Towards Process Improvement for Case Management

An Outline Based on Viable System Model and an Example of Organizing Scientific Events

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Abstract. There are a number of methods for business process improvement that are used in practice and investigated in theory, such as Lean or Six Sigma. Most of these methods are activity based and they are aimed at optimizing the activities flow, and/or the usage of resources in the process. These methods suit well the workflow-based processes and thinking, but they are not easily adaptable to Case/Adaptive Case Management (CM/ACM) processes, the goal of improvement for which is improving the overall result from the knowledge workers cooperative work. Another distinctive feature of CM/ACM is that the process is guided not through which flow of activities to use in certain situations, but through a set of templates to use in these situations. This paper outlines a possible method of improving CM/ACM processes based on the Viable System Model (VSM). Though the usage of VSM for process improvement has been reported in the literature, it was not specifically applied to CM/ACM processes. The outline is based on the analysis of the process of organizing a series of scientific events, such as the *AdaptiveCM* workshop.

Keywords: Business process · Process improvement · Case management · Viable system model · VSM · ACM · BMP

1 Introduction

Process improvement is one of the main directions in Business Process Management (BPM). The traditional aim of process improvement is optimization of process flow and usage of resources engaged in the process. This, for example, can be achieved by removing operations/activities that do not produce value for the customer or substituting activities that result in waste of resources with more economical ones, automating where possible with the help of modern technology, designing optimal process logistics to ensure that expensive resources, such as experts, or equipment have the maximum of engagement. There are a number of methods recommended for systematic process improvement, based, for example, on Lean or Six Sigma ideas. These methods, however, are adjusted to the operational/workflow view on business processes, explicitly

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dealing with operation/activities and resources needed for completing them, including, human and time resources.

As we proposed in [1], Case Management (CM) and Adaptive Case Management (ACM) processes are more appropriate to describe in terms of templates/forms that guide the knowledge workers in completing their work. Such a template may incorporate a mixture of goals to be attained, information to be obtained and, possibly, actions to be undertaken for attaining these goals. The knowledge workers are to pick an appropriate template and work with it according to the situation at hand. Though a CM/ACM system may impose some restrictions on what templates can/should be picked and in which order, the knowledge workers retain considerable freedom to do appropriate choices of templates, and which actions to complete when following a particular template. Considering improvement of CM/ACM business processes, the foremost goal here is improving the overall result from the knowledge workers cooperative work.

Due to the substantial difference between the workflow-based processes and CM/ACM processes, the existing process improvement methods developed for the former cannot be directly used in the latter without modification. The aim of improvement of CM/ACM processes could be defined as improving the templates used in these processes rather than optimizing the flow of activities and usage of resources. Therefore, adjusting the traditional methods of process improvement to CM/ACM processes means starting, more or less, from scratch. In this situation, other, less used, methods could be taken into consideration when deciding on the basis from which to develop process improvement methods suitable for CM/ACM processes. We believe that one of the promising approach to take is to utilize Viable System Model (VSM) of Beer [2] for designing the templates.

VSM is especially adjusted for modeling, analyzing and designing an organizational system that: (a) consists of semiautonomous units that work together for producing results, and (b) possesses the ability of adjusting itself to the changes in the environment without losing its identity. A CM/ACM process can be considered as such a system, where the individual knowledge workers function as semi-autonomous units when doing their parts of work. Though VSM is rarely used in the BPM world, there are some works where it is employed for process improvement. Mostly these are theoretical works related to the overall process architecture, see for example [3]. However, there exist some articles that use VSM for practical purposes, e.g. configuring a generic process to each specific unit in an organization [4]. As far as VSM in relation to improvement of CM/ACM processes is concerned, our search on Google Scholar has not produced any relevant results.

The goal of this paper is to outline an idea of how process improvement for CM/ACM processes based on VSM could be done. To explain the outline, we will be using an example of CM process related to organizing scientific events like the *AdaptiveCM* workshop [5]. The process has been chosen based on the following line of reason:

1. The flow of activities in this process - advertise, gather submissions, review, notify, etc. - is well known and there is but little chance that it can be improved.
2. The process is interesting from the point of view that it is completed by a virtual team of knowledge workers that might not know each other.

3. The author has experience of this type of processes in different capacities, chair, reviewer, submitter (customer).
4. The audience to which this paper is addressed has the knowledge of this process, at least from the submitter/customer perspective.

The rest of the paper is structured in the following matter. In Sect. 2, we give an overview of VSM and literature related to using VSM for process improvement. In Sect. 3, we give an outline of our idea. In Sect. 4, we discuss the details while demonstrating our suggestion on the process of arranging scientific events, such as *AdaptiveCM* [5]. In Sect. 5, we summarize the results achieved and draw plans for the future.

2 VSM and Its Usage for Process Improvement

Viable system model (VSM) has been developed by Beer [2] and his colleagues and follows, see for example [6]. It represents an organization as a system functioning in its environment and consisting of two parts: *Operation* and *Management*. In its own turn, *Operation* is split into a number of semiautonomous operational units, denoted as System 1, that have some communication mechanism to ensure their coordination. The latter is denoted as System 2. *Management*, in turn, is split in three parts, denoted as System 3, System 4, and system 5. Dependent on the author, these systems may be dubbed differently, see Table 1, but they have more or less the same meaning, see the last column of Table 1.

Table 1. Components of VSM

Identification	Naming	Function
System 1	Operations, Implementation, Delivery	Producing and delivering products and services for external customers, thus actively interacting with the environment
System 2	Coordination	Coordinate work of operational units included in System 1
System 3	Control, Delivery management, Cohesion [6], Homeostasis [7]	Managing operational units (System 1), and establishing/maintaining coordination mechanism (System 2). Making the semiautonomous units function well as a whole (cohesion) in the current business environment (homeostasis)
System 4	Intelligence [6], Future, Heterostasis [7]	Forward looking adaptation to possible future changes in the environment through identifying trends and preparing to changes or affecting the environment in the desired direction (intelligence). System 4 allows changing from one homeostasis (now) till possible

(*Continued*)

Table 1. (*Continued*)

Identification	Naming	Function
		homeostasis in the future thus allowing the system to function in a heterostatic environment. System 4 is considered as including development, marketing and research
System 5	Identity [7] (management), Policy [6] (management)	Solving conflicts between System 4 and System 3 [8]. Permitting System 4 to introduce changes despite the conservatism of System 3, and not allowing System 4 to change the identity of the whole system that exists via functioning of Systems 3, 2, 1. This is done through designing, maintaining and imposing policies that stay in place even when changes designed by System 4 are implemented in Systems 3, 2, 1

Note that components listed in Table 1 do not need to coincide with the organizational structure of a particular organization. Different components can be manned by the same people. This, for example, happens in a small enterprise where the same group of people does the job on all levels. The components in this case are differentiated not through who is doing the job, but through the nature of the job done, e.g. policy document writing belongs to System 5, while completing a customer order belongs to System 1.

The viability of the system with a structure like suggested by Beer is attained in two ways. Firstly, the viability is attained through each component being responsible for interacting with its own part of environment (though the parts that fall into responsibility of different components can partially intersect). This ensures fast (non-bureaucratic) response to fluctuations and changes. Secondly, it is attained through the recursive decomposition of components so that each of them has a structure of a viable system in respect to its own part of the total system environment (such decomposition concerns the units of System 1, in the first place).

The most common works on VSM in relation to business processes are the theoretical ones, a typical example of which is [3]. It discusses the needs for configuring/adjusting each generic process, e.g. inventory management, to the local environment that corresponds to the given operational unit of System 1. It also discusses the needs to review/update business processes at the rate that correspond to the dynamics of the environment of the operational unit in which these processes are enacted.

There are however, also works that try to envision a practical approach to using VSM for process improvement, as it is done in [4]. It shows how a generic purchase process can be configured (tuned) for each operational unit dependent on the environment in which the latter functions.

As we already mentioned in Sect. 1, the existing literature related to the usage of VSM for process improvement do not specifically takes the issues connected to CM/ACM processes. This paper is a try to fill this gap by finding relations between VSM and CM/ACM, and outlining an approach to CM/ACM business process improvement based on VSM.

3 An Outline for CM/ACM Processes Improvement

Our proposal is based on the following assumptions:

1. Templates used in running instances of a CM/ACM process are related to the goals connected to the process on one hand, and the external environment on the other hand. In addition, some templates need to be synchronized (aligned).
2. The relationships between the templates and the goals and environment could be revealed by building a VSM model of the organization that is responsible for the process and connecting the templates creation and usage to different components of the VSM system. In addition, positioning of the templates in the resulting model could help to understand which templates need to be synchronized.

Based on the above assumptions the improvement process can be defined as consisting of the following steps

1. Analyze the process at hand and identify templates used for running the process instances/cases.
2. Build a VSM model of an organization responsible for the process and relate templates to the components of the VSM model, thus establishing relationship between the templates and organizational goals and the environment.
3. Based on results of step 2, establish requirements on synchronization between the templates
4. Based on the results of steps 2&3, check whether the templates are aligned with goals, environment and with each other. Make changes where misalignment happens.

As can be seen from the above, the basis for the improvement consists of building an augmented VSM model – steps 1, 2 and 3. The details of this model are discussed in the next section, while we demonstrate its usage using a concrete practical example.

4 Demonstration on the Process of Organizing a Scientific Event

For discussing and demonstrating the details of the outline from the previous section, we will be using a process of organizing a series of scientific events in general, and running the *AdaptiveCM* workshop [5] in particular. The activity flow in such type of processes is well-known and looks like *Choose a conference to attached to* → *Submit a workshop proposal* → *Set up a website* → *Advertise the event* → *Set up a submission management system* → *Set up a PC* → *Gathering submission* → *Review* → *Make decision on*

submissions → …. This sequence is more or less the same for anybody organizing a scientific event. Actually, the case of conference organization is quite often used in scientific papers devoted to business processes; see, for example [9]. So, the issue of organizing the flow of activities in this type of events is quite worked out. As despite the same flow of activities, some event series succeed better than the others, there are other (than workflow) factors that affect the success. We will demonstrate that these factors can be uncovered by following the steps from the outline in Sect. 3.

4.1 Analyzing the Process and Identifying Templates

The main actors of the process at hand can be divided in three categories:

1. Participants, who are both customers and value-creating agents. The participants create value for each other by presenting material to others and discussing the material of others at the event.
2. Program Committee (PC) that acts as Quality Assurance filtering the submissions and recommending improvements to be made in the materials to be presented.
3. Event chairs, responsible for each event running smoothly.

Note that there is no full separation between the categories. Many events series allow a chair to be a PC member and submit a paper, though some have stricter rules that exclude mixing the roles.

The main tools that are used to support running the process instances/cases are:

1. The event-web portal, like the one set for *AdaptiveCM* [5] in Fig. 1, and
2. A conference management system, like *EasyChair* [10], which is used for managing the workshop

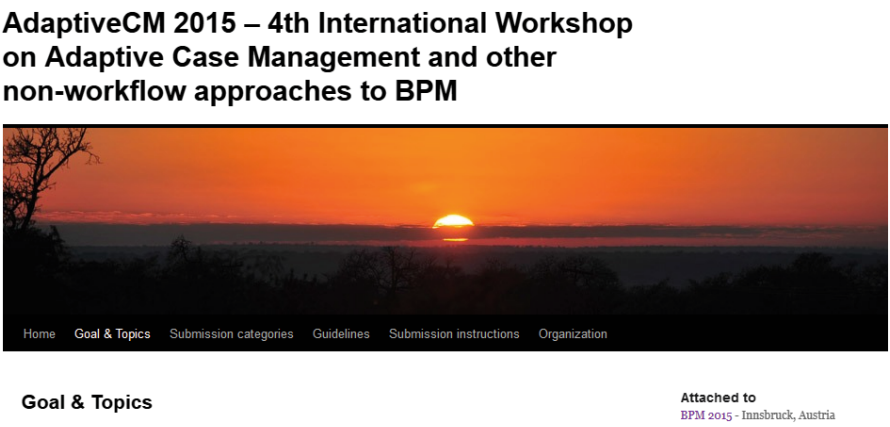

Fig. 1. Web portal of *AdaptiveCM* 2015

The main templates used in managing the *AdaptiveCM* event are as follows:

1. *Topics* - list of topics to define the submissions of interest (Goal & Topics in Fig. 1)
2. *Categories* - submission categories to define the styles of papers acceptable for the event (*position paper*, *idea paper*, *experience report*, *research paper*)
3. *Guidelines* to explain the styles to the potential submitters
4. *Submission template* – see Fig. 2.
5. *Criteria* used in the reviewing to ensure consistent reviews independently of which members of the committee are completing them. Part of the reviewing template for *AdaptiveCM* is presented in Table 2.
6. *Channels* – a list of electronic channels through which to advertise the event, e.g. mailing lists, social media outlets, etc.

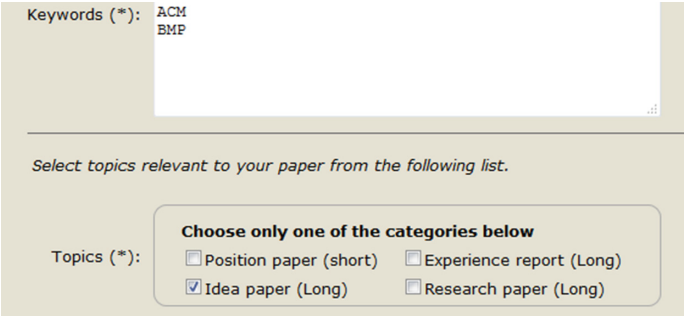

Fig. 2. Part of the submission template from *AdaptiveCM* 2015

Table 2. Reviewing criteria

#	Criterion	Values
1	**Relevance.** Assess the relevance of the paper to the goals and topics at http://acm2015.blogs.dsv.su.se/goal-topics/. If possible point out the topic number from this page when writing your comments	• Not relevant • Implicitly relevant • Explicitly relevant
2	**Categorization.** If you do not agree with the paper categorization by the authors, you can reclassify it. For instance, if an experience report does not follow the guidelines, you might want to reclassify it as a research or idea paper.	• The category is correct • Experience report • Idea paper • Research paper • Position paper
3	**Originality.** Assess the originality of the ideas and results and presence of: at least partial evaluation (FULL RESEARCH PAPER); interesting observations and lessons learned (EXPERIENCE REPORT); vision (IDEA PAPER); interesting question or position (POSITION PAPER)	• Nothing new or interesting presented • Some new or interesting material • Substantial amount of new or very interesting material

(*Continued*)

Table 2. (*Continued*)

#	Criterion	Values
4	**Discussability.** Rate the potential of the paper for raising useful and interesting discussion	• Low • Medium • High
5	**Style.** Is the style of the paper follows the recommendation given at http://acm2015.blogs.dsv.su.se/submission/ and guidelines given at http://acm2015.blogs.dsv.su.se/guidelines/	• No • Partly • Yes
6	**Language.** Evaluate the quality of the language used in, and the presentation of, the paper	• Unacceptable • Acceptable • Good
7	**Practicality.** Evaluate practical usefulness of the results and whether it was discussed or not in the paper	• Not useful • Uncertain, the practical usefulness has not been discussed • Could be useful • Definitely useful

4.2 VSM Model of Organizing a Scientific Event

A simple VSM model for organizing a scientific event in general, and *AdaptiveCM* in particular, is presented in Fig. 3, and described below.

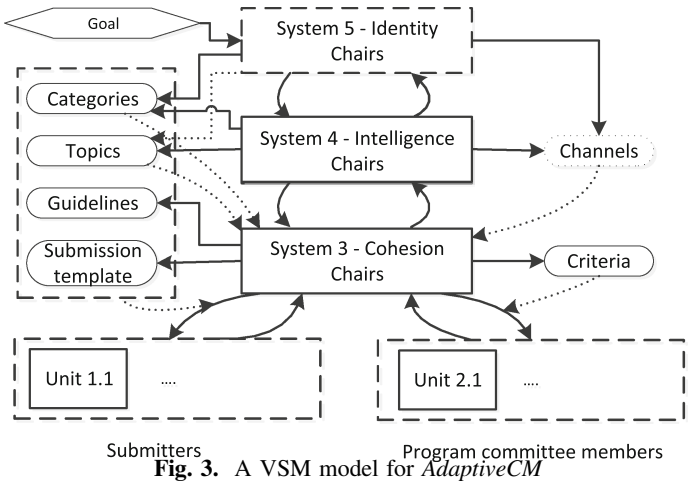

Fig. 3. A VSM model for *AdaptiveCM*

- System 1 consists of two types of units working relatively independent from each other: (a) authors that write and submit papers, and (b) members of PC who review the papers. The work of both types of units is controlled by a number of templates. Templates *categories*, *topics*, *guidelines*, *and submission template* regulate the work

of submitters, while template *criteria* regulates the work of PC members. These two set of templates are synchronized via the criteria template referring to other templates, see Table 2, which serve as mechanism of *implicit* coordination between the operational units of two different types (System 2). There is no explicit coordination between the submitters, and little coordination between the PC members. However, communication between the PC members can happen when their opinions on the same submission differ. Both types of units have their local environment: area in which a particular research is being done by a submitter, and a wider area of research interests of a PC member. Naturally, these areas can intersect, but usually they do not coincide. The overlapping, but not coinciding local environments of operational units ensure a broader coverage of the scientific field of interest during the event, and makes the event interesting and appealing to the participants.

- System 3 (*Cohesion*), manned by Chairs, has responsibility for all System 1 units working in the same direction to produce an interesting event. It does this by preparing proper templates which regulate the outputs produced by the units, and by having one-, and two-ways communication with the units on the operational matters, such as deadlines, reminders, etc. For the latter, there are also templates but they are of lesser importance and are not considered here. System 3 interacts with the wider environment, the community of experts that are interested in the topics listed in the *topics* template, using channels from the *channels* template. It may also update the list of PC members, e.g. based on the new topics added by System 4 to *topics*.
- System 4 (*Intelligence*), also manned by chairs, is responsible for the event is on the frontier of the scientific field of interest. It looks at the trends and changes in the field and updates the *topics*, *categories*, and *channels*. It can also change the format of the event.
- System 5 (Identity), manned by chairs is responsible for changes made by system 4 not breaking the identity of the whole system. The desired identity, which is how the event is considered by observers, is identified in the goal set for the scientific events series. For *AdaptiveCM* it is set as "to bring together researchers and practitioners to discuss theoretical and practical problems and solutions in the area of non-workflow based approaches to BPM in general, and ACM (as a leading movement) in particular …" [5]. The goal affects which categories and topics should be included and which channels are to be used. Therefore, System 5 can complete its task by ensuring that the *categories*, *topics* and *channels* templates are consistent with the goal. For *AdptiveCM* it means that: (a) *topics* appeal to both researchers and practitioners, (b) the submission categories are adjusted to the type of work both categories do, and (c) there are channels on the list to reach both categories.

4.3 Synchronizing the Templates Based on the VSM Model Built

As can be seen from the VSM model in the previous section, the system as a whole rely much on the templates in its functioning. These templates are not independent of each

other, but require synchronization. The dependencies that exist and, thus, the needs for synchronization can be presented as a square matrix where both rows and columns represent the templates. The cross in the sell <*X,Y*> means that the template of row *X* is dependent on the template of column *Y*. Beside the templates, a row and column that correspond to the goal of the process are included in the *dependencies matrix*. The dependencies matrix for *AdaptiveCM* is presented in Table 3.

Table 3. Templates dependencies in *AdptiveCM*

	Goal	**Categories**	**Topics**	**Guidelines**	**Submission template**	**Criteria**	**Channels**
Goal							
Categories	x		x				
Topics	x						
Guidelines		x					
Submission template		x					
Criteria	x	x	x	x			
Channels	x	x	x				

To demonstrate the importance of synchronization according to the dependencies, below, we present two examples of what happens if the dependencies between the templates are not implemented. We will use notation X → Y to denote that template Y depends on template X:

1. Consider dependency *topics* → *criteria*: if *topics* are not explicitly incorporated in *criteria*, there is a risk that a reviewer may reject the paper base on the *relevance* without realizing that the topic to which the paper belongs is explicitly mentioned in *topics*.
2. Consider dependencies *categories* → *submission template*, *submission template* → *criteria* and *categories* → *criteria*. Suppose a conference defines two categories of submissions: *research paper* and *experience-based paper* but does not introduce the categories in the submission template. There is a risk that a reviewer wrongly assigns the category to the paper, and rejects it in the end based on the mistaken categorization. Even greater risk of unappropriated rejection exists when *categories* are not incorporated in *criteria*.

The two examples above are not artificial. The first happened at one of early issues of *AdaptiveCM*, the second happened last year with our experienced-based paper [11] submitted first to *EDOC* (Enterprise Computing Conference) [12], then to *PoEM* (working conference on the Practice of Enterprise Modelling) [13], and then to *BPMDS* (working conference on Business Process Modeling, Development, and Support) [14].

All three conferences had a category of experience-based papers. For *EDOC*, the category was defined as “Industry experience reports or case studies”. For *PoEM*, the

category was defined as "Experience papers - present problems or challenges encountered in practice, relate success and failure stories, or report on industrial cases and practices". For *BPMDS*, the category was defined as "Experience reports, which should follow guidelines in <link>." As far as submission template is concerned, neither *EDOC*, nor *PoEM* listed submission categories, thus it was left up to the reviewer to decide to which category a particular paper belongs. *BPMDS* had a listing of categories in its submission template. What is more, neither *EDOC* nor *PoEM* had categories mentioned in the evaluation criteria, but *BPMDS* had special instructions of the same type as in Table 2.

As the result, the paper was rejected by both *EDOC* and *PoEM*. Though some reviewers' comments were valuable, others were clearly related to the reviewers evaluating the submission as a research paper, e.g. complaints that only one case has been described. The paper was finally accepted to *BPMDS* where it was evaluating according to its category and related to this category evaluation criteria. The lack of consistency in the templates in *EDOC* and *PoEM* results in the wrong evaluation of the experience-based papers. The consequence of this is the submitters getting impression that this category of papers is of no interest for these conferences. The latter affects the identity of these events, making them pure research events, independently of which categories of papers they list in their CFPs.

5 Discussion and Conclusion

The goal of this paper was to outline a possible approach to business process improvement for CM/ACM processes. The assumption for building such an approach was that a CM/ACM process can be improved via changing a set of templates used by knowledge workers when running the instances/cases of the given CM/ACM process. The approach is based on considering a process as a system for which a VSM model can be built, and a place for each template in it can be identified. The next step is to build a template dependency matrix, and adjust the templates to the process goals and the environment, while ensuring all templates being synchronized.

The approach has been demonstrated on the process of organizing scientific events, like conferences and workshops, having the *AdaptiveCM* workshop in view as an example. We also showed concrete examples of what happens when the templates become desynchronized. Though the approach seems working well on this particular type of processes, it is not clear how generic it is. The question whether it is possible to apply the approach to all CM/ACM processes, or only to a subclass of such processes remains open. To answer this question, more tests need to be completed, which is in our plans for the future.

A distinctive characteristic of the process chosen for the demonstration is that it is run by a virtual team the members of which work as autonomous units. If the area of applicability of the approach suggested needs to be limited, the processes completed by virtual teams could serve as a constraint to applicability of the approach.

It is also worthwhile to mention that to the best of our knowledge, the suggested approach is unique in respect it being solely directed at improving the process based on changing and synchronizing templates that guide the work of process participants.

An important issue that has not been discussed in this paper is how to measure the results of improvement. It is not clear whether there can be generic ways, but it seems reasonable to consider two types of measurements. One type is connected to the goal of the process. For our example, we can, for example, measure the ratio between practitioners and academics submitting/participating in the workshop, the number of submissions/participants, the number of re-participants, etc. The second type of measurements is connected to the template synchronizations, and can be expressed in the reducing the number of incidents/erroneous outcomes. In our example, it could be minimizing the number of rejections on the wrong ground.

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