TELECOMMUNICATION STANDARDISATION - DO WE REALLY NEED THE USER?

K Jakobs[1], R Procter[2], R Williams[2]

[1]Technical University of Aachen, Germany; [2]The University of Edinburgh, UK.

Almost regularly do voluntary standardisation bodies issue calls for increased user participation in their work groups. This paper challenges such calls: first, it suggests that users are in no position to provide meaningful requirements on a new IT service from the outset, simply because of a lack of necessary experience. Second, the paper argues that an unconditional 'call for users', even if it were answered, would probably be counter-productive, in that a simple increase of the number of users on the committees would not necessarily increase the number of user representatives, but of company delegates. This is explained drawing upon evidence put forward by innovation theory. The views presented have been compiled through a number of interviews with representatives of both, large companies and standards setting organisations. The case of electronic mail is used to illustrate the arguments.

INTRODUCTION AND MOTIVATION

Standardisation processes adopted by the 'official' bodies (e.g. ITU and ISO) are facing an increasing amount of criticism. Typically, these bodies are reproached with operating far too slowly, and thus with not being able to cope with the pace of technological progress, especially in the field of information technology.

As a consequence, a large number of more informally operating industry consortia and fora have been established in recent years, and are about to take on some of the tasks that used to be within the official bodies' domain. Having seen the writing on the wall, and in an attempt to recover some of the lost ground, the official standardisation bodies are trying to improve their situation, for instance by streamlining their procedures, by opening up the process to specifications generated by some external entity (e.g. a company or a consortium), and by establishing liaisons with other specification-producing organisations. In particular, they have regularly been issuing calls for increased user participation in standardisation. In most cases this was an unconditional call, motivated by the perceived high risk of a standard's failure in the open market if no users were involved in its development. This perception is pretty much in line with the commonly held belief, frequently echoed by standards theorists, that increased user participation is the panacea to many problems ITU and ISO are facing. Yet, in the light of the results of a recently conducted survey, and drawing upon lessons that can be learned from the literature on technical innovations, this claim appears to be in need of a critical second look.

Regarding the former we will link the corporate 'introduction strategy' typically to be observed in the case of e-mail (as a sample high-level communication service) to users' inability to contribute to standardisation from the outset. Regarding the latter we will argue that user participation at all costs does not achieve very much; in fact, it may rather be counter-productive due to the environment-specific requirements that each single user is likely to contribute.

Throughout the remainder of the paper we will first look at the standards life cycle, especially if and how user requirements can be channeled into the standardisation process, and the role users should play. The typical introduction strategy of corporate e-mail systems will subsequently be discussed, its schedule will be related to the one observed for standards setting, and the consequences from the context-specific nature of emerging requirements will also be addressed.

THE STANDARDS LIFE CYCLE

Development of a standard is typically associated with a technical committee of a standards setting organisation, producing a proposal which has then to be approved by the various higher instances of the respective organisation. Today, three years is the target period for standards production within ISO [ISO (1)]. Using the 'Fast Track' or 'PAS' (Publicly Available Specification) procedures, this period can be reduced to one year (this does, however, not take into account development efforts that went into the specification prior to submission, which means that the overall development times will not differ too much between the procedures).

However, developing a standard is a multi-stage process, which covers more than just producing the specification of a base standard, the one activity typically associated with 'standards setting'. Rather, subsequent tasks like profiling, product development and testing have to be considered as well, as has the final deployment. Moreover, user requirements need to be elicited prior to the actual start of the process. A rough sketch of the resulting overall standards life cycle, which covers all related efforts, is depicted in Figure 1 [Reilly (2)]. Similar cycle stages have been identified by other organisations as well [Cargill (3)]. It should also be noted that no formal mechanisms exist to verify that the resulting base standards are actually based on real user requirements. We will come back to this issue later.

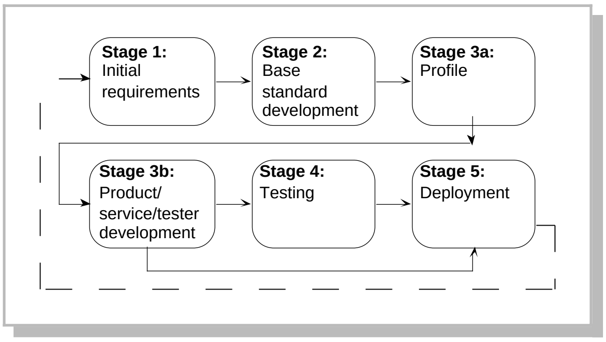

Figure 1: The stages of the standards life cycle

To some degree the dashed line represents wishful thinking, as no formal mechanisms are in place to provide a means to feed requirements resulting from service deployment experiences back into the process.

Producing the base standard is roughly equivalent to stage two, plus possibly a small part of stage one in the above model. Thus, as can be seen in Figure 1, actually developing and writing the base standard accounts for only a small part of the overall development cycle. Roughly at least another four years must be added to cover the other stages as well [3], yielding an overall time frame of five to seven years.

Integrating User Requirements

In the increasingly competitive standardisation environment it would definitely make sense for individual organisations to make sure that the outcome of a prospective new standard meets real user demands, and that these demands are adhered to during the process.

Both ISO/IEC JTC1 and ITU-T, have established strict formal procedures on how user requirements are to be incorporated into the documents (see e.g. [1]). The JTC1/SC18 procedures stipulate that preliminary user requirements have to be included with the standards document during the proposal stage and commented upon by national bodies as part of the balloting process. During the course of further development, the WG in charge shall establish a set of user requirements to be submitted to SC18 for agreement. Once such a set of requirements has been approved it will be registered as an ‘Agreed User Requirement’ (AUR); subsequent changes must be agreed upon within the WG and reported to SC18.

Within ITU, responsibilities are assigned to Study Groups (SGs). Until recently SG1 was in charge of producing ‘Service Definitions’, which were supposed to reflect user requirements. However, this group was abandoned in late 1996; its responsibilities were transferred primarily to SG 2. Yet, ITU has always recognised that requirements can come as well from ‘technical’ groups, in which case any requirements identified have to be sent to the SG in charge of service definitions for approval through ‘Liaison Statements’. However, no mechanisms are in place to verify the actual origin of purported user requirements (this holds for ISO as well).

The formal procedures which have been established by the ‘official’ standards setting bodies seem to suggest that without adequate requirements from the users’ side no activities are initiated at all. Yet, the question remains whether the procedures are adhered to.

Committee Members on Users’ Tasks

The opinions summarised in the following have been compiled through interviews with senior members from ISO and ITU work groups [Jakobs et al. (4)]. A majority of the interviewees would welcome stronger user participation and, even more so, stronger user orientation of the standardisation work. However, this vote was far from being unanimous. A broad range of reservations have been articulated, as well as a number of pre-requisites that would have to be met if more users were to be made welcome.

Despite all reservations, a benefit almost unanimously associated with increased user participation in the standards process has been to bring it ‘closer to reality’. That is, with users being more active in (parts of) the process the final specifications are supposed to be closer to users’ needs and to enjoy broader acceptance in the market place. Thus, there would be a better chance of the specification providing what the customers actually want.

Moreover, standards are supposed to be implemented more readily, and systems to be bought if and when available, if it could be proved that they meet actual needs. User input is primarily considered important for acceptance of a standard in the open market rather than technical excellence. Consequently, most respondents sought user participation not for the work on a standard’s technical nuts and bolts, but to increase its final credibility and acceptance. This implies that users are supposed to provide requirements rather than technical knowledge. This, in turn, means that users would primarily need to get involved in the process during the requirements compilation stage, and, more important, following practical experiences during the deployment stage (stages one and five, respectively, in Figure 1).

CORPORATE E-MAIL

Introduction and Implementation Strategy

Overall, the results of our study suggest that large, international enterprises do not normally make top-down, strategic decisions about communication services from the very beginning. This result may partly reflect the structure of the case study organisations, the majority of which are subdivided into a number of almost autonomous companies or branches, located around the globe. Typically, early messaging-related decisions were made at departmental or site level [Jakobs et al. (5)]. The consequence was the wide-spread emergence of a hybrid introduction and implementation strategy which combined elements of bottom-up and top-down strategies. This strategy, which is outlined below, could be found at about two thirds of the organisations within the case study. In it, bottom-up adoption and top-down development strategies are pursued at different phases within the overall implementation process.

During the initial implementation phase a group of employees obtained a messaging tool, either to fulfil a specific work requirement, or bundled in with other software. The new service soon became popular. Slowly, mainly by word of mouth, information about benefits provided spread throughout the department. The number of users increased steadily, though still within the department or site, rather than at the organisational level. However, at the same time very similar developments took place at many sites, resulting in an extremely heterogeneous environment - the inevitable outcome of a bottom-up approach.

Eventually, the number of problems caused by the heterogeneity reached a critical mass. Users now recognised the need for integration as they experienced the problems of the incompatibilities between the patchwork of systems adopted at different sites. In some cases, there were more than ten different mail systems in use at the same time. The degradation of organisation-wide communication quality was severe and often costly for the company and frustrating for the users.

Attempts to institute a top-down development strategy began: A central entity took over and tried to integrate the different services with management backing. Also during this phase most organisations started looking at more flexible and feature-rich systems, which were typically to be found on PCs or UNIX machines.
Many of the case study organisations are currently pursuing the third phase - harmonisation. This is a continuation of the top-down development strategy, and is characterised by the introduction of a (more or less) uniform local e-mail environment, interconnected through a messaging backbone (typically an X.400-based system) which also offers access to the outside mail world (primarily the Internet). Completion of this step means that a (more or less) homogeneous service will be available for most, users, and that the number of different gateways will be minimised. The final environment will then form the platform for more sophisticated, strategic mail-enabled applications.

Contributing Requirements

The timeframe of the development outlined above is an important aspect with respect to user involvement in requirements compilation and verification for standardisation projects. Throughout the first phase, departments struggled to get the service up and running, and to actually use it. Neither sufficient knowledge nor resources were available to contribute anything to standards setting. During the following stage, technical problems, especially regarding interconnection of the single systems, had to have priority. Again, there could be little inclination to 'waste' valuable resources on standardisation work, the outcome of which could realistically not be expected to be of any help to solve the problems at hand. Following harmonisation, once the ad-hoc technical problems have been solved, and e-mail has been recognised - and employed - as a strategic tool, and been integrated into business critical processes, new, additional requirements may be expected to emerge. Unfortunately, according to the case studies, this stage will typically be reached after about eight years at the earliest - if at all [Jakobs et al. (6)].

As has been stated above, most companies are currently at an early stage of the 'harmonisation' phase (after typically eight to ten years of experience, give or take a few years). Thus far they have used e-mail for little else than interpersonal communication. In particular, it has not yet become part of major business-critical applications. This explains the absence of any further requirements - the functionality of X.400-based systems is more than sufficient for even the most convenient exchange of interpersonal messages. It has to be expected, however, that new requirements will surface due the increasingly strategic use of e-mail in mail-enabled applications (as e.g. EDI).

Serious, centrally led exploitation of e-mail started at about the time when the first X.400 implementations appeared on the market. Users at that time simply were not in a position to contribute much to a requirements compilation simply because of the lack of experience with open e-mail systems. Even if there were a formal mechanism enabling users to provide feedback to the standards setting process, it would only be now that they could start contributing new requirements (if at all), as there still is little experience regarding sophisticated applications' requirements going beyond the limits of X.400. This is particularly devastating as meaningful user participation is largely confined to requirements compilation and verification.

The Issue of Context-specific Requirements

Information technology has a considerable impact on the environment within which it is employed; 'enabler of change' has been one of the most prominent roles assigned to IT in the business domain. That is, use of IT enables companies to develop new business processes and to open up new markets. IT changes organisational structures and, in one way or another, has an impact on the working life of most employees. It may be a less popular observation, but studies on the social shaping of technology have shown that the reverse holds as well. That is, not only has IT an impact on its environment, but at the same time it is itself framed through this very environment, through technical, but also through societal, cultural and economic factors [Williams (7)]. In the specific case of a corporate environment this implies that the need for compatibility with other IT systems and applications, but also organisational structures, existing hierarchies, work responsibilities and even (potentially unfounded) expectations will influence implementation and use of a new IT system. Indeed, not paying sufficient attention to these issues may well lead to a no-use of a newly installed system [Orlikowski and Gash (8)].

To straightforwardly establish a common set of requirements the various local user environments would have to be sufficiently similar. Given the huge variety of business sectors, organisational forms and business philosophies, the many different intra- and inter-organisational interdependencies, and all the differences that come with varying company sizes, not to mention regional or national differences in culture and legislation, it is most unlikely that such coherent requirements will ever materialise. A user promoting his requirements may therefore not only face resistance from vendors, but also from fellow users, whose needs are very different from his or her own. This suggests that some mechanism is needed to reconcile the different requirements.

There is nother related reason why such an alignment is crucial. We have discussed elsewhere [6] that representatives of user companies do not necessarily see themselves as user envoys in general; rather, they are representing their respective employers (which makes sense given the potentially very heterogeneous environments). Thus, even if the popular call for more user participation were answered it appears questionable whether this could actually improve the situation. It follows that any form of ‘random’ user participation will at best be (potentially) helpful for organisations that operate in a sufficiently similar environment, and have a similar organisational culture as those which are actually represented on the committee. On the other hand, it will most likely be counterproductive for others, who work within a different environment and have therefore developed equally different requirements. Indeed, as has been noted above, the odds are that, apart from rather generic requirements, very few users will identify identical needs due to the huge variations in their respective environments.

The discussion above also suggests that providing purely functional and technical requirements does not suffice, as they cover only part of what actually needs to be addressed. Rather, organisational and other non-technical needs have to be considered, and user representatives need to be in a position to actively define these needs. Thus, it would not make too much sense if only technically experienced people were sent to the committees to represent users, as it typically is the case today. Rather, corporate strategists and managers also need to get involved, to make sure that the non-technical issues are adequately covered as well.

CONCLUSIONS

The implementation of a corporate IT system is far from being a simple and straightforward exercise. Rather, in many cases it starts as a highly distributed process, which only at some later stage becomes largely centrally organised and managed. In the case of e-mail it typically took five to ten years before central IT departments took over, which in most cases happened in the late eighties to early nineties. Since then, only a few of the organisations represented in the case studies have managed to harmonise their system to the planned degree and to actually integrate e-mail into their business processes (if they intended to do so at all, that is). It has already been mentioned that requirements emerge when a service is exploited outside its originally anticipated application context. It is only now that even pioneering companies are in a position to identify functional deficiencies of the system resulting from the more advanced use, and are forced to take appropriate action. One possible alternative considered at this stage - and actually realised in some of the organisations studied - is to carry the requirements into the standards setting process. It should be noted that this is only happening more than ten years after e-mail had first been introduced in the companies concerned.

From this it may in turn be concluded that initially standards cannot realistically be designed based on real user requirements simply because such requirements will not normally be available at this time. This is underpinned and further stressed by the comparably general and sketchy level of the requirements compiled through case studies even from long-standing users [5].

The second problem identified above relates to the type of input required from the user community, specifically the non-technically issues that need to be addressed during the design of a useful system, and the resulting need to bring user managers and strategists to the standards groups. A major obstacle here is rooted in a communication problem, and in the different perceptions of technology that can be identified between engineers and managers. To overcome potential communication problems these different perceptions need to be aligned. This requires learning by all sides; engineers need to gain some understanding of the necessary organisational and managerial considerations, and managers need to get an understanding of at least the technical basics. This may sound trivial, but the reported major credibility and acceptance problems from which ‘user requirements groups’ suffered in both ISO and ITU-T finally contributed to the abandoning of these groups.

The first conclusion that has to be drawn from the discussion above is that users will not normally be in a position to provide meaningful contributions to the standards setting process. However, first-hand information on real-world requirements is essential for the development of standards to stand a chance of survival in the market place. To cater for both observations the standards process is in need of a major overhaul, not necessarily in terms of speed, as the popular claim has it, but primarily in terms of formal channels to enable user input following the development - and implementation and deployment - of systems based on an initial version of a standard. Secondly, there is a need for a mechanism to align the different, context-specific user requirements prior to and during the process. This could, for instance, be achieved through a ‘user coalition’, i.e. a forum for users where the requirements could be specified, aligned, and subsequently fed into the standardisation process. This would yield the additional benefit of allowing small companies - which typically have requirements very different from those of the big companies - to be represented as well; for them, the costs associated with participation in standards setting are normally prohibitive. In the case of e-mail, for example, this forum could be established by the user groups of the world's electronic messaging associations.

User participation in standards setting seems to be useful only after a reasonable time of actually using a service; meaningful requirements do not come out of the blue, but are rooted in sound experience. At the same time, however, the widespread notion that a standard's acceptability and chances of survival in the market place critically depend on users' participation during its development process remains valid. We conclude that standardisation processes, at least in IT, will have to undergo major changes if they do not want to take the risk of becoming obsolete. A potential remedy might be a quick first implementation based on the - probably very generic - requirements available, and a limited number of subsequent rounds of refinement, based on real-world requirements. A channel to enable such user feedback would thus be a crucial enhancement of the current process, and indeed far more important than a speed-up.

REFERENCES

1. International Organization for Standardization, 1995, 'IEC/ISO Directives - Procedures for the technical work of ISO/IEC JTC1 on information technology'.

2. Reilly A.K., 1994, 'A US Perspective on Standards Development' IEEE Comm. Mag., 1/94.

3. Cargill, C.F., 1995, 'A Five-Segment Model for Standardization', in: Kahin, B.; Abbate, J. (eds): Standards Policy for Information Infrastructure, MIT Press.

4. Jakobs, K.; Procter, R.; Williams, R.; Fichtner, M., 1996, 'Corporate E-Mail in Europe - Requirements, Usage and Ways Ahead', Proc. 4th Int. Conf. on Telco Systems, Modelling and Analysis.

5. Jakobs, K.; Procter, R.; Williams, R., 1996, 'Users and Standardisation - Worlds Apart? The Example of Electronic Mail', ACM StandardView, 4/96.

6. Jakobs, K.; Procter, R.; Williams, R., 1997, 'Users in IT-Standardisation: A Myth Revised', Proc. 1st Int. Conf. on Managing Enterprise Stakeholders, Mech. Eng. Publications.

7. Williams, R., 1997, 'The Social Shaping of Information and Communications Technologies', in: Kubicek, H. et al. (eds.), The Social Shaping of the Information Superhighways, Proceedings of International Conference, COST A4, European Commission DGXIII, Luxembourg.

8. Orlikowski, W.J.; Gash, D.C., 1994, 'Technological Frames: Making Sense of Information Technology in Organizations', ACM TOIS, 2/94.