Scores of Rule-Setters – Co-operation and Competition in ICT Standards Setting

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***Abstract**: The paper discusses some aspects relating to competition and co-operation in ICT standards setting, including a discussion about the arguably counter-productive distinction between formal bodes and industry consortia. Looking at both theoretical and practical aspects it concludes that co-ordination co-operation of standards setting bodies is urgently called for, and that standards policy in Europe is in need of an overhaul.*

1 Some Background

1.1 A Brief Introduction

Over the last decades a huge number of consortia and industry fora have entered the ICT standards setting arena. As a result, companis 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 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[2]. 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

[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.

[2] For instance, in the 80s the IEEE groups 802.3/4/5 worked on competing technologies for local area networks. Eventually, Ethernet (802.3) won.

techncial the excellence of a standard. Accordingly, aspects like, for example, IPR regime, membership, and governanc, of an SSB are playing a crucial role. Such characteristics contribute to a certain 'credibility' of an SSB (ot the lack thereof), and may thus also be deployed by SSBs to attract a certain market segment, or a certain type of company.

In the remainder of the paper we will first provide a little necessary background. Subsequently, we will discuss co-operation in standads setting in section 2. This will be followed by a closer look at expressions of competition in standards setting, using some examples to highlight some core issues. Reputation and legitimacy of SSBs will be discussed in section 4; this also includes the desdription of a survey and its outcome. Finally, some concluding remarks ar egiven in section 5.

1.2 A Little History – How Did the Current Standardisation Environment Emerge?

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[3] 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[4]. The various national SDOs developed their own specific standards, but also contributed to the work of ISO.

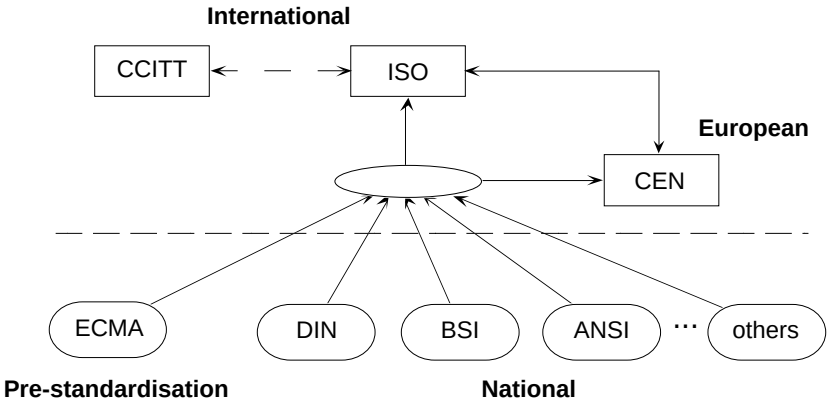

Figure 1: The ICT standardisation universe in the seventies (excerpt)

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.

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

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

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[5] in the US and TTC[6] 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].

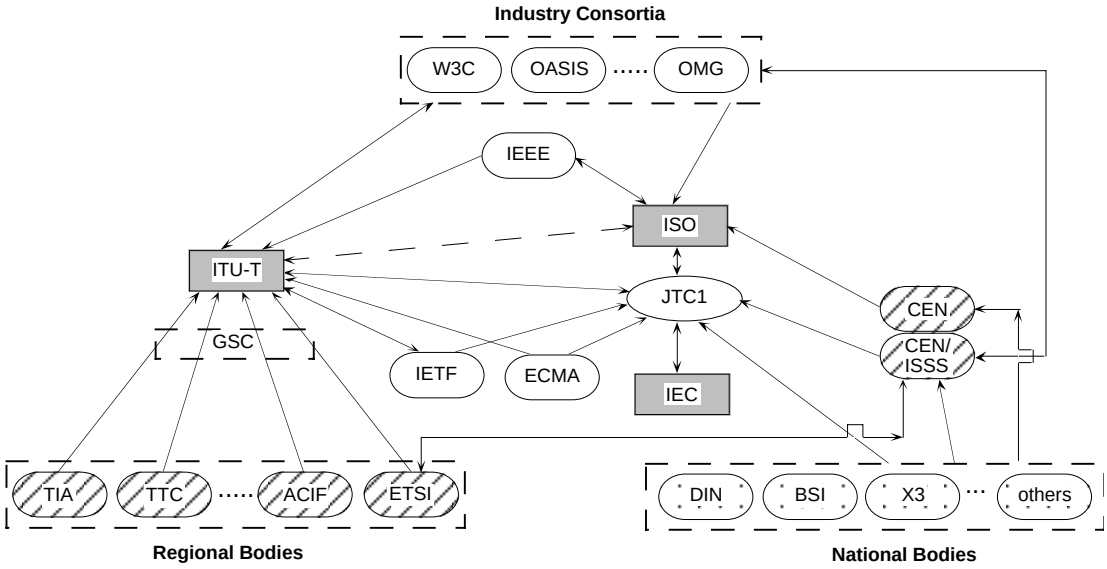

Figure 2: The ICT standardisation universe today (excerpt)[7]

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

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 and e-business systems. 'Traditional' SDOs were widely considered as not being capable of coping with this speed (see e.g., [Besen, 1995], [Cargill, 1995])[8]. However, it seems the situation is beginning to change – the number of ICT consortia found in

[5] Alliance for Telecommunications Industry Solutions.

[6] Telecommunication Technology Committee.

[7] 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).

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

2004 was down by around 20% (to 190+) compared to the 2003 figure [ISSS, 2004]. This is mostly due to 'mergers' of consortia, i.e., attempts to reduce competition.

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, vendors, 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[9], 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, though.

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 IETF's process as superior to those of the formal SDOs[10] (see e.g., [Crocker, 1993], [Monteiro, 1995], [Solomon & Rutkowski, 1992]).

1.3 Evaluating Standards Setting

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

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[9] The Internet Engineering Task Force.

[10] See [Jakobs, 2003] for a maybe more objective discussions of this view.

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 porcess that leads towards a 'Standard', but are more akin to the specifiations issued by consortia (i.e., e.g., they require only a lower level of consensus, and can be published quicker). Obviously, this move has introcuded 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 committment 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 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.

These diverse positions already hint at the currently ongoing discussion about the role of consortia in relation to European standardisation, and abut what exactly establishes an 'open standard'.

2 Co-ordination in Standardisation

Standardisation is basically a mechanism for co-ordination [Werle, 2001], [Shapiro, 2001], [Jakobs, 2000]. 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.

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 within a working group. Here, numerous stakeholders convene, trying to come to a solution that meets their needs.

Within such a working group 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 process in order to prevent any standard in the field in question. According to [Besen, 1995] four distinct situations are possible:

- 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 serves 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.

Another aspect of co-ordination may be observed at a 'higher' level. In order to avoid duplication of efforts and, particularly, to avoid contradicting specifications, SSBs need to co-operate and co-ordinate their efforts. Adequate mechanisms are in place only within the – merging, but still separate – sectors of telecommunications and IT, in the world of formal standards. Yet, this do not necessarily also include all national activities (that is, national standards may well contradict each other), and certainly not the activities of the various consortia[11]. Here, liaisons and MoUs[12] are frequently used to this end, but they are rather more deployed on a case-by-case basis.

Yet another relevant co-ordination mechanism is that of 'Publicly Available Specifications' (PAS). 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 SDOs.

For an organisation to be accepted as a PAS submitter, and for a specification to be accepted as a PAS, the following topics must be adequately addressed [JTC1, 2004]:

Organisation related criteria

- co-operative stance,
- characteristics of the organisation,
- intellectual property rights.

Document related criteria

- quality,
- consensus,
- alignment.

3 Competition in Standardisation

The easiest way to achieve co-ordination would be what van Wegberg calls the 'Grand Coalition' [van Wegberg, 1999]. This represents the most centralised solution, supported by all stakeholders. The level of co-ordination would assure that a single standard would be established. That is, technologies in use would be fully compatible and positive network externalities could be realised [van Wegberg, 1999]. In practical terms, this would imply that all standardisation work on a given topic would be carried out by one working group.

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[11] The ICT Standards Board (ICTSB) is a notable exception here. It is an initiative from the three recognized European standards organisations (CEN, CENELEC, ETSI) and aims to co-ordinate specification activities in the field of Information and Communications Technologies (ICT). Partners also include numerous consortia.

[12] For example, the 'ISO/IEC/ITU/UN-ECE Memorandum of Understanding concerning standardization in the field of e-business' co-ordinates the activties of ISO, IEC, ITU, CEN/ISSS, and OASIS [ITU, 2000].

In practice, however, the process is fragmented in many cases. This may be due to several reasons. For one, different stakeholders may consider different SSBs as optimal for their specific individual needs. Likewise, a new SSB may be established by stakeholders (or one individual stakeholder) who are dissatisfied with the work of an SSB, ad feel they would be better off with a consortium of their own to promote their ideas and technologies.

However, the fragmentation of the standards setting world does not necessarily lead to competition. Fragmentation, may, for instance, occur based on the geographical scope of an SSB, the industry sector within which it is active, and its 'formal status' (accredited SDO or consortium) [Werle, 2001]. Whereas all these distinctions are blurring, the former two do not necessarily lead to competition or conflicts.

In 2001, Werle observed that "*Conflicts between standards organizations* [as opposed to conflicts within one SSB] *over their claims of competence or their involvement in overlapping areas of standardization have been rare*" [Werle, 2001]. Today, this does not necessarily hold any more. And most conflicts arise between an SDO and a consortium, or between consortia. Below, some such cases will be briefly discussed.

In addition to these cases, other well-known examples of conflicts between SSBs include:

- Wireless Home Networks
  802.11 (IEEE) / Bluetooth (802.15; IEEE)) / HomeRF (HomeRF™ Working Group).
- Wireless LANs
  HIPERLAN / 2 (ETSI) vs 802.11 (IEEE).
- Cellular Trunked Radio Systems
  Tetra (ETSI) – Tetrapol (Tetrapol Forum).

3.1 VHS vs BetaMax

The case of the competing VCR tape formats VHS and BetaMax is the classical example of a 'standards war' (see e.g., [Cusumano, 1992], [Fletcher, 1996], [Park, 2005]). However, no SSBs were involved – this was a competition between two manufacturers. The case is nonetheless instructive.

Sony was the first to introduce a compact and relatively inexpensive video cassette recorder (called BetaMax) based on their earlier U-Matic format. By 1974, six major competing designs had been proposed, with JVC (the producer of VHS) eventually emerging as the major competitor. By the mid-1980's, the battle was over. Sony, the first mover, had fallen behind the VHS approach in 1978. Ten years later, Sony conceded and began producing VHS equipment. This happened despite the inferiority of VHS [Fletcher, 1996].

Apparently, the willingness of JVC to create alliances and the interaction with complementary goods were key to success for the VHS format. JVC invited alliance partners to participate in the development of the VHS design to meet perceived market needs. Also, signed early OEM agreements with Hitachi, Sharp and Mitsubishi in the mid-seventies. They also established alliances in other parts of the world, most notably the European market for which a special PAL version of the system was developed. Also, alliances with content providers lead to a dominance of VHS in the video rental market. These alliances created an increasing demand for VHS products, which in turn increased production numbers and thus lead to lower prices per unit.

This early case demonstrates that alliances are crucial (and may well be much more important than technical superiority). JVC joined forces with other vendors and content providers which eventually gave their product dominance in the market.

3.2 DVD+ vs DVD-

In a way, this example describes the successor technology to VCR. Two industry consortia have proposed competing standards:

- DVD Forum
  An industry consortium originally founded by ten companies[13] holding assets in form of Intellectual Property Rights (IPR). Since 1997 the DVD Forum is also open to other companies, including manufacturers of both consumer electronics and IT, as well as content developers like the movie industry[14].
  Obviously, they had learned their lesson well – this move not least serves to extend the acceptance of DVD technology and further legitimise the DVD Forum's position as the standard-setting consortium for DVD and DVD-related products.

- DVD+RW Alliance
  In June 1998, the DVD+RW Compatibility Alliance, later to be renamed DVD+RW Alliance, was founded by Philips, Sony, HP, Yamaha, Ricoh, and Thomson, to promote their DVD+RW specifications[15].
  Arguably, the motivation behind this split was the desire of the holders of IPR on CD-R technology (most notably Sony and Philips) to re-vitalise these assets, which were assumed to become irrelevant with the expected demise of CD technology [Gauch, 2005].

Additional SSBs playing an important role in the process include ECMA[16] and JTC1 (see also Figure 3).

The roles of these players are crucial as they serve as a platform where representatives of both camps meet. ECMA was selected as an 'intermediary', as they are recognised JTC1 Category A external liaison, and can thus submit proposals to JTC1's fast-track procedure [JTC1, 2004]. JTC1's SC 23 has a close relationship with ECMA TC 31 (the TC in charge of DVD standardisation). Almost all standards addressed by SC 23 for the past 6 years have originated from fast-track projects proposed by ECMA and the Japanese National Body [Toshima, 2004].

ECMA and ISO have endorsed specifications from both consortia, and have published them as ECMA standards and ISO standards, respectively[17].

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[13] These included Hitachi, Matsushita, Mitsubishi, Pioneer, Philips, Sony, Thomson, Time Warner, Toshiba, and JVC.

[14] Today, around 250 companies are members.

[15] Today,the leading members include Dell, HP, Mitsubishi Chemical Corporation, Philips Electronics, Ricoh Company Ltd., Sony Corporation, Thomson multimedia, and Yamaha Corporation.

[16] The European association for standardizing information and communication systems. Before 1994 ECMA stood for 'European Computer Manufacturers Association'.

[17] Some specs are still under development within JTC1 (at DIS level).

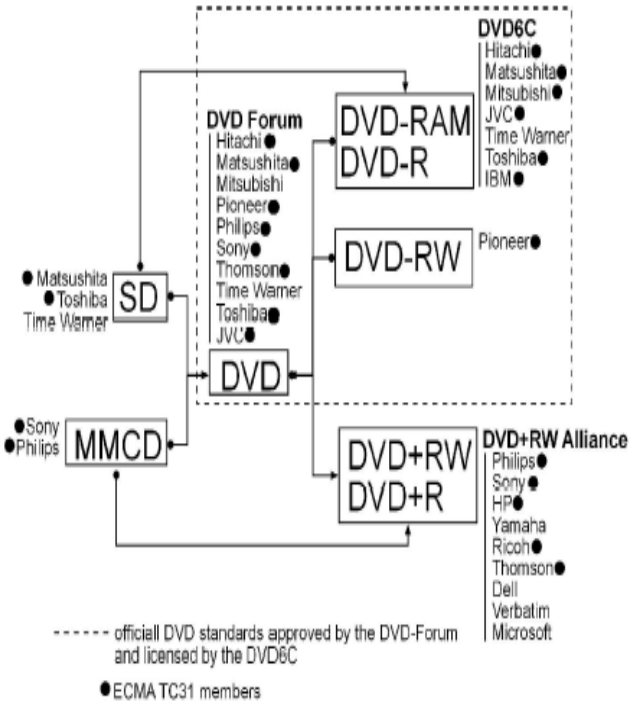

Figure 3: Membership of the competing DVD consortia and of ECMA TC31 (from [Gauch, 2005])

Today, it appears that, for practical purposes, the '+' and '-' standards will co-exist, with the vast majority of end systems being able to use both.

3.3 X.400 Message Handling System

These days, e-mail has established itself as a convenient and virtually ubiquitous communication tool, in both private and business life. Yet, the dawn of e-mail broke only about some thirty years ago. By that time, a few simple proprietary systems were on the market, which were typically part of some larger software package (e.g., an office system). The new technology became more and popular within companies. The number of systems available on the market grew, and so did the importance of e-mail for both internal communication and information exchange with external partners. A largely uncontrolled and unmanaged diffusion of e-mail systems could be observed. Eventually, many organisations, especially larger ones, had to cope with a variety of different systems, which made e-mail communication a total mess, as incompatibilities between systems led to intolerable information losses [Jakobs, 2002b].

The resulting, and widely identified need to interconnect the various proprietary e-mail systems triggered the initial work on what was to become X.400 in the mid to late seventies. This development started in the late seventies within IFIP[18]. From the outset, there was a consensus that a completely new system was needed which should complement and subsequently replace proprietary systems [Werle, 2001].

[18] The 'International Federation for Information Processing'. IFIP is a non-governmental, non-profit umbrella organization for national societies working in the field of information processing. It was established in 1960 under the auspices of UNESCO.

The remaining question was – to which SDO to turn? At that time, the standardisation universe was still comparably simple; the worlds of IT and telecommunications, respectively, were still largely separated. That is, the issue burned down to the question whether ISO or CCITT[19] were better suited. Opinions were split; obviously, organisations from the telecommunications sector (most notably, Bell Northern Research Corporation, BNR), would opt for CCITT. At that time, national PTTs[20] were in charge of standardising telecommunications systems, and they met within CCITT. With virtually all PTTs committed to implementing CCITT recommendations, global interoperability of the new system would be ensured.

On the other hand, computer manufacturers and software vendors had reservations about CCITT. They felt that network operators (i.e., the PTTs) were not adequately equipped to deal with data communication problems, were afraid of the CCITT's lengthy process and that the resulting standard would neither be technically up to date nor meet users' needs. Also, electronic messaging was closely related to the then ongoing work on the OSI stack of protocols and services. Therefore, for these organisations ISO was the SDO of choice.

As a result of these diverse preferences, work on a new electronic messaging system commenced more or less in parallel within CCITT and ISO, termed 'Message Handling System' (MHS) and Message-Oriented Text Interchange Systems (MOTIS), respectively. Inevitably, and despite the fact that work within both organisations was based on input provided by IFIP, the two versions diverged. To counter this development, various mechanisms were deployed (with varying degrees of success), including joint meetings, co-located meetings, and liaison persons. Eventually, the two specifications were aligned under the leadership of CCITT[21].

3.4 Some Lessons Learned

Even the brief discussions of the above cases teach some interesting lessons. For one, it has become obvious that reliance on technical superiority is likely to turn out being a very naive approach. Clearly, Sony's BetaMax technology was technically superior to JVC's VHS system, but this only helped during the early years of competition.

Also, at least initially Sony enjoyed a superior position in the market, thanks to its 'first-mover advantage'. They were in a position to produce, and offer, a unique product, which gave good quality, was robust and not overly expensive. However, and quite surprisingly, this advantage was also very short-lived.

Moreover, Sony then already was a major player, skilled in building video recording systems; they could draw on extensive experience with their earlier U-Matic system. Yet, they lost to what was then a small firm – JVC – with limited manufacturing and distribution capabilities [Cusumano et al, 1992]. Last not least, and probably most unexpectedly, even Sony's superior reputation did not help in the long run.

In fact, this seems to be hardly in line with common wisdom about business strategies, which lists superior (organisational) skills, resources, and position as major cornerstones of a competitive advantage [Rumelt, 1998]. Sony's organisational skills were clearly adequate, relevant resources were at their disposal (from IPR to experiences in building video recorders. And being the first mover should have

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[19] International Telegraph and Telephone Consultative Committee, the pre-decessor of ITU-T.

[20] Post, Telegraph and Telephone administration.

[21] For a detailed acccount of the X.400 standardisation process please see [Schmidt & Werle, 1998].

yielded 'positional' advantages. A similar – albeit not as dramatic – effect can be observed in the DVD case. Here as well, the first mover has been faced with stiff competition from a competing technology. Yet, this competing technology is backed by a group of major players (the DVD+RW Alliance).

The VCR and DVD case also reveal another crucially important aspect – the need for alliances. Basically, this means that it is important to reach a critical mass[22]. JVC won because it was very successful forming alliances with companies with complementing capabilities. Likewise, the major stakeholders from the DVD+RW Alliance (i.e., those who held significant relevant IPR} made sure that renown manufacturers with adequate manufacturing capabilities (Ricoh and Yamaha) were on board. Similarly, the DVD Forum enlisted the support of a major content provider (Time Warner), and eventually (in 1997) also admitted other companies from consumer electronics and from the IT sector. this was not least done to further legitimise the Forum as the most relevant standards consortium [Gauch, 2005].

However, a critical mass per se is not sufficient. Another, closely related aspect to be considered refers to the interests of the individual stakeholders. For example, the desire to re-use existing IPR was a major driving force behind the formation of the DVD+RW Alliance. That is, making sure that the expectations and views of those to be involved are aligned is an important pre-requisite. This is in line with the literature – potential stakeholders' perceptions of the future course of an innovation (a standard, in this case) need to be aligned. This "*alignment of perception is an important step in innovation*" [Williams, 1997].

Another, very different aspect also emerges from the cases – the convergence of specifications. In the case of DVD two levels of merging may be observed. First, the specifications for both versions have been passed to ISO via ECMA for formal standardisation. Second, maybe more importantly, converging occurs in the end-systems; most state-of-the-art DVD recorders and writers can cope with both formats. A similar effect may be observed for mobile handsets, where tri-band, or dual-band and dual-band/tri-mode mobile phones (see e.g., [Barth, 2003], [Springer & Weige, 2002]) overcome the incompatibilities of the underlying standards.

In the case of X.400, two globally operating SDOs produced almost identical specifications in parallel for a while. Each SDO had been deliberately selected by a group of stakeholders with specific views and requirements. However, eventually the desire to develop one system prevailed, and the two versions were aligned[23].

4 Reputation & Legitimacy

4.1 A Brief Overview

According to [Cash et al., 2002], "*Legitimacy refers to whether an actor perceives the process in a system as unbiased and meeting standards of political and procedural fairness.*"

[Orlikowski & Robey, 1991] note that "*...human action is guided by cultural notions of legitimacy, ...*". Obviously, (perceived) 'legitimacy' also plays a role in the selection of an SSB, or of one of its products.

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[22] This is not that much of a surprise. At the end of the day, standardidastion is also about diffusion (of standards-based technology). And reaching the crtitical mass is a crucial pre-requisite for the success ful diffusion of an innovation [Rogers, 1995].

[23] Largely through individual in intiatives, though. Apparently, ISO's and CCITT's higher echelons were not involved [Schmidt & Werle, 1998].

For SSBs, this implies that they need to establish an adequate level of legitimacy. At least for formal SDOs, this is typically based on government endorsement which, in turn, requires that a "*... voluntary consensus standards body is defined by the following attributes: (i) Openness; (ii) Balance of interest; (iii) Due process; (vi) An appeals process.; (v) Consensus, ...*" (Office of Management and Budget Circular A-119; quoted in [Bukowski, 2003]).

Somewhat strangely, the 'old' international SDOs, i.e., ISO and IEC[24] (see also Figure 11???) did not enjoy any governmental endorsement when they were founded[25]. Even today, any 'authoritative' source of their legitimacy (i.e., why they are referred to as 'formal') seems to be unclear[26]. A widely held belief is that this status was 'earned' basically by tradition – i.e., by having done beneficial standardisation work over decades[27]. People now seem to trust these institutions (which may be to a lesser degree the case in the ICT sector, which is comparably young and where many SDOs were not really fully fit for the job at hand.

Specifically for Europe, de Vries observes the European 'New Approach Directives', which apply to more than 50% of all products on the European market refer to formal (European) standards only. He goes on stating that legitimacy of the European standards bodies[28] is based on "*... the principles of openness and consensus.*" [de Vries et al, 2003]. This is seconded by [van Wegberg, 2004], who notes that comprehensive co-ordination in what he terms a 'grand coalition' (which includes all participants in the standards setting process) could enable convergence to a single standard. Such a grand coalition might well be an SDO, in which case consensus would lend legitimacy to the resulting standards.

Typically, consortia do not enjoy the benefit of government endorsement. Thus, they need to explore other routes towards legitimacy. Van Wegberg notes that popular means to establish an SSB's legitimacy include (among others; see [van Wegberg, 1999]):

- Participation of key players.
- A track record in a certain field.
- IPR assets.
- Co-operation with other SSBs.

4.2 A Small Study on SSBs' 'Credibility'

This issue has been further investigated in a recent study on the 'credibility' of SSBs as perceived by those who either contribute to setting standards, or who wish to implement a standard and are frequently faced with a choice which one to select. The study was based on a questionnaire comprising 22 open-ended questions, which was sent to a number or competent individuals, as well as to two relevant distribution lists.

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[24] The International Electrotechnical Commission.

[25] The third one, CCITT (ITU) is a UN treaty organisation.

[26] Except for the European bodies ('legitimised' by an EC Directive) and the US national bodies (accredited by ANSI).

[27] See also the discussion on http://mail-i4.informatik.rwth-aachen.de/mailman/private/siit/2005-February/thread.html

[28] CEN, CENELEC, and ETSI.

Based largely on a literature review a number of hypotheses were developed. The outcome of the study regarding the most interesting ones will be briefly discussed below.

(H1) International/regional SSBs are considered more important than national ones.

The responses here were fairly homogeneous overall. National SDOs are considered by most as being of rather little relevance in the e-business and telecommunications sectors. Likewise, the potential market size may be larger for international standards. Possibly a bit surprising, regional (e.g., European) SDOs were also not regarded too favourably by several respondents. This is understandable given the inherently global nature of the sectors in question.

That is, (H1) seems to be only partially correct; over-estimating the role of regional bodies by equating their importance with that of international bodies.

On the other hand, and considering the importance attributed to the adequate participation of SMEs in standards setting (see e.g. (European Commission, 2001), (European Commission, 2004b)), particularly NSOs may enjoy a renaissance. They may well become the channel through which the needs and requirements of those stakeholders which cannot realistically participate in standards setting at the global level (due to, for example, lack of expertise, but also because of such rather more mundane reasons as lack of adequate financial resources) can be fed into the global standards processes.

(H2) Formal SDOs are seen as being more relevant than consortia.

Perhaps somewhat surprisingly, perceptions of SDOs and consortia differ only marginally. A slight edge is conceded to the former in terms of acceptance and adoption of their products, for the latter, in terms of speed of the standards setting process. Neither aspect is considered crucially important, though. Accordingly, (H2) must be considered as wrong.

That is, a general preference for either SDOs or consortia cannot be identified. While certain constituencies do seem to have specific preferences (regulatory bodies for international/European SDOs, European SMEs for European/national SDOs), especially practitioners from industry point at the different, yet complementing roles of consortia and SDOs.

(H3): The origin of a standard is important for its success in the market.

Selection of a standard for local implementation, or for integration into commercial products or services, hardly seems to depend on its institutional origin per se (i.e., whether it originated from a formal SDO or a consortium). IPR issues are the one exception in this context.

Rather, more practical aspects seem to be important, most notably a standard's fit into the environment within which it will have to operate, the fit into the product portfolio in case of a manufacturer or a service provider, as well as its likely future adoption by the market.

Somewhat in contrast to this, the characteristics of an SSB's process seem to play a role for the selection of an SSB for pro-active standards setting. However, here as well they are not assigned the importance one would expect. On the other hand, this lack of perceived importance is in line with the responses regarding the relevance of different types of SSBs.

The most important aspect to be considered for potential standards-setting activities is the match between an SSB's characteristics and the proposer's strategy. That is, any platform for standardisation activities would need to be able, and flexible enough, to accommodate potentially very different strategies. These might require, for example, to focus on technical details, or on the emergence of a new standard. Likewise, various degrees of influence are likely to be required, also depending on the underlying corporate strategy.

All in all, the requirements listed form a very mixed bag – no single dominant demand can be identified.

The 'track record' of an SSB appears to play a more important role for a company assuming the role of a potential active contributor to standardisation than it would if the role of a user were assumed. While by no means agreed upon by all, the importance of such a track record was mentioned far more frequently for standards setting than it was for standards deployment.

Here again, the type of SSB is considered not relevant by many. While some (notably regulator and SME association) expressed a preference for SDOs, many others stated that this would (have to) be a case-by-case decision.

Finally, it was observed by many that the impact individuals (most notably, chair persons) may have on the process must not be under-estimated. A consequence of this observation would be that aspects such as, for example, the individual make-up of a working group, and the previous track-record of the convenor/chairman (or absence of it), and possibly even the make-up of the committee will have to be taken into account if the suitability of a particular SSB for a new standards initiative is to be evaluated.

4.3 Preliminary Conclusion

The one conclusion that immediately suggests itself is that companies who need to either implement or set standards are not that much interested in issues like 'consortium vs SDO'. In fact, it seems that this distinction is hardly valid any more.

Rather, considerable importance is assigned to the processes adopted by an SSB. Here, IPR aspects seem to play the most important role. More generally, an SSB's characteristics need to be compatible with a company's strategy and its business model. Accordingly, preferences will frequently depend on the characteristics of the individual case; there's hardly any general 'SSB of choice'. Obviously though, SDOs may enjoy a competitive advantage in cases where regulatory requirements call for 'formal' standards. However, given the above, this increasingly artificial distinction may need to be revisited.

5 Some Concluding Remarks

The standardisation environment in the ICT/e-business 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, consortias' working

groups was far less influenced by politics and/or private agendas, as everyone was supposed 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.

Another related phenomenon to be observed is the shrinking number of consortia. According to subsequent versions of the CEN/ISSS survey on industry consortia [ISSS, 2004] their number went down from around 250 to some 180 in 2004, i.e. by around a quarter. This is most likely due to a consolidation process, but it may be assumed that fierce competition has driven a number of consortia out of business.

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[29]. 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 be achieved through an adequately flexible and speedy transposition process, and/or through a division of labour, whereby long-lived 'infrastructural' technologies would be dealt with by the SDOs through their 'traditional' process, and short-lived other technologies would be within the realm of consortia and the SDO's New Deliverables. The sequentiality between infrastructure and subsequent applications and services have also to be taken into account in the standardisation activities of SDOs and consortia and their co-ordination efforts.

This changing landscape has major ramifications for (European) policy makers as well. European policy makers still consider SDOs (especially the European Standards Organisations, ESOs) as superior to consortia. Unfortunately, this is not just a minor side issue – standards are referenced in procurement documents and in European

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

Directives. Accordingly, the largely unreflected categorisation SDOs vs consortia represents a severe disadvantage for the (products of) the latter. To make things worse, moves seem to be under way to 'ennoble' some of the ESOs new deliverables here as well, i.e., to consider them as on par with full-blown 'norms'. In the light of the findings and discussion above this would be a very questionable move if it actually happened.

To summarise: competition between SSBs prevails – this holds for both consortium vs consortium and consortium vs SDO. Policy makers could 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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