Transferring R&D knowledge in a partnering relationship

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Abstract. In this paper a case of a software R&D knowledge transfer process is briefly described and the qualitative case data is analysed using a framework of nine factors affecting the success of an R&D knowledge transfer process. The usefulness of the framework for the use of companies doing knowledge transfer projects is also discussed. That kind of a framework could be very useful tool for companies attempting transfer knowledge either internally of with another company. The framework provides a good starting point for companies to plan and analyse the success possibilities of a knowledge transfer process.

Keywords: Knowledge transfer, R&D, partnering.

1 INTRODUCTION

Transferring technical knowledge between companies engaged in an R&D partnering relationship is challenging. To make the knowledge transfer process to succeed it is important to be able to transfer codified as well as tacit knowledge [1] [2]. Both parties of the transfer process need to work actively together to e.g. understand where the actual knowledge resides. They also need to share a similar kind of knowledge base [3]. In principle, knowledge can be transferred by e.g. moving the networks in which knowledge is embedded; however, that is not easily accomplished in practice even inside a single company [4]. A significant amount of knowledge in a company, especially tacit knowledge, is embedded in its individual members [4] and thus moving employees is seen as a powerful mechanism to facilitate knowledge transfer [5][6] also when transferring knowledge between companies [5]. The other main method used for knowledge transfer is to somehow modify the knowledge reservoirs of the recipient unit, usually by communicating or training the other party [4]. The various components of knowledge are interdependent and that inhibits the transfer process [7].

Cummings and Tenn [3] in their research of transferring R&D knowledge present a framework of nine factors that affect knowledge transfer success between companies. They argue that knowledge transfer success depends on *knowledge articulability* (how knowledge can be verbalized, written, drawn or otherwise articulated; knowledge that is articulable is easier to transfer than knowledge that is not as articulable), *knowledge embeddedness* (knowledge may be embedded e.g. in people, tools and organizational routines and best practices, and also in multiple elements and subnetworks, such as a cluster of individuals who work together), *organisational distance* (when the parties are close to each other, such as in strategic alliances or networks, it is more effective to transfer knowledge), *physical distance* (how easily the parties can get together face-to-face), *knowledge distance* (how similar kind of base knowledge the parties have – the more similar it is the easier the knowledge transfer is), *knowledge norm* (how similar the organizational culture and value systems the parties share), *learning culture in companies* (when companies have positive and tolerating learning culture and have a set of routines for learning, transferred knowledge is richer), *transfer project priority* (what is the relative importance of the transfer project to the R&D unit), and *transfer activities* (the more the parties have different activities concerning the knowledge transfer the more probable it is that the transfer results are good).

In this paper knowledge transfer process of an empirical case is presented and the data is briefly analysed using the framework introduced by Cummings and Tenn [3]. The usefulness of the framework for the use of companies doing knowledge transfer projects is also discussed.

2 MATERIAL AND METHODS

The case customer company in this study is Nokia Corporation and one of its independent business units, Nokia Networks/IP Mobility Networks. Nokia Corporation is the world leader in mobile

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communications: it is the world's number one manufacturer of mobile terminals, owning about 30% of the world's mobile terminal markets and is also a leading provider of network infrastructure, service delivery platforms and related services to mobile operators and service providers. Nokia has its headquarters in Finland, is listed on five stock exchanges (Helsinki, Stockholm, Paris, Frankfurt and New York), and employs approximately 51 000 people. The company has 16 manufacturing facilities in 9 countries, and R&D centres in 11 countries. The Nokia Networks business unit (NET) of Nokia Corporation is a pioneer in telecommunications network infrastructure building. NET develops telecommunications equipment for the GSM family of technologies (GSM, EDGE and UMTS). (http://www.nokia.com)

The case partner company is TietoEnator. With its close to 12 000 employees (2003) TietoEnator Oyj is the largest IT services company in the Nordic countries. TietoEnator has its headquarters in Finland, is listed on two stock exchanges (Helsinki and Stockholm) and is active in more than 20 countries. (http://www.tietoenator.fi)

At the end of the year 2000, Nokia Networks/IP Mobility Networks' top management made the decision to outsource some parts of the mobile core network's software R&D. The intention was to find a strategic software R&D partner for the business unit. The company's internal preparation work for the outsourcing started in January 2001. First contact with possible partner candidates was made in March 2001 and negotiations with the candidates started in May 2001. An outsourcing agreement was signed with TietoEnator in August 2001. 318 employees were to be transferred from NET/IMN to TietoEnator together with a corresponding amount of work from four different Finnish NET/IMN sites. After the business transfer the companies continued collaboration in a partnering mode.

Originally knowledge was transferred between the companies by transferring the employees from the customer company to the partner company. However, some time after the beginning of the collaboration it was necessary to expand collaboration and transfer some new work to the partner without transferring any employees. The latter transfer process is analysed in this paper.

In the study the formation phase of the outsourcing partnership was followed as well as management of the relationship for the first two years. A case study method combined with a qualitative approach was chosen for the research method. To investigate the case, a series of in-depth interviews with 24 participants from the customer company and 9 participants from the partner company were conducted. All the interviewees were in a managerial position. Included was couple of the top management representatives from both companies. All the interviews were tape-recorded and transcribed. For validation purposes, after each transcription, a more fluent description of the interview was written and sent to the interviewee in order to check the correctness of the interview report and to give them the chance to add further thoughts on the subject. In some cases some additional questions were asked also. The duration of the interviews was typically between one and one and a half hours. The interviews were conducted as theme-centred interviews – all the interviewees were presented several open-ended questions about the themes central to the study and we discussed the subjects rather freely.

3 FINDINGS FROM THE CASE

In this chapter the knowledge transfer process between the case companies is described and after that follows a brief analysis of success possibilities of the case based on the framework provided by Cummings and Tenn [3].

3.1 The knowledge transfer process

During the outsourcing negotiations and relationship establishment phases the case companies did not see a need for a separate knowledge transfer plan, as knowledge transfer took place in this outsourcing case through the transfer of competent employees to the partner company. However, some time after the beginning of the collaboration it was necessary to expand collaboration and transfer some new work to the partner without transferring any employees. This presented a new challenge even though both companies already had experiences in this kind of knowledge transfer.

The partner company needed to hire new employees to do the new work. The new employees were chosen based on their previous experience of working on telecommunications sector. When the new employees had been hired the actual knowledge transfer began. Different methods were used: training sessions, self-training, and learning by doing in laboratories working side-by-side with experienced employees from the customer company. Usually a basic general training course concerning the GSM network was needed, as well as some more specialised customer company internal courses on the products. Training sessions on processes, methods, and applications were also needed, including information about

where to find the documents and other material needed to carry out the work.

A series of knowledge transfer plans was created for different transfer needs. The plans included the following items: description of the transferred work; list of contact persons; description of what kind of competence the partner employees should have prior to the competence transfer; some estimates of the resource requirements of the transferred area – how much work is usually required, an estimation of the number of employees needed in different roles based on the estimated amount of work in the future; list of equipment needed for testing purposes in laboratories, induction/training plan - what kind of training is arranged for the new partner employees, by whom and when; schedule for the competence transfer; the actual plan of how the competence transfer is to be carried out; and resource allocation ramp-up/ramp-down – recruitment plan for the partner company (for new employees needed for the transferred work) and plan for the customer employees who are released to do some other work (when they will be released, and for what work).

Also, a personal training plan was created for every trainee and each trainee's situation was followed up regularly. The companies had regular meetings where they reviewed the competence transfer situation in general and every trainee in particular.

At first the partner company employees used the laboratories and test equipment in the customer company but when they were competent enough to take total responsibility for testing, the environments were transferred to the partner company's premises.

When the knowledge transfer was being planned, a three year transfer period was discussed. However, the customer company had earlier experiences of knowledge transfer and these experiences had shown that a period this long does not work very well. As the main responsibility for the work remains in the customer company during the transfer period, the employees of the customer company cannot move on to do other work. And as long as the partner company does not have total responsibility for the work they will not really know how to do this work and manage with it:

> *"It is not possible to do a hundred per cent [knowledge] transfer – at some point the game just has to be stopped, and total responsibility has to be transferred to the partner. After that the partner employees ask lots of questions, then, slowly, the amount of questions decreases, and eventually the questions end."* (Customer representative)

Thus a one year period was used for the knowledge transfer. Both companies felt that this period was probably the minimum time needed as it also included the recruitment of the new employees to the partner company. Still, this was an acceptable time in which to carry out the transfer. After the one year knowledge transfer period, the customer company still had some employees nominated as support persons for the transferred work. The goal was for the need for the support to diminish slowly, and to end in one or two years.

Even though the employees hired by the partner company were competent individuals and quick to learn, it takes years to really understand the area:

> *"It often looks like the [knowledge] transfer was very successful but when some unexpected troubles arise, it can be seen that only the superficial knowledge has been transferred and the deeper understanding is still missing."* (Customer representative)

Problems arose from the different ways of organising the work within the companies: in the customer company many of the lower level managers are often also important technical specialists. In the partner company, however, the managers were not able to hold such dual roles as they had too much actual managerial work. This caused difficulties in the knowledge transfer as the company culture had to be changed.

The organisers of the knowledge transfer had, at the beginning of the knowledge transfer activity, discussed the possibility of carrying out the activity as a project. The idea was considered a good one, but it never became reality. Instead, the transfer process was carried out as single tasks, run jointly by the customer company competence areas owning the knowledges to be transferred, and the partner company areas receiving them. There was, however, a centralised management for the knowledge transfer. Still, it was problematic that the roles and decision-making power of the actors were not very clear in the customer company. Some interviewees felt that if they needed to find something out, they did not even know who to start asking. Also, because of the nature of the process, they needed to make decisions without having the actual power to do so. This caused uncertainty and ineffectiveness during the activity. These problems may be due to the large number of different actors. Still, carrying out the knowledge transfer as a project might have lessened these problems. There were fewer such problems in the partner company, possibly because this type of activity is very familiar to them.

To monitor the process of knowledge transfer, the companies had weekly meetings where the

managers of both companies discussed current problems and agreed necessary actions. They also had some planning days during which they could go through the situation, discussing openly the strengths and weaknesses of the transfer process. Both companies collected feedback from the employees who participated in the transfer process; how it was going, how the trainees seemed to be learning the new skills, how the trainers were managing to teach the trainees, etc. This was considered very fruitful and useful.

The organisers of the knowledge transfer also considered what kind of knowledge should be sustained in the customer company in order to be able guide the partner in the right direction and to have some control over and understanding of the work. As well-defined sets of activities were to be transferred to the partner to carry out, this issue was resolved by naming specialists in the customer company system who were responsible for maintaining up-to-date knowledge on the transferred products and competences. There was no previous experience of this kind of arrangement in the customer company and thus the interviewees were interested to see how this would work out in the long term.

On the whole one of the interviewees said that the customer company had been satisfied with the knowledge transfer process and its results so far. However, he commented:

> *"If employees' feelings etc. were not considered at all, the slickest solution would have been, again, to transfer to the partner company both the work and the employees doing it. The work is based on experience – only after two years of work is one able to manage these tasks totally by himself. There are employees who have gathered such an experience base during ten years of work that it cannot be transferred to some other person. Hence the slickest solution would have been to transfer the employees."* (Customer representative)

3.2 Analysis of the case success possibilities

Using the framework provided by Cummings and Tenn [3] it is possible to assess the success probability of the knowledge transfer process:

Knowledge articulability. Problem with the transferred knowledge was not as much the knowledge articulability but the sheer amount of the knowledge. Big amount of the 'raw' knowledge was already in written format and in addition to that the companies e.g. arranged courses, hands-on trainings, and arranged the work so that 'newcomers' were working side-by-side with the experienced personnel. However, some parts of the transferred knowledge needed very extensive understanding of the GSM network. That kind of knowledge accumulates during years of working and it is not possible to transfer it to another person in a short timeframe.

Knowledge embeddedness. The customer company used rather well-documented processes for the work and the partner company mainly used the same processes even prior to this knowledge transfer case to make it easier for the companies to co-operate and communicate. The case companies had realised there was knowledge embedded in processes and intention was to transfer that knowledge as well; however, I have no data of how that succeeded.

Organisational distance. The case companies worked in a close partnering mode. The partner company used the same tools and processes as the customer company.

Physical distance. Knowledge transfer was needed in two sites. On one customer site the transfer was made between the local partner site, on the other customer site the transfer was made both to the local partner site as well as to another partner site situated several hundred kilometers away from the customer site. Contacts in the local transfers were regular both between the developers as well as the managers and those transfer processes seemed to work rather well. The transfer to the farther partner site was more problematic. Partner company employees came to work to the customer company site for some time periods and customer company representatives were also sent to the partner site to train the partner company employees. However, the transfer did not proceed as well as was expected. The interviewees were not able to point the reasons for that but suspected that the physical distance was part of the problem but that there were probably also some other reasons for the problems.

Knowledge distance. Personnel in both companies had rather similar kind of knowledge base and they agreed that that helped the process significantly.

Knowledge norm. When a partner company was looked for during the outsourcing process the criteria set to the partner candidates included the organisational culture similarity. The interviewees seemed to think that organizational culture did cause very little problems. The only problem they mentioned was the difference in roles of low level managers – in the customer company they were also important technical specialists whereas in the partner company they handled mainly managerial work.

Learning culture in companies. The case data did not include enough information to be able to validate the learning cultures of the companies.

Transfer project priority. For the customer company the knowledge transfer had a big importance as it

would result in freeing their own personnel to do some other work, and the managers responsible for the transfer process spoke very highly of it. However, the case data was not extensive enough to tell what the relative importance of transfer activities was in everyday work and how the designers saw the importance of the process.

Transfer activities. The companies had relatively big amount of transfer activities ongoing including at least the following: training sessions, self-training, learning by doing, training courses, employees changing locations to work on customer company site and vice versa, and different types of managers' meetings.

The case was not followed long enough to get data of how successful this knowledge transfer case appeared to be once the transfer process was over. However, based on the brief analysis above, it seems that the transfer process had rather good possibility to succeed as the companies had in some way covered all the elements of Cummings and Tenn's [3] framework I had data of.

4 CONCLUSION

Knowledge transfer between companies demands active work in both companies. Various factors affect the success of the process. In this paper I have briefly described a case of a software R&D knowledge transfer process and analysed the case data using Cummings and Tenn's [3] framework for the success of an R&D knowledge transfer process. That kind of a framework could be very useful tool for companies attempting transfer knowledge either internally of with another company. The Cummings and Tenns's framework provides a good starting point for companies to plan and analyse the success possibilities of a knowledge transfer process even though it has not been planned to be used as such a tool. However, the framework would be even more useful if it provided some more practical examples of the different elements of the framework.

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