

Key Knowledge Sharing Points: Exploring a new concept for studying Crossroads in Global Innovation Projects

Tore Hoel¹, Jan M. Pawlowski²

¹Oslo University College, Oslo, Norway

²University of Jyväskylä, Jyväskylä, Finland

tore.hoel@hio.no

jan.pawlowski@jyu.fi

Abstract

This paper introduces the concept of Key Knowledge Sharing Point (KKSP) to describe potential crossroads in global innovation projects. As Knowledge Management becomes more and more important in global settings it is essential to identify when and where key knowledge is or must be shared within specific process cycles in order to run innovation projects successfully. The goal of the paper is to contribute to the methods development of standardisation as a design activity in the domain of learning technologies. This activity is reported suffering from a legitimacy crisis and needs both improved process and products.

As a Key Knowledge Sharing Point the authors understand situations or events in which knowledge sharing is of essential importance for the success of an activity. The KKSP construct is explored in in two cases studies in order to test its abilities as a descriptive lens. The first case study analysed a case of legitimacy breakdown in stakeholder engagement, focussing on Key Knowledge, Key Sharing Points and Key Timing, the three intersecting aspects of the KKSP constructs. The second case study was chosen for its critical timing (scope definition of new standardisation work items), and demonstrated the analytical strength of the KKSP construct highlighting the importance of what knowledge to be exchanged through which channels.

This paper describes a first step towards a prescriptive model based on a iterative development with several cycles of descriptive studies. The authors use Actor Network Theory to analyse standardisation activities understood as a recursive process of design, sense-making and negotiations. For further development of the KKSP construct in a prescriptive direction the authors point to the problematisation and perspective primitive Why as a starting point.

Keywords– Organisational learning; Key Knowledge Management Point; Descriptive and Prescriptive theory building; Global Innovation; Anticipatory Standardisation

1 Introduction

Global innovation projects always run the risk of breakdown. Global cooperation has its own risks, prone to a mixed set of influence factors given by the context (Pawlowski & Bick, 2011). Add an innovation focus to the activity and the risk multiplies, as the object of the activity is not yet defined. Breakthrough innovations seem to have a local point of origin. Even if the latest gadget from Apple is assembled in China of parts produced all over the globe, the company makes a point of it being “Designed in California”. In this case the locus of control over the design process is well defined, grounded in an organisational culture that is refined over years. In this paper we will focus on knowledge management challenges related to globally distributed design of future artefacts (Tuikka 2002). The domain we have chosen is international standardisation of learning technologies.

The very idea of “innovative design by committee” sounds like an oxymoron. In the innovation life cycle described by Abernathy and Utterback (1975) standardisation is the last third stage, after a first fluid explorative stage leading to a second transitional stage with a dominant design. When international standards groups engage in creating anticipatory standards, i.e., standards that are designed to meet future needs of users of technologies and services, they run huge risks of failure.

However, the potential upside seems to be interesting enough to keep the activity going: If standards were successful the market could benefit greatly given the global scope of information technologies.

Our goal with this paper is to give a small contribution to the methods development of learning technology standardisation by constructing a new concept of a Key Knowledge Sharing Point (KKSP). We will explore this concept within the context of global knowledge management, shaping of technology and international standardisation. In the following we will give a short overview of related research before we look into the dimensions of the KKSP concept and apply it in two case studies.

2 Related research

2.1 Learning Technology Standardization

Standardisation as an activity is not well understood (Cargill 1989, Mitra et al. 2005). Cargill found more than 20 years ago that “the philosophical and conceptual bond that ties the activity together is, at best, very weak. (...) Standards represent different things to groups and disciplines, to organizations, and to individuals, and these meanings vary with time and context. The disagreement between the organizational and individual rationales and goals for participating in standardization is a major cause of confusion about standards and standardisation in the IT industry” (Cargill 1989, p. 10 ff.). Based on participation in LET standardisation the last decade, we conclude that the situation has not changed.

The field of learning technology standardisation has produced very few successful standards in the past decade (Hoel, Hollins & Pawlowski 2010). However, anticipatory standards are urgently needed due to the fragmentation of the market, lack of agreements on common base concepts and technologies as well as lack of large industry interests. Learning technology standardisation is a typical example showing the issues, problems and contradictions we find in the field of standardisation. We are dealing with consensus standards that mainly fall in the category of voluntary standards (Cargill 1989). Nevertheless, when published by formal standards bodies as ISO or CEN they are attributed mandatory qualities. Cargill has identified three aspects that produce challenges to consensus standards, LET standards included: The importance to the market is contested; there is an intermix of standards to be implemented in products and standards of conceptual nature; and some standards are process standards, while others are product standards (ibid., p. 26). Besides, rapid changes in the market make the LET standards community more involved in shaping the technology of the future (Egyedi 1996) than regulating or stabilising what is already in the market. Rather than creating stable points of reference, supporting interoperability and minimising informational transaction costs (Egyedi & Sherif 2008) in systems already adopted the focus of this community is on anticipatory standardisation (Jakobs 2001), which is part of a global innovation enterprise with a host of complex knowledge management challenges (Tidd and Bessant 2009).

When results are questioned the legitimacy of the activity comes under attack. Hoel and Hollins (2008) have developed a model describing input and output factors that contribute to the overall legitimacy of a LET standard. The input legitimacy factors relate mainly to the process, while output legitimacy factors relate to the product (i.e., the technical standard), hence the name Process and Product Legitimacy model (PPL).

Table 1 Process and Product Legitimacy model of standardisation (Hoel & Hollins 2008)

Input legitimacy	Output legitimacy
All 'interests' considered and ideally represented	Inscription of stakeholders' interests

Open process	Enactment status (is the specification implemented and used in services?)
Balanced choice of Standard Setting Body	Technical maturity of the specification

We will use this model to structure our empirical study and to identify where we may find breakdowns in the standardisation process.

2.2 Knowledge Management & Knowledge Sharing

The global knowledge sharing challenges related to international standardisation are obvious. However, it is highly necessary to identify at which points of the standardisation process knowledge sharing breakdowns occur, leading to failure of the standardisation process.

A variety of studies have been done to identify critical success factors, e.g., knowledge-sharing barriers that have to be crossed (Riege 2005) and critical information that must be considered (Soliman & Youssef 2003, Wong 2005). The framework set up by Pawlowski and Bick (2011) identifies the interrelationship between stakeholder contexts, knowledge, processes, instruments and results. Critical success factors and barriers are strongly connected to certain activities (processes) or interventions (e.g. introduction of new knowledge-related technologies). This group of studies identifies how knowledge sharing can be supported and how it can fail. However, we need a construct that produces more than flat lists of hurdles managers must consider, as we need to show in which part of the process things can go wrong. The time aspects are in most cases not considered.

With the advancement of ICT systems support to almost all sectors of society we see introduced embedding of time critical knowledge in ordinary work procedures (Davenport & Glaser 2002). We would argue that a phase- or time-based concept is necessary. This has the potential to extend just-in-time knowledge management by conceptualising the more subtle processes where conflicts occur because knowledge was *not* shared, or the mix of knowledge, timing and delivering context was not right.

3 Construction of KKSP – theorising about methods improvement

In the following, we describe Key Knowledge Sharing Points as well as the theoretical background.

3.1 Defining Key Knowledge Sharing Point (KKSP)

Sharing of key knowledge is critical for global projects (Holden 2002, Kalkan 2008, Riege 2005). However, at certain points knowledge sharing is essential and more crucial than in other project phases. Thus timing is an important research aspect (Ancona et al. 2001). A Key Knowledge Sharing Point (KKSP) is therefore a stage in a sequence of processes that is critical for the overall project success due to certain barriers or influence factors. The global knowledge management framework developed by Pawlowski and Bick (2011) can help to identify in which contexts and situations KKSP occur and how they can be predicted. The overall aim with our research is to contribute to an improved method for standards development. We see learning technology standardisation as a design process consisting of a number of development cycles punctuated by KKSPs. What is presented in this paper is just a small step towards such an improved method, which may need additional constructs to KKSP.

3.2 Theoretical Foundation & Methodology

Tsang (1997) has introduced a simple model for how to integrate descriptive and prescriptive research so that the proposed methods improvement rest on a rigorous scientific approach. The first step is through a descriptive study to get an understanding of the domain, its major variables and their relationships. Based on this study we would be able to formulate prescriptive implications. The third step should be to study the outcome of implementing the prescriptions, and so feed these results back to revising the prescriptions and to continue a methods development in a number of iterations.

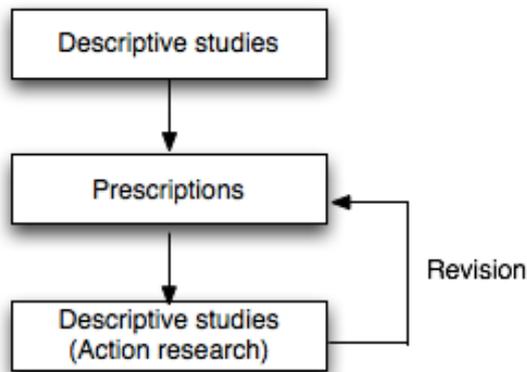


Figure 1 Integrating descriptive and prescriptive theorising, from Tsang (1997)

The KKSP concept is well suited as a descriptive lens to get an understanding of the system of activities we study. The assumption is that by identifying KKSPs we will get a handle on the aspects that will inform prescriptions for an improved method.

Actor Network Theory (ANT) in the tradition of Bruno Latour (1986), Michel Callon (1999) and John Law (1999) provides a small set of concepts that are proven powerful in understanding standardisation activities (Egyedi 1996). We will make use of ANT perspectives and methodologies in developing the KKSP construct,

which is very much related to translation, described by Crawford (2005) to be the core concept of ANT. "Translation (transport with deformation), as distinguishable from diffusion (transfer without distortion), is both a process and effect" (ibid.).

Our research is aimed at locating the centres of translation "where network elements are defined and controlled, and strategies for translation are developed and considered" (ibid.) in order to identify the Key Knowledge Sharing Points and open them up for discussion (refer the ANT concept of black-boxing and what it takes to see what is in the "black box").

Focussing on the standardisation activities themselves, Fomin et al. (2003) have provided a generic framework, the D-S-N model. The model (Figure 2) understands the standardisation activities as a recursively organised process that combine Design, Sense-making and Negotiations processes. In all these processes we would expect to find KKSPs. According to this model *design* involves intelligence gathering; inventing, developing and analysing possible courses of action; and selecting a particular course of action. This will involve *sense-making* processes, often proactive and related to not-yet-invented technologies. In order to produce an agreed standard we need the *negotiation* processes, enrolling actors and artefacts in the network that constitutes the ongoing standardisation activity.

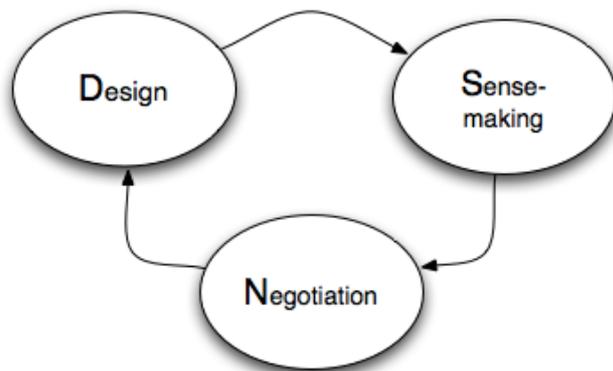


Figure 2 The D-S-N model describing the standardisation process as a recursive process of combining design, sense-making and negotiations, from Fomin et al. (2003).

In the first case study we focused on the contextual aspects of stakeholder mobilisation. We look into the stakeholder motivation for taking part in international standardisation, and how this activity is

perceived and fed into national policies and processes. How is knowledge defined and managed? Are we able to identify any knowledge that plays or could play a key role in legitimacy processes?

The results of the first case study led us to focus on a particular processes, zooming in on the actual work being done in standards group meetings. The question we ask is if there are crossroads towards a final standard that are more critical than others where intervention actions may be taken, guided by analysis where the new KKSP concept gives added value. If so, could the understanding of the nature of these crossroads help us better define the KKSP concept itself?

For the case studies we used a qualitative approach combining an archival document study with a discourse analysis of a three hours session with key persons working in the domain. The data for the first case were strategy outlines, budget briefs, reports from support actions, guidelines, project reports etc. relating to the national organisations since 2003 involved in LET standardisation in Norway. Key phrases in the documents were tagged and analysed according to a number of indicators developed through an iterative process of repeated data analysis. The resulting “stop words” were then used as prompts in the group discussion, which was then transcribed and analysed.

In the second case study the same qualitative approach was used to analyse 16 new work item proposals presented to the CEN Workshop on Learning Technologies.

4 Two case studies from LET standardisation

4.1 Legitimacy breakdown in stakeholder engagement - a national case

What prompted the first case study was a breakdown of legitimacy of international LET standardisation seen from the perspective of a national governmental stakeholder. Since 2003 the Norwegian Ministry of Education, or agencies acting on behalf of the ministry supported standardisation activities in CEN WS-LT and ISO/IEC JTC1 SC36 covering the travel expenses of selected experts attending meetings in these committees. From 2011 this semi-formal arrangement was put on halt and the experts who were committed to different ongoing tasks in the standard groups were told that no travel support was guaranteed for future meetings due to questions as to the benefits of international standards development to the Norwegian educational sector.

The archival analysis shows how international standardisation over the years had been written into the Norwegian policy related to ICT in education as a concept on par with “ICT architecture”. The Norwegian eStandard project (2003 - 2006) was set up to explore how standards could be promoted and to coordinate European and international participation. In 2007 the portfolio was transferred to the new National Secretariat for Standardisation of Learning Technologies. Since then the discussion on the nature of standards, where to participate, how to engage in the process with which organisation gradually disappeared. The discussion on why standards and standardisation appears as frozen or black-boxed, and the focus is more on how to apply a subset of the standards that comes out of the process. When the why questions fade out we see from our material that the discussion on the state of art and recommendations of particular standards become more a matter of fact: “In the Norwegian educational sector the specification NORLOM is used for describing digital learning resources”. This recommendation is copied and pasted between documents without any further justification.

For an uninitiated observer standardisation is difficult to understand, a reason why the Ministry of Education at an early stage asked for a “eStandards for Dummies” report from eStandards project (2005). When LET standardisation as a national activity was handed over from a project to a national secretariat, and then to a government agency the meaning of that activity became more and more defined by the organisational context, than by the activity itself. As an example, the document study shows *quality* as a strong interest of the Ministry of Education, and brought into the context of standardisation quality and standards are given an almost similar meaning. When the Ministry asks for quality guidelines for learning resources, we see the recommendations related to international standardisation is limited to the subset of interoperability standards that the agency defines a “used in the Norwegian educational sector”. We find no reference to international quality standards, developed

by committees with Norwegian participation. And we find no discussion on alternative standards that are being developed over years with heavy involvement of Norwegian experts.

It is clear from the document study that the network spun by the national stakeholder to international standardisation was developing in another direction than the network made out of the textual, conceptual, social and technical actors taking part in the CEN and ISO groups. The breakdown of legitimacy may be seen as a result of lack of alignment, centred around a concept of uptake of results emerging in the discussion around the “stop words” resulting from the document study. However, if uptake of results is the success criterion there is a need for a common understanding of results. The analysis of the discussion session showed that there is no consensus about pivotal concepts like standards and standardisation.

... actually, when we get things from others (.) maybe particularly from KD (the Ministry of Education and Research), which we have a lot to do with (1.5) when they talk about standards then they talk about _a lot more_ than ah (.) formal standards and it is not at all given that it is open standards (.) what is the sort of definition for that

what do KD mean?

sh: when they say standards they may really think about some kind of rules

If standards are just “some kind of rules”, from a ministry’s point of view there is no need for international standardisation. Ministries and government agencies deal with rules all the time, and they are based on national legislation and political processes, not in consensus processes in international standards setting bodies. However, the 2011 goal for the Norwegian agency remains: “The Centre has contributed to development of international standards and specifications for learning technology (..) in cooperation with the sector and Standards Norway”.

In Table 2 we have summarised this case study in terms of Key Knowledge Sharing Points.

Table 2 Key Knowledge Sharing Point summary of Case study 1

Key Knowledge	Typology of standards; Affordances of International Standardisation; Standardisation as a expertise, e.g., how to deal with impenetrable expert lingo
Sharing Points (channels / translation nodes)	Budget documents; National implementation projects, e.g., digital exams, Learning Management Systems, basic infrastructure (Identity Management), Open Educational Resources & other technology innovation; Guidelines
Timing	Budget work/planning deadline; Organisational reshuffles; Technology ruptures

4.1.1 Discussion – Case 1

As one of the discussants remarked, it would be nice if the reasoning for why standardisation is a sensible thing to do had been done once and for all as a high level clarification. He found it arduous to argue in every project in favour of standardisation. The case study showed that lines of argument for the benefits of standardisation, held in a popularised form, had been a resource in the actor network

from the very beginning, even commissioned by the Ministry itself. This illustrates that availability of key knowledge is not in itself enough to make a difference. Two more conditions must be present in order to open up a node for translation. First, the key knowledge must be found in a strategic sharing point. In the case we are discussing, this sharing point may have been a budget or planning document. Even this is not enough, if not the last condition is fulfilled: timing. We see that common understandings are of little value if new actors enter the network. It might be new persons or organisations picking up the tasks, or it might be new adoption projects or new technologies entering the scene. In the case we have studied we see that the planning cycle of a governmental organisation is important for timing. However, if the timing and channels are right but the key knowledge is missing, we still have not got a Key Knowledge Sharing Point. International standardisation as a prioritised work item of the Norwegian agency is a case in point. The work item is acknowledged but lacks legitimacy because the key knowledge is not translated to the primary actors in the network.

The first case study demonstrated that timing is critical to be able to open network nodes that are black-boxed and not open for translation. What is the critical time in the process that relates to the technical qualities of a standard and influence what we have called product legitimacy? We would suggest that the stage when new work items are scoped would be critical. Therefore we have for the second case study chosen a dataset that consists of New Work Item proposals. Analysing data originating from the same process stage we should be able to gain more insights in the key knowledge part of the KKSP construct.

4.2 Case 2: In search for key knowledge in a proposals for new work items for standardisation

How do the new work item proposals address the purpose of the technical artefact that should be the outcome of the standardisation process? In the second case study we looked for exchange about how standards should be done.

The analysis show how guidelines and description templates guide the project description in the direction of the economic-political context, leaving out aspects more related to the domain, e.g., the pedagogical need for the standard.

Overall, methods for doing standards are understood by the authors of new work item proposals as execution of the consensus developing script that comes with the Workshop on Learning Technologies: formation of project team, presentation of drafts to the meeting, submission of interim reports, and finally publication of the Workshop Agreement. However, the approach towards both the design object and method is discussed indirectly in the proposals by relating the work to alternative standards or candidate standards for harmonisation, extension or profiling.

Table 3 summarises this case study in terms of Key Knowledge Sharing Points.

Table 3 Key Knowledge Sharing Point summary of Case study 2

Key Knowledge	Methodological approaches to standards development related to the domain and task
Sharing Points (channels / translation nodes)	New Work Item description; EU funding procedures
Timing	Scoping stage in standards development life cycle

4.2.1 Discussion – Case 2

By design the scoping phase of a new standardisation project is an important Key Knowledge Sharing Point. This is the time where all critical dimensions of a project are defined: aims, scope, project team, resources, time frame, etc. If these aspects are not sufficiently detailed and resolved the design, sense-making and negotiation processes will be strained with tasks not contributing to an efficient standardisation process. In the design of anticipatory standards this is especially important as this category of standards is often subject to scope creep (uncontrolled change of scope) as nobody is able to foresee what is needed in the future. The focus on funding instead of on the technical needs increases the danger of scope creeps.

The case study showed that the point of time was right, but the sharing context did not allow for the right key knowledge to emerge. Knowledge related to alternative methods of development and design was transferred as fixed or frozen artefacts, encapsulated in the standards the authors suggested as a starting point for the work. It is expected that the proposal clarifies what technologies on which the new solution will be built. However, if the base standards are not opened up for translation, the implicit methods will not be exposed. In the document analysis the base standards act as immutable mobiles rather than key knowledge objects under transformation.

5 Towards a prescriptive theory

We have seen that the multifaceted KKSP concept is useful studying crossroads in global innovation projects. The notion of a crossroad comes with an understanding of a choice between different directions. In the simplified model of the innovation process described by Tidd and Bessant (2009) the concept is particularly useful in the second stage of the process: *Select – what are we going to do – and why?*, the step that comes after *Search – how can we find opportunities for innovation?* However, a further development of the KKSP concept towards a prescriptive theory should give guidance on how to make a rational choice of direction. In the case of LET standardisation this should contribute to enhanced legitimacy for the activity.

Going back to the overall objective of standards the authors of this paper acknowledge that implementors and end users alike want to push into the background routinised actions that could be called by reference. We want systems “just to work”, not knowing what goes on behind the scene. However, sometimes when a system is questioned (e.g., the legitimacy breaks down due to errors or accusations that one particular interest is favoured by the standard, software, system or service) we want to check. And we want to make sure that new systems are based on sound principles. Therefore, on a regular basis, we need to be able to foreground the punctualised actants. The prescriptive steps we are searching for is the ones that let us identify and reopen the black boxes.

The actor network theory sees order always as a provisional state. Networks needs continual maintenance. This was demonstrated by both case studies. The first case study showed that Key Knowledge needs to be revisited again and again in order to mobilise the network. In the second case we observed that even if the network was mobilised (a team was making a proposal) translation of key knowledge was missing.

Callon (1986) have described the translation process in three steps that broadly correspond to the Design - Sense-making - Negotiation process Fomin et al. (2003) used to theorise about the standardisation process. These steps include Problematisation (setting up the objectives, identifying actants, etc.); Intersement and Enrollment; and Mobilisation. Problematisation includes an identification of one or more Obligatory Point of Passage. In an actor network concerned with LET standardisation some actors may have a position that gives them a disproportionate influence on the problem definition, e.g., certain stakeholder groups or in the case of the new work items in the CEN group, the European Commission. The KKSPs are definitely found in Obligatory Points of Passage. However, these are concepts of different granularity. We would assume that KKSPs could be found all over the network, depending a network node is opened for translation. The interesting perspective

arising from analysing the KKSP concept in relation to the process stage of Problematisation is that it gives us an idea how we could further develop the concept in a prescriptive setting.

6 Conclusion

In this paper we have explored a new concept of Key Knowledge Sharing Point as a contribution to the methods development within a subdomain of global technology innovation. The concept is constructed as the intersection between Key Knowledge - Key Sharing Point - Key Timing. We have done a first validation of the construct in two steps, applying the concept in the context of setting up a process, and in the context of defining how the process should be designed.

We have used the KKSP concept to describe key characteristics of processes. However, our aim is to come up with a concept that has prescriptive qualities, i.e., a concept that contributes to steer the activity in a more optimal direction. To achieve this we need further studies where the KKSP concept is used by actors to inform actions. This transformation from using a construct as an analytical lens to applying it as an heuristic is ripe with methodological challenges. In this paper we have just indicated where to start this further development, using the problematisation and perspective primitive *why* as the entry point. The *why* question relates to all aspects of the KKSP concept, and could also be applied as negation, *why not*. *Why* could be asked to extract key knowledge. *Why not* could be used to identify KKSPs where key knowledge is missing.

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