Pattern-Based Knowledge Documentation and Sharing Approach for IT Project Management

Md. Shafiul Alam Chowdhury, Md. Emrul Hasan, Md. Shahadot Hossain

Abstract— The need for lessons learnt sharing is evident in project management profession, yet it is rarely defined what the best approach to fulfil the need is. Literature and surveys are used to show such need exists. The software design patterns are known in IT industry (Gang of Four) and in this research work we try to adapt patterns idea and evaluate patterns based approach effectiveness for capturing and sharing of best practices in IT Project Management. Literature, similar research and surveys are used to elaborate prioritized features list for the pattern based knowledge sharing tool. A case study is conducted to test this tool in the organization and resulting feedback is discussed at the conclusion. Suggestions for further research and tool implementation details are added at the end.

———————————— ◆ ————————————

1 INTRODUCTION

A lot of project management methodologies and standards (like, Project Management Body of Knowledge, Rational Unified Process or Capability Maturity Model) require a few things related to knowledge sharing:

a. Tailor processes for each project

Usually this means taking generic processes and adjusting them by the needs of the specific project. Information and practices are taken from previous similar projects.

b. Reuse information and lessons learnt from similar past projects

This might mean from reusing the best practices to planning risk responses to making estimates and predictions based on historical information.

c. Document lessons learnt for future projects (so called 'final project report').

This is the phase when organizational assets are enriched with new information and knowledge collected during project execution. Although the need is established in the number of project management methodologies, they do not define how to capture and share this information. Attempts to find any tools that support best practices sharing didn't succeed much.

————————————————

- *Md. Shafiul Alam Chowdhury, Assistant professor & Chairman, Department of Computer Science & Engineering, Uttara University, Bangladesh. Email : shafiul.a.chowdhury@gmail.com*

- *Md. Emrul Hasan, Senior Lecturer, Department of Computer Science & Engineering, Uttara University, Bangladesh, Email: emrul87@gmail.com*

- *Md. Shahadot Hossain, Assistant Professor, Department of Computer Science & Engineering, Uttara University, Bangladesh. Email:shahadot_bdm@yahoo.com*

Most of the results are recommendations about the knowledge sharing processes. Webmedia is a fast growing IT company with branches in Scandinavian and other region. The Swedish start-up branch, where we perform our case study, has 10 project managers who have experience in a number of different IT organizations. After short investigation with them it appeared that neither Webmedia nor previous organizations had employed effective best practices capturing and sharing methods. There are attempts to share projects post-mortem information (lessons learnt, solved problems, some metrics, etc.) in monthly project managers meetings, but the information remains in presentations, is neither well structured nor searchable. Yet, these meetings create peer to peer connections that come handy when searching for advice. However, those who missed the meetings or new hired employees are in a disadvantage as they don't have immediate access to the knowledge or knowledge sources. After investigating some sources of collected and published project management practices, we found that some authors systematically use one or another chosen pattern template to describe clearly their insights (McConnel (1996), Cockburn (2003)). Similarly design patterns are famous and widely accepted and used among software engineers. Exactly this way of documenting best practices, sharing and searching them looks promising to me. We would like to verify this hypothesis with this case study.

2. PROBLEM

2.1 Review Stage

The question we are trying to answer is: Could documenting problem-solution patterns be an effective approach for capturing and spreading the best project management practices from project to project?

We are tried to verify this with the case study. During the case study we have established some metrics to measure the progress and we collect the feedback about pros and cons of the proposed approach.

3. PURPOSE

The purpose of this work is to increase professionalism and standards in the IT project management field, where project managers could easily search and reuse the best practices from previous projects.

4. METHOD

The method used in this case study to conduct following the proposed information systems research framework by Hevner et al 2004.
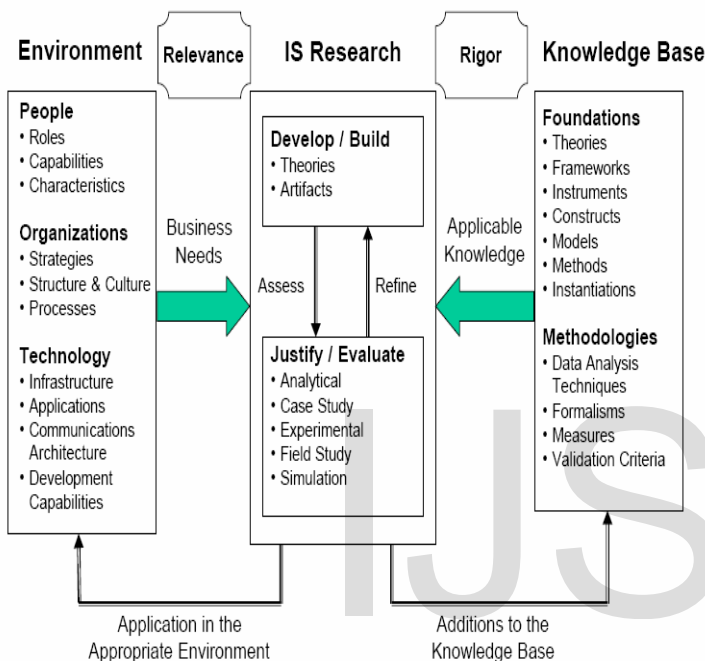

Figure: Information systems research framework

According to Hevner, information systems research is related to both, behavioural-science and design-science. An IT artefact, implemented and analyzed in organizational context, often participates in behavioural-science research cycle. 5 Researchers' intent is to observe, predict and explain phenomena that occur with artefact use, perceived usefulness, and impact to individuals and organizations. On another hand, design-science research cycle creates and evaluates artefacts that are intended to solve organizations' problems. They are described and evaluated in a structured form, with rigor logic, formalisms, measurements. Mathematical basis for design allows quantitative evaluations of the artefact, like, speed, availability, proving correctness and so on.

In this research work, we will follow behavior science cycle. The goal, as it was mentioned, is to improve project management practices (the business need). We are trying to solve business problem with a new IT artifact – a tool for documenting and sharing project management practices. The outcome of this work - the collected feedback during tool construction and

usage - will be used for improving the tool and this approach further.

In the beginning we will check the problem relevance and collect business needs by reviewing literature and interviewing 10 experienced project managers who have worked in different IT organizations.

With this information a tool for documenting and sharing project management patterns will be created. Effectiveness of this prototype will be evaluated in the case study with the same IT project managers.The case study will be carried out in Web-media Sweden, IT organization of 40 people. As it was mentioned, 10 of these employees are experienced project managers, working at least 4 years in project management, and with experience in 1-2 other IT organizations prior Web-media. They are likely to give a good representation about used practices in Swedish IT market. Also, it is expected they will be the main users of the tool and main content contributors.

Other users (4-5 - business analysts, quality analysts) will be also involved in the experiment to generate extra content and provide feedback on usefulness, both, the tool and content. To determine the list of features for the tool we use literature studies and input from users. At the end of the case study we try to determine the benefits and deficiencies of such tool and approach for documenting and sharing best practices among IT project managers. This knowledge would help to elaborate the tool in the future research. Finally, technical information provides to allow construction of such or similar tools in other organizations. Organizational challenges overcome by introducing this tool listed at the end of the study. This information should help to develop, apply and evaluate the tool in other organizations.

5. LIMITATIONS

The experiment was carried-out only in an organization (Web-media) although participants were selected with different and wide experience prior Web-media to get a better representation. Content growth and adoption might increase because of organizational motivation or decrease because lack of it.

6. LITERATURE REVIEW

6.1 Project Management Body of Knowledge by Project Management Institute

Project Management Body of Knowledge (PMBOK) defines 5 main process groups for project management: initiating, planning, executing, monitoring & control and closing.
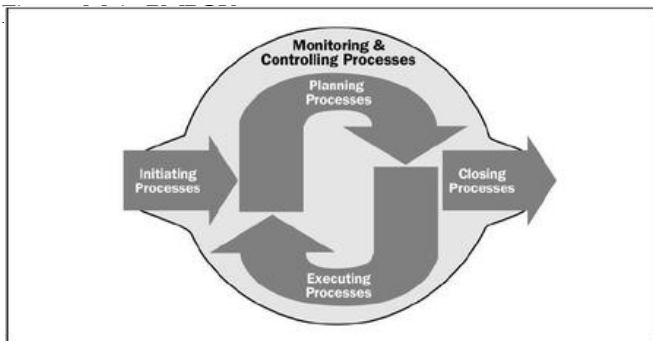
Figure: Main PMBOK process groups

All these project management processes have a number of inputs and outputs. One of the most often used is Organizational process assets that are defined as:

- Policies
- Procedures
- Standards
- Guidelines
- Defined processes
- Historical information and
- Lessons learnt

Organizational process assets are used mostly during project initiation and planning, i.e., at that time project managers reuse organizational know-how developed from experiences of previous projects. Updates to these assets occur mostly during the closing phase and to some degree during monitoring & control and project execution phases.

During project execution and monitoring, organization assets are updated with corrective actions taken, project plan variations and their causes. During phase or project closure, final phase or project data is required to be captured and updated in the organizational assets.

6.2   Capability Maturity Model Integration

The latest version (1.2) of Capability Maturity Model Integration (CMMI) contains 22 key process areas indicating the aspects of product development that ought to be covered by company processes. Integrated Project Management process is a Project Management process area at Maturity Level 3. Its purpose is to establish and manage the project and the involvement of the relevant stakeholders according to an integrated and defined process that is tailored from the organization's set of standard processes.
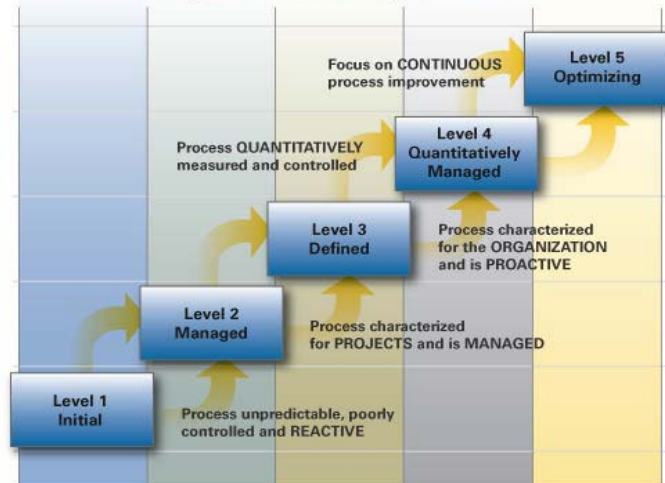

Figure: CMMI stated maturity levels

6.3 Rational Unified Process

The Rational Unified Process (RUP) is an iterative software development process framework created by the Rational Software Corporation, since 2002 a division of IBM. The RUP is not a single concrete prescriptive process, but rather an adaptable process framework, intended to be tailored by development organizations and software project teams that will select the elements of the process that are appropriate for their needs. Although, RUP does not describe how knowledge that helps tailoring is added to organization, it based on the principle that every process should be tailored for the specifics of every project.

7. Patterns

"In software engineering, design patterns are standard solutions to common problems in software design" – this is a definition given by Wikipedia (2004). Probably the most known patterns in IT community are Gang of Four software design patterns (Wikipedia, Design patterns (2007)). They are used by information systems practitioners as good and accepted in the industry practices when designing and developing their systems.

Yet, software design patterns are not only ones – there is a lot of other like information system analysis patterns, business design patterns, architecture patterns, etc. They all share an idea of capturing standard solution to recurring problem. Patterns from one domain usually follow the same documentation template to make them more readable. E.g., the description might include pattern name, problem, solution, context when to apply, principles involves in solution, and examples in use. Classified and structured patterns from one problem domain make a pattern language. One standalone pattern might be too big, complex and applicable only to a specific problem. Patterns classified and structured into smaller pieces, let the user easier search, understand and apply required solution. Web sites are convenient way

for storing, searching and browsing such classified patterns. Hillside.net (2004) gives good advises (documented as patterns) how to write new patterns.
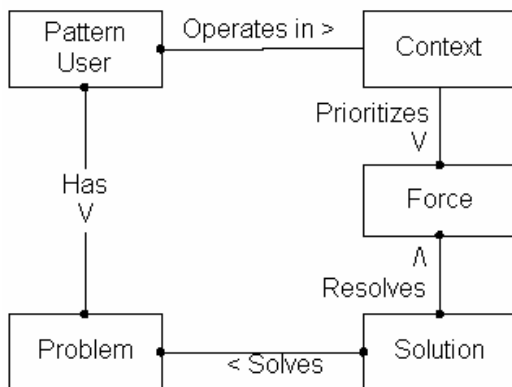
The minimal suggested set of elements for documenting patterns is explained in the Figure

8. EVALUATION

We tested the approach and the Project Management Patterns Repository by introducing them to the organization and collecting feedback. The feedback was collected twice: when introducing, and after some period of usage. The summarized feedback about this approach and tool is presented here.

8.1 INTRODUCING THE REPOSITORY TO ORGANIZATION

A survey with project managers was conducted to find out organizational risks they see in introducing the tool to organization. The organizational risks must be mitigated to leave the tool to the end-users without organizational obstacles. When they are removed or at least reduced, I can evaluate more confidently if tool and approach is accepted or rejected because of its convenience and perceived usefulness.
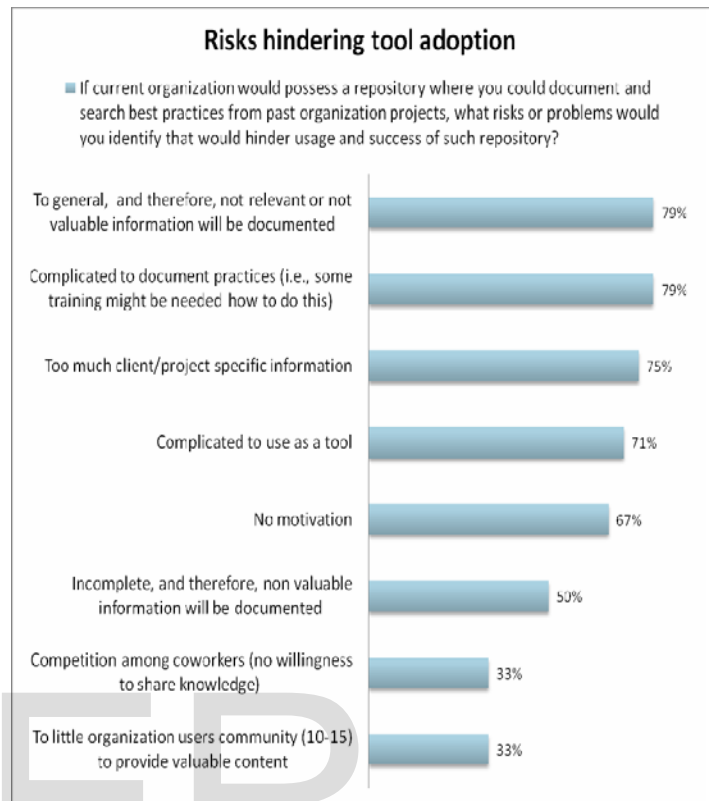

Figure: The project managers ranked risks list and were able to add their own

8.2. FEEDBACK: BENEFITS AND DEFICIENCIES

After project managers tried to document lessons learnt as patterns and to use for this purpose central PM patterns repository, a survey was conducted to collect feedback about approach and tool suitability, likelihood to use and how they would prefer to use it.

9. CONCLUSIONS

At this work we aimed to verify if the pattern based knowledge documentation and sharing approach can be effectively used for IT project management. We chose Hevner et al 2004 described information systems research method to carry out our assessment. Following the method we run a case study with these results.

In the research work we managed to find that "there exists a business need for project management knowledge sharing" in literature and in the project managers' survey results. Based on literature sources, similar projects and features found in other web based systems, we created the list of features required for patterns based IT project management knowledge sharing.

We verified the list of tool features with the project managers, and rated them from the most important (should be to start knowledge sharing) to the least important (optional features that can be implemented later). This revealed project managers perceived usefulness of each feature and could be used when planning this patterns repository implementation.

We implemented the highest ranked functionality for case study, and surveyed project managers, what risks they see when introducing the application. Together with the same project managers we developed and executed risk response plans. These plans could be used in other organizations when trying to introduce similar knowledge sharing approach and tools. After trial period, when project managers tried to document and add their project management experiences, a final survey was run to collect feedback if project managers perceive this approach and tool useful and how they would like to use it in the future.

It should be noted, that organization was not used to writing final project reports, although internal project management processes required that. Therefore, trial period took longer then expected, needed a few internal discussions and it meant cultural leap to start documenting and contributing lessons learnt. However, our interpretation is that organization succeeded to cross (or is still crossing) the chasm because of:

- Project managers have provided guidelines (i.e., pattern templates) and help (moderator feedback) how to document lessons learnt,

- Project managers know that it will be available for everyone's access in central repository, i.e., not lost somewhere,

- Project managers know how their lessons learnt will be used (discussed in the meetings and distributed to colleagues), and

- Project managers know that this approach complements (or substitutes, if such is not written) final project reports (part of process).

Although patterns idea is not new in IT world, the idea of writing patterns was novel for the most of people and therefore active facilitator provided training, support and help was needed when organization members tried to write first patterns.

Our ultimate purpose was to increase professionalism and standards in the IT project management field, where project managers could easily search and reuse the best practices from previous projects.

Hopefully other organizations and researchers can reuse findings from this research when trying to develop and enhance knowledge sharing in their organizations. For this purpose, lists of functionality, visual prototypes, collected feedback from project managers, risks and risk response plans are presented in this document and its appendixes.

10. LIMITATIONS & FUTURE WORK

During this study we implemented only basic first priority functionality and collected feedback how project managers would like to use the tool further. Other research work should be cared out to investigate how additional features can help to improve the best project management practices repository's content growth, content quality and content distribution to end users. Content growth can be measured by counting entered practices and updated practices in the repository every month. The quality can be measured by reviewing patterns evaluations. The suggested criteria are discussed. Finally, the content distribution success can be measured by repository popularity. I.e., number of visits, distribution of users (i.e., everyone should be involved, not only a few hyperactive users), search criteria (indicates what content is missing or is not findable easy) could be used in this research.

REFERENCES

[1] D'Adamo, Margaret, Kols, Adrienne. A tool for sharing internal best practices. (2005). [On-line] Accessed on May 8th, 2007 at URL: http://www.infoforhealth.org/Sharing_Local_BPs.pdf

[2] Wingerd, Laura, Seiwald, Christopher, High-level Best practices in software configuration management. (2005). [On-line] Accessed on May 8th, 2007 at URL: http://www.perforce.com/perforce/bestpractices.html

[3] Library success: a best practices wiki. [On-line] Accessed on May 8th, 2007 at URL: http://www.libsuccess.org/index.php?title=Main_Page.

[4] McConnel, Steve (1996), Rapid Development (1st edition). Microsoft Press

[5] R. Cockburn, Alistair, Cone of silence strategy and related project management strategies. (2003). Accessed on May 8th, 2007 at URL: http://alistair.cockburn.us/index.php/Cone_of_silence_strategy_an d_related_ roject_management_strategies

[6] Project Management Institute (2004), Project Management Body of Knowledge Guide (3rd edition)

[7] Hevner, R. Alan, March, T. Salvatore, Park, Jinsoo & Ram, Sudha. (2004) Design Science in Information Systems Research.MIS Quarterly Volume 28, Number 1

[8] Wikipedia, IBM Rational Unified Process (2007). [On-line] Accessed on May 20th, 2007 at URL: http://en.wikipedia.org/wiki/Rational_Unified_Process

[9] Stirna, Janis, Bubenko jr., Janis, Persson, Anne (2000). User guide of the Knowledge Management approach using Enterprise Knowledge Patterns. [On-line]. Accessed on 21th of May, 2007 at URL http://people.dsv.su.se/~js/ekd_user_guide.html

[10] Singleton, Steve, (2006). Best Practices Plan: Dissemination of a Great Idea. [On-line]. Accessed on 21th of May, 2007 at URL: http://ezinearticles.com/?Best-Practices-Plan:-Dissemination-of-a-Great-Idea&id=7977

[11] E Cockburn, Alistair, (1995) Risk management catalog TOC. Accessed on June 1st, 2007 at URL: http://alistair.cockburn.us/index.php/Risk_management_catalog_TOC)

[12] Hillside.net. (2004). [On-line] Accessed on December 26th, 2004 at URL: http://www.hillside.net/patterns/writing/patterns.htm

[13] Wikipedia, (2007). Design patterns. [On-line] Accessed on September 13th, 2007. http://en.wikipedia.org/wiki/Design_Patterns

[14] Yasar F. Jarrar and Mohamed Zairi, Best practice transfer for future competitiveness: a study of best practices, Total Quality Management 11, 4-6 (July 2000)

[15] Cockburn, Alistair, (1997) Project Risk Reduction Patterns. Accessed on June 1st, 2007 at URL: http://alistair.cockburn.us/index.php/Project_risk_reduction_patterns

IJSER