An Exploratory Study on SAP Maintenance Process Management

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Abstract

This research-in-progress aims at investigating and understanding the fundamental maintenance process management provided by SAP, a top-tier ERP vendor, to help supporting client's maintenance activities; and then exploring whether there is a need for the clients to adopt de-jure standards (such as ISO/IEC 12207, 15504 and CMMI) for ERP maintenance process management. Based on the prior studies, process standard is advantageous because it provides a framework for software process where it can be planned, organized, managed and executed, and a consistent and standardized process will allow maintenance process improvement and permit process maturity to be assessed. In order to achieve this, structured interviews are conducted with experienced SAP consultant and supporting documentations on SAP maintenance process management are reviewed. The characteristics of the vendor's maintenance process management are discussed and the needs for adopting the de-jure standards to strengthen and improve maintenance process management are provided.

1. Research Background, Problem and Significance

According to AMR Research, ERP is the largest segment of the applications budget (34%) (Scott and Shepherd, 2002). Despite ERP market had zero growth in 2002, but the ERP vendors were still able to generate nearly \$20B in revenue (Shepherd and O'Brien, 2003) due to large installed bases and diverse revenue, including maintenance and services.

Having large number of installations over the last decade and potential market from the small and medium enterprises, ERP-adopting organizations are now and will be at the post-implementation phase dealing and struggling with variety of management issues. One of the fundamental issues is the ERP maintenance management. ERP maintenance is defined as post-implementation activities undertaken by client-organization to realize more business benefits from the system, on top of keeping the system working and supported version, implementing patches, providing user support, and adapting to the changed environment.

The definition of software maintenance process management in this context is based on the process management proposed by Software Engineering Institute (SEI) in the Carnegie Melon University (Florac, Park and Carleton, 1997). Florac, Park and Carleton describe that there are four responsibilities central to process management, namely define, measure, control and improve the process (see Figure 1).

In general, software process standard is a means for process management; it provides a framework within which software life cycle processes, activities, and tasks can be wisely selected, planned, organized, managed and executed (Singh, 1995). Heineman, Botsford, Caldiera, Kaiser, Kellner, and Madhavji (1994) agree that the motivations for applying models of software processes are to support process improvement, automate processes, and support process management. Also it will permit process maturity to be assessed. Software process standards are important elements in the development and maintenance of quality software (Tripp and Voldner, 1995). Quality here may include the quality in service/product, cost and time effectiveness, process, and confidence in management. A standard for software (e.g. maintenance) process provides a framework not only for quality control and assurance but also quality management (Hinley and Bennett, 1992). In general, standards are meant to be generic but specific in purpose.

A standard software maintenance process is a useful method for managing software change (IEEE, 1998). Availability of maintenance process provides clarity to foster understanding and communication among all parties involved, facilitates effective maintenance support to the system users or stakeholder in general (Sneed, 1996). Zurich Life Insurance's experience shows that a well-defined maintenance process is necessary to saving costs while improving the customer service (Sneed, 1996). With standard maintenance process in place, then process can then be measured to direct management attention toward improvement areas, track improvement over time, and help make choices among alternatives (Stark, 1996 425). Pigoski (1997), a maintenance process also helps reducing the effort and cost of maintenance (page 40). According to Basili et al. (1996), software measurement integrated into a well-defined maintenance process can help to acquire an in-depth understanding of specific maintenance issues thereby lay a solid foundation for software maintenance process improvement. Software measurement is useful for making assessment and prediction on process (Fenton and Pfleeger, 1997).

An example of de-jure standard for maintenance process definition is ISO/IEC 12207 - *Information Technology - Software Life Cycle Processes*. On the other hand, examples for maintenance process measurement, control and improvement are ISO/IEC Technical Report 15504 - *Software Process Assessment* and Capability Maturity Model Integration (CMMI). These standards are: (1) normative and umbrella standards; (2) the most cited and popular standards in the market; (3) strongly aligned to one another; and (4) international standards. However, these standards are not necessarily perfect match for all organizations of all types; thus, usually tailoring is involved when using generic standards (Yoon, Min and Bae, 2001).

Likewise, a well-defined ERP maintenance process can facilitate effective planning, organizing, managing, executing, initiating and closing of maintenance and upgrade projects. Better knowledge about the fundamental ERP software maintenance measures/data can facilitate maintenance knowledge storage and reuse, enhance the capability and ease of measuring process performance, service quality and process bottleneck, and can be useful in designing the structure of maintenance database and change-request forms. However, there is paucity of research effort in this area. Thus, the objective of this paper is to explore whether there is a need for the clients to adopt and adapt existing de-jure standards for ERP maintenance process management. The fundamental maintenance process management provided by SAP, a top-tier ERP vendor, to help supporting client's maintenance activities will be discussed.



2. Research Methodology

Face-to-face structured interview method is used to collect data for this research. It is targeted at a top-tier ERP vendor, i.e. SAP. The interviews are conducted with SAP consultant who has six years of knowledge and expertise in SAP software maintenance process management, controlling and measurement. According to Brown, Lusch, Koenig, Kroeter and Pharr (1990), interviewing a single reliable participant who is an expert and closely involved in the area is more dependable than involving multiple non-expert and inexperienced participants. The questions asked during the interview are: Does SAP adopt any software maintenance process management standard in the latest version of the software in an effort to simplify or support clients' software maintenance process management, and why? What are the available management tools and/or methodologies for maintenance process management in SAP's latest version? What roles and responsibilities should a vendor like SAP play for its clients' software maintenance process management? What

are the strengths and weaknesses in SAP's packaged software for software maintenance process management? These interviews are tape-recorded and transcribed immediately after the interviews. The interview transcript is then sent back to the interviewee for content validation.

The objective of these interviews is to understand better SAP's up-to-date development, research and supports for ERP maintenance process management (i.e. software functionality, tools or methodology embedded in the software that are meant to facilitate the clients to plan, manage, monitor and evaluate their maintenance process such as servicing a change/modification request).

The interview transcripts will be used as one of the main sources of data, and reference for identifying SAP's ERP maintenance process management. Together with evidences from existing literature and trade press, the characteristics of SAP's ERP maintenance process management are identified. The process used to conduct the data analysis is illustrated in Figure 2.



3. Characteristics of the Vendor's Maintenance Process Management

It is found that SAP does not particularly adopt any industry or de facto software engineering standard but rather its own proprietary standard for managing its software maintenance process. According to the consultant, the maintenance support for SAP packaged software can be divided into two parts. They are internal and external maintenance supports provided to the clients. He states,

Internal maintenance support runs inside SAP and it consists of SAP R&D team, QA team and support consultant team. This internal maintenance has its own proprietary maintenance management process. Its purpose is to produce new release development.

The new releases are meant to provide improvements and enhancements to the clients' installed versions. On the other hand, external maintenance is to accommodate the clients' needs for add-ons and custom programs after their SAP system implementations. SAP in fact provides a unique methodology to the clients to manage these activities. The consultant explains,

The methodology consists of three system landscapes; they are development (DEV) environment, quality assurance and testing (QA) environment and production (PRD) environment. In the DEV environment, there is a mechanism called checked-in and checked-out. Once the written code in this environment is saved, it is called checked-in. If an error is found, then the previous source code can be checked-out. The DEV environment also has a functionality named versioning control that will keep different versions of the modified source code, and a log of all the changes made. Once the change is confirmed, a change request will be generated by the DEV environment and delivered into the Change Transport System, where the request will be transported to the OA environment. Testing is conducted in the QA environment, and then transferred to the PRD environment. Finally, the change or the new code will go-live into the real production system. This is SAP's standard for maintenance management process; it is automatically controlled by the SAP system. The system will also automatically record who, when and what the change is.

The consultant affirms that the purpose and role of the three environments, and the right transport routes (for source code) from one environment to another are predefined by the system administrator when the environments are first installed. The three system landscapes are embedded in SAP software for client's internal MIS (maintenance) management process.

This three-system-landscape is SAP's maintenance methodology within R/3, and it is also embedded in an automated tool named Solution Manager. Besides the three system landscapes, other components contributing the SAP R/3 maintenance methodology are program development environment – ABAP workbench; tools for testing, monitoring and distributing – Change Transport System; and preventive maintenance monitoring – EarlyWatch Alert (SAP AG, 2003). In addition to the aforementioned, Solution Manager also consists of an implementation roadmap. Solution manager is particularly useful as a central system for the clients to maintain multiple SAP products such as SCM, CRM, SRM, PLM, BI, enterprise portal, EAI, and so forth. According to the consultant, the objective is,

... to help simplify client's efforts in managing three landscapes for each installed system, SAP develops and provides the Solution Manager tool to the clients to reduce the management overheads in managing multiple SAP landscapes for multiple SAP solutions.

The consultant further adds that having to manage three landscapes for each SAP's product is perceived as too complicated to manage by a client's MIS department. With the Solution Manager,

It is connected to SAP intranet via the Internet. Whenever SAP releases a patch, the Solution Manager will automatically notify the corporate client about the new patch. The respective MIS department can then download the patch. After downloading, the MIS department will then decide whether to apply it and to which landscape.

4. Discussion

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Based on the above section, maintenance process definition is embedded in the Solution Manager, a SAP maintenance management tool. Although maintenance process is not directly based on the one in ISO/IEC 12207, the core activities should be pretty the same. In fact, it provides more core activities specific to packaged software than that offers in the standard, for instance: (1) receiving, downloading, and implementing patch; (2) creating support messages, sending to the vendor and receiving replies; (3) maintenance issues tracking for follow up purpose; (4) managing, monitoring and maintaining different system landscapes; (5) collecting maintenance data and sending them to the vendor's support system; (6) storing maintenance project documentation; and (7) reporting or detailed list view of support package level (SAPAG, 2004).

Based on the guidelines given in the process management model proposed by Florac, Park and Carleton (1997) in Figure 1, the first three responsibilities central to process management, namely defining, measuring, and controlling the maintenance process are apparently inherent in SAP maintenance process management. Features for improving the maintenance process are not too obvious, but there are in SAP maintenance process management in the forms of: (1) progressively and increasingly better maintenance methodology; and (2) informing client by sending and delivering maintenance services and messages requested.

As a result, the areas where the vendor's maintenance methodology can be improved are (the concepts of) process measurement and process improvement. Although basic process measurements for change request and software modification are available, measurements for process quality, performance and control are lacking. At current state, client-organization wanting to assess their maintenance process and process maturity level would still have had to: (1) set their process performance indicators, such as maintenance turnaround time, number of requests serviced per time period, service quality and number of bugs introduced; and (2) determine their process capability indicators. As a consequence, this preliminary study suggests that ISO/IEC 15504 and CMMI may be useful.

5. Conclusions

SAP uses its own proprietary standard for managing its internal software maintenance process (for both bug fixes and new release development). As for maintenance activities at the client side, SAP provides a methodology and automated tools embedded in the system for its clients to manage their maintenance activities. The tool records who, when and what changes are made to the system. SAP encourages its clients to use the maintenance methodology provided and to follow certain guidelines and rules in making changes to the standard software. The vendor is continuously developing better tools and mechanisms to simplify and assist clients in maintaining multiple system landscapes and better manage their ERP maintenance activities. These services do not cost the clients additional costs as they are included in the annual maintenance fees. Future studies will include investigating the client's perspective on the quality of SAP maintenance process management, and the needs for adopting software process management standards such as ISO/IEC 15504 and CMMI.

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References

[1] Basili, V., Briand, L., Condon, S., Kim, Y.-M., Melo, W. L. and Valett, J. D. (1996) Understanding and Predicting the Process of Software Maintenance Releases, in (Eds.) *International Conference on Software Engineering*, IEEE Computer Society: Los Alamitos CA, 464-474.

[2] Brown, J., Lusch, R., Koenig, H., Kroeter, T. and Pharr, S. (1990) Using Key Informants in Marketing Channels Research: A Critique and Some Preliminary Guidelines, in Advance in Distribution Channel Research, G. Frazier, Editor, JAI Press: Greenwich, CT.

[3] Fenton, N. E. and Pfleeger, S. L. (1997) Software Metrics: A Rigorous & Practical Approach, PWS Publishing Company: Boston, MA. p. 638.

[4] Florac, W. A., Park, R. E. and Carleton, A. D. (1997)
Practical Software Measurement: Measuring for Process
Management and Improvement, Software Engineering Institute (SEI), Carnegie Mellon University: Pittsburgh, Pennsylvania. p. 223.

[5] Heineman, G. T., Botsford, J. E., Caldiera, G., Kaiser, G. E., Kellner, M. I. and Madhavji, N. H. (1994) Emerging

Technologies That Support A Software Process Life Cycle, *IBM Systems Journal*, 33, 3, 501-520.

[6] Hinley, D. S. and Bennett, K. H. (1992) Developing a Model to Manage the Software Maintenance Process, in (Eds.)

Conference on Software Maintenance, IEEE Computer Society: Los Alamitos CA, 174 - 182.

[7] IEEE (1998) IEEE Standard for Software Maintenance, IEEE Std 1219-1998, Institute of Electrical and Electronics Engineers: New York. p. 47.

[8] Pigoski, T. M. (1997) Practical Software Maintenance: Best Practices for Managing Your Software Investment, John Wiley & Sons, Inc.: New York. p. 384.

[9] SAP AG (2003) SAP Solution Manager, SAP AG: Walldorf, Germany. p. 230.

[10] SAP AG (2004) SAP Solution Manager 3.1: Master Guide, SAP AG: Walldorf, Germany. p. 11.

[11] Scott, F. and Shepherd, J. (2002) The Steady Stream of ERP Investments, AMR Research.

[12] Shepherd, J. and O'Brien, D. (2003) The Enterprise

Resource Planning Report, 2002-2007, AMR Research.

[13] Singh, R. (1995) The Software Life Cycle Processes Standard, *Computer*, 28, 11, 89-90.

[14] Sneed, H. M. (1996) Modeling the Maintenance Process at Zurich Life Insurance, in (Eds.) *International Conference on Software Maintenance*, November 4-8, Monterey, Canada, IEEE Computer Society: Los Alamitos CA, 217-226.

[15] Stark, G. E. (1996) Measurements for Managing Software Maintenance, in (Eds.) *International Conference on Software Maintenance*, Monterey, Canada, IEEE Computer Society: Los Alamitos CA, 152-161. [16] Tripp, L. L. and Voldner, P. (1995) A Market-driven Architecture for Software Engineering Standards, in (Eds.) *IEEE International Software Engineering Standards Symposium*, IEEE Computer Society: Los Alamitos CA, 105-116. [17] Yoon, I.-C., Min, S.-Y. and Bae, D.-H. (2001) Tailoring and Verifying Software Process, in (Eds.) *Eighth Asia Pacific Conference on Software Engineering*, IEEE Computer Society: Los Alamitos CA, 202-209.