

Exploring ACM and S-BPM for Modelling Human-centric Processes: An Empirical Comparison

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ABSTRACT

Human-centric processes are characterized by the need to provide participants with everything they require without restricting them. A typical example of such a process is medical treatment, which involves medical personnel cooperating to treat patients. ACM is a well-known approach targeting the support of knowledge workers, while S-BPM is a typical approach targeting role-driven process modeling. In this paper, the characteristics of both approaches are explored, as well as an empirical comparison takes place between them towards human-centric process modeling. To this end, two meta-models were created by the authors of this paper based on the theoretical background of the methodologies, which were evaluated through a medical treatment process case study. Additionally, the similarities between the two approaches were identified, while a comparative study of their specific characteristics was performed, so as to identify points of correlation between ACM and S-BPM so as to combine them in a unified research attempt at a future stage.

Categories and Subjects Descriptors

• **Human-centered computing~Empirical studies in collaborative and social computing** • *Human-centered computing~Empirical studies in interaction design* • **Computing methodologies~Model verification and validation** • *Software and its engineering~Semantics*

Keywords

Human-centric Business Processes; ACM; Subject-BPM; empirical comparison; modeling tools; medical treatment

1. INTRODUCTION

Business Process Management describes a structure that organizations develop so as to control their business workflows fact that makes this method system-centered or enterprise-centered and it does not aim in supporting decision. This philosophy does not fit with today's service industry, where people undertaking activities in knowledge-intensive service processes are highly qualified and specialists in their areas of expertise. Thus, a facilitating and supporting concept would be preferable than a restricting one. Although being considered as a so commonly used discipline for the organizations around the world, BPM seems unable to support organizations in continuously changing environments and continuously changing stakeholder needs. These environments

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could be healthcare, legal, social work and few other. The common characteristic between these domains is that the work procedure simply cannot be implemented through usage of machine programs uniquely, as it needs human worker involvement because the work that has to be done in these domains is highly variable [1].

The goal of this paper is to examine how a more human-centric aspect of BPM can be implemented through different and alternative modeling approaches which present the business processes from the view of a human, who has the knowledge to execute them properly. These two approaches are ACM and S-BPM, upon which a comparative study will take place by adopting a typical human-centric process such as the Medical Treatment example.

In Section 2 of this paper, related work is presented. Section 3 projects the two core meta-models designed by the authors upon ACM and S-BPM as well as a description of their key features. Section 4 presents Medical Treatment upon which a case study was examined. Additionally, a correlation of the two approaches takes place in terms of their applicability into Medical Treatment. Section 5 contains an attempt by the authors to identify the convergence between ACM and S-BPM at a more conceptual level. That way, a co-integration between the two methodologies is attempted. The final Section refers to the conclusion that can be drawn including any added value created from this research work, as well as some future challenges set by the authors.

2. RELATED WORK

Adaptive Case Management considers, as a data-driven theory, data creation and data exchange as the center of attention. Through this, the above mentioned theory uses the created case data that may lie even in case workers' inboxes [1], as knowledge, in order to support the knowledge workers [2] in decision making. That makes the theory supportive and human-centered as its main initiative lies to facilitating the involved participants, as well as agile and adaptive as a methodology, especially because it provides an organization with the ability to change according to its needs, a feature that is essential in continuously changing human-centric business domains. [3]

This generic adaption in the human-centric domains requirements, has created a debate between researchers, whether ACM is "the one" or there is room for alternative methodologies. Such an alternative theory is the Subject-oriented Business Process Management approach, which as a role-driven methodology, as it moves the center of attention from something abstract like a process to the human factor. As the alternative methodologies seem to cover human-centric BPM from a different perspective, several attempts were made to combine these approaches into one, such as trying to

In short terms the Medical Treatment process is describing all the needed activities for a hospital in order to address every possible scenario concerning patient's status. What is important, is to get familiarized with the variety of Tasks performed by the end users during Medical Treatment. To this end, Table 1 depicts a classification of tasks per role.

Table 1. Tasks per role in the medical treatment process

Role	Task
Emergency Department Personnel	Provide health status information
	Start treatment
Physicians	Specify diagnosis
	Prescribe medication
	Perform examination
	Evaluate examination results
	Revise diagnosis / medication
Nursing Personnel	Consult a specialist
	Administrate medication
	Blood Drawing
	Vital signs measurements
Intensive Care Unit Personnel	Record measurements
	Urgent surgery

4.2 ACM in Medical Treatment

The examination of the validity and usefulness of the above mentioned ACM core features under the Medical Treatment Case Study required a supportive tool to implement its main characteristics. During the design of such a human-centric process using the ACM philosophy, a case was defined alongside with important details such as priority, expected duration, milestones as well as the case goals. Human tasks were also instantiated, although were not possible to be connected with the appropriate roles. Medical treatment required data to be exchanged between tasks, in order to achieve a normal flow of artifacts and useful knowledge. Those data were stored as task inputs and outputs in predefined case folders and can be loaded in future modeling attempts. The connection between tasks, roles and data was implemented through the use of business rules for the Case project that is executed. These business rules, define the interaction between the Adaptive Case Management elements that were presented above as well as the assignment of the different human tasks to the appropriate actors.

4.3 S-BPM in Medical Treatment

The proposed meta-model as well as the key features of S-BPM were explored through the Medical Treatment process in Metasonic Suite. To a certain extent, Healthcare is a domain that requires human communication in order to achieve the best results of the work procedure, so it would facilitate such communication as the exchange of messages, which contain data, tasks instructions and business objects is one of main characteristics of S-BPM theory. As far as the implementation of medical treatment example processes is concerned, firstly, the subjects involved in these processes were created, alongside with their internal behaviors that contained the exchange of messages and data through them. Accordingly, the roles expected to be assigned to these subjects had to be created as well. The sequence of actions is easily understandable as for every

send state that a subject has, the second one has a receive state, except to some complex interactions between subjects of different processes. The exchange of data objects or business objects between roles in S-BPM represents completely the philosophy of medical treatment example.

4.4 Correlation of the two approaches

This correlation was based on the criteria already referred to [8], [11], namely flexibility, ease of use, understandability, simulation and scope. Especially, as far as [8] is concerned, the comparison criteria that are used in that research work inspired us to focus upon the flexibility of the approaches. Additionally, the ease of use as described in [8] is expressed through the ease of modeling and role and resource management criteria in our comparative table.

Table 2. The modeler's Perspective Comparison table

Property	Adaptive Case Management	Subject-Oriented Business Process Management
Ease of Modeling	The modeling of notions is difficult to understand for someone not familiar with methodology.	Modeling of notions related to those of BPM is closer to what someone is expecting to see from a BPM alternative theory.
Role Management	Roles as a primary element and characteristic of the ACM theory.	Clear roles definition. Roles are mandatory to be assigned to subjects.
Data Management	Data are stored in the Case Folder and are considered important of the methodology.	Data are exchanged through messages between the subjects and as inputs and outputs of processes.
Multi-level Modeling	ACM enables multi-level modeling, as the orientation and the division of basic elements can be done in different layers.	The S-BPM theory requires multi-level orientation as different levels of modeling are used. A drill-down philosophy is followed.
Constraints Representation	Constraints are implemented with Business Rules so as to implement Roadmap.	Constraints are of restricted use in S-BPM and are including only the sequence of the actions taken by a subject.
Flexibility in Modeling	Changes can take place in every modeling stage of a Case.	Flexibility, is provided through communication of different subjects of different processes.
Flexibility in Process Execution	Changes are applied in run-time phase while role involvement can occur in run-time.	In run-time there can be no change in the sequence of actions. Every subject has a specific set of actions to take.
Strongest Point	The ability of being agile in a changing environment.	Drill-down approach makes the phases fully understandable.
Weakest Point	When little emergency handling is required, ACM is not preferable	In human-centric environments with high emergency, S-BPM seems inappropriate.

5. ACM AND S-BPM CONVERGENCE

After correlating ACM with S-BPM through medical treatment, it is about time to make an attempt of converging the two approaches in a more general scope. Firstly, a notion-oriented matching has to take place between the approaches elements, while later, the above mentioned convergences are examined in order to find ways of combining these two theories.

5.1 Notion-Oriented Matching

The matching will be completed in an element basis of these methodologies, because that way the interrelationship of the approaches would be more understandable. For that reason, Table 1 was created, which is projected below and contains the basic or secondary elements that are matching with each other. What is presented through the below projected table, is the interrelationship between the two meta-models' elements through a notion-oriented matching, where these elements are categorized upon six categories. Each category presents a different aspect of the matching in order to present common points or differentiations between the two theories.

Table 3. The Approaches Conceptual Convergence Table

Notion	ACM	S-BPM
Basic Modeling Element	Case	Subject
Activity Modeling	Task	State
User Modeling	Role	Role
Data Modeling	Artifact	Message / Business Object
Conditional Modeling	Decision Point	Transition
Action Sequence Projection	Roadmap	Internal Behavior

5.2 Co-integration of the two approaches

What is required for the co-integration of the two approaches lies to notions that can be substitutes as far as their context is concerned and can be related to both the ACM and S-BPM theories. More specifically, if ACM is examined and it is attempted to have S-BPM integrated into it, then a possible integration point would be the Actor element. This element could be considered as a subject which would have an internal behavior and would communicate with other subjects (Actors) through exchanged messages. On the other hand, if S-BPM is examined and it is attempted to integrate ACM into it then a possible point of correlation between those two theories could be the consider a Process as the main Case element that is comprised of tasks that should be executed by predefined roles.

6. CONCLUSIONS AND FUTURE CHALLENGES

What was presented in this research work was an attempt by the authors of this paper to combine ACM with S-BPM and examine their correlation, through the creation of two core meta-models, within the borders of a human-centric domain of knowledge work such as Medical Treatment which could lead to a co-integration between the two methodologies. The added value of this research

work is that the meta-models that were created by the authors, were based upon the theoretical background of the ACM and S-BPM methodologies, focusing upon their most important aspects.

As far as the conclusions is concerned, firstly, these methodologies can enhance human-centric process management in a different way. For instance, ACM is agile and adaptive, leaves the different actors involved in the case to act as they consider best, while, S-BPM is rather rigid and strict and addresses better some less handling emergency oriented cases. The second conclusion refers to the provided ability to attempt a co-integration of ACM and S-BPM who can be substituted into a convergence attempt so as to create a combined theory that would inherit features from both the approaches. Finally, a future modelling challenge could be set so as to design a unified meta-model for both theories creating an approach within the notion of Subject-ACM.

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