Experiencing Adaptive Case Management Capabilities with Cognoscenti

Danielle Collenbusch, Anja Sauter, Ipek Tastekil and Denise Uslu[8]

Abstract: In a world with rapidly changing customer requirements and the increased role of technology, companies need more flexible systems to adapt their processes and react dynamically to changes. Adaptive Case Management (ACM) comes into consideration by providing a concept to adapt to changing business conditions. Within our research project we did a first foundational evaluation of the potential of ACM in supporting unpredictable sales processes. Based on a set of criteria we tested the concept of ACM with the open source tool *Cognoscenti*. The evaluation gave us the possibility to experience the concept of ACM. Hence we were able to provide a statement about the potential of ACM within the context of an unpredictable sales process, setting the path to further research and discussion of ACM in the area of sales processes.

Keywords: Adaptive Case Management, ACM, Business Process Management, BPM, Cognoscenti, Sales process, unpredictable process, Knowledge Worker

1   Introduction

In today's working environment it is essential to adapt to changing circumstances in order to compete and raise customer satisfaction. Imagine a sales process within an IT company that is selling hardware (HW) and software (SW) with an additional service portfolio. Some customers can be served with out of the box solutions (HW, SW and pre-packed services), therefore a standardized process flow would be sufficient. But in other cases customers have very specific requirements, so there is no standardized process flow to fulfill them. That is where we questioned capabilities of Business Process Management (BPM) and started to research whether there is another way to support such an unpredictable sales processes – with no predefined path, many roles involved, high level of communication, changing scope, etc. [Sw11]. An initial research on how unpredictable processes could be supported led us to Adaptive Case Management (ACM) [Sw11] [Wo14]. Based on an abstract model of an unpredictable sales process, we evaluated the capabilities of an Adaptive Case Management System (ACMS) to support knowledge workers involved in a certain sales case. Using the open source tool *Cognoscenti* [Sw15b] provided by Keith Swenson, we did a first evaluation of the concept of ACM. Within our evaluation we defined criteria covering the usability of the tool and the ACM capabilities of *Cognoscenti*.

In this paper we want to share our experience and while doing this we aim to contribute

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[8] University of Reutlingen, Faculty of Informatics, M. Sc. Services Computing, Danziger Str. 6 | 71034 Böblingen, Firstname.Lastname@Student.Reutlingen-University.de

in revealing the potential of the concept of ACM within the context of an unpredictable sales process using the open source tool *Cognoscenti*. In *Section 2* we provide an overview over the abstract sales process, derived requirements and our point of view showing why we chose ACM. In *Section 3* we describe the tool *Cognoscenti* briefly. In *Section 4* we provide our evaluation outcomes. *Section 5* gives a brief overview of related work. Finally we give an outlook to further discussions and research arising out of our evaluation in *Section 6*.

2   Preparing for the evaluation

As a foundation for the evaluation we outlined an abstract sales process[9], defined high level requirements, and refined why we want to evaluate the capabilities of ACM within our scenario.

2.1   An abstract sales process

In *Figure 1* we show objectives (milestones) which are predefined or created based on the sales *case*[10]. Furthermore we defined a guidance frame to cover the aspects of underlying/related tasks, policies, business rules, events, etc. which are considered as guidance while working on objectives. To achieve objectives human resources as well as IT related resources are required.
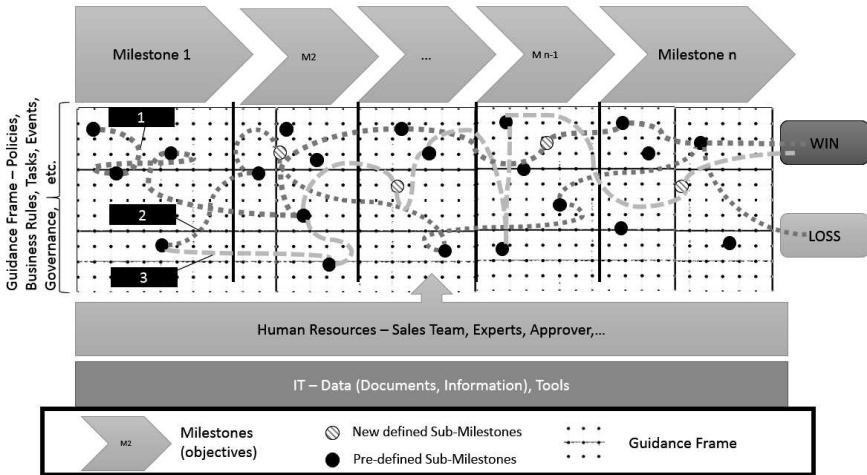

Figure 1: An abstract sales process description

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[9] The abstracted sales process is based on a real life sales process.
[10] A *case* is similar to an instance of a process. A process instance is based on a standardized process model whereas each case instance has no standardized model as foundation.

For the evaluation we created a more precise description including objectives as well as human resources and IT resources. A snippet is shown in *Table 1*. We used the detailed description of an abstract sales process as a foundation for the use case to be evaluated – creating sales cases within the ACMS *Cognoscenti*.

Within the sales process we defined six main milestones with sub-milestones. The milestones, their attributes (such as: required roles, timing, etc.) as well as predefined tasks are viewed as a guidance frame to work on a sales case. Every sales case may take a knowledge worker through completely different paths based on customer requirements as well as human resources / IT-Resources and the guidance frame (see numbered lines in *Figure 1*). With this aspect in mind the next step led us to the definition of requirements regarding a supportive environment.

Goal	Definition	Description	Roles	Documents| Information Requirements
Mn	reviewed/ qualified opportunity and resource approval	This is the final milestone before the opportunity is transferred into the next phase. After this milestone has been completed the opportunity milestones arise regarding the contract, etc.	opportunity lead approver reviewer	opportunity status information | documentation customer information resources needs additional information sources for the opportunity
n.1	reviewed opportunity	Depending on the opportunity setup the review team and make sure all information for the review is available to the review team.	opportunity lead	
…				
n.1.3	evaluation prepared	Setup meeting for the review / evaluation team. Make sure all needed information is available and prepared.	opportunity lead	document set for evaluation

Table 1: Excerpt of the sales process description

2.2   Defining Requirements for a software solution

Based on our abstract sales process we defined the following requirements for a software solution. In our context we define the term "solution" as a software or tool, which fulfils the defined requirements. The solution should provide means to sketch an unpredictable

sales process. Even though milestones, goals, etc. are elements from project management, we wanted to be able to sketch the sales process with all sub goals in the selected tool. To reflect the adaptive nature of ACM, these goals should be changeable. The solution should also provide means to link documents. As documents are (besides the process flow) the most important fragments of a business case that can be tracked, the tool should provide means to link documents to certain process steps. This could be done either by upload, or by including a connection to SharePoint or other document stores. Furthermore, the solution should provide roles to which users can be assigned. The solution should also provide a mechanism for prediction of potential next steps. As the ultimate goal is to predict which steps in the process could lead to success or failure, a solution which is capable of doing so would be provide the highest level of support. However, this is highly improbable, so a solid base of data and possibilities to implement this prediction mechanism would be sufficient. Most importantly, the solution must be free of charge. In the best case the solution is open source, which is not only free, but provides the possibility of extensions and corrections.

2.3   Adaptive Case Management – handling unpredictable processes

BPM is a discipline involving modeling, automation, control, and optimization of business activity flows, within and beyond the enterprise boundaries [Pa15]. Standard BPM is about automating routine processes that have a standard flow every time. But automation is impossible for knowledge related work, because the work itself simply doesn't repeat in routine patterns [Sw13].

After questioning the BPM approach, it was clear that normative defined and fixed processes are only useful for the execution of predefined and standardized flows. But in our case, "predefined" was the challenge. If it is not known, what tasks and in which order will be performed, how can they be predefined? Besides, in some cases there is a huge number of alternatives to offer and it is not possible to choose one right path to meet customer demands.

What we needed was a flexible BPM that supports real-time decisions and is adaptable with learning effects. These essential requirements for enabling to support unpredictable and dynamic processes led us to ACM for further research. According to ACM every single *case* has to be considered as an individual process. To achieve specific goals of *cases*, knowledge workers decide (with their own know-how, information systems etc.) which potential process steps to follow. ACM is thus flexible, data-driven, and dynamic. It also offers on-the-fly process models and allows customers and participants to act dynamically. Therefore a solution based on ACM was chosen.

ACM and BPM are not opposite approaches, instead they complement each other. In many projects both methods are needed and each should be used where it is appropriate. If there are a lot of potential process steps, if it is essential to use the know-how of a knowledge worker or if there is an unpredictable dynamic process; then ACM comes into consideration.

3   ACM Environment – *Cognoscenti*

An ACM approach provides a framework for knowledge-based and less predictable processes, which are unstructured and dynamic. Therefore an ACMS must provide a high level of flexibility and support knowledge workers to achieve their goals related to a *case*.

Cognoscenti[11] has been developed by Keith Swenson who has made many contributions[12] in the ACM area. Today *Cognoscenti* is available to everyone as an open source experimental platform which presents features and characteristics of an ACM approach.

To support complex and unpredictable processes, one should experience many different processes and approaches first. Regarding this purpose *Cognoscenti* offers a set of capabilities to track documents, goals, roles, notes, etc. By providing such structural support with the ability to adapt as needed, it supports knowledge workers to adapt their specific cases, make real time and data-driven decisions, and achieve their goals.

Cognoscenti stores all information in XML files. Since adapting databases to specific needs is highly complex in a comparison to XML files, *Cognoscenti* makes the installation a lot easier by removing the need of a database. XML files offer a flexible schema that can be evolved efficiently and also allow users to access and edit files directly.

The conceptual object model which consists of "Site," "Project" and "UserProfile" objects, forms the root of *Cognoscenti*. The "Site" object stands for a space which has a group of owners who all are allowed to create projects on this site. The "Project" object is a collection of documents, notes, roles, goals, history etc. The "UserProfile" object has personal information about users like their addresses and personal settings, but it is not related to the "Site" and "Project" objects. Therefore a user is allowed to have multiple roles and responsibilities in variable projects.

Since *Cognoscenti* is first and foremost a collaborative case management system to work with sensitive information, security features, that control how particular users access particular artefacts, are seen as a primary consideration by the developers of *Cognoscenti*. Security must be easy and clear enough to understand and only the right people should have access to specific artefacts. Therefore, the security and access control settings must be clear for non-technical users, too. If a particular user is assigned to an active goal in *Cognoscenti*, this user will automatically get access to all the documents of

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[11] The adventure of *Cognoscenti* has begun as a research prototype within Fujitsu North America. It has been developed by Keith Swenson. Today with some strategic internal company changes *Cognoscenti* is available to everyone as an open source experimental platform.

[12] Keith Swenson is a pioneer in case management area and keynote speaker at many conferences. He is also the writer of the book „*Mastering the Unpredictable: How Adaptive Case Management Will Revolutionize the Way That Knowledge Workers Get Things Done*" which has a high importance in the Case Management Area.

this goal. If this user delegates an assignment to another person, this person will also get access to the documents immediately. With these features users of *Cognoscenti* don't need to spend additional time on management of the access rights. [Sw14]

3.1   Installing *Cognoscenti*

Aiming to share the whole picture of our experience within this paper, we also want to cover the installation process of the ACM tool *Cognoscenti* as follows:

Cognoscenti is built to be installed in five easy steps. First, the user has to drop the downloaded WAR-file into TomCat's webapps directory and second edit the main configuration. The next steps are to edit some configuration files, for which examples are given. As a last step the user has to create an account and edit the main config to set this account as administration account.

Installing *Cognoscenti* is straightforward. However, there are a few details, that aren't mentioned and caused our installation to fail multiple times. As most of them are already fixed in a newer version of *Cognoscenti*, we only wanted to mention the following one: Only one *Cognoscenti* instance per machine is allowed and trying to install multiple instances leads to breaking all instances. This should be mentioned more visible to avoid confusion. But in the best case, installing *Cognoscenti* is actually really easy and requires almost no deeper technical knowledge. All needed configuration details are given and work out of the box.

3.2   Cognoscenti reflecting sales cases

After the technical setup of *Cognoscenti* we created sales *cases* based on our abstract sales process to do the evaluation. Using the vocabulary of *Cognoscenti* we set up the environment as follows:

Project: The sales *case* is reflected as a *project* within *Cognoscenti*. All of the following setups are within the context of a specific *project*.

Project goals: We used *project goals* to reflect the milestones as well as some sub-levels of milestones. Here we used the possibility to describe the milestones in more detail – like timing, required roles, description, etc. This enables new knowledge workers to learn about the case – current status, next steps/objectives, etc.

Project notes: *Project notes* were used for communication within the case environment. It provides the capability to share information as well as gathering feedback from the team. Additionally there is the possibility to restrict the access to *project notes* to focus on a certain group of case worker. This is important regarding sensitive data within a sales *case*.

Project documents: While handling a sales *case,* a wide range of data is needed,

gathered, and processed moving towards closing a *case*. To store the data in context of the *case* we used the *project documents* repository. We also used the possibility to send data directly to the sales *case's project document* repository using email and a token (as email subject) relating the data to the *case*. There is also the possibility to manage access to certain documents.

Project roles: When users are added to the sales *case* we associated them with certain roles. The case manager is responsible for the *case*, he decides about roles and responsibilities and when to close the *case*.
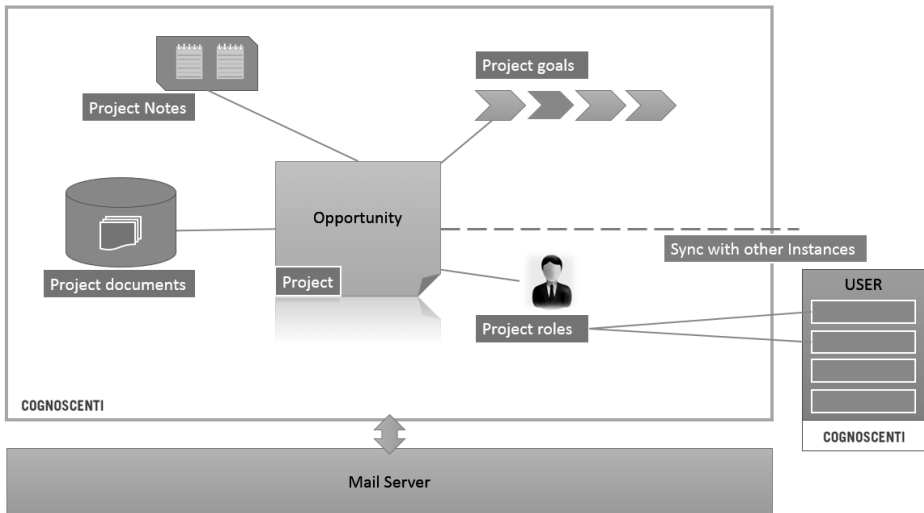

Figure 2: Sales process within Cognoscenti

A schematic overview of the setup is displayed in *Figure 2*. It shows the *project* as central context for *goals*, *roles*, *documents,* and *notes*.

4   Evaluation and Outcome

According to the setup of the sales *case* within *Cognoscenti* the evaluation is based on our experience. Hence, we have focused on significant criteria for the concept of ACM gathered from the paper of Keith Swenson [Sw14]. Additionally we added some criteria based on our working experience. A brief overview of our criteria is shown in *Table 2*.

Evaluation Criteria	Criteria Source
Data	[SW14]
Security Access Control	[SW14]
Affordance of Change	[SW14]
Roles	[SW14]
Representation of Goals	[SW14]
Learning & Templates	[SW14]
Restructuring over time	[SW14]
Document Repository Support	[SW14]
Fedarated Case Support	[SW14]
Information Management	working experience
Project Management	working experience
Team Management	working experience
Usability	working experience
Information Management	Usability	working experience
Information	Data Sharing	working experience
Project Management	Usability	working experience

Table 2: Brief overview of our evaluation criteria

For the evaluation of the different criteria we used a target-performance comparison. It provides a first analysis of the concept of ACM related to our abstracted sales process. The evaluation of these criteria was made by assigning one of three possible states ("*fulfilled*," "*missing*" or "*not/partly fulfilled*"). Furthermore, we provided some improvement suggestions based on our experience.

These evaluation criteria allowed us to research the potential of the concept of ACM by using the open source tool *Cognoscenti*. Following, we provide a brief overview of some

of our outcome:

Cognoscenti stores Data in an XML-format which simplifies the data exchange and also the extension of the Data-schema. The idea for improvement of the criterion *Data* is to collect use historic case-data and make it useful for further projects/cases (e.g. recommend a next best step). A pattern structure could give guidance on how to fulfill customer requirements successfully based on historic data (logs). Thus the weakness of a process can be emphasized and determined with enhancement for a better customer service.

The criterion *Affordance of Change* administers the members for access, project, and goals. Worth considering is that a role will not be distributed by the super admin. Different roles should have the possibility to manage an access to provide more flexibility.

The *Federate Case Management* criterion is responsible for the connection with other Case Management Systems and could not be evaluated, since we only have implemented one ACMS. The *Federated Case Management* is beneficial for synchronizing data in-between heterogeneous ACMSs [Sw14]. The *Document Repository Support* enables the synchronization of project documents and connection to several repositories. This enables a better handling of project related content even though it is distributed over a variety of repositories.

The *Learning & Templates* capability allows reusing cases that are marked as template. A central repository for all project templates would provide a dynamic exchange and the users could learn from each other. However, improvement suggestions for capabilities related to the criterion *Usability* might be considered. The navigation in *Cognoscenti* is not always explicit. The possibility for users to personalize the menu would reduce complexity.

For the project management *Cognoscenti* has beneficial features. We were able to map every single process step. The structure of hierarchy gave notice about the goals and the sub-goals (*Representation of Goals*). For a general overview it would be nice to have a one pager inside of a project which can be used to get more detailed information. To achieve goals the support of *Information / Data Sharing* is essential. Folders can be generated and information can be shared in order to work towards goals and make decisions. However, a communication outside of the notes was not enabled within the implementation of *Cognoscenti*. Additional functionality enabling collaboration could provide a further improvement (e.g.: Instant Messaging, Micro Feed, etc.).

The concept of *Cognoscenti* is promising. Therefore, this first evaluation was fundamental to emphasize the potential of the concept of ACM for our scenario. For an ultimate assumption our evaluation is not sufficient. For sophisticated statements there needs to be ongoing research and further evaluation with a deeper focus on certain parts of the concept of ACM.

5   Related Work

Within our project we looked on the potential of ACM for an unpredictable sales process. There are other scientific works analyzing the aspects of ACM. Especially the paper from Hauder, Pigat et al. [HPM14] gives an overview over the research areas of ACM. The books published by the WfMC are providing also good insight on the concept of ACM. Beside of theoretical aspects there are also real life cases explaining how ACM is already used [Sw11] [Sw12] [Sw15a]. In [Sw15a] for example, use cases describe scenarios where ACM is used for a NASA project or within the government of Norway.

Looking at tools beside the open source tool *Cognoscenti* we found Oracle [Or15] and TIBCO [Ti15] providing ACM capabilities within their products. Another tool which is one of the first hour is Isis Papyrus [Is15].

Within our evaluation we found the functionality of advanced collaboration within *Cognoscenti* was not sufficient. In other researches in the area of ACM, the collaboration aspect seems to be an important topic. This includes topics like: finding experts to handle a case [HWG14], collaborative case management supported by IT-tools [HLB14], flexible case management in a social network environment [Mo12] and collaborative knowledge work [MKR13].

Looking on all those references and related works we could not identify use cases for the context of unpredictable sales processes. Mainly we found examples for health care or insurance claims. Nevertheless the related work show that there is a broad range of research within the area of ACM which can also be leveraged into further research in the context of unpredictable sales processes.

6   Conclusion and Outlook

The ultimate goal of all companies hasn't changed: "to meet customer demands." But in a world with rapidly changing customer requirements and the increased role of technology, companies need more flexible technology solutions to adapt their processes and react dynamically to the changing conditions. ACM comes into consideration by providing such flexibility and capability to adapt to changing business conditions. ACM puts knowledge in the center and serves for sustainable further development and optimization.

Within our paper we provided a first foundational evaluation of the potential of ACM in supporting unpredictable sales processes. The evaluation with *Cognoscenti* showed us that the concept of ACM has a high potential. Further research could evaluate the potential of linkages to Customer Relationship Management, the analysis of collected *case* data as well as management support with new measurement systems to manage unpredictable processes. A further evaluation may also involve user and include criteria weighting, taking additional tools into consideration.

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