ICT standards setting has become a major issue.

At the same time, however, we may observe fierce competition in standards setting. Initially, in the eighties consortia invaded the standardisation territory, which had always been the SDOs[1]' monopoly. This move was also helped by the deregulation of the telecommunication sector. Eventually, the SDOs started fighting back. As a result, these days competition may occur between working groups of different SSBs, and between entire SSBs which cover largely the same ground. In addition, though, WGs of the same SSB may also compete. And finally, competition may occur within a working group, between individuals with different ideas, agendas, and mindsets.

Companies that wish to implement a standard, or to contribute to developing one, have in many cases very specific needs an requirements that go well beyond technical the excellence of a standard. Accordingly, aspects like, for example, IPR regime, membership, and governance, of an SSB are playing a crucial role. Such characteristics contribute to a certain 'credibility' of an SSB (or the lack thereof), and may thus also be deployed by SSBs to attract a certain market segment, or a certain type of company.

The remainder of the paper will first (in section 2) provide a little necessary background of the current diversity in ICT standardisation, and discuss its pros and cons. Subsequently, co-ordination between SSBs will be discussed section 3. The paper argues that SSBs also need to co-ordinate with their

[1] Standards Developing Organisations, i.e., the 'formal' bodies like e.g. ISO and ITU at the global level, CEN and ETSI at the European level, and the various national bodies.

stakeholders; why this is the case, and what needs to be done here is discussed in section 4. Finally, some concluding remarks will be provided in section 5.

2 Diversity in ICT Standardisation

2.1 The Emergence of Diversity

Over the last three decades, the world of ICT standardisation has changed dramatically, from the fairly simple, straightforward, and static situation that could be found in the seventies (see Figs. 1 & 2 below; both are not complete, though).

Back in the seventies, there was a clear distinction between the then 'monopolist' CCITT[2] on the one hand, and the remainder of the world of ICT standards on the other. CCITT were in charge of standards setting in the telecommunications sector. They was basically run by the national PTTs, which still enjoyed a monopoly situation in their respective countries. ISO was in charge of almost all other ICT-related standardisation activities[3]. The various national SDOs developed their own specific standards, but also contributed to the work of ISO.

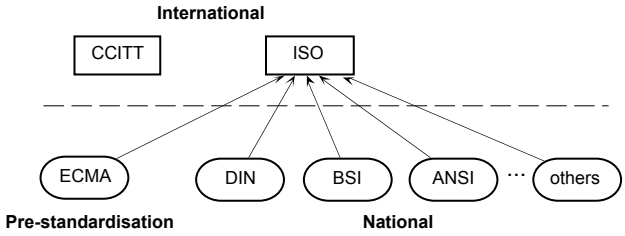

Figure 1: The ICT standardisation universe in the seventies (excerpt)

Over time, two trends contributed to an increasingly complex ICT standardisation environment:

- the growing importance of ICT,
- the globalisation of markets.

In a way, these were coupled, and further accelerated, by the Internet, which was 'discovered' for commercial use in the mid-nineties.

Further complexity was caused by the liberalisation of the telecommunications markets and the associated emergence of regional bodies, such as ETSI in Europe, and ATIS[4] in the US and TTC[5] in Asia. This was reinforced by the still ongoing merger of the formerly distinct sectors of telecommunications and IT, which caused considerable changes in these markets [David, 1995].

These processes affected primarily SDOs and the relations between them. In addition, and as 'external' competitors, standards consortia emerged as a new phenomenon. Well-known examples today include, for instance, the W3C (the World Wide Web Consortium), OASIS (the Organization for the Advancement of Structured Information Standards), or OMG (the Object Management Group).

Also, the economic importance of standards grew. A system 'ennobled' by having become a standard held the promise of huge financial gains for its proponents. Likewise, backing a loosing system would imply both severe monetary losses and a severely reduced market share for its supporters. In an attempt to save the day, new consortia could be established to standardise the loosing system.

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[2] International Telegraph and Telephone Consultative Committee, the predecessor of the ITU-T.

[3] Some related activities were also carried out within IEC, the International Electrotechnical Commission.

[4] Alliance for Telecommunications Industry Solutions.

[5] Telecommunication Technology Committee.

Obviously, this approach increased the number of consortia and led to an even higher complexity of the standards setting environment.

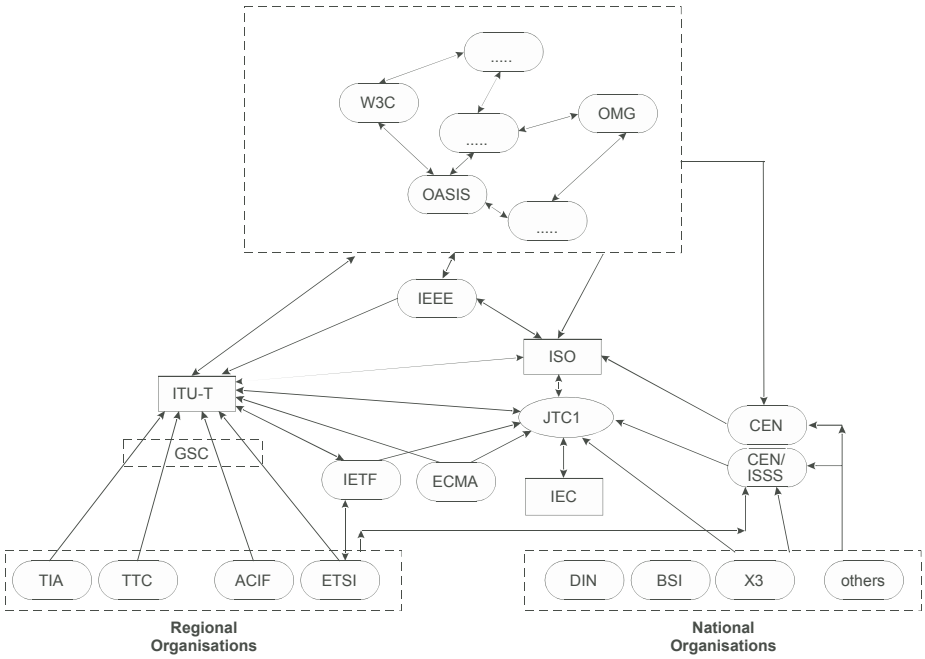

Figure 2: The ICT standardisation universe today (excerpt)[6]

As a result, for a number of years consortia emerged an amazing rate [Cargill, 1995]. This was largely in response to the enormous speed of technical development in ICT systems. 'Traditional' SDOs were widely considered as not being capable of coping with this speed (see e.g., [Besen, 1995], [Cargill, 1995])[7].

To further increase complexity, a proliferation of sector-specific standards may be observed in Europe, especially in the e-business domain. The most prominent representatives here include CEN/ISSS Workshop Agreements (CWAs), many of which have been tailored towards the needs of a dedicated industry sector.

One effect, which was a direct result of the trends outlined above, is that many companies, especially large manufacturers and service providers, are forced to participate in a much higher number of SSBs than they used to, to make sure that they do not miss a potentially relevant development (see e.g., [Updegrove, 2003]).

The Internet's standards body, the IETF[8], should also be mentioned. This body plays a somewhat special role thanks to the unprecedented importance of the Internet in today's economy. For many years the IETF had not been accepted as a standards setting body, and its output, the Internet Standards, were not recognised by government procurement regulations [Werle, 2002]. This has changed by now.

Also, the IETF may be regarded as the role model for many large consortia, such as the W3C and OASIS, which have based their processes on that of the IETF. In fact, many have considered the

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[6] Please note that neither does this figure show all relevant SSBs, nor all links that exist between individual SSBs (which may change over time anyway).

[7] Whether or not this view is justified is a matter of debate. For a slightly different view see e.g., [Sherif, 2003] and [Jakobs, 2002].

[8] The Internet Engineering Task Force.

IETF's process as superior to those of the formal SDOs[9] (see e.g., [Crocker, 1993], [Monteiro, 1995], [Solomon & Rutkowski, 1992]).

2.2 Evaluating the Diversity

The complex environment outlined above represents a major obstacle for those who are considering active participation in standardisation, as well as for those who are looking for standard that best suits their needs.

Considering this complexity of the IT standardisation universe, "Where to participate?" is a relevant question. Functionally equivalent systems may well be standardised in parallel by different SDOs and consortia, and participation in all relevant work groups is well beyond the means of all but the biggest players. The correct decision here is crucial, as backing the wrong horse may leave a company stranded with systems based on the 'wrong' (i.e., non-standard) technology.

In addition to the more practical aspects that need to be considered when selecting the best suited SSB for particular standards setting activity other, less tangible aspects may play a role in such decision processes, too. In particular, this may include the perceived reputation of an SSB.

Perceptions of the importance and relevance of different types of SSBs differ widely. For instance, Rutkowski offers a rather extreme point of view – "*The Internet standards development process is by far the best in the business."* [Rutkowski, 1995]. However, things have changed since the times when the IETF on the one hand and ISO and CCITT on the other were basically the only players in the international ICT arena. These days, the IETF is one of a number of accepted members of the global web of standards setting bodies.

Likewise, the role of the national SDOs has changed. This holds particularly for Europe, where 90% of standards produced are European or international (as opposed to national; this ratio has changed dramatically within a couple of years) [Bilalis & Herbert, 2001]. Along similar lines, Ghiladi fears that "*... non-harmonized national standards and rules have the effect of erecting barriers.*" [Ghiladi, 2003].

Moreover, in an attempt to improve their position in the competition with consortia many SSBs have introduced 'new deliverables'. These are documents which do not have gone through the full-blown process that leads towards a 'Standard', but are more akin to the specifications issued by consortia (i.e., e.g., they require only a lower level of consensus, and can be published quicker). Obviously, this move has introduced further complexity into standardisation.

Many consortia and other SSBs outside the network of formal SDOs have established themselves as recognised sources of standards. Initially, though, their output was considered 'inferior' to that of the formal bodies, which had major repercussions, e.g. in (public) procurement (see e.g., [Heafner, 1988], [Werle, 2002]). Here, Europe's commitment to OSI in the 1980-90s was a remarkable example. In addition to its undoubted technical superiority, one of the major reasons why OSI standards were considered preferable to their Internet counterparts was the fact that ISO, where the OSI standards were developed, was a formal SDO, unlike the IETF, which was viewed with considerable suspicion.

Similar views could be observed in the private sector. A standards inventory project in the US petrochemical industry, for instance, established rules where *"... preference was given first to international standards, followed by national standards, and then consortium specifications*." [Kowalski & Karcher, 1994].

Yet, by now Europe has recognised that: "*... consortia and fora are playing an increasing role in the development of standards, ... the European Standards Organisations have to recognise these facts and re-design policies, processes and organisational structures, in close collaboration with stakeholders and in particular industry ...* "[EC, 2004b], albeit with some concern: "*It is considered doubtful whether, in the light of the speed of development and the limited participation of experts, the fundamental principles for accountability of standardisation such as openness, consensus and*

[9] See [Jakobs, 2003] for a different point of view.

transparency are followed in a robust fashion." ([EC, 2004a]; see section 4 for a sketch of the industry's view on this). Interestingly, this position has been challenged in [Egyedi, 2003], stating that democracy should not necessarily be required from consortia processes.

3 Co-ordination in Standardisation

Standardisation is basically a mechanism for co-ordination [Werle, 2001], [Shapiro, 2001]. Not unlike the research sector, standards setting serves as a platform for co-operation between companies which are otherwise competitors. This function of standardisation is largely independent of the nature of the actual platform; that is, it doesn't make a big difference whether negotiation and co-operation occur within a formal SDO or an industry consortium. Yet, the complex structure of the web of SSBs described above suggests a considerable amount of fragmentation and overlap of standards setting activities. In fact, this occurs at different levels

- Between SSBs
  Typically, several SSBs are active in similar and overlapping domains. As a result, there may well be competition either generally between SSBs covering similar ground (RosettaNet and ebXML would be an example here), or temporarily between SSBs working on similar projects (e.g., the IEEE 802.11a/b/g standards and ETSI's HIPERLAN/2).
- Inside SSBs
  It may well happen that different groups within the same SSB cover almost the same ground (take the various LAN-MAC[10] standards that were developed in the 80s by different groups of the IEEE 802 committee as an example[11]).
- Within working groups
  At the end of the day a standard originates from a working group where the technical specifications are developed by a group of individuals; it is here were the basic technical decisions are made. That is the motivations, attitudes and views that influence these working group members' work need to be co-ordinated as well (to reach consensus).

In the following, the focus will be on the former examined. Co-ordination between working groups of an individual SSB will be ignored for the moment, as it does not occur very often, and is an internal matter of the respective SSB anyway[12]. Co-ordination inside working groups, while typically overlooked despite its importance, is outside the scope of this paper[13].

In addition to the above, co-ordination between SSBs and potential setters and users of standards is important. The SSBs need to make sure that their processes, services, etc meet their stakeholders' demands. This aspect will be addressed in section 4.

3.1 Different Interests

According to [Werle, 2001], a company has different options concerning standards setting:

- To try and bypass organised standardisation and set a de facto standard.
- To participate in the work of an official or a private standards organisation.
- To set up a new consortium or forum which deals with the standards project.

Assuming an organisation decides upon one of the latter alternatives, standards setting work will eventually commence.

Obviously. interests of the various stakeholders may differ. That is, each participating organisation may try to either push its own ideas, propose a 'neutral' solution, or just try to impede the whole

[10] Medium Access Control, a sub-layer of the Data Link layer.

[11] Those included Ethernet (802.3), Token Bus (802.4), and Token Ring (802.5); Ethernet is the sole survivor and has monopolised the LAN market.

[12] For an interesting account of how Ethernet won against its competitors see [von Burg, 2001].

[13] For a closer look inside SSBs' working groups see [Jakobs at al., 2001].

process in order to prevent any standard in the field in question. According to [Besen, 1995] four distinct situations are possible[14]:

- Common interests
  There are no competing proposals, and a decision can quickly be reached by consensus. All parties involved attempt to serve the common good.
- Opposed interests
  Each opponent prefers his own proposal to be adopted, but would prefer no standard at all to the adoption of a competitor's proposal. This situation arises when the gains associated with the winning proposal are comparably big compared to the gains of the industry as a whole.
- Overlapping interests
  Again, each opponent prefers his own proposal to be adopted, but would rather have a competitor's proposal adopted than have no standard at all. This may happen if, conversely to the situation outlined above, the whole industry stands to benefit the most from the adoption of a standard (regardless from where it originated) rather than the original proposer.
- Destructive interest
  At least one player prefers not to have any openly available standard at all, and accordingly tries to slow down the process. This player typically is a major vendor largely dominating the market with a proprietary product who would lose market shares if a standard were in place.

This is pretty much confirmed by [van Wegberg, 2003], where a model of the standardisation process was developed which compares competing committees with what he calls a 'grand coalition'.

Obviously, the above alternatives all come down to the question of competition vs. co-operation. The path towards competition may eventually lead to a company's dominating market position with a product or service based on their own proprietary specification. Yet, at the same time the virtual absence of other players may render this particular market insignificant. On the other hand, co-operation establishes a broader market for products or services based on open specifications, created through, and capable of accommodating, a number of different players. As has for instance been shown in [Swann, 1990], a product that succeeds in creating an environment in which other vendors consider it beneficial to produce compatible products will prove considerably more successful than its competitors. Such compatible products can only emerge if the underlying original specifications have been made public, or if a very liberal licensing policy has been pursued. This example may serve to highlight potential benefits to be gained from open specifications, even if the product itself is inferior to its (less open) rivals in terms of functionality provided. Here, the range of products compatible to the original specification strengthen its status as a de-facto 'standard', which in turn triggers the development of even more compliant products [Swann, 1990]. As a result, a bigger market has been established, leading to increased revenues.

3.2 Co-ordination at SSB Level

3.2.1 State-of-the-Art

The increasingly complex web of SSBs, in conjunction with the equally increasing inter-dependencies between different ICT systems, and between applications and ICT infrastructure, imply an urgent need for co-operation and distribution of labour between the SSBs active in ICT standardisation. This has also been recognised by the European Commission [2004b] who observe that '*… consortia and fora are playing an increasing role in the development of standards, ……..*".

Today, various forms of co-operation between SSBs may be found. In the realm of SDOs, 'horizontal' co-operation between the international SDOs (ITU, ISO, IEC) is regulated by a dedicated guide for co-operation between ITU-T and JTC1 [ITU, 2001]. This document specified different forms of co-operation, including, in order of level of co-ordination, 'liaison', 'collaborative interchange',

[14] These situation may occur at the level of both SSBs and working groups.

'collaborative team'. However, the document also makes it very plain that "*By far, the vast majority of the work program of the ITU-T and the work program of JTC 1 is carried out separately with little, if any, need for cooperation between the organizations*".

Similarly, the CEN/CENELEC/ETSI Joint Presidents' Group (JPG) co-ordinates the standardisation policies of the ESOs based on a basic co-operation agreement [CEN et al., 2000]. Five different modes of co-operation have been defined, including 'Informative relation', 'Contributive relation', 'Sub-contracting relation', 'Collaborative relation', and 'Integrated relation' (see [CEN et al. 2001] for more details). Moreover, the Directive 98/34/EC [European Commission, 1998] mandates that conflicting standards have to be withdrawn. This is managed internally by each ESO, between the three bodies (through cross-representation at General Assemblies and co-ordination bodies), and 'vertically' with their members, the NSOs.

'Vertical' co-operation between ESOs and the international bodies is governed by individual documents. Here, the major need for co-operation and co-ordination is primarily sector-specific (IT, Telecom; see Figure 3).

The 'Vienna Agreement' [ISO, 2001] provides the rules for co-operation between CEN and ISO; analogously, the 'Dresden Agreement'[15] governs relations between IEC and CENELEC. Somewhat surprisingly, only a rather more informal Memorandum of Understanding (MoU) exists for the co-operation between ETSI and ITU[16]. On the other hand, and also a bit unexpected, a dedicated agreement guides the relations between ETSI and IEC[17].

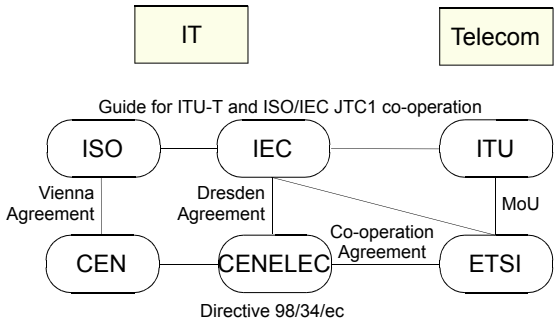

Figure 3: Co-operation and co-ordination agreements between European and international SDOs

In general, the 'vertical' agreements and MoUs (i.e., those between ESOs and the international bodies) define various levels of co-operation and co-ordination, albeit in comparably vague terms. Nonetheless, co-operation between CEN and ISO, and CENELEC and IEC, has been very successful in many cases, primarily through joint working groups. In contrast, the documents governing the respective 'horizontal' co-operations, are far more rigorous. This holds particularly for the European Directive that regulates the relations between the three ESOs.

The Global Standards Collaboration (GSC) covers both vertical (between regional telecommunication standards bodies and the ITU) and horizontal co-ordination (between regional telecommunication standards bodies). It provides for the regular exchange of work programmes and other information between its members. However, it is likely that the progressing merger of the IT and telecommunications sectors will pose additional problems in this respect, such as, for example, the need to include new members (from the IT sector).

[15] http://www.iec.ch/about/partners/agreements/cenelec-e.htm.

[16] http://www.itu.int/ITU-T/tsb-director/mou/mou_itu_etsi.html.

[17] http://www.iec.ch/about/partners/agreements/etsi-e.htm.

ETSI Partnership Projects[18] represent a different, albeit related approach to co-ordination. Covering both SDOs and consortia, such projects co-ordinate a group of regional SDOs and industry consortia working towards a common objective. The '3rd Generation Partnership Project' (3GPP) is the most prominent example.

In the e-business sector, a specific MoU [ITU, 2000] exists between ISO, IEC (the 'parent' organisations of JTC1), ITU, and UN/ECE[19]. A number of additional organisations have been recognised as participating international user groups, (including, e.g., OASIS, CEN/ISSS, and SWIFT[20])

The objective of the MoU is to encourage interoperability. To this end, it aims to minimise the risk of conflicting approaches to standardisation, to avoid duplication of efforts, to provide a clear roadmap for users, and to ensure inter-sectoral coherence. Most notably, its 'division of responsibilities' identifies a number of key tasks and assigns a lead organisation (one of the four signatories) to each of them.

Overall, the co-ordination of the work of the SDOs appears to be reasonably well organised[21]. See section 5 for some suggestions for further improvements.

This does not necessarily hold for the co-ordination between SDOs (and ESOs in particular) and standards consortia. Numerous co-operations do exist, however, the current situation can be best described as piecemeal; there is no overarching framework to organise the individual co-operations. The MoU on e-business standards is a good initial step, but its coverage in terms of organisations involved is still rather limited.

In this context, the move of UN/CEFACT[22] to 'outsource' ebXML related activities to OASIS is a notable move, as it represents a unique form of co-operation between an 'official' body and a standards consortium[23].

An initiative taken by the three ESOs is another promising development. The ICT Standards Board (ICTSB) aims to co-ordinate specification activities in the field of Information and Communications Technologies. In addition to the ESOs, the ICTSB membership comprises major standards consortia (including, for example, ECBS (the European Committee for Banking Standards), ECMA International (Standardizing Information and Communication Systems), OASIS, the Object Management Group, RosettaNet, The Open Group, and the World Wide Web Consortium. The ICTSB's objectives include[24]:

- The analysis and co-ordination of requirements on standardisation.
- The translation of these requirements into standardisation programmes or projects.
- The allocation of work to the most appropriate specifying body (SDO or consortium).

Thus, its approach is quite similar to the one adopted by the MoU on e-business standardisation, albeit broader in scope.

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[18] "Where appropriate, ETSI will base its activities on Partnership Projects committed to basic principles such as openness, clear Intellectual Property Rights (IPR) policy and financial co-responsibility, to be established with partners of any kind (global and regional, Standards Development Organizations (SDOs) and Fora, etc.)" http://www.etsi.org/etsi_galaxy/worldwide/partnership/partnership_a.htm.

[19] The United Nations Economic Commission for Europe.

[20] The Society for Worldwide Interbank Financial Telecommunication

[21] There have been exceptions, though, which need to be avoided in the future. For example, the IEEE 802.11a/b/g activities and ETSI's HIPERLAN/2 covered the same ground and were in direct competition (ETSI 'lost').

[22] The United Nations Centre for Trade Facilitation and Electronic Business.

[23] In Europe, CEN/ISSS is the focal point for European participation in ebXML-related standardisation [CEN, 2003].

[24] http://www.ictsb.org/archives_short-cuts.htm.

'Publicly Available Specifications' (PAS) represent a different, yet highly relevant co-ordination mechanism. The ISO directives state that "... *constitutional characteristics of the* [PAS-submitting] *organisation are supposed to reflect the openness of the organisation and the PAS development process*." [JTC1, 2004].

The PAS procedure is a means for JTC1 to transpose a specification more rapidly into an international standard. The specification starts out as a Draft International Standard (DIS), which, if approved by JTC1 members, immediately acquires the status of an International Standard (IS) [Egyedi, 2000]. This mechanism has primarily been designed to enable JTC1 to transpose specifications that originated from consortia into international standards. In this capacity it also serves as a mechanisms to at least contribute to co-ordination of work done within consortia and the world of formal SDO.

With respect to the co-ordination between individual consortia the situation is even worse. Here as well co-operations occur rather more at the level of technical bodies (if at all) than at SSB level. In most cases, however, the world of standards consortia experiences more competition than co-operation. There is direct competition between consortia covering similar ground, for instance, between RosettaNet and ebXML, and between the Semantic Web Services Initiative (SWSI) and the W3C.

According to Blind and Gauch [2005], a consolidation process may be observed in the ICT sector. Such a process might contribute to reduced competition between consortia, if those active in similar areas join forces to ensure survival in the market.

3.2.2 Improving the Situation

Very much in line with the description above, the EC – rightly – observes that there is a need for "... *procedures by which the needs of consortia can be better accommodated in ESOs. ESOs should fully exploit the potential for synergies by improving their co-operation and reinforce their mechanisms of coordination for subjects of common interest*" (European Commission, 2004a). To achieve this goal, several routes could (and should) be followed.

- Strengthen existing co-ordination activities.
  Initiatives such as the MoU on e-business standardisation and the ICTSB should be encouraged to involve more SSBs and other relevant organisations. Also, for standardisation in the e-business sector, it would be helpful if the ICTSB established a dedicated Working Group for e-business, to co-ordinate the relevant activities of its members.
- Encourage new forms of co-operation between SDOs and consortia.
  In the light of increasingly similar membership, processes, and IPR regimes of major consortia and SDOs it would make sense to extend to major consortia those forms of co-ordination and co-operation already in place between SDOs. These may take on the form of, for example, mutual exchange of documents and work programmes, exchange of observers, the right to submit input, and joint working groups.
  Also, the PAS and fast-track procedures offer useful mechanisms to improve co-operation between SDOs and consortia. Coupled with a suitable division of labour (see below) better exploitation of these mechanisms could safe considerable time and effort. This would, however, require pro-active 'marketing' of these mechanisms to consortia (after all, they will need to benefit from it as well).
- Identify a suitable division of labour between SDOs and consortia.
  A division of labour between 'infrastructure' and 'applications' would be beneficial. Given the diverse characteristics of infrastructure technologies and applications on the one hand, and of SDOs and consortia on the other, the former should focus on standards for a long-lived infrastructure, while the latter should concentrate on standards for the more dynamic sector of e-business applications .
- Re-visit the distinction between SDOs and consortia (in policy-relevant areas).
  Not only does this distinction seem more and more artificial, it also creates the need for time-consuming transposition processes and double memberships.

To this end, it would be beneficial to perform a thorough analysis of the individual SSBs' processes and other characteristics, and to produce an initial 'white list' of SSBs whose processes meet the requirements on potentially policy-relevant standards. In particular, this list should not distinguish between the respective status of an SSB (i.e., 'formal' vs. 'consortium'), but be solely based on the SSB's characteristics. The list would need to be monitored and updated regularly.

4 Concluding Remarks

The standardisation environment in the ICT sector has been undergoing significant changes over the last couple of years. Arguably the most important development has been the proliferation of standards consortia, largely created out of frustration about the 'formal' standards setting process, and typically driven by one, or a group of, major industry players. At least in the early days of this development consortia were widely considered as being more efficient, and more oriented towards the needs of the industry. The time-to-market of their specifications, and consequently, of the products based on them, were also said to be vastly superior to those of SDOs. These specifications did not have to go through a cumbersome and often time consuming wide consensus process. Moreover, at least initially consortias' working groups were far less influenced by politics and/or private agendas, as everyone was supposed to be working towards an agreed common goal.

It seems, however, that this initial enthusiasm has somewhat faded over time. Ironically, one reason for this was the increasing importance of consortia. In many areas their specifications have become way more important than those of the SDOs (if they can be bothered to produce anything at all, that is). For example, for quite a while the W3C almost held a monopoly on standards for the World Wide Web (this has changed with the advent of new consortia covering similar ground).

Also, faced with the new competition, the established SDOs 'fought back', new deliverables being their major 'weapon' here. That is, in order to better compete with consortia, and in what must be considered an attempt to mimic the rules and processes of the major consortia, most SDOs introduced 'lightweight' processes, leading to specifications with a lower required level of consensus. These specifications do not go through the full consensus forming process as the formal 'norms' do, and are thus more akin to the deliverables of the consortia. Typical examples here include ISO's 'Technical Reports', ETSI's 'Technical Specifications', and the CEN/ISSS 'Workshop Agreements'.

On the other hand, the processes of some of the major consortia (notably OASIS and W3C) can hardly be distinguished any more from those of the SDOs. In fact, in a way the W3C's requirement for royalty free licensing of IPR which is incorporated is surpassing those of all formal SDOs (which typically require 'reasonable and non discriminatory' licensing).

In consequence, we can observe a convergence of the two formerly separated 'standards worlds'. This is not to say that competition has stopped, but it is becoming increasingly hard to distinguish consortia and SDOs based on their processes and outputs.

Still, the current environment forces companies with a business interest in the ICT sector (i.e., primarily large vendors and service providers, but also leading-edge users) to participate in a vast variety of SSBs[25]. This is certainly an undesirable situation, and a higher level of co-ordination between consortia, and consortia and SDOs would be highly desirable. The latter could, for example, be achieved through an adequately flexible and speedy transposition process (see 3.2.1). In addition division of labour between SSBs should be considered more seriously. That is, long-lived 'infrastructural' technologies could be dealt with by the SDOs through their 'traditional' process, and more short-lived other technologies could be within the realm of consortia and the SDO's New Deliverables. The sequentiality between infrastructure and subsequent applications and services would also have to be taken into account in the standardisation activities of SDOs and consortia and their co-ordination efforts.

[25] For example, HP and Sun each are involved in around 150+ SSBs [Updegrove, 2003].

To summarise: competition between SSBs prevails – this holds for both consortium vs. consortium and consortium vs. SDO. Policy makers need to do something about it by encouraging both camps to improve co-operation or at least co-ordination. Whether or not this is going to happen anytime soon remains to be seen. For the time being, it appears that at least in Europe policy interest is solely focussed on the ESOs.

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