Managing the Experience in IT R&D Department

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Abstract How to manage the experience in IT R&D department is vital for the IT company. The primary purpose of this paper is to probe into the natural character of the experience in IT R&D department, and put forward the strategy of how to manage it. The research on the strategies is applied in a mobile phone game software company to further validate its efficiency. The results indicate using the strategies of “a learning history” and “dynamic knowledge map” can improve the performance level and more attentions should focus on the relationship between people and how to communicate.

Key words experience; procedural; tacit; knowledge management; IT R&D department

Innovation can help IT firms to build and sustain competitive advantage. Innovation has become increasing complex, costly and risky because of changing customer preference, extensive competitive pressure, and rapid and radical technological change. Innovation depends on knowledge, especially on the experience, which is unique for a firm.

More and more companies have invested in knowledge management to leverage own experience and acquire better market information[1]. But the result of the investment is uncertain and ambiguous. On the one hand, it reduces waste, accelerates processes, and increase customer satisfaction[2]. On the other hand, it can “blind” team members and stifle innovativeness[3].

The failure coupled with the increasing capacity of new service product development teams to utilize from experience and acquire market information underscore the importance of understanding how firms can benefit from these knowledge resources.

The first step to know how to manage knowledge is to explore the nature of knowledge in IT R&D department.

Because of the orientation toward unique project, much knowledge in R&D is experience-based.

Experience is the gaining of knowledge or skill that comes from practice in an activity or doing something for a long time rather than from a book. Fleiner considers the experience of the organization is the lesson and knowledge from what have experienced in history. The experience come from the practice, is the accumulation of the information and knowledge of what have happened. And the experience is not systemic and standard. To probe into the nature of experience, it is procedural and tacit.

1 Character of Experience in IT R&D Department

1.1 Procedural vs. Declarative

According to the cognitive psychology, the knowledge can be divided into procedural knowledge and declarative knowledge.

The procedural knowledge is about how to achieve the goal, is the pattern sequences of learned behavior. It has two implications. First, when people acquire procedural knowledge, they will acquire the cognitive skills or sets of productions. The sets can help people to think, solve problems and make decision. But the knowledge can only be used in particular domain. For instance, in the context of new product development, it includes routines for team cooperation, project milestones, or skills in predevelopment market assessment, prototyping, concept testing and market launch[4-5]. Second, the procedural knowledge is automatic[6]. People can use it unconsciously.

The declarative knowledge is about what it is. It is the knowledge about fact, events, or propositions. For declarative knowledge, it has two implications. First, it can be acquired consciously. It can be used for analyzing the new problem[7]. For instance, cause and effects, the similarity to the past event and the suitable response to the problem[8]. Second, the declarative knowledge can be used in general not committed to a
specific use.

In view of cognitive psychology, the experience should be classified into procedural knowledge.

The research indicates the different knowledge have the different effects on product development. There exists an invert U-shaped relationship between procedural knowledge and the result of new product development.

Too low procedural knowledge will make the development process ineffective. Lacking necessary rule will make the employee confused. But too much procedural knowledge will impede the development. The predetermined routine is just like a perceiving filter making the designer neglect the new need of customers and the new trend of competition. So the market will not accept the product. And the predetermined routine is always automatic which is the key factor for impeding the creativity. The moderate procedural has the highest level. The employee will benefit from the increasing experience but not fixed in thought.

The meta-analysis study indicates that there exists no U-shape relationship between the declarative knowledge and product result[9]. The detail and abundance of declarative knowledge can help the employee to choose the right way to adapt to the market. Consciously using the declarative knowledge can facilitate the new way to solve the problem.

In fact, the company did not distinguish the two kinds of knowledge. The company not only codifies the declarative knowledge in detail, but also emphasizes too much on codification the practice and experience to form the rule and tips. In this way, the procedural knowledge is solidified and forms the fixed thinking and perceiving filter to lower the creativity.

Since the main knowledge in the IT R&D department is experience-based which is procedural, it should not be codified in detail that will harm the creativity.

1.2 Tacit vs. Explicit

There are two kinds of knowledge: tacit and explicit. According to Polanyi’s definition, tacit knowledge is highly personal, context-specific, and therefore hard to formalize and communicate. Tacit knowledge is knowledge housed in the human brain, such as expertise, understanding or professional insight formed as a result of experience. Explicit knowledge, on the other hand, refers to codified knowledge that is transmittable in formal, systematic language and is easily transferred by using Information Technology[10].

The nature character of experience is tacit. Tacit knowledge represents knowledge based on the experience of individuals. Usually it is difficult to express tacit knowledge directly in words, and often the only ways of presenting it are through metaphors, drawings and different methods of expression not requiring a formal use of language[11]. Tacit knowledge is more valuable as it is hard to acquire (in the market) and it does not easily leak to competitors due to its low permeability[12].

Reber regards there are two patterns to learn. One is explicit learning, which needs efforts and strategies to learn. The trait of the learning is its conscious and explicit processing. The other one is implicit learning; people do not realize the rule, but grasp the rule in some degree. The implicit learning can acquire the complicated knowledge of the stimulation. It is automatic, abstract and comprehensive[13]. In fact, whether using the explicit strategy or not, people will represent the material and acquire some rules just by paying attention to.

To grasp the experience knowledge, we should use the implicitative learning. The experience knowledge is difficult to induce the rule and limited to the expression. We cannot just follow the traditional way to learn: first, sum up the knowledge; second, systemize it then learn it in the explicative instruction. For the experience knowledge as tacit knowledge, it should be learned in implicitative way. When the rule is ambiguous, it is better to learn in implicitative way.

Encouraging the subjects to find out the rules that are impossible to be found out will be harmful. It will force the employee to induce a false rule and response in ill-suited way[14].

Knowledge management of experience should emphasize the importance in providing more information but not forcing the employee to find out the rule.

2 The Way to Manage Experience

According to the two significant character of experience in IT R&D department, two ways to manage it are advanced.

2.1 A Learning History

Art Kleiner and George Roth advanced a tool named “a learning history” to facilitate learning from the experience[15]. It records the important events
happened recently. Every event is recorded in two columns. One column records the descriptions of the related persons who involved in, observe or affected in the event. The other column is the analysis by the learning history experts who either are the trained experts outside the organization or experts having rich knowledge inside the organization. The experts identify the repetitive occurring cues, advance the questions and list the problem that is undiscussional. Finally conclude the experience and systemize it by discussing the problems again and again with the person who is involved in the events. This tool is useful and adopted by many giant companies such as GM.

A learning history is useful but also has the defaults in itself. Firstly, the limitation of language and unconsciously knowing how are the obstacles for expression. Secondly, the events is experienced by the employee but explained by the experts. Sometimes the explanation is so personal and empirical. In fact, some of the narration of the employee is so ambiguous that result in false conclusion. So the better way is not to conclude but let the employees think it by themselves. But the experts always analyses everything converting tacit knowledge to explicit knowledge. The knowledge became static when tacit knowledge is made explicit through language.

The key to make the tool effective is to find out what should be codified and what should not.

The experts can codify the declarative aspect of experience as detail as possible but should only pay attention on the basic procedure, the identification of milestone in phrase. We can use this tool only to find out the key experience about the process.

2.2 Dynamic Knowledge Map

Knowledge map typically points to people as well as to documents and databases to enable a person to find an appropriate knowledge source. Furthermore, knowledge can be seen as a cultural product. It is the networks of people who meet and work with each other that often cause knowledge to migrate and be created. Jeong-Han Woo advanced a dynamic knowledge map that is a web-based knowledge navigator searching for experts and facilitates communication with the experts by using Internet Technology. Logging into dynamic knowledge map, the employees would search for an expert with the relevant knowledge, and will connect with him in real time by using instant messaging, e-mail, telephone, or Internet conferencing. So the employee will receive direct experience help from an expert, and learn it in an implicative way to benefit from it. Furthermore, Pinto also argues that the modern communication technology, such as electronic mail, is impersonal means of communication and often details, confidential issues and idiosyncrasies of message hindering their effectiveness. So the key point of application of this method is to provide the information about who own the knowledge needed and encourage the employee to communicate face-to-face as much as possible.

3 Case Analysis

Our research investigates a mobile phone game software company named Siying in southwest china. It was set up in 2004 and now it has 32 employees. The projects of the company as follows: client port developing, service port database system developing and backstage management system developing. Before we studied the small company, it has developed 5 games and sold it successfully. We studied the company for 4 months, attended 18 meetings and investigated all the employees.

First, we applied the “a learning history”. We investigated the employees developing the game, wrote down every details of the process of the development. Then we worked with the experts (the researchers and the majordomo of the technology) to find out the key steps and points of the whole developing process. We also wrote down the necessary background knowledge of the whole developing process. We put the result on the intranet. And required every employee involved in developing software should learn it.

Second, we applied the dynamic knowledge map. We designed the website. Everyone can easily find out what others have taken part in what kinds of software developing before and the way to contact with.

Third, built and supported the knowledge infrastructure, by giving opportunity, space and resource to those wishing to interact and collaborate.

We analyzed the data collected and compared the expected time and actual time of developing the game. The expected time was based on the similar project and the mean time of the same size companies in the industry. We compared the time in three phases of developing, as shown in Tab.1.
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To explore the data deeply, we investigated the employees and tried to find out the real reasons. We find out there are several reasons: first, already known the basic process of the development, the employees feel more easy and confident to start the work, especially for the new employees; second, the employees having different backgrounds have the difficulty in communication. Since the difference in subjects, the game designer, programmer, music producer and graphic designer took a lot time in trying to understand each other. The “a learning history” records the basic knowledge of each field. The employees can read the record and know the knowledge of other fields. And it can facilitate the communication; especially the programmers can understand the requirements more accurately and clearly. Third, easily finding the person who has the experience in similar project and encouraging the employee to communicate face to face can also facilitate the whole process.

Face-to-face interaction is considered the richest medium because it allows simultaneous feedback so that understanding can be checked and interpretation corrected. It also allows simultaneous interaction of multiple cues, including body language, facial expression, and tone of voice, which convey knowledge beyond the spoken message[17]. In fact, the face-to-face communication also can enhance the relationship between people. The intimate relationship can facilitate the transfer of tacit knowledge that is complex and difficult to be codified[18]. The experience is tacit, difficult to be codified, and can be learned implicitly through the intimately interaction. And the intimate relationship can build the trust that is necessary for a person who wants to share his experience[19]. Moreover, the relationship-specific heuristics and specialized language developed between strong ties are conductive to conveying complex chunks of knowledge[20].

4 Conclusions

Experience is vital for IT R&D department. How to codify and transfer the experience is extremely important for the company. Experience management is based on the understanding of the nature of experience.

The experience has two prominent characters: procedural and tacit. The procedural aspect requires that we should not codify every detail of the process that will harm the creativity. The tacit aspect requires that the transfer knowledge should not focus on technology-based but focus on people-based. The advanced technology should provide the information about the people with whom to communicate. And the more attention should focus on the relationship between people and how to communicate. The tacit aspect also requires that we should use the implicative learning to learn tacit knowledge, which will be more congruent with the nature trait of experience.

References

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