

A Model for Context-Sensitive Transfer of Expertise

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Abstract: This paper introduces the LIR-Schema, a framework to model knowledge flows within a company based on model-theory. Competence management is integrated in this framework as a tool for modelling the contexts of sender and receiver of expertise. The main target of this framework is to reduce the knowledge gap between experts and laymen within the company.

Keywords: Competence-management, transfer of expertise, knowledge-transfer, LIR-Schema

Categories: M.4

1 Introduction

This paper discusses the topic of sharing expertise within a company. It will give you an idea, why it is difficult to share expertise and sketches a model that helps to ensure that expertise can be transferred in the company. The authors of the paper work in the field of knowledge management and have already conducted several structured interviews with managers responsible for knowledge transfer processes and/or human resources in different companies in Austria ranging von 200 to 1000 employees. These interviews indicated a major problem with designing the process of expertise transfer. The interviewees located a loss of quality of expertise during the transfer-process.

The authors of the paper derived a need of frameworks for context-sensitive knowledge transfer within companies. Probably the LIR-Schema enriched with competence management can outline such a framework. In what follows the authors first describe the LIR-Schema and the some required basics of competence management. Afterwards these two buckets are combined and the benefits of this integration are illustrated.

The approach is based on a model of knowledge transfer and representation that itself is based on model-theory. This is the LIR-Schema (*Language-Information-Reality*) which is illustrated in Figure 1 [Born 1987; Born 2000b; Born 2000a; Born and Danielczyk 2007]. The initial point of the LIR-Schema is an analysis of language in relation to information and reality but can be extended to a general framework for the analysis of correlation of representation, knowledge and world.

The LIR Schema contains four roles in the knowledge transfer process which are embedded in the two dimensions representation and reality. Furthermore you have to differentiate between the left side (structures) and the right side (processes). The left

side shows the static and explanatory side whereas the right side shows the dynamical and operative elements.

The main objective is to get a better understanding of the generating, creating and transferring of knowledge especially the transfer of expertise with the help of multi-component semantics according to the philosophy of science see [Born 2000b].

The main quadrants show the different roles that are involved in the process of transferring knowledge. There are the expert's role (E), the layman's role (F), the calculus (C) and the meta-knowledge (M).

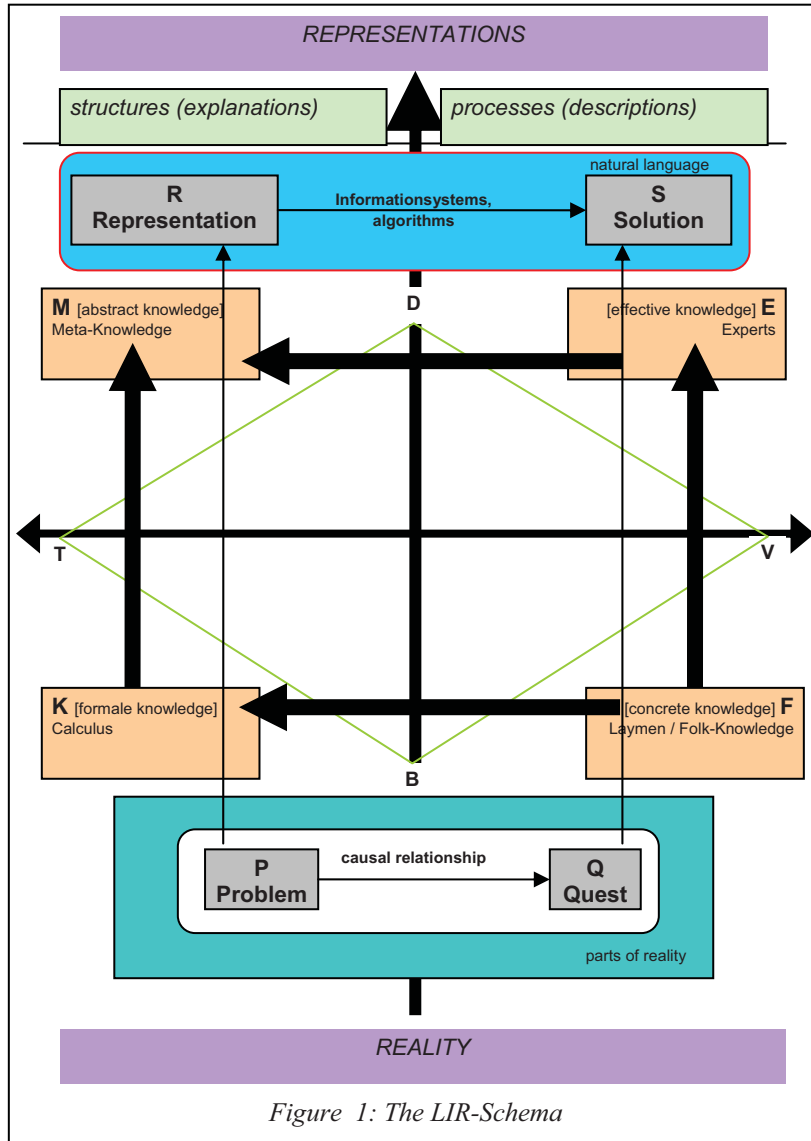


Figure 1: The LIR-Schema

If you try to illustrate the procedure of reproducing a solution of a special problem in the real world (the transition from the Problem P to Quest Q in the LIR-Schema) you have to make explicit the components which represent the background-knowledge of the individuals who are involved in the process of sharing knowledge.

An important aspect is the splitting of the total area in a part above the middle and one below the middle because in the top part, there is a logical deduction whereas in the bottom part there is a temporal deduction of the solution.

The LIR-Schema addresses the main-problems of knowledge management systems, that act in a way that McElroy and Firestone capture with the term *first generation knowledge management* [Firestone 2001a; Firestone 2003; Firestone and McElroy 2003a; Firestone and McElroy 2003b; McElroy 2003]. First generation knowledge management means that the experts' knowledge (the E-role in the LIR-Schema) is just codified, digitalized and stored in databases. In terms of the LIR-Schema the Experts document their knowledge. This is stored in a database-system. The knowledge is transferred from E to C. C now acts as a kind of experts system for the laymen (F). The laymen just act according to the given rules in C, yet they do not understand the deep rooted sense in these rules. First generation knowledge management was misused for eliminating the experts (many thought, the whole experts knowledge is stored in the rules in C). Yet in this state the system is stuck. Every time when there is a case that doesn't fit into the given rules it is considered as defective work because the laymen do not have the required background knowledge to interpret the case and generate an innovative solution. According to the LIR-Schema there are only the roles C and F involved. This way knowledge transfer work like an assembly line. Everything that doesn't stick to the rule is considered as defective work. The only Mantra is: never stop the assembly line. The work of Deming at Toyota showed that the assembly line should be stopped every a time a failure occurs and the root of the failure should be retrieved to improve quality.

Firestone and McElroy reclaim that this kind of knowledge management is just another information management concept because it deals with information and not with knowledge. The LIR-Schema shows that individuals in the role of experts produce a different set of solutions using the formal knowledge from the Calculus (C) than the individuals in the role of laymen would do. These two sets are equivalent in an average realm, yet problems arise in the periphery. These peripheral spots are the origins of new knowledge and innovative energy. Therefore we have to bestow consideration upon this peripheral spots.

2 Problems with the transfer of expertise

The main target of knowledge management within a company is, wide spreading the experts' knowledge within the company. Ideally the laymen have the same knowledge as the experts. Nevertheless in reality a gap arises between the knowledge of the experts and the layman. (*Mind that "expert" and "layman" are roles in the knowledge transfer process. The same individual within the company can occupy different roles in different knowledge processes.*) This knowledge gap is illustrated by

the distance between the experts' role (E - Experts) and the laymen's role (F – Folk-Knowledge) in the LIR-Schema (see Figure 2)

This knowledge gap exists for different reasons. One of them is the difficulty of transferring knowledge, due a different background or context of the participants. Usually the way of solving a problem is codified in a special formalized way. Yet the person who documents the case only documents, what he or she thinks is important. These important facts are those that were important because of the context of the documenting person. There may be aspects that would be important to another reader with a different background, but they were not documented. In this way the documentation is less worth to the reader. To minimize these problems the people in the role of experts and the people in the role of laymen should communicate more intense. Nonetheless the communication is the most difficult part of the knowledge transfer process. For example nurses have a lot of practical knowledge in dealing with patients and in diagnosing kinds of illnesses whereas doctors have expert knowledge and knowledge in the theory of illnesses. In the sense of knowledge and expertise transfer the two parties should communicate and exchange knowledge for better mutual understanding an improving the treatment of patients. Yet there are different cognitive and motivational factors that affect the willingness of knowledge-sharing. Hinds and Pfeffer argue that *“there are deep-rooted cognitive and motivational limitations that interfere with people's ability to share their expertise.”* (see [Hinds and Pfeffer 2002]) In the case of nurses and doctors there are different barriers. One of them is a motivational or social factor because doctors usually have a higher social reputation than nurses due to their academic degree and longer studies. For removing this barrier different training from the field of soft skills could improve the situation. Another barrier is a contextual. Generalizing nurses are practitioners (laymen in the sense of the LIR-Schema). Their problem approach is patient-oriented. Generalizing doctors are experts. Their problem approach is coined from their studies of medicine, they are Science-oriented. The gap between these two groups also arises because of the different contexts. Another example for the impact of different contexts could be the use of context-specific vocabulary. If you are able to model the context of the people participating in the process of knowledge sharing and generating, it's easier for them to understand and interpret the knowledge of the other party.

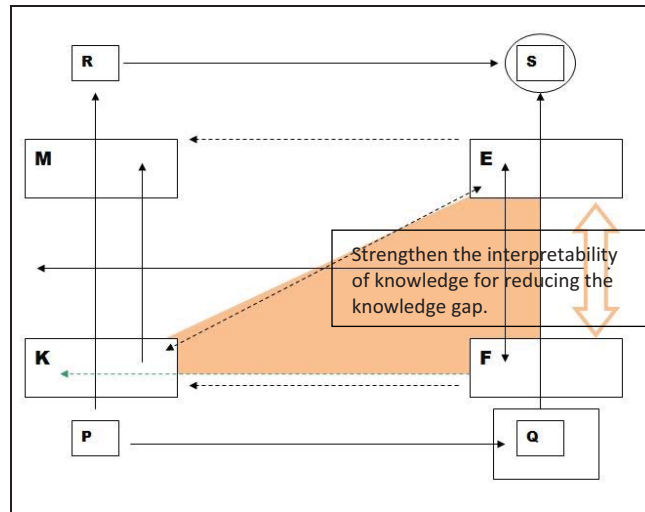


Figure 2: The knowledge Gap

Generally speaking, the main reasons for the knowledge gap are limitations in the transfer of knowledge. These limitations could be minimized by establishing a common ground between the expert and the layman respectively between the sender and the receiver of the expertise.

3 Striving for a solution

Neglecting the fact, that this model of the transfer of expertise is a generic model that's not bound to a specific software system the use within software can be promising. If a knowledge management software tool should be successful, it must be capable of minimizing the knowledge gap within the company and help to simplify the transfer of expertise. To do so, the tool must consider the context of the sender and the context of the receiver – this is what the model does.

This context is summarized in M (the Meta-Knowledge) within the LIR-Schema. The Meta-Knowledge describes what makes the experts successful. This description contains the context in which the knowledge was created and the background knowledge of the participants. The main challenge is to find a way to model such a context. One approach could be the use of the methods of competence management to model the individual's background. For this reason the following section covers some basics of competence management and how it's integrated into the LIR-Schema.

4 Competence Management

This paper shouldn't give a deep insight in the methods of competence assessment. The reader interested in the topic of competence assessment is referred to [Bergenhengouwen, Horn ten et al. 1996; Bellmann 2002; Erpenbeck and von

Rosenstiel 2003; Rosenstiel, Pieler et al. 2004; Zelewski, Alan et al. 2005; Bergmann and Daub 2006; Jochmann and Gechter 2007] for a deeper insight in the assessment of competences.

To give a short introduction in the field of competence assessment we have to distinguish between self-assessment and external-assessment of competences. Self-assessment means that individuals rate their competences by themselves whereas external-assessment means that the competences are rated by another person (mostly the superior of the individual person). Both practices have different advantages and disadvantages. Therefore the methods should be combined to get a good understanding of the competences of the individual.

With the help of the assessed competencies it's possible to model a network of competences for each person within the organization (it's also possible to do this for external persons – e. g. customers, suppliers, etc). These individual competences are aggregated to an individual competence-profile.

This competence-profile forms a strengthened Meta-Knowledge about the contexts of the individuals participating in the knowledge transfer process. With this stronger M it is possible to enrich and represent expertise with context. This means the context of the sender and the receiver of expertise can be encoded into the problem-solving algorithm. (The transition from R to S in the LIR-Schema)

So especially information and communication systems using a strong Meta-Knowledge M to enrich expertise with context are capable of presenting meaningful knowledge to the receiver. The knowledge receiver can interpret the knowledge in an easier way. This makes systems able of sense making [Weick 2001] for the interacting individuals. Now individuals are able to interpret expertise in an easier way. This supports the transfer of expertise. This way of sense-making should help enterprise to minimize the knowledge gap and support the dialogue between the roles Experts and Folk-Knowledge within the LIR-Schema.

The integration of methods of competence management into the LIR-Schema enriches the possibilities of transferring expertise by adding a component that is able to represent the context of the sender and the context of the receiver. This representation can be processed automatically by information technology. So the integration enables information technology to represent expertise according to the specific needs of the users.

5 Future work

There has to be done future research work about the way, knowledge can automatically be adapted to different contexts and this functionality can be successfully used in information and communication systems.

Therefore, further research should be conducted in the field of context-sensitive knowledge transfer. Case studies should show how the framework of sharing expertise and knowledge that was presented in this paper can be best adapted to the requirements of practice and how these theories can be combined with existing theories of representing knowledge in an adequate way.

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