Instant Standard Concept for Data Standards Development

Research-in-Progress

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ABSTRACT

This paper presents the current results of an ongoing research about a new data standards development concept. The concept is called Instant Standard referring to the pressure that is generated by shrinking the length of the standardization process. Based on this concept it is estimated that the development time is reduced by over 50% while maintaining an appropriate quality level for achieving interoperability in practice. The Instant Standard concept for development of data standards is described in the paper.

Keywords

Data standards, standards development, standards lifecycle, interoperability, quality, adoption, Instant Standard

INTRODUCTION

Today’s businesses are in a dynamic and more and more connected environment. Organizations try to connect their business processes for the better productivity and higher efficiency (Harvey & Novicevic, 2006). Organizations need interoperability to align their processes. Data standards support the achievement of interoperability by providing a clear and straightforward definitions, layouts and processes for everyone who is willing to use it (Folmer and Verhoosel 2011). Data standards make sure that the different parties in the cooperation use the same names, measurements and way of doing the business during their inter-organizational work. The ability to connect devices and systems can increase their utility to end-users and the end-user can increase the utility of a product by connecting it to another one. Standards set specifications for components that make it possible to connect these components to each other (Wegberg, 2004). Standards ensure that users can enjoy of the benefits of connected products. Standardization and interoperability are important in value-generating process.

When the organizations ‘speak the same language’ connecting their business processes is much easier task and in the end interoperability is easier reachable. This is the reason that it is generally accepted that interoperability is supported by data standards. The importance of the standards in the achievement of interoperability explains that the standardization is essential for organizations. Companies lose a lot not having the advantage of the interoperability. Almost $3.9 billion annual loss in the electronics industry and $5 billion annual loss are estimated in the automotive industry, just because missing standards (Steinfield et al., 2011). Moreover, the lack of integration and data standardization is making health care services inefficient and costly. Hospitals have $29 billion cost yearly because of errors. Venkatraman et al. (2008) claim that three out of four errors can be eliminated by better use of information technology. These losses could be eliminated with appropriate level of interoperability.

However, the IS data standards development processes are far from the desired maturity. One main concern is the average standards development time of the data standards. Wegberg (2004) claims that speeding up standardization will be valuable if the benefits from the standard are time-dependent. Currently, the average time of standards development is 36 months (European Commission, 2010). The importance of the problem is shown by the European Commission too, who demands that before 2020 the average time is reduced by 50%, down to 18 months (European Commission, 2010). However one could argue whether 18 months is acceptable or not, why 18 months, and how about quality?

The need of fast solutions is especially important in the ICT field. Various actors of the same or different industries work together and their productivity can be seriously hindered by the lack of appropriate connectivity of their IT systems. To fully realize the benefits of e-business, common standards are required to define the syntax and semantics of Web-based
information sharing among firms (Zhao, Xia, & Shaw, 2005). To have an even more complicated situation, companies are waiting for the solutions in a fast changing technology environment.

In the ICT domain, industry consortia set the vast majority of important standards, in contrast to formal standards organizations (Rada and Ketchell 2000). Industry consortia are growing in number and importance; they cannot be neglected anymore in government policies (Kroes 2010; European Commission 2011). In the data standards area there is often one dedicated consortium that maintains one specific data standard for a specific domain. However both large industry consortia and formal bodies are aiming for the inclusion of more of these data standards. For instance OMG, The Open Group and W3C, are all industry consortia involved in data standards for different domains, and currently W3C is offering a free online platform that can be used by data standards initiatives. The formal bodies bring their formal status into play, while the industry consortia offer their expertise and flexible processes (Folmer 2012).

This paper is introducing the Instant Standard for data standards development and reveals the possible future of standards development.

RESEARCH QUESTIONS, METHODOLOGIES

Our research goal is to develop a data standards development concept that is faster while still achieving quality, and is better aligned with practice. Which leads to our research question: What are the characteristics of a fast development concept for data standards?

The new development method got the Instant Standard name, because it is using higher pressure on the development workgroup than in a traditional case of periodically (eg. Bi-monthly) workgroup meetings. This Instant Standard has been developed by applying design science methodology (Hevner, March et al. 2004). Design science fits perfect for inclusion of both practical and theoretical knowledge, and suits best for an iterative design (Hevner and Chatterjee 2010).

The Instant Standard as presented in this paper is based on four build-evaluate cycles. The first build was based on literature (see next section) and the practical experience of the developers. This practical experience includes involvements of more than 20 different data standards in different domains and on both national and international level. The second till fourth iterations are practical applications (action research (Avison, Lau, Myers, & Nielsen, 1999)) of the first build version of the Instant Standard in three different data standards development projects: STOSAG (data about garbage collection), EBA (data about waste transport) and “Digitale Rotonde” (data about providing utilities in new houses).

The research is still in progress, and three more improvements iterations of the model are currently underway. First, combining the current model with other and new theories from literature. Second, improvements to the model based on evaluation of the first three applications of the Instant Standard by organizing a survey, as a survey is suited to learn about opinions and attitudes (Blumberg, Cooper, & Schindler, 2011). As follow up to gather more in depth understanding, expert interviews are organized in semi-structured form in order to learn the experts’ viewpoint regarding situations relevant to the broader research problem (Blumberg et al., 2011). Third, test the improved model in a (4th) project application and improve it based on the results. During these final iterations the attention is shifting from more design oriented to a focus on validation of what has been designed.

PRIOR LITERATURE

The prior literature on the development of data standards is mainly concerned with the reasons for joining a standard development organization (Folmer and Verhoosel 2011). One of the reasons to getting involved is to contribute and to orient the standard towards one’s own business practices (Zhao et al., 2007). Boh et al. (2007) presented the paradox of participation in standards development. According to the paradox, the greater the number of stakeholders, the more difficult it is to achieve consensus. It will slow down the process. On the other hand, involved stakeholders will be early adopters.

Boh et al. (2007) also described strategies used in the development of Rosettanet. These are:

- Commitment of resources to the milestone program
- Clear roles and restrictions
- Validation beyond full implementation
- Informal norms and social networks

The lessons learnt from Rosettanet are:
• Only involve the organizations that are committed to solving the problem
• Focused, quick, problem solving approach to standard setting
• There is no one right approach for the standards development process, not even a full open approach

In the MISMO case, Markus et al. (2006) pointed out a certain success factor for standard development. It is necessary to ensure participation of representative members of heterogeneous user groups, and avoid the natural tendency to splinter into rival homogeneous groups.

Zhao et al. (2007) claim that the better the standard and the faster it is developed, the greater is the direct benefit for the developers. By being involved in the development of the standards, there is an increase in the understanding of the standard details which helps to reduce future implementations costs. Werle and Iversen (2006) made four suggestions for the standard development process, based on observations:

• Openness to and direct representation (participation) of all actors interested in or potentially affected by a standard.
• Work in accordance to impartial and fair procedural rules.
• Decision-making should be based on consensus.
• All interests are considered in the standardization process.

Comparing nine different vertical standards, Nelson et al (2005) identified key drivers, differences and similarities in the development processes. They also created the inter-organizational system (IOS) standards development cycle.

Spivak and Brenner (2001) emphasize that the standard developing organization should keep it in mind that the process they select must serve the industry and not the other way round. Löwer (2005) found another problem: Although there are many existing standards, during a lot of standard development, the SSOs are reinventing the wheel and do not use each other’s results.

Currently, to our knowledge there are four standards on standards development (ANSI/SES-1-2002, SES 2:2006, ISO/IEC Directives Part 2 and the British Standards Institution also developed a standard) but these initiatives provide only dictionaries and definitions of processes, they miss to offer more than a very general overview of the process of standards development.

THE INSTANT STANDARD CONCEPT

The basic idea of the Instant Standard is why can’t we develop a standard in one week? We then put the experts together for a full week and with good preparation and afterwards some decent reviewing we should be able to achieve a standard with 80% quality. An 80% data standard can be defined as a standard that covers only the main process and does not include the possible exceptions. Besides, an 80% data standard usually includes many optional elements that would not be part of a 100% standard. This second feature is the result of the harmonizing process during the short development. If someone wants to include an element that is not refused by the others, then it gets included in the standard developed. So no quest for the perfect standard, but delivering a standard that is good enough to test in pilot settings and being improved afterwards. Key is the quality and commitment of the workgroup who gets the responsibility of achieving results within the week. Commitment is the willingness of the members to do their best, in order to develop a data standard, which is able to solve the information exchange problem. The workgroup’s commitment is essential, because the experts usually do not have detailed knowledge on the specific domain, they are present to foster the group-work. In other words, the workgroup has to develop the standard with the guidance and lead of the experts. Although traditional concepts also include workgroups, the work intensity within the Instant Standard is unique.

THE MODEL

The Instant Standard model contains 11 activities and is depicted in Figure 1. In the following part, the actors involved, their task, the input and the output of the all the activities will be described.

There are three actors recognized in the standard development. There is an organization that combines the interest of the stakeholders who have a shared business problem. This organization can have different forms, but it is out of the scope of this...
paper. The organization is called Steering Committee (SC) in the model. The standard development is traditionally done by a workgroup. This group is included in the model, their task is the same, but they work under special conditions. They have to develop the standard in a week and this is the real difference between the traditional concepts and the Instant Standard concept. A traditional concept includes a couple of sessions with same tasks as the high pressure week, but instead of being joined, these sessions take place typically 5-6 weeks after each other. Third actor in the model are standardization experts. They guide the Steering Committee, manage and coordinate the work of the workgroup and finalize the documentation of the standard. In the Instant Standard projects, two experts participate. Their tasks differ during the high pressure week. The Chairman moderates the discussions, manages the work to make sure that the process goes as it was planned and is also responsible to ask questions that help the group’s work. The other expert, the Co-pilot, continuously captures the information discussed during the high pressure week and records it in models.
Figure 1 Instant Standard Concept
1. Setting up Steering Committee

<table>
<thead>
<tr>
<th>Actors</th>
<th>Different stakeholders who are connected by a shared business problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Responsible for the development and management of the standard</td>
</tr>
<tr>
<td>Output</td>
<td>Operational and financial plan of the committee</td>
</tr>
</tbody>
</table>

The first activity determines four important things, the form of the organization, the members, the operational plan and the financial plan. The organizational form can be foundation, association or government organization and it does not influence the Instant Standard concept. The Committee has to agree on the operational and financial plan in the beginning. The first describes the way of doing their work like regulations of decision making, administrative work, and control type. The latter needs decisions on the financial support of the organization. Typical topics are membership fee, estimated costs and the price of the standard.

The Committee manages and the coordinates the development and management of the standard and chooses the Workgroup members.

2. Decide on scope, set up planning, select the members of the Workgroup

<table>
<thead>
<tr>
<th>Actors</th>
<th>SC members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Common goal</td>
</tr>
<tr>
<td>Output</td>
<td>Scope document v1, Schedule, List of Workgroup members</td>
</tr>
</tbody>
</table>

At this point, the Steering Committee has to decide whether they want to use the Instant Standard concept or not and has to define the scope of the standard they want to be developed. The agreement on the scope ensures that every stakeholder knows what the problem and what the business process, where the standard should provide interoperability, is. When the scope is determined, the SC has a signing event, where they express their commitment to the project. The scope document makes the list of requirements clear and shows what the solution has to cover.

After determining the scope, the Committee sets up the planning for the development. They decide on the starting time and the dates of milestones. The milestones are the date of the draft version, the date of review, the date of delivery to the Committee and the date of the final standard. The planning is the key to be able to provide the standard for the pilot or adoption in time. The period for the high pressure week is also selected by the Steering Committee, but this can be slightly changed later.

Finally, the SC selects the members of the workgroup. In the selection process, the Committee aims to put a group with diverse knowledge together. They choose 10-15 participants with business and/or technical knowledge.

The working group is a group within the community with a demarcated sub-activity with a clearly defined end result as its objective. The workgroup develops the standard for the Committee.

The second step of the model takes around 1 month of time, but it highly depends on the Committee members. If they see the goal crystal clear and can agree on it easily, then the agreements and plans can be done in shorter time.

3. Information meeting with the standardization experts

| Actors | Steering Committee representatives and standardization experts |

As preparation for the information meeting, the standardization experts ask the Steering Committee to collect all the available information about the standard and the business environment. The SC representatives also present the scope document.

Obviously, the experts do not know the business environment in details, therefore they use the information from the SC to get known the environment and the business processes that might play an important role in the standard development.

The information meeting with time for preparation takes 1-2 weeks.

4. Decide on the long-term management, governance, finance and adoption of the standard

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4. Decide on the long-term management, governance, finance and adoption of the standard

Activity 4 is parallel with the high pressure week in time. The SC has to finalize their plans with the standard. They have to decide on the long term management and the governance of the standard. Besides, the pricing model has to be set up and the adoption of the standard has to be planned as well. The questions, they have to decide on:

Management: Who, how and what will do with the standard?
Government: Who and how can decide on the future of the standard?
Finance: Who, when and how much have to pay for the standard?
Adoption: Who, when and how will start the diffusion of the standard. Consider the use of a pilot project.

The BOMOS work (Folmer and Punter 2011), currently in the progress of becoming an European standard for standards governance, is used for inspiration to answer these questions.

In ideal case, the SC should be done with these decisions by the end of the high pressure week in order to provide seamless process for the standard in the future. From practice, it is experienced that if this is not the case, then in the standard diffusion delays appear. Uncertainty does not help, the SC has to try to mitigate it by reaching consensus in time.

In order to agree on the management, governance, finance and adoption of the standard, the SC can start the discussions a week before the high pressure week. Therefore they have two weeks to produce the output of this activity.

5. Scope refinement

By this step, the experts checked the information and scope provided by the Committee. Two SC representatives and the standardization experts refine the scope together. The refinement makes sure that the standard development is feasible with
the Instant Standard concept and it is possible to develop it within the high pressure week. The scope document has to clearly state the boundaries, and the parts of the business process that must be included in the standard.

With the preparation, the meeting takes a week.

### 6. Preparation for the high pressure week, information processing and customization

<table>
<thead>
<tr>
<th>Actors</th>
<th>Standardization experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Information provided by SC, Scope document v2</td>
</tr>
<tr>
<td>Output</td>
<td>Customized plan and presentations for the high pressure week</td>
</tr>
</tbody>
</table>

The Chairman and the Co-pilot read the information provided by the SC in details. Based on the scope and their understanding on the needs and background, they make the planning for the high pressure week. Depending on the standard, maybe more time is needed for the Business Domain model or for the Information model. The experts decide on this question and schedule the week according to that.

Furthermore, the experts do their preparation for the working week too. They prepare presentations and supporting tools for the work week. The experts need one week to get ready to the high pressure week.

### 7. High pressure week

<table>
<thead>
<tr>
<th>Actors</th>
<th>Workgroup and standardization experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Knowledge on the business and technical background, prepared materials for the work</td>
</tr>
<tr>
<td>Output</td>
<td>A standard draft without technical mapping</td>
</tr>
</tbody>
</table>

Activity 7, the high pressure week, is the core of the Instant Standard concept. This week gives a quick first step in the standard’s life by decreasing the development time to one single week. In general, this activity makes the standard development process an Instant Standard standard development process.

The high pressure week consists of four main activities. Figure 2 represents these.
First, there is the Kick-off. The Kick-off covers the welcoming and the introduction presentations. The first presentation introduces the experts and the workgroup members. Later a SC representative presents the background and the goals of the whole project. This presentation places the upcoming work of the group into a broader context. Afterwards, the Chairman presents the goal, the schedule of the following days and explains the game rules for the work. The rules, shown in Table 1, are simple, but necessary for success.

<table>
<thead>
<tr>
<th><strong>Game rules for the high pressure week</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strive for consensus</td>
</tr>
<tr>
<td>Be ready to compromise</td>
</tr>
<tr>
<td>Time is limited, the participants must restrict themselves</td>
</tr>
<tr>
<td>The Steering Committee is available in case of ‘emergency’</td>
</tr>
<tr>
<td>Everyone is expected to focus on this project during the week</td>
</tr>
<tr>
<td>The activities always start on time, no excuses for being late</td>
</tr>
</tbody>
</table>

Second, in the workgroup has to identify the roles in the business environment. For every role, the tasks and activities have to be determined. If the process is relatively straightforward and there are not too many different scenarios, then the workgroup builds the process model too. Afterwards, the information exchange points and the exchanged messages are identified. Creating the Business Domain model starts on the first day and depending on the customization it can be continued on the second day.
Third, on day 2-3-4, depending on the customization, the workgroup creates the Information model. The terms and definitions for each message element and the business rules are defined in these days. Fourth, the workgroup agrees on the Technical requirements on the last day. The issues emerged during the past days and are still valid are discussed here.

### 8. Create the documentation of the draft

<table>
<thead>
<tr>
<th>Actors</th>
<th>Standardization experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>The result of the high pressure week, the draft</td>
</tr>
<tr>
<td>Output</td>
<td>Fully documented draft</td>
</tr>
</tbody>
</table>

After the high pressure week, the experts create the documentation and technical mapping of the standard and document in the draft version. In this step, additional experts can be involved in the project to fasten the work.

### 9. Review via internet

<table>
<thead>
<tr>
<th>Actors</th>
<th>Workgroup members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>The draft</td>
</tr>
<tr>
<td>Output</td>
<td>Feedback on the draft</td>
</tr>
</tbody>
</table>

The workgroup members individually revise the draft. For communication, internet is used. The workgroup members have 2 weeks to do the review.

### 10. Review session

<table>
<thead>
<tr>
<th>Actors</th>
<th>Workgroup and standardization experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Draft and comments</td>
</tr>
<tr>
<td>Output</td>
<td>Agreement on the emerged questions</td>
</tr>
</tbody>
</table>

The standardization experts analyze the workgroup’s feedback on the standard. They organize a review session where the workgroup members can discuss the different opinions and the new suggestions. The meeting takes place on one day, but with the preparation, the activity takes a week.

### 11. Finish the standard

<table>
<thead>
<tr>
<th>Actors</th>
<th>Standardization experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Result of the review session</td>
</tr>
</tbody>
</table>
Using the result of the review session, the standardization experts finalize the standard and its documentation. This process takes up to 1 week.

When they finish the work, they deliver the final draft to the SC for approval. When it is approved, the final draft will be called the release. Currently, the case, in which the Committee refuses the final draft, is not included in the model. The release is usually used for pilot projects first. From now on, the SC has the responsibility to decide what to do with the standard. If step 4 has been successfully done, then there are no open questions about the management at this point.

**DISCUSSION**

In this paper, a new data standards development concept is provided, based on four design cycles including three applications in real standard development projects. It is important to emphasize that the standard developed in such a short time, in the high pressure week is about an 80%, not perfect, standard. The Instant Standard can give a fast first step toward the final standard. The result of a high pressure week can be used for a pilot project and during the pilot, it can be fine-tuned.

Although the Instant Standard concept worked in the three included cases, it cannot be stated that it fits to every situation. Based on expert interviews, we expect that for the application of the Instant Standard, the scope should be limited. More research needs to be done to determine the situation characteristics for which the Instant Standard is the best option in comparison to the traditional development process.

Of course it would be ideal to perform a longitudinal study about the effects of a standard developed by the Instant Standard in comparison with the traditional approach. However this will be really hard to measure, but still an interesting path for future research. The duration of the activities presented in the model represent is the most optimal version. In practice, all the analyzed project took longer than the optimal because there were some buffers between steps. These buffers were introduced to help the planning of meetings with different stakeholders. The three Instant Standard projects took around 25 weeks. Maybe using the model, the Steering Committee could accept a stricter planning and committed to it, they could keep the development time close to the most optimal.

A finding is that the workgroup members are the key for the success. If they are able to form a group, which considers the common goal more important than the individual targets and feels responsible for the standard, then the high pressure week is likely to end with a good result. Without this group, it is believed that the Instant Standard concept cannot be used successfully. This statement has to be subject of a further study as well.

**CONCLUSION**

To answer our research question we described the Instant Standard model for standards development. This concept has already been successfully applied and helped to decrease the data standards development time to 6-7 months. These applications are exciting experiments that can radically change the way of developing data standards, which haven’t changed a lot since decades. For data standards this is particular useful since these are developed outside the traditional standards world and have a business need that does not allow the usually long development time. The Instant Standard concept shows that there is potential in improving the current standards development process by making it faster and more efficient regarding the development time. The new concept might even end with better adoption.

However further research is needed in improving the concept, making it repeatable, and finding out in which situations the Instant Standard is suited, and in which not or should be adapted like in situated method engineering (Brinkkemper 1996). And finally we have to study the quality of the standard and compare it with traditional concepts. We expect that the Instant Standard in the future not only shortens the development time, but will also improve both the adoption and quality of data standards.
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