Indicators for Measuring the Efficiency of the Accelerated Knowledge Sharing Systems

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Abstract— The authors present a set of detailed practical results obtained while experimenting with an original knowledge sharing methods applied for training young software developers in order to enable them to work for the world's most demanding IT companies. The article focuses on the subject of speeding-up the process of knowledge sharing and identifies a method of measuring the efficiency of accelerating the educational process of young software developers. The main finding of the article is an indicator that measures the efficiency of accelerating knowledge sharing in order to compress the time needed to educate a software developer. It also offers an indication on the efficiency of some motivational factors that were used experimentally.

Keywords— knowledge sharing, software development education, enterprise resource planning, ABAP.

I. Introduction

TRAINING young software developers is a common activity in the society we live in nowadays. IT companies are learning organizations and human aspects of knowledge creation are critical for sustaining the development of learning organizations [1]. In the IT industry the competitiveness of a company is largely determined by the knowledge it possesses and the knowledge of an organization is considered to be derived from its employees [2],[6].

Providing the right training in a minimal amount of time is a critical factor for any software development company that is active in today's highly competitive IT industry. This is why many companies are now looking for ways to reduce the training periods of their employees and to train them in a manner faster then the conventional training on the job.

In order to accelerate the educational process the authors of the current article have developed a framework for accelerating that sharing of knowledge between experienced software developers and trainees. The model, described in details in [3], started from the bold idea of an Italian IBM partner who approached Romania's largest university and proposed the development of a method that would transform young IT graduates in internationally competitive ABAP programmers in a matter of months. The endeavor that followed was successful, and the result was a framework that ensured both the transfer of explicit and tacit knowledge.

Briefly described, the knowledge sharing system that resulted from the above mentioned process, and will be used in the current article, consists of two main components: the explicit knowledge sharing component and the tacit knowledge sharing component(Fig. 1).

The explicit knowledge sharing component is responsible for ensuring the transfer of explicit knowledge. This is the knowledge that is available in books, reports, forums or oral discussions.

The tacit knowledge is knowledge that people keep in their minds and is difficult to access. It often happens that they are not aware of the knowledge they possess or how it can be valuable to others. Tacit knowledge is considered more valuable because it provides context for people, places, ideas, and experiences. Effective transfer of tacit knowledge generally requires extensive personal contact and trust [4].

In a few words, according to a famous aphorism of the knowledge management community, having tacit knowledge means that "we know more than we can tell".

In order to share the tacit knowledge, the tacit k-sharing component of the system presented here uses the concept of scenario. A scenario is a replication or a repetition of a real or possibly real situation which allows people to share tacit style will adjust your fonts and line spacing.

II. Problem Formulation

During the various sessions of training of young software developers, there have been great variations in terms of initial team size and the success ratio of the training process.

Our current intention is to measure the efficiency of the knowledge sharing process and to compare the efficiency between sessions. Such an analysis can provide results that can improve a lot the knowledge sharing process. In order to reach this objective we will have to define an indicator that will allow us to compare the data sets. Defining the efficiency indicator and comparing the sets of data from different sessions of training is the scope of our current research that will be detailed in the following paragraphs of this article.

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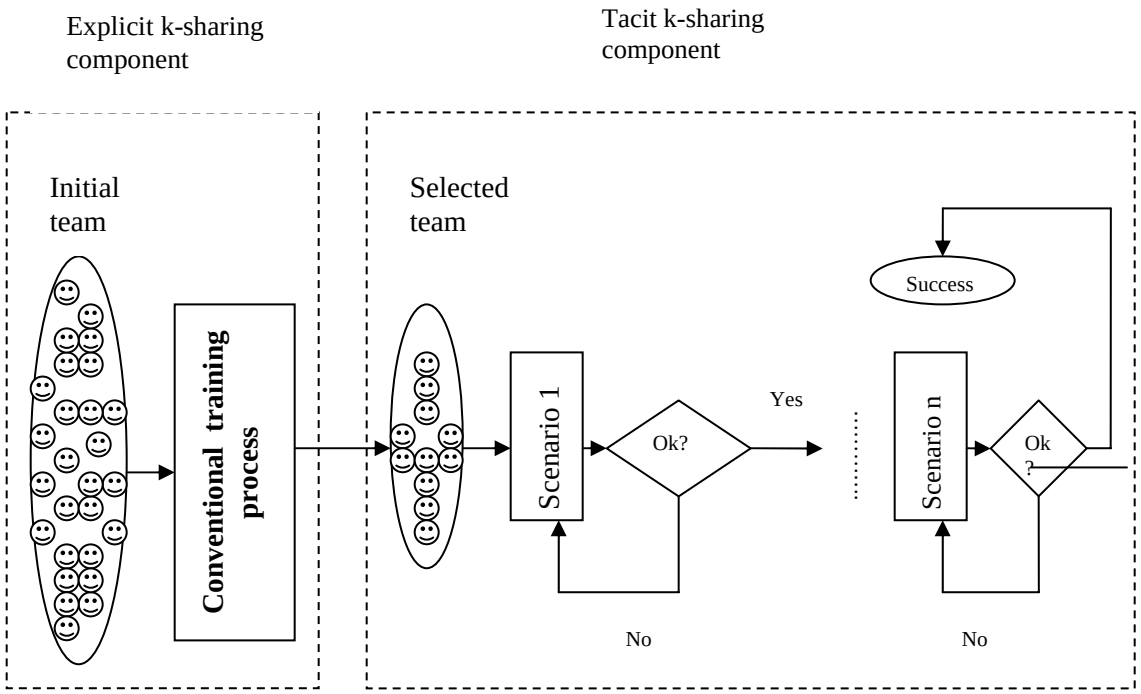

Fig. 1. The knowledge sharing system

III. Problem Solution

A. Defining the model

If In order to solve the problem we have to start by defining an indicator of efficiency for the process of knowledge sharing. Such an indicator must provide a way to compare the data accumulated over time

Since the main purpose of the knowledge sharing process is to reduce the time in which a person reaches a good level of expertise, this duration will obviously be the main variable of our indicator. The shorter the period a person needs to become internationally competitive the better. This means that the efficiency is indirectly proportional with the time needed by students to reach a good level.

In software development the concept of "good enough to work on a real project" is fuzzy. It is difficult to say when one has enough expertise. In our case the "good enough" idea has been defined as having the set of knowledge that is compatible with two years of conventional training on the job. So, the period that we will consider for our efficiency indicator is the time needed by a programmer to reach the same level that could be reached in two years of conventional training on the job. We will use the symbol T for this variable.

Another important component of the efficiency indicator is the amount of knowledge actually transferred both during the explicit k-sharing process and during the tacit one. Again, this element is difficult to measure as knowledge can be transferred in 4 ways[5]:

Tacit to Tacit *Socialization*	**Tacit to Explicit** E*xternalization*
Explicit to Tacit *Internalization*	**Explicit to Explicit** *Communication*

Fig. 2 Transfer of knowledge between tacit and explicit forms

In our case the transfer of knowledge occurs mostly in explicit to explicit and tacit-to tacit forms. Since it is not the aim of our process to convert knowledge from tacit to explicit and vice versa, in the knowledge sharing system used in this article we have very little explicit-tacit and tacit-explicit conversions and, therefore, transfers of knowledge in these forms can be considered zero.

In order to estimate the efficiency of transferring the explicit knowledge we can compare the size of the selected team with the size of the initial team. This is practically the percentage of students that manage to pass the test and will be used as a second variable that we call:

$$P = \frac{SI}{SS} \qquad (1)$$

where:
SI=Size of Initial team;
SS=Size of Selected team.

The efficiency of the tacit knowledge sharing process is difficult to estimate in terms of sizes of teams as generally very few students leave the selected team in this process. In order to estimate the efficiency of this component, we have to use the same indicator T that we used for the global process efficiency.

For simplicity, we have decided to define the global efficiency indicator E as depending on the two variable T and P:

$$E = \frac{Tm}{T} + \frac{P}{Pm} \qquad (2)$$

where:

Tm=Average amount of time needed by a trainee to reach the amount of knowledge that would normally require two years of training on the job

Pm=Average percentage of the students from the initial team that make it in the selected team after the test.

It can be easily notice that according to the above indicator, the efficiency E is directly proportional with the percentage indicator(P) and in an inverse proportion with the time indicator(T).

B. Comparative analysis

Using the model defined above, we will compute the efficiency indicator E for a few sets of data. The set of data that we will use is available in the table bellow:

Session#	Size of initial team	Size of selected team	P %	T
1	50	15	30.0	6
2	38	10	26.3	5.6
3	36	10	27.8	6.2
4	80	26	25.0	5.4
5	376	106	28.2	3.7

Table 1. Team sizes for ABAP training

The data from Table 1 is actually a synthesis of the five training sessions on ABAP that were held in Bucharest between 2004 and 2007 using the accelerated knowledge sharing system.

The values of the parameters Pm and Tm can be easily computed as they are the average values of the last two columns of Table 1:

Pm=27.45 and Tm=5.38

By applying the efficiency indicator described in (2) to the set of data from Table 1, considering the average values computed above we obtain the efficiency indicators presented in Table 2.

E
1.99
1.92
1.88
1.91
2.48

Table 2. The efficiency indicator E

One can easily notice that the average value of the efficiency indicator is about 1.9 with the exception of the last training course when it was much higher.

The explanation for the difference is the fact in the last training the students were stimulated to study with high value prizes. The best of them obtained a car, and this has stimulated a lot the trainees who reduced the time needed to go though the tacit knowledge-sharing process.

This comparative analysis confirms the validity of the efficiency indicator E described in (2) and offers a basis for identifying factors that influence the efficiency of the training process.

IV. TERMINOLOGY

The above process of speeding-up the sharing of knowledge in the process of creating teams of software developers is not named in the knowledge management literature although scientific databases contain extensive research related to knowledge sharing. Our team used the term “knowledge farming” in order to name the technique.

V. CONCLUSION

The efficiency indicator presented in the current article is a good way to measure the successful acceleration of a knowledge sharing process. It can be used to identify the factors that speed-up the process of knowledge sharing and is, therefore, a good instrument to improve the quality of the educational process based on accelerated knowledge sharing. According to the above analysis factors such as high value prices offered to students increase the efficiency of the knowledge sharing process by 24%.

As possible future research, the authors intend to use this indicator to identify the impact of other external factors that are likely to catalyze the knowledge sharing process.

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