A Thing Called "Fluid Process" – Beyond Rigidity in Business Process Support

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Abstract: This keynote reports on a new class of processes - so called *fluid processes* - whose "engineering" and "use" is indistinguishable. Fluid processes are continually being adapted and reformed to fit the actual needs and constraints of the situation in hand and to fulfill the overall goals of the involved actors in the best possible way. We present a detailed review of challenges and techniques that exist for the support of fluid processes. We give insights into their nature, discuss fundamental challenges to be tackled, summarize basic technologies enabling fluid processes at the information system level, and describe advanced applications of fluid processes.

1 Motivation

The economic success of an enterprise increasingly depends on its ability to flexibly support its business processes by information systems and to react to changes in its environment in a quick and flexible way [RRMD09, WRRMW09]. However, today's process engineering technologies and tools are ill equipped to meet this challenge because of their inherent brittleness and inflexibility [WRRM08, RD98]. The current generation of BPM tools [Wes07] implicitly embrace the "engineer use" dichotomy inherited from traditional approaches to software and database engineering. This, in turn, is based on the classic engineering principle that systems are first "engineered" and then, once deemed fit for purpose, are "used" (or "operated"). Maintenance and evolution activities are not regarded as part of operation but rather as interruptions to the "in use" state which temporarily return the system to the "being engineered" state. However, in scenarios in which requirements come and go on a much more dynamic and ad hoc basis (e.g. healthcare [LR07] or automotive engineering [MHHR06]), this "engineer use" strategy is unworkable.

The only feasible way to cope with dynamism is to dissolve the fundamental distinction between "engineering" and "use" and seamlessly merge the whole service and process lifecycle into a single encompassing framework [WRRMW09, WSR09]. This will lead to a new class of processes - so called *fluid processes* - whose "engineering" and "use" is indistinguishable. Such processes are continually being adapted and reformed to fit the actual needs and constraints of the situation in hand and to fulfill the overall goals of the involved actors in the best possible way. Since enterprise workflows can be viewed as special forms of processes, the notion of fluid workflows is also important.

2 Characterization of Fluid Processes

Fluid processes and services should be not confused with "(self-)adaptive systems" as recognized by the adaptive systems research community. Fluid processes and services are adaptive in the sense that they are continually evolving and reshaping to fit the situation in hand, but unlike classical adaptive systems (as understood in adaptive system research) they are not expected to do this themselves. On the contrary the whole point of fluid process is that the adaptation is performed with the help of the human user/engineer where needed. In other words, in fluid processes, human engineers and users are "part of the loop", and processes use and adaptation are seen as two sides of the same coin. In this sense, fluid process have more in common with agile software development methods, which are focused on encouraging human developers to evolve software in as rapid and effective a way as possible, than adaptive systems which are responsible for all dynamic adaptation themselves.

Adaptive systems research is still essentially based on the engineer use distinction, the only difference to traditional approaches is that the systems are given much more intelligence than usual in order to exhibit a wider range of behaviors. This notwithstanding, the techniques and ideas of adaptive systems research are very relevant to fluid process and services, because all forms and techniques of adaptation need to be exploited. In fact, the notion of fluid process and services subsumes standard adaptive systems, and is based on a more general approach where humans are tightly bound into the loop as well as artificial intelligence.

Fluid processes also fundamentally change the way in which human stakeholders interact and collaborate because they dissolve the distinction between process engineers and process users. To date, business process support technologies have focused on enhancing and automating the way in which process users collaborate and interact, but have not significantly changed the way in which the processes themselves are engineered (i.e. defined and maintained). The assumption has been that this is done by IT specialists in a distinct engineering phase with little or no connection to the execution of the processes or the normal operation of the enterprise. However, with fluid processes this distinction will blur (if not entirely disappear) and process engineers will also be process users and vice versa. Stated differently, process engineering will also he regarded as a normal, fluid business process involving the collaboration of multiple stakeholders. In short, process engineering will become reflective.

3 Outline of the Keynote

This keynote presents a detailed review of challenges and techniques that exist for the support of fluid processes [RRMD09]. We give insights into the nature of fluid processes, discuss fundamental technological challenges to be tackled, give an overview on basic technologies enabling fluid processes at the information system level, and describe advanced applications of fluid processes. In this context we revisit some of our research projects

on fluid processes like ADEPT [RD98, RDB03, RRD03], CEOSIS [RMR07, RMR09], Corepro [MRH08], and Philharmonic Flows [KR09].

References

[KR09]   V. Künzle and M. Reichert. Integrating Users in Object-aware Process Management Systems: Issues and Challenges. In *Proc. Business Process Management Workshops 2009*. Springer, 2009.

[LR07]   Richard Lenz and Manfred Reichert. IT support for healthcare processes - premises, challenges, perspectives. *Data Knowledge Engineering*, 61(1):39–58, 2007.

[MHHR06]   Dominic Müller, Joachim Herbst, Markus Hammori, and Manfred Reichert. IT Support for Release Management Processes in the Automotive Industry. In *Business Process Management*, LNCS 4102, pages 368–377, 2006.

[MRH08]   Dominic Müller, Manfred Reichert, and Joachim Herbst. A New Paradigm for the Enactment and Dynamic Adaptation of Data-Driven Process Structures. In *Proc. CAiSE'08*, LNCS 5074, pages 48–63, 2008.

[RD98]   M. Reichert and P. Dadam. ADEPT$_{flex}$ - Supporting Dynamic Changes of Workflows Without Losing Control. *JIIS*, 10(2):93–129, 1998.

[RDB03]   M. Reichert, P. Dadam, and T. Bauer. Dealing with Forward and Backward Jumps in Workflow Management Systems. *Software and Systems Modeling*, 2(1):37–58, 2003.

[RMR07]   S. Rinderle-Ma and M. Reichert. A Formal Framework for Adaptive Access Control Models. In *Journal of Data Semantics, IX*, LNCS 4601, pages 82–112, 2007.

[RMR09]   S. Rinderle-Ma and M. Reichert. Comprehensive Life Cycle Support for Access Rules in Information Systems: The CEOSIS Project. *Enterprise Information Systems*, 3(3):219–251, 2009.

[RRD03]   S. Rinderle, M. Reichert, and P. Dadam. Evaluation Of Correctness Criteria For Dynamic Workflow Changes. In W.M.P. v.d. Aalst, A.H.M. ter Hofstede, and M. Weske, editors, *Proc. Int'l Conf. on Business Process Management (BPM'03)*, LNCS 2678, pages 41–57, Eindhoven, The Netherlands, June 2003.

[RRMD09]   Manfred Reichert, Stefanie Rinderle-Ma, and Peter Dadam. Flexibility in Process-Aware Information Systems. *T. Petri Nets and Other Models of Concurrency*, 2:115–135, 2009.

[Wes07]   M. Weske. *Business Process Management: Concepts, Languages, Architectures*. Springer, 2007.

[WRRM08]   Barbara Weber, Manfred Reichert, and Stefanie Rinderle-Ma. Change patterns and change support features - Enhancing flexibility in process-aware information systems. *Data Knowledge Engineering*, 66(3):438–466, 2008.

[WRRMW09]   Barbara Weber, Manfred Reichert, Stefanie Rinderle-Ma, and Werner Wild. Providing Integrated Life Cycle Support in Process-Aware Information Systems. *Int. Journal of Cooperative Information Systems*, 18(1):115–165, 2009.

[WSR09]   Barbara Weber, Shazia Wasim Sadiq, and Manfred Reichert. Beyond rigidity - dynamic process lifecycle support. *Computer Science - R&D*, 23(2):47–65, 2009.