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Real Standards for Virtual Worlds: *Why and How?*

By Kai Jakobs, RWTH Aachen University

Abstract

The paper gives the necessary background to those who would like to pro-actively participate in the setting of standards for Information and Communication Technologies (ICT; this includes Virtual Worlds). Some of the more tricky and confusing terms are discussed, as are the characteristics of today's ICT standardization environment. Finally, the paper gives more concrete advice on how to identify the most suitable standards setting body for a given technology to be standardized.

Keywords: ICT standards; standardization; standards setting bodies.

Real Standards for Virtual Worlds:
Why and How?

By Kai Jakobs, RWTH Aachen University

"… the evolution of open standards to enable interoperability between virtual worlds is one of the highest-impact, highest-uncertainty issues for the future of the market[1]".

The above quote says it all, really. But then again, this does not come as a big surprise. The 'real' world as we know it would hardly function without standards (using the term loosely), so why should the 'virtual' world be any different? There as well, inhabitants want to interact, create things, do business, travel between worlds (ok, that's something we do not yet do in the real world. Then again, neither in the virtual one, due to a lack of suitable standards), etc. All these activities would suffer severely from the absence of (globally, regionally) accepted standards. Specifically, this holds for any interaction between individual virtual worlds (VWs). But also any wide-scale exploitation of VWs for business purposes will introduce problems for which standards will be required – just think, for instance, of secure transactions between virtual enterprises. However, whereas it is comparably clear which organisation is developing which standards for the real world, this does not hold for the virtual world. There are few dedicated 'VW-standards'; VRML (Virtual Reality Modeling Language) is a notable example. Typically, one would look for potentially useful standards that have been developed for use in the real world, and try to apply them in VWs as well.

The first section of the paper will generally discuss the importance of standards in the ICT (Information and Communication Technologies) sector. It will first provide a very brief historical account, then talk a bit about terminology (e.g., 'open', 'standards', 'standardization'). I believe that this will be necessary as 'standard' and 'standardisation' are rather tricky terms, not well enough understood by many (if not most).

The remainder of the paper is organized as follows. Section 2 will discuss today's ICT standardization environment, how it came about, and how co-operation between individual Standards Setting Bodies (SSBs; this term is used to denote both formal SDOs (like ISO, and ITU-T), and standards consortia (like the W3C and OASIS)) is achieved. Subsequently, Section 3 represents an attempt at helping potential standards-setters pick the most suitable platform (i.e., SSB) for their purposes. Finally, Section 4 will offer some final remarks on the future of standards for VWs.

A wee bit of history

Even if we disregard social, moral and religious rules for the moment, standards – in a very general sense – have been with us for quite some time: about 5,000 years ago the first alphabets emerged, enabling completely new forms of communication and information storage[2]. Some 2,500 years later, the first national, coin-based currency, invented by the Lydians, established the basis for easier inter-regional and even international trading. The Industrial Revolution in the 18th century and, even more so, the advent of the railroad in the 19th century

[1] According to SRI Consulting Business Intelligence, http://www.sric-bi.com/VWW/VWviewpoints.shtml.
[2] Adapted from [Jakobs, 2003].

resulted in a need for technical standards, which was once more reinforced when mass production generated a demand for interchangeable parts. In parallel, the invention of the electric telegraph in 1837 triggered the development of standards in the field of electrical communication technology.

In 1865 the International Telegraph Union – to become the International Telecommunication Union (ITU) in 1932 – was founded by twenty states. The other major international standards setting body, the 'International Organization for Standardization' (ISO) was established in 1947.

These days, a web of Standards Developing Organizations (SDOs), i.e., the likes of ISO and ITU at the global level, the 'European Telecommunications Standards Institute' (ETSI) at the regional level, and the 'American National Standards Institute' (ANSI) and the 'British Standards Institution' (BSI) at the national level issue what is commonly referred to as 'de-jure' standards – although none of their standards have any regulatory power. Likewise, a plethora of industry fora and consortia (a recent survey found more than 250; [ISSS, 2008]), such as, the 'World Wide Web Consortium' (W3C) and the Open Group (an industry consortium to set open standards for computing infrastructure), to name but two of the longer standing ones, produce so-called 'de-facto' standards.

Terminology

'Standard' and 'standardization' are tricky terms. They are even trickier when it comes to ICT[3]. Think about it for a minute – what exactly establishes a 'standard'? Are only specifications issued by of one of the 'official' SDOs standards? Does it suffice if such an SDO just rubber-stamps a specification developed by a third party? Or is the degree of usage of a system or a product the decisive factor; is, for instance, MS-Word a 'standard', or SAP/R3? Do industry consortia actually issue 'standards'? And what about the Internet – are those Requests for Comments (RFCs) that have been published in the Internet Engineering Task Force's (IETF) standards-series actually 'standards'? Ask any three people and the odds are that they will come up with at least four different opinions. As does the literature. For instance, Webster's New Universal Unabridged Dictionary defines a standard as

> "*An authoritative principle or rule that usually implies a model or pattern for guidance, by comparison with which the quantity, excellence, correctness etc. of other things may be determined*".
>
> The Oxford English Dictionary says a standard is
>
> "*The authorized exemplar of a unit of measure or weight; e.g. a measuring rod of unit length; a vessel of unit capacity, preserved in the custody of public officers as a permanent evidence of the legally prescribed magnitude of the unit*".

These definitions already hint at a major dilemma in the theory of standardization: there is no generally agreed upon definition of what constitutes a standard, and the definitions that do exist cannot be meaningfully applied.

[3] Adapted from [Jakobs, 2006].

The definition adopted by ISO says that a standard is a document,

"*… established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context*."

Similarly, for the European Commission (EC) a standard is defined as:

"*a technical specification approved by a recognized standards body for repeated or continuous application, compliance with which is not compulsory*."

The latter two definitions restrict what is colloquially referred to as a standard to those issued by 'recognized bodies'. However, what exactly characterizes such a 'recognized body' remains unclear. In Europe, 'recognized body' typically still means an SDO, as opposed to a standards consortium[4]. On the other hand, findings reported in [Jakobs, 2007] suggest that firms do net really care about the nature of the origin of a standard (i.e., whether it was specified by an SDO or a consortium). They are more interested in an SSB's characteristics, e.g., its membership and IPR regulations.

Likewise, the term 'open standard', albeit widely used, has not yet been clearly defined. It therefore holds competing connotations for different actors. For the Open Source community, for example, 'open' basically means 'free licensing'. I.e., it refers to the final product, whereas in this paper 'open' refers to the standards development process. An open standard means that those involved deliberately set about to codify the standard as non-proprietary knowledge. In effect, no individual commercial interests control the resulting products, and in fact the open standard is made accessible and usable to all interested parties on reasonable and equal terms, even if proprietary technologies are incorporated.

The ICT Standard Board (ICTSB) is "*an initiative from the three recognised European standards organisations and specification providers to co-ordinate specification activities in the field of Information and Communications Technologies*". Its definition of what constitutes an 'open' standard is perhaps the most comprehensive and useful one [ICTSB, 2005]:

- developed and/or affirmed in a transparent process open to all relevant players, including industry, consumers and regulatory authorities, etc;
- either free of IPR concerns, or licensable on a (fair), reasonable and non-discriminatory ((F)RAND) basis;
- driven by stakeholders, and user requirements must be fully reflected;
- publicly available (but not necessarily free of charge);
- maintained.
-

The ICT Standardization Universe Today

Standardization is basically a mechanism for co-ordination (Werle, 2001). Not unlike the research sector, standards setting serves as a platform for co-operation between companies that

[4] Things seem to be moving, though; see [EC, 2009].

are otherwise competitors[5]. According to Werle, an organization has different options concerning standards setting:

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

Assuming that standards-setting work will eventually commence, interests of the various stakeholders are likely to differ. That is, each participating organization 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 of that standard's origin) 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.

Obviously, the above alternatives all lead 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 may establish a broader market for products or services. 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 (also in Swann, 1990). As a result, a bigger market has been established, leading to increased revenues.

[5] Adapted from [Jakobs, 2008].

The emergence of diversity

Over the last three decades, the world of ICT standardization has changed dramatically from the fairly simple, straightforward, and static situation that could be found in the seventies. Back then, there was a clear distinction between the then 'monopolist' CCITT (the International Telegraph and Telephone Consultative Committee, the predecessor of the ITU-T) on the one hand, and the world of IT standards on the other. CCITT were in charge of standards setting in the telecommunications sector. They wer basically run by the national [1] Post, Telephone and Telegraph administrations (PTTs) that were enjoying a monopoly situation in their respective countries. ISO was in charge of almost all other ICT-related standardization activities[6]. The various national SDOs developed their own specific standards, but also contributed to the work of ISO.

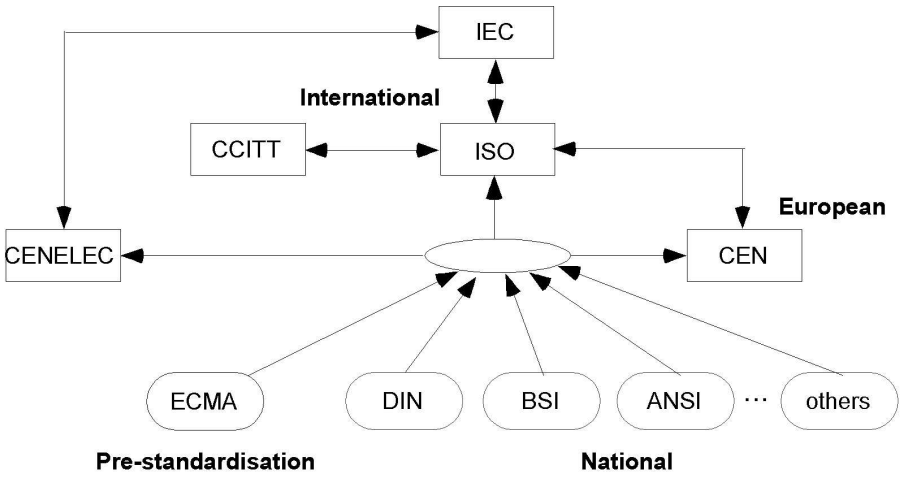

Figure 1: The ICT standardization universe in the 1970's (excerpt)

Throughout the past 20 or so years, five trends contributed to this increasingly complex ICT standardization environment:

- The growing importance and development speed of the ICT sector.
  Increasing importance of ICT implied an (almost) equally increasing commercial importance of the underlying standards. This made standards setting appear more lucrative especially for large manufacturers. And those who were supporting a loosing proposal, or were dissatisfied with the progress and/or the pace of the standardization process, dropped out and formed their own standards consortium to standardize their technology. Many such consortia were formed only to lend some extra credibility to the resulting standards, which would otherwise have been proprietary specifications.
- The commercial exploitation of the Internet since the mid-nineties (especially the WWW).
  Until the late eighties / early nineties the Internet was little more than an academic network, with few nodes outside the US. The advent of the WWW, and the subsequent emergence of Internet-based e-business applications, lead to the foundation of a number of new consortia (most notably the World Wide Web Consortium W3C).

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

- The globalization of markets.
  This triggered the need for global interoperability, typically achieved through internationally accepted standards. The potentially global customer base further re-enforced the commercial interest in ICT standards, and particularly in standards consortia.
- The liberalization of the telecommunications markets.
  One outcome of this process was the emergence of regional bodies telecommunication standards bodies, such as ETSI in Europe, and ATIS[7] in the US and TTC[8] in Asia. The additional co-ordination efforts required between these bodies led to the foundation of the Global Standards Collaboration (GSC; see also Figure 2).
- The still ongoing convergence of the formerly distinct sectors of telecommunications and IT.
  Until the late eighties / early nineties, telecommunication on the one hand, and IT on the other, were rather separated fields. Standards for the former were developed by the CCITT, those for the latter primarily by the ISO/IEC Joint Technical Committee 1 (JTC1). The merger implies that standards of the respective other field are becoming more and more important, resulting in an increasing need for co-ordination.

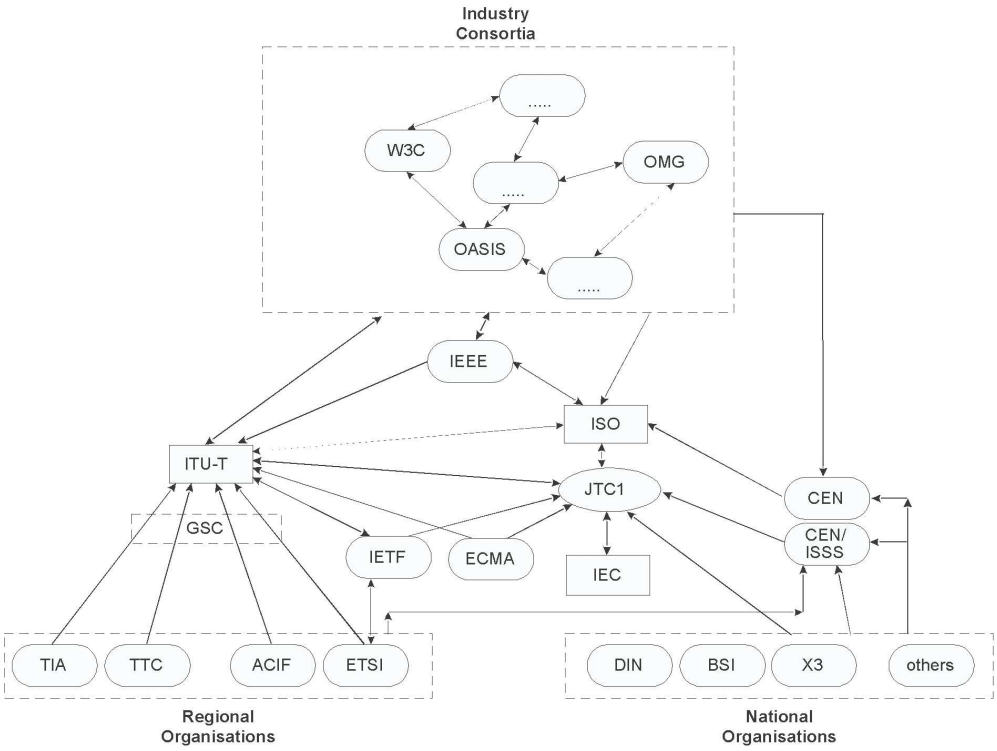

Figure 2: The ICT standardization universe today (excerpt)

Co-ordination between Standards Setting Bodies

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

[7] Alliance for Telecommunications Industry Solutions.
[8] Telecommunication Technology Committee.

standardization. This has also been recognized by the European Commission who observe that '*... consortia and fora are playing an increasing role in the development of standards.…*" (EC 2004).

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). 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 standardization policies of the ESOs based on a basic co-operation agreement (CEN, 2001). Moreover, Directive 98/34/EC (EC, 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.

The 'Vienna Agreement' (ISO, 2001) provides the rules for co-operation between CEN and ISO; analogously, the 'Dresden Agreement'[9] 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[10]. On the other hand, and also a bit unexpected, a dedicated agreement guides the relations between ETSI and IEC[11].

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 and co-located meetings. 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.

Figure 3 depicts a summary of the existing formal relations between the international and the European SDOs.

[9] http://www.iec.ch/about/partners/agreements/cenelec-e.htm.
[10] http://www.itu.int/ITU-T/tsb-director/mou/mou_itu_etsi.html.
[11] http://www.iec.ch/about/partners/agreements/etsi-e.htm.

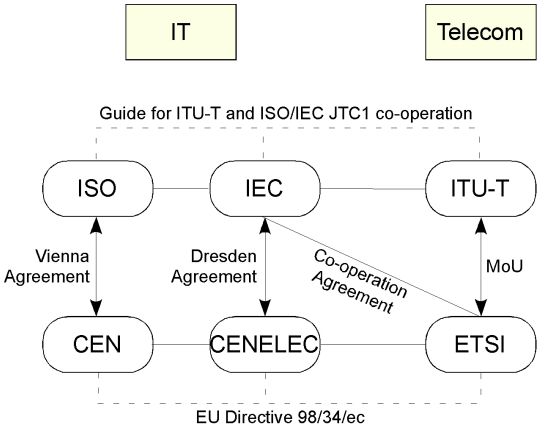

Figure 3: Co-operation and co-ordination agreements between European and international SDOs

ETSI Partnership Projects[12] represent a different 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' organizations of JTC1), ITU, and UN/ECE[13]. In addition, a number of organizations have been recognized as participating international user groups. The objective of the MoU is to encourage interoperability. To this end, it aims to minimize the risk of conflicting approaches to standardization, 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 organization (one of the four signatories) to each of them.

Overall, the co-ordination of the work of the SDOs appears to be reasonably well organized[14]. 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 organize the individual co-operations.

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 ICT. In addition to the ESOs, the ICTSB membership comprises major standards consortia active in the e-business domain (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

[12] "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.

[13] The United Nations Economic Commission for Europe.

[14] 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').

Consortium. Its approach is quite similar to the one adopted by the MoU on e-business standardization, albeit broader in scope.

Another relevant co-ordination mechanism is that of 'Publicly Available Specifications' (PAS). The ISO directives state that "*... constitutional characteristics of the* [PAS-submitting] *organization are supposed to reflect the openness of the organization 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 mechanism to at least contribute to co-ordination of work done within consortia and the world of formal SDOs.

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 working groups (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.

Categorising SSBs and Standards Users[15]

The high complexity of the ICT standardization landscape implies that organizations wishing to become active in standards setting (for whichever reason) need to consider their options very carefully. For one, pros and cons of joining the standardization bandwagon vs trying to push a proprietary solution need to be taken into account. Standards based products or services may imply price wars and lower revenues, but may also open new markets and widen the customer base. Offering a proprietary solution may yield (or keep, rather) a loyal customer base, but may also result in a technological lock-in and, eventually, marginalization.

Once having decided to go for a standard, a firm normally wants to make sure that the 'right' standard emerges. Yet, what exactly characterizes the 'right', or at least a 'good' standard is far from being clear. Indeed, different companies may well have very different views here, largely depending on factors such as, e.g., their respective own technological base, corporate strategies, business models, etc. These determine the level of involvement in standards setting (an organization wishing to create a new market in a certain domain is likely to adopt a different approach to standards setting than a company which only needs to gather advance intelligence for its business), and also the best platform for doing so (that is, the selected standards setting body's characteristics should be compatible with the company's goals). Standardization may thus be seen as an interface between technical and non-technical (e.g. economic, organizational and even social) factors. Standards are not only rooted in technical deliberations, but also result from a process of social interactions between the stakeholders and also, probably most notably, reflect the economic interests of the major players.

[15] Adapted from [Jakobs, 2007].

Categorising SSBs

SSBs can be categorized according to very different criteria. The most popular, albeit not particularly helpful distinction is between formal SDOs and consortia. Typically, the former are said to be slow, compromise-laden, and in most cases not able to deliver on time what the market really needs. In fact, originally the formation of consortia was seen as one way of avoiding the allegedly cumbersome processes of the SDOs, and to deliver much needed standards on time and on budget. Consortia have been widely perceived as being more adaptable to a changing environment, able to enlist highly motivated and thus effective staff, and to have leaner and more efficient processes. Accordingly, attributes associated with SDOs include, for example, 'slow', 'consensus', and 'compromise-laden', consortia are typically associated with 'speed', 'short time to market', and 'meets real market needs'.

However, it is safe to say that this classification, including the over-simplifying associated attributes, are not particularly helpful for organizations who want to get a better idea of what the market for standards has to offer. This holds all the more as an organization's requirements on an SSB very much depend on a combination of factors specific to this particular organization.

Accordingly, a more flexible approach towards classification was adopted. Rather than pre-defining certain categories, a set of attributes has been identified that can be applied to describe SSBs. This description can than be matched onto an organization's requirements on SSBs, thus allowing companies to identify those SSBs that best meet their specific needs.

Thus, the attributes for the description of a Standards Setting Body fall into four categories (adapted from, and based upon, [Updegrove, 2005]):

- General
- Membership
- Standards setting process
- Output

The attributes associated with each of these categories will be discussed below.

'General' Attributes

These attributes serve to provide some high-level information about the working environment an SSB has defined for itself. The form of governance chosen, for instance, provides information about which body, and who, is making the ultimate decisions, which in turn may help reveal the level of transparency in the SSB's decision making process. This is also of interest to those who wish to exert a certain level of influence.

Finance and staffing are important for an evaluation of an SSB's ability to survive. These are also valuable indicators for the commitment of the SSB's (leading) members – if they are prepared to invest (heavily) into its activities they are also likely to try and make sure that the objectives are met.

The IPR (Intellectual Property Rights) policy adopted may have significant impact on the attractiveness of an SSB to holders of relevant IPR. An SSB needs to find a reasonable balance here – the policy must neither deter IPR holders, who may be afraid of losing valuable assets, nor potential users, who may be afraid of implementing a standard with high licensing fees attached to it. Thus, this policy may also have implications on the level of openness envisaged by the SSB.

The latter also holds for the number and types of an SSB's liaisons. They are a good indicator of an SSB's openness towards relevant work done elsewhere. Moreover, liaisons are one means of co-ordination (see above), thus at least somewhat reducing the risk of standardising on a technology that is at odds with other standards.

The level of competition an SSB faces indicates one aspect of the risk to be associated with going for its standards, with a high level suggesting a high risk of eventually being stranded with a loosing technology. Conversely, a 'monopoly' situation may indicate a reasonably safe bet.

Along similar lines, a good reputation of an SSB (albeit possibly somewhat hard to quantify) may suggest higher chances of its output to succeed in the market (see chapter 5 for a more detailed discussion relating to this aspect).

'Membership' Attributes

Information on the membership base of an SSB is relevant with respect to the level of its openness, and its decision making process (both formal and informal). A small number of hand-picked members, for instance, or membership levels with very different associated fees and rights suggest the idea of a rather more closed group of decision-makers (possibly despite a huge overall membership base). Likewise, it may reveal an SSB's support of the needs of a specific clientele (e.g., large manufacturers).

The overall number of members serves as a very rough first indication of the success factors of an SSB's output. A broad membership base may provide valuable support for a standard.

More important than the number of members, however, is the 'quality' of the membership. That is, an SSB's chances of being successful in the market are much better if large potential users and major vendors/manufacturers or service providers are among its members, and thus likely to support its output.

In addition, the level of membership of these companies is of interest – it indicates whether they are only interested in e.g., intelligence gathering, or if they want to play an active role in the standardization process, and in the SSB in general.

Who is actually working actively in an SSB is probably even more important. A company's active participation in an SSB's standards setting process is a very good indicator of this company's support of the SSB's standards setting activities.

Finally, the individual member representatives may be supposed to act as corporate representatives, or in an individual capacity. In the latter case the points listed above may become slightly less relevant, as it is not necessarily ensured that WG members actually represent the corporate goals of their respective employers.

'Standards Setting Process' Attributes

An SSB's standards setting process not only reflects its ability to quickly adapt to a changing environment and newly emerging requirements, to meet a window of opportunity, or to support real-world implementations. It also shows the level of 'democracy' considered desirable by the SSB, and again, whether or not certain stakeholders are more equal than others. A high a level of 'democracy', in turn, may be attractive for some stakeholders, but a deterrent for others.

'Time' is a crucial factor for many standards setting initiatives. That is, on most cases standardization should be at least in sync with the technical development, maybe even ahead of it. This does not necessarily hold for infrastructural technologies (such as, e.g., ISDN), where getting everything right the first time is more important than speed (see [Sherif, 2003]). In any case, lagging behind for too long will make a standard irrelevant for most purposes. In fact, 'shorter time to market' has always been one of the major arguments in favour of consortia. Also, meeting a window of opportunity is a crucial success factor for a potential standard. Accordingly, the time it takes from submission of a proposal to form a working group to address a specific topic until the final acceptance of the standard is an important factor. This time span, in turn, comprises three elements:

- the time it takes to establish a working group,
- the time it takes this WG to do the work, and
- the time for the final ballot.

Obviously, this depends very much on, for example, the level of consensus sought, and on the decision mechanisms adopted by the respective SSB.

That is, there are other aspects of an SSB's standards setting process that may be of interest to potential proposers, which may have a negative impact on a process' duration, and which need to be addressed as well. Particularly, these include the degree of openness of a standards setting process, its transparency, the required level of consensus, and the observation of due process.

Basically, these attributes describe the level of 'democracy' observed by a standards setting process. Are the elements of the process, the decisions taken, and the reasons for these decisions well documented and available? Does everyone have the right to speak, and to be listened to? Is there a way to appeal against a decision, and how does it work? Which level of consensus is required (e.g., at working group level, at membership level)? In many cases, it will be necessary to balance the requirement for speed and the need for a broad consensus.

In many instances a standards setting process should not stop once a standard has been described on paper. Other aspects may at least be as important as a base standard. Most prominently, these include the availability of interoperable implementations of a standard, and

proof of an implementation's conformance with the standard. Whether or not an SSB's process requires the former, or if the SSB provides for the latter, may well be important aspects to be considered.

'Output' Attributes

Finally, the types of deliverables produced also give an indication about an SSB's flexibility. For instance, full-blown formal standards indicate a lengthy, democratic, consensus-based process, whereas technical reports or similar types of deliverables suggest a faster, more adaptable process with a lower level of consensus. Information about the number of implementations shows the relative 'importance' of an SSB, as does, to a certain level, the fact that it is accepted PAS submitter to ISO. The latter also indicates an SSB's willingness to meet the associated requirements on its process. A standard that is maintained, and possibly developed, over time suggests that it is envisaged to be long-lived, and also says something about the SSB's willingness to adapt its deliverables to changing environments.

In order to improve a standard's chances of success in the market it will help if it originated from a well accepted source. The number of implementations of other standards from an SSB may serve as one indicator of this SSB's 'credibility'. Also, the free availability of a standard's specification may help disseminate it more widely.

In some instances, especially for a more long-term planning, it may be of interest whether of not an SSB maintains its standards, or whether it has adopted a 'fire and forget' approach. A standard's maintenance will need to cover, for example, the addition of technical corrigenda, of addenda covering additional functionality, and maybe eventually the release of a follow-up version of a standard. In each of these cases, backward-compatibility has to be ensured. A well-managed maintenance process is extremely helpful if longevity and adaptability of a standard are or concern.

Along similar lines – an SSB should make sure that a new standard does not contradict other, established ones. At the least it should have a mechanism in place to ensure consistency of its own standards, ideally this should extend to all standards (although this will be next to impossible to achieve).

Last, but not least, an SSB might want to consider the impact a standard might have. While hard to do, this might be a worthwhile exercise that may well safe serious money which might otherwise be wasted on a standard with little or no chances of success in the market.

Categorising Users of Standards

For a classification of standards users we need to look at their respective motivations for an active participation in the standards setting process. In most cases the respective level of interest of companies wishing to get involved in a new standards setting activity will differ widely. For some, the nature of a standard, or even the fact that a new standard will materialize, may be a matter of life or death. For others, an emerging new standard may be of rather more academic interest.

Still at a fairly general level, prospective participants in a standardization activity may be subdivided into three categories – 'Leader', 'Adopter', and 'Observer', respectively[16]. The motivation to actively participate in standards setting, and for joining – or maybe even establishing – an SSB will be very different for members of each individual category, and may be summarized as follows:

- Leaders
  These are companies for which participation in a certain standards-setting activity is critical. They may even create a new consortium to establish a platform for the standardization work they consider crucial. They are prepared to make a large investment in such an activity. For these companies, the strategic price of not participating in a given standards effort can far outweigh its costs. 'Leaders' aim to control the strategy and direction of a consortium, rather than to merely participate in its activities. Large vendors, manufacturers, and service providers are typical representatives of this class.
- Adopters
  Such companies less interested in influencing strategic direction and goals of the consortium. Adopters are more interested in participation than influence (although they may want to influence individual standards). Large users, SME vendors and manufacturers are typically found here.
- Observers
  Such companies (and individuals) main motivation for participation is intelligence gathering; they don't want to invest any significant resources in the effort. Typically, this group comprises, for instance, academics, consultants and system integrators.

Leaders

When deciding about joining an existing SDO or consortium (the latter preferably as a founding member; in most cases founding members have a greater say concerning the goals and strategies of a consortium), as opposed to founding one, Leaders specifically need to analyse an SSB's governance – does it provide for the level of influence they want to exercise? Or is a strong group with incompatible goals already well established, and likely to block any new activities? Also, the IPR policy is of crucial importance – with too lenient a policy many important players may be hesitant to join, a too restrictive policy may prevent users from adopting any standards of this SSB.

In addition, Leaders will need to carefully analyse several characteristics of an SSB they are considering to join, and match them to their strategic goals. The most important of these characteristics are summarized in Table 1 below.

[16] Adapted from, and based upon, [Updegrove, 2005].

Table 1: Leaders' criteria

Strategic Goals	Most important SSB characteristics
To create a market	**Governance**: Does it provide for strong influence of interested players? Or is it rather more 'egalitarian'? **Finance**: Are finances sound? Will the SSB have the stamina to survive the process? Does it depend heavily on individual entities/contributors? **IPR policy**: Is the IPR policy adequate? Will it eventually put-off users who are afraid of high licensing fees? Will it deter holders of important IPR from joining? **Reputation**: Is the SSB well respected in the area in question? Related to that – are its standards widely implemented? **Competition**: Are there competing SSBs? Are competitors likely to emerge, or are all relevant players members? **Membership levels**: does the highest membership level available guarantee the necessary level of influence? Who else is at this level? Are leading users represented in the 'upper' levels? **Key players involved?**: Who are the active players, and which roles do their representatives assume (individual capacity / company rep)? Are the 'right' companies represented? Are all relevant stakeholders represented? Are leading users on board? Are any key players missing? Is the combined market power adequate? **Timing**: Will I be able to meet a window of opportunity?
To create a (successful) standard	**Governance**: Does it provide for strong influence of interested players? Or is it rather more 'egalitarian'? **Finance**: Are finances sound? Will the SSB have the stamina to survive the process? Does it depend heavily on individual entities/contributors? **IPR policy**: Is the IPR available inside the SSB adequate, or is licensing of third-party IPR necessary? **Reputation**: Is the SSB well respected in the area in question? **Membership**: Are there potential allies/ opponents? Is adequate technical expertise available, at both corporate and individual level? **Key players involved?**: Is the combined market power adequate? Are relevant stakeholders represented? Are important stakeholders absent? **Timing**: How long will it take to develop a standard? Will the window of opportunity be met? **Process characteristics**: Can the process be used against me; e.g., to delay the standard? For how long? What are the decision mechanisms? **Products**: Does the SSB offer an appropriate type of deliverable? **Dissemination**: Will the specifications (and possibly reference implementations) be available for free?

In addition to the 'positive' goals identified above, the analogous 'negative' goals may also be observed. I.e., to prevent the creation of a new market, or of a successful standard, may also be strategic goals of an organization. In both cases, the considerations concerning the

important characteristics of an SSB remain the same. The same applies for the considerations below.

Adopters

Most companies will be in this category. Their goals will be rather more tactical than strategic. Accordingly, they will rather more aim at technically influencing the actual standard rather than the market, and would like the new standard to be in line with their own developments. In addition, they will want to gather specific intelligence early on, and maybe adopt their developments accordingly. Another motivation for adopters to actively participate in standards setting may be the desire to share development cost by moving part of this work into the standards body (see also Table 2).

Given the above goals, companies in this group tend to go for full rights of participation in all technical activities, but may be less interested in influencing the strategic direction of the efforts and goals of the SSB.

Table 2: Adopters' criteria

Adopters – Strategic Goals	Most important SSB characteristics
To influence standard development	**Governance**: does it provide for strong influence of interested players? Or is it rather more 'egalitarian'? **Membership**: Is a level available that provides for adequate influence? Who else is at this level? Who are the 'active' members? **Key players involved?**: Are the important players on board? Who are potential strong opponents or allies? **Individuals' capacity**: Do I need to know the individual reps and their views, and the roles they are likely to assume? **Required level of consensus**: Is it possible to exploit the consensus requirement in order to delay the process or to cripple the outcome?
To share development costs	**Membership**: Are enough (important) members with similar interests on board, at an adequate membership level (to indicate sufficient interest)?
To gather specific early intelligence	**Membership**: Is a level available that offers a good RoI; i.e. one that does gives access to all relevant information without costing a fortune

Observers

Many companies and individuals will have a need to know what an SSB is working on but will not be interested – or will not have the means – to actively participate in any form. That is, their main interest lies in the gathering of general knowledge (Table 3; important, for instance, for consultants).

Table 3: Observes' criteria

Observers – Strategic Goals	Most important SSB characteristics
To gather general (early) intelligence	**Membership**: Is a level available that offers a good RoI; i.e. one that does gives access to all relevant information without costing a fortune?

Summary and Some Final Remarks

In both the real and the virtual worlds standards are a sine-qua-non. Yet, for a variety of reasons the standards setting environment in the ICT domain is extremely complex. As a result do those who wish to actively contribute to standards setting have to face the problem of identifying those SSBs that best meet their technical and/or business requirements. An organisation's decision which SSB(s) to select as the platform of choice for its contributions to the standardisation process needs to be based on a variety of criteria. Some of these criteria will be related to the SSB's characteristics. Others will be more associated with the potential standards setter's visions, goals, and business models. This paper has tried to provide some guidelines to those who wish to go that – potentially thorny, and certainly costly and time-consuming, yet ultimately beneficial – path.

On a brighter note, in some instances the process of identifying the most appropriate SSB is fairly straightforward. If you want to develop new protocols or the Internet, the IETF will almost certainly be the SSB of choice. And if you want to set new standards for local area networks, you will in all likelihood contribute to one of the various IEEE 802 working groups.

Unfortunately, things are not that simple in the case of standards for Virtual Worlds. Here, the identification of the most suitable SSB is hampered by the fact that currently rather few SSBs are addressing VW-specific problems. ISO is one of the exceptions here; a number of their standards – though not necessarily specifically designed for Virtual Worlds – have been useful for VWs[17]. Other major SSBs that have developed relevant standards include the IETF and the W3C.

My guess is that the development of standards specifically for VWs will require dedicated consortia. While many 'real-world standards' may be applied for VWs, some problems (like, for example, teleporting between worlds, ownership of objects, and identity) will required very specific standards without any equivalent in the real world. Perhaps such standards setting activities could – at least partly – be located in a Virtual World.

[17] Including, for instance, VRML (ISO/IEC 14772), X3D (ISO/IEC 19775-7), PLIB (ISO/TS 10303-1291), and a number of the MPEG series of standards.

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