

From Process Design to Process Execution

a joint challenge for vendors, adopters and researchers of process-oriented it

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Abstract. We present an overview of the current distance from process design to process execution based on a series of meetings with a representative selection of vendors of case handling and business process management systems on the Danish market covering the spectrum from full-bodied, general BPMS systems to innovative self-service and knowledge worker case handling systems. Taking out-set in the Workflow Repository developed by Local Government Denmark (Kommunernes Landsforening) containing more than 800 BPMN workflows from the danish municipalities we challenged the vendors to give their view on process execution. The result was an identification of the co-existence of several distinct kinds of processes: automated decisions, citizen self-service, and guidance for the case worker, six concrete recommendations for the Workflow Repository on the short run, and a number of joint challenges for researchers, vendors and adopters of process-oriented it on the long run.

1 Introduction

In 2007, Local Government Denmark (Kommunernes Landsforening, KL), an interest group safeguarding the Danish municipalities, launched the Workflow Repository (Arbejdsgangsbanken). Building on Michael Hammers work on business process reengineering [2,3,10], the repository aimed at mapping and optimizing workflows throughout the municipal administration.⁴ In KL, six people are employed to oversee the development of the Workflow Repository.

Today, the repository contains more than 800 such workflows – ranging from simple workflows (e.g., updating the national register when people relocate) to exceedingly complex ones involving multiple actors and transactions between municipal departments (e.g., managing payments of sickness benefit).

⁴ Cf. www.kl.dk/Aktuelle-temaer/Arbejdsgangsbanken/

The ambition driving the continuing development of the repository is that it eventually should contain every workflow relevant for municipal caseworkers, social workers, etc., when dealing with administrative casework stemming from requests from citizens, organizations, or businesses. Besides incorporating workflows that tally with the mandatory, legal requirements circumscribing casework, the repository also strives to define workflows that encapsulates a best practice for various types of casework.

In February-March 2010 we conducted a series of meetings with a representative selection of vendors of case handling and business process management systems on the Danish market to get an overview of the current distance from process design to process execution. The list of vendors included SoftwareAG, Dafolo, Resultmaker, CBrain, and Exformatics, covering the spectrum from full-bodied, general BPMS systems to innovative citizen self-service and knowledge worker case handling systems.

The present report is a short summary of these meetings. In Sec. 2 we briefly describe the questions we posed to the vendors and the new questions identified during the meetings. In Sec. 3 we present the summary of answers, and finally in Sec. 4 we provide some suggestions for the future Workflow Repository.

2 Questions to BPMS and case handling vendors

We presented each of the vendors with three general questions. The questions probed into the vendors' professional opinions on (1) the type of processes to be included in the repository, (2) the type of notation and architecture to be used in the repository, and (3) the goals that should guide the future development of the repository.

Specifically, we asked the vendors

1. Which type of workflow processes should be supported in the repository, and which type of processes would be the most valuable to include in the repository? (e.g., complex vs. simple ones).
2. Which type of notation and architecture was considered the most suitable for modelling workflows (e.g., BPMN, XPD, BPEL).
3. Which type of workflow processes should the repository ultimately shoulder (e.g., support for flexible workflows, best practice or monitoring and analyzing work processes).

Discussing these questions with the vendors raised a set of closely related questions. These included

- The type of front-end supporting the process-engine.
- Where the workflow processes should be executed (at a local engine or in a cloud).
- How to provide an overview of mutual dependencies between workflows.
- How to model workflows in a manner comprehensible for case-workers (and other the end-users of the workflows).
- How, if at all, to capture the tacit, taken-for-granted knowledge guiding the work of caseworkers.

3 Summary of answers

On some of the questions presented in the previous section, the vendors tended to agree; on others they voiced some disagreement. At the risk of oversimplifying the differences between the vendors' professional opinions, we present their answers as if these easily could be reconciled. Still, for the sake of presenting a handful of helpful suggestions that might guide the ongoing development of the Workflow Repository, we have chosen to iron out these differences.

3.1 Process types

The vendors suggested that the repository supported three types of processes. Firstly, the vendors pointed out that adding automatic support (i.e., 'straks-afgørelser') for the clear cases seemed an obvious possibility. Secondly, the vendors stressed that transforming workflows from the repository into web-based self-service solutions for citizens and businesses had considerable opportunities. Finally, the vendors argued that the workflows could act as a guide helping caseworkers to get a better overview of the case handling process, especially when dealing with highly demanding casework (involving complex legislation, important deadlines, etc.). Ideally, all these types of support could be provided by the same it-system and processes.

While the vendors did acknowledge the repository's potential in supporting casework, the vendors unanimously cautioned against the idea that the workflows from the repository could be smoothly implemented in the municipalities. According to the vendors – most of whom had considerable experience in mapping workflows in municipalities – different municipalities adjusted even simple workflows (e.g., updating the national register) to suit the set of local problems facing the municipality (e.g., performing different types of checks depending on the demographic structure of the municipality). In addition, the vendors argued that understanding such localized adaptations, proved just as important as mapping a workflow in accordance with the legal, mandatory requirements circumscribing casework.

Although the vendors did caution against implementing workflows from the repository in a "one size fits all" manner, the vendors simultaneously provided some hints as to how to deal with localized adaptations to a predefined workflow. Simply, the vendors proposed that the repository also embrace "workflow fragments", that is, an isolated sequence of an otherwise complete workflow. According to the vendors such fragments, or subsets of a workflow, should be reusable and combinable (and perhaps even parametrized) so that different municipalities could piece together workflows suiting their particular need for localized adaptations.

3.2 Notation and architecture

Currently, the workflows in the repository are modeled with BPMN using Qualiware tools. The BPMN notation can then be exported to XPDL, the XML based process definition language developed by the Workflow Management Coalition (WfMC). The vendors tended to agree that BPMN serves as a good starting point for modeling the workflows, by providing a fairly detailed overview of a possible ideal workflow. Also,

users able to read and understand BPMN diagrams are much better prepared to discuss local variations and adaptations.

However, the current XPDL export in many cases did not allow for import without loss of information. Also, the BPMN and XPDL standards are still evolving (and in Beta versions) and consequently the current tools either only partially support the standards or do not support them at all. There is currently a race between the development and use of a native BPMN XML format for or XPDL as export format, and it is being pointed out in the forums discussing the notations that they are far too complex for most uses, thus there is a need for identifying useful subsets.

One of the key ideas of process-oriented it-systems is that changes in processes should be easy to accommodate, and indeed all the solutions provided by the vendors provided tool support for changes in workflow definitions. However, as also agreed on by leading researchers in BPM and workflow languages, the vendors pointed out that adding support for *flexible* workflows in BPMN based systems that allow users to deviate from the ideal workflow described in the diagram and support for *on the fly* changes to the workflows during execution presents several challenges. Most of the solutions did not allow for changes during the execution of a process. Also, the vendors recommended that workflow consultants or experts, locally trained in BPMN modeling, made such changes and adaptations.

The vendors suggested that changes to a workflow (or a “workflow fragment” for that matter), whether performed locally or in the repository, should be visualized in manner easily detectable for caseworkers, e.g., a web-based RSS feed documenting such changes.

Some vendors pointed out the potential in running the repository as well as the execution engine as a cloud based solution. The vendors did emphasize, however, that the repository should employ different front-ends for different kinds of users (i.e., one type of front-end for consultants and experts with permission to change workflows, and another type of front-end for caseworkers).

Some vendors pointed out that more flexible, rule based (i.e. declarative) process notations are more appropriate both in the initial description of the requirements of the systems and in the support for process guidance. Leaving the designated flow of a BPMN diagram in a BPMN/BPEL based system is generally not readily supported (except for support for e.g. exceptions and task delegation), and modeling all exceptions tend to result in too complex diagrams.

It is currently an area of active research [9,4,13,14] to pursue more flexible declarative notations and their relation to the imperative standards such as BPMN and BPEL. Also, the standardization bodies behind BPMN and XPDL are working on better support for more flexible declarative specifications within BPMN and XPDL.

Ideally, one should be able to choose either a flow-graph based or declarative notation and map back and forth between the different notations without loss of information. In this way, requirements, flexible guidance and on-the-fly changes could be based on the rule based view, while process overview could be supported by the BPMN based view. Several vendors pointed out that a high-level view of process phases and interactions, e.g. like abstract BPMN processes could be more useful in provide an overview of the process.

3.3 Goals driving the development

The series of meetings resulted in six recommendations for the future development of the Workflow Repository. First, adding support for reusable workflow fragments (e.g. parametric workflow patterns and sub/super relationships), version control and subscription to changes should thoroughly be explored.

Second, workflows should be divided into *phases* readily understandable for case-workers.

Third, the repository should employ a distinction *within* the process descriptions between constraints that can serve as a guide for caseworkers (i.e., prescribing a best practice), and constraints with mandatory adherence to (i.e., as an imperative, for instance due to legal requirements). When dealing with the latter type of workflow, case-workers should be provided with instructions explaining why a workflow is mandatory (for example, linking to a passage in the legislative text).

Fourth, *each* task within a workflow process should ideally contain a full description of the data needed for executing this particular task. This should be seen as opposed to the current practice of only giving the full set of data needed to carry out the entire process, e.g. as a standard form, in the beginning of the process. Ideally, the data dependencies should be provided in a digitally processable format and accompanied by a precise description of possible standard services that can provide the data.

Fifth, the repository should provide easy access for evaluating key performance indicators. Such indicators should be seamlessly be integrated with systems already in use in the municipalities such as Executive Information System (Ledelses Informations System).

Finally, the use of BPMN and XPD L as standard digital formats were useful as a starting point, but given their complexity and unstable state it could be useful to identify a simple subset of the standards and style of process design that could remain stable and more easily mapped to other future standards.

Independently of the Workflow Repository, it was also stressed that it was of the utmost importance to achieve the expected performance gains that standard services became available that could digitally provide the needed information within the workflows.

4 The road ahead

As described above, the series of meetings resulted in six concrete recommendations that could be implemented on the short run in the Workflow Repository and reduce the gap between process description and execution.

To provide more intelligent solutions in the long run, ensuring at the same time the most efficient use of resources and the highest quality, it was recognized that the technologies, standards and practices within process-oriented it needs to be developed much further.

In particular, a joint effort between researchers, developers, adopters and users is needed to develop the basis for

- more maintainable, securely interoperable and usable software technologies that at the same time allow for flexible digital support that matches the modern knowledge work practices, can support citizen self-service, and provide automation where possible,
- understanding how business processes and flows of interaction between citizens, public and private sectors are carried out in practice and best supported by it systems, and
- representations and standards for processes and requirements in an understandable, maintainable and exchangeable format which can be digitally processed and support customization and interoperability [1,11], dynamic adaption [7], modularization and reuse [12,8,15].

As an initial step towards such a collaboration an interest group for researchers, developers, adopters and users within Processes and IT has been established within *infini*t (www.infini.dk), the national innovation network for innovative uses of it. It is the ambition that this group will lead to collaboration on research and innovation projects within process-oriented it targeting the above issues.

5 Acknowledgements

This work was funded in part by KL, the Danish Research Agency (grant no.: 274-06-0415 and) and the IT University of Copenhagen (the CosmoBiz [5] and TrustCare [6] projects). Thanks to the representatives from SoftwareAG, Dafolo, Resultmaker, CBrain, and Exformatics for participating in the series of meetings conducted in February-March 2010.

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