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Web 2.0 Enhanced Automation of Collaborative Business Process Model Management in Cooperation Environments

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Abstract

In today's business, effective enterprise cooperation and efficient utilization of appropriate information technology are basic prerequisites for the success of individual companies and networks. This means that the process-oriented management has to offer adequate support for collaboration. This article shows how monolithic business process management can be enhanced considering the Web 2.0 paradigm. The concept is carried out with a platform for collaborative business process management which integrates functions for cooperative model management and for using collective intelligence.

Keywords

Business Process Management, Automation, Collaborative Networks, Web 2.0, Tagging

INTRODUCTION

Collaborative Business Process Management

Effective enterprise collaboration and cooperation and efficient utilization of appropriate information technology are basic prerequisites for the success of individual companies and networks. Process models illustrating the activities of an organization play a key role when managing business processes. Business process management (BPM) implies an explicit division of process design and process execution between organizational units responsible for the modelling processes and organizational units responsible for the execution. Process designers depend on knowledge of the executing employees about the performed tasks. Modelling always has a specific perspective and a specific intention and is therefore always incomplete and limited. Furthermore, there's very often a reference on continuous process improvement while it is not clear how feedback between process modelling and process execution instances should be carried out.

Cooperation partners communicate through groupware systems and through the internet and are not bound to regional boundaries. Because of the integration of business processes, the business process modelling has to cope with new requirements and also to offer an adequate support for collaboration. Current challenges to the process management in cooperative environments can particularly be seen in the distributed modelling imposed by the spatial distance of the partners. This in turn gives rise to problems related to collaborative process models and heterogeneous, distributed model data stores (Vanderhaeghen, Hofer and Kupsch 2006). The integration of models has to compensate the fact that the cooperation partners possess special process knowledge, but seldom have process knowledge about the organizational structure as a whole. An additional complication arises through the different modelling tools and standards implemented by the collaboration participants for documentation of their processes. Every standard requires a more or less complex familiarization with new languages and techniques to realize the integration of the different models. Modelling standards have to be translated, amount of leeway eliminated, interfaces identified and connections between the models established. All model owners have to be involved in this process in order to strike an agreement on the required result and not to lose process knowledge for the integration.

The prescribed characteristics lead to an area of conflict in cooperation between model design and application. On the one hand, business tasks have to be streamlined and established in form of process models which imply a model based abstraction due to the amount of details. On the other hand, the tasks have to be put into execution in accordance to the designed process models. The problem intensifies as different parties have to collaborate

across departments and enterprises. While existing process management approaches are largely assuming a centralistic planning and controlling paradigm, the Web 2.0 perspective leads to a decentralisation of the planning and controlling tasks. So far only few scientific papers explore options for action for information systems design from a Web 2.0 perspective (e.g. Schmidt and Nurcan 2009; Koschmider et al. 2009; Bitzer and Schumann 2009; Silva et al. 2009; Fellmann et al. 2010). Thus Web 2.0 potential is practically used at the most rudimentary within process management.

Philosophy of Science and Contribution

The present article aims at offering an improved usage of computer supported tools for managing collaborative business processes. This goal is particularly motivated by increasing process integration scenarios of collaborative business relations such as virtual organizations (Camarinha-Matos et al. 2005). This leads to the intensive building of cross-organizational interconnections. Only few requirements, e.g. an explication of collaborative real-world objects, have been addressed with computer-aided tools so far. This deficit can be addressed by incorporating Web 2.0 techniques into computer-aided business process management.

The objective of design-science research is to develop technology based solutions for important and relevant business problems (Hever et al. 2004). The basic phases consist of building and evaluation. As this research paradigm “attempts to create things that deserve human purposes” (March and Smith 1995), utility is the main goal. The artifacts must provide generic problem solutions, that is, they should be applicable to a set of problems (Winter 2008). This article tends to information system research with new characteristics. In this context system development methods are especially applicable when new system requirements have to be determined. In order to achieve a clear idea of process management shortcomings and Web 2.0 options for action, a prototypical system development approach was chosen. Afterwards the design oriented research has to be evaluated arguing on the basis of the criteria *abstraction* (global perspective on process management activities and tool support), *originality* (enhancement of existing process management paradigm) and *justification* (user-oriented Web 2.0 options for action). Nevertheless we have to admit that the scenarios realized are “only” prototypical use cases not drawing a complete picture of the effects generated.

The structural outline of the present paper encompasses the introduction of our concept and the platform architecture, based on Web 2.0 paradigms and applications in the next section. Subsequently we will present main aspects of the concept in form of the cooperative model management module and the collective intelligence realization. The article ends with a discussion of our results.

WEB 2.0-BASED PLATFORM FOR COLLABORATIVE BPM

Web 2.0 Paradigm and Implications

Web 2.0 associates with certain application types and buzzwords such as weblogs, social software, wikis or folksonomies. An overview and introduction to the separate services is given by (Alby 2007). A debate over possible applications will be set aside at this place. A paradigm will be defined as an amount of associations, aspects, principles and methods of operation implemented or utilized by a group of system engineers or users when creating or using an information system. The term Web 2.0 will be defined through its basic principles and characteristics (O'Reilly 2005; Wahlster et al. 2006). These are:

- Self organization and utilization of collective intelligence: applications of the web 2.0 are realized through the participation of collective members. Through collective participation it is possible to create, to service, to administer and to evaluate the content being created by the community for use by that same community. Through the process of mutual evaluation a certain degree of information quality is achieved. Individual participation and efforts are not centrally coordinated but are decentralized and left to independent judgement of the respective members. The possibility for a self-organization is further dealt with in the consecutively enumerated aspects.
- Establishing of a global interconnectedness: through a global interconnection over the internet it is possible to connect different players enabling them and further participants to utilize open standards, services or data. Thus a reuse of third party solutions for the resolution and achievement of one's own tasks or goals is made possible.
- Assembly of data driven platforms: collection of information and its preparation and allocation through databases gains in an enormous significance within the Web 2.0 context. This leads to the creation of databases around a specific informational topic and its allocation to other market participants. In turn, this ensures a binding of data to new services.

- Applications of web 2.0 are being continuously developed and enhanced by its users. They reside in a desired continuous beta state. Feed-back loops return continuously real time information and contribute to further application development.
- Assembly of light-weighted architectures: In order to ensure creation of added value through the interconnection of different information services in Web 2.0 environment, there is a need for open, light-weighted technologies with corresponding interface and architecture concepts. These ensure a quick creation of own and utilization of external services.

Table 1 gives an overview of those basic principles and their effect on information processing. The basic principles of Web 2.0 can be seamlessly accommodated within the topic of the present paper – collaborative business processes and their computer supported management. Applications oriented on Web 2.0 offer a potential for explication and utilization of the collective intelligence comprised within a BP through the utilization of a web-based system. The community group consisting of the participants in the collaborative business process can be recreated through a web-based application. The global interconnection and construction of light-weighted architecture also promise a collaborative computer supported management of business process models.

Table 1: Web 2.0 Paradigms and Implications for Information Processing

| Principle | Implication for Information Processing |
|------------------------------|--|
| Global interconnection | Collect, offer, exchange information on a global level; counteract information islands. |
| Collective intelligence | Exchange, systemize and evaluate information through users or customers |
| Data-driven platforms | Collect and systemize information, in order to create and syndicate unique, and valuable data assets |
| Perpetual beta | Receive feed-back and document user behaviour in order to continuously improve and enhance products and services |
| Light-weighted architectures | Utilize open interfaces ensuring quick own creation or simple adaptation of external services |
| Device independence | Collect and offer platform independent and situation adequate information |
| Comprehensive user interface | Design user and customer interaction with contemporary and state of the art information processing systems |

Platform Architecture

From the perspective of Web 2.0, different technology options for the arrangement of process management exist on which we will concentrate in the present section. The primary focus is placed not on main value creating processes in the enterprise, but on support processes within the scope of research and development or the implementation of new technologies. The following explanation concentrates on the development and application of software tools for process management. In analogy to the modularization principle within the development of software systems, there have recently been similar adaptations of the modularization principle for the purpose of creating service and component-oriented architectures. The composition of the software system's modules takes place dynamically during the runtime phase. This development opens new perspectives and options regarding applied software tools for process management. As such, contemporary process management systems viewed from the angle of Web 2.0 application, are not being regarded as monolithic overall systems. This motivates the understanding in the following examination not to speak of a "monolithic" tool for process management, but to consider a platform for process management comprising different modules for the accomplishment of its specific tasks. The described modules are not tightly coupled, but rather allow for a "dynamic" runtime orchestration offering the possibility of further expansion through integration of new models with extended process management functionalities. Figure 1 presents the schematics of the proposed platform, comprising four main modules, each of them providing special services (Vanderhaeghen 2009):

- Cooperative modelling management: This module offers functionalities for the collaborative creation of models. This includes for example parallel presentation and manipulation of single process models at different locations.

- Self-organization for process collaborative groups: This module offers functionalities for the support of self organization and use of collective intelligence.
- Transformation and converter management: This module comprises functionalities for transformation and conversion between different description languages. This functionality is very important in the context of Web 2.0, as the presence of a single process modelling language can barely be assumed.
- Management of dynamic process modules: This module supplies a model library in which separate models are stored. The process modules can be used for the configuration of business processes and represent in this sense reference models.

The data collected in the database is stored in a repository. Furthermore, the proposed platform offers different interface possibilities. On the one hand there is an interface connection to the tools for creation, maintenance and analysis of process models (representing “classical” tools of process modelling and analysis). On the other hand it can be assumed, that the described platform will be instantiated more than once in the reality, so that many instances of the same or similar platform will exist in the need to be properly interfaced with one another.

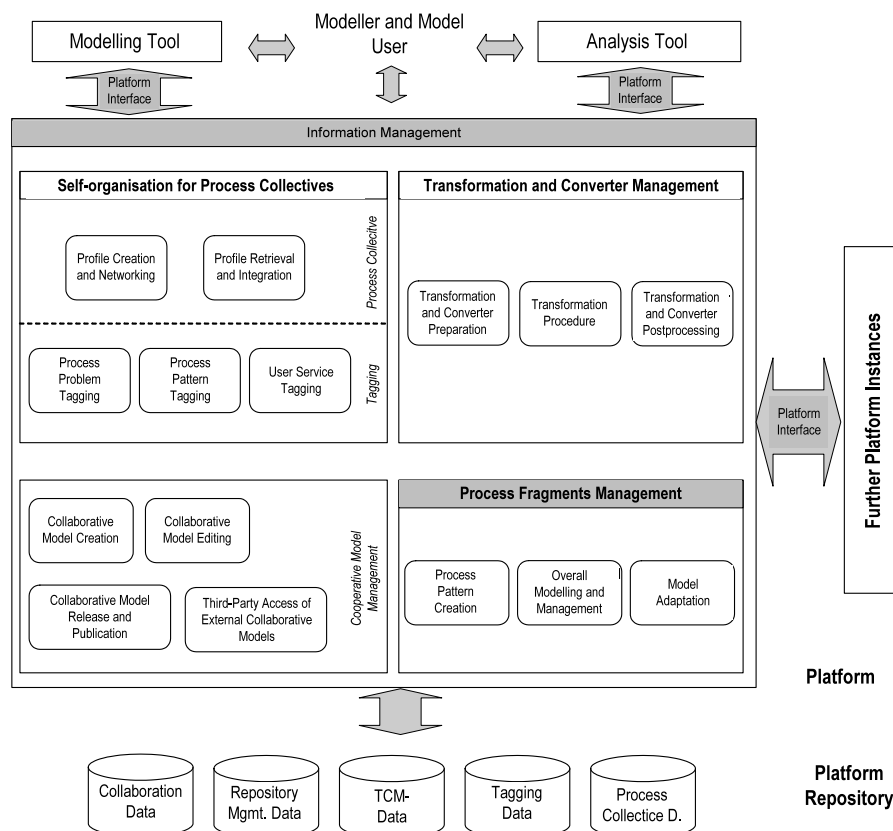


Figure 1: Architecture of the process management platform

The following segment describes the main components of the proposed architecture as well as separate aspects, which play an important role in context of cooperative modelling management and the utilization of collective intelligence.

Model Management Platform Implementation

The main component role of the prototype platform implementation is assigned to a web-based application named CollMap (Collaborative Model Management Platform). The requirement of a decentralized application makes a web based user interface particularly appropriate. The support platform should be executable by the different collaboration partners while ensuring both partner autonomy and distribution without any compulsory installation requirements. The World Wide Web offers a suitable basic service, abstracting the platform heterogeneity and ensuring distributed use of applications.

The management of own collaborative models in CollMap distinguishes between two basic types. One of these is the operative model administration and the other, the independent model management. The relevant models can be retrieved over the navigation points of the operative model administration. The model management is

completed through a list view of all relevant models within a specific project. The list can be sorted by different attributes, e.g. model name, model type or process owner, so that the clarity of the arrangement can be enhanced. Further functionalities such as graphic visualisation tools within CollMap or accessing original models in the original modelling tools are being offered for the models. Additionally, an export of a model over the interface of CollMap as a XML-Data can be achieved. This allows the utilization of the created model in external applications like simulation or workflow management systems. CollMap allows the handling of model meta-data required for the information management. The model management also builds on a list view of the models, but extends the filter functionalities by tools specific attributes, model description and project assignment.

The approval and publication of own models for access by collaboration partners is carried out within the model data development. The access to external models is implemented through a decentralized integration interface. Over the global models a collaboration partner can call the CollMap instance of another collaboration partner. The models for which he is being granted access are shown in an own window of the external CollMap instance in that process.

COOPERATIVE MODEL MANAGEMENT

Languages for collaborative business process modelling

The information systems discipline is using models for the description of business processes in form of suitable modelling methods, techniques and languages. These business process models can be electronically processed in order to assess their compliance to established conventions. A business process model often builds the basis for the implementation of a software system respectively for the execution of the business process (e.g. a workflow system) or its support. A large number of modelling languages for the description of business processes has been used (Dumas et al. 2005). Due to the language heterogeneity a set of modelling techniques is first selected as a basis for the corporate process modelling. Selection criteria are the spread of a standard as well as acceptance and branch neutrality. A reasonable comparability of the modelling basics has to be ensured in order to guarantee undistorted results. Identical techniques and languages are not suitable for a meaningful heterogenic integration since the results are partly given in advance. On the other hand the integration of entirely different approaches could be undesirable as it may not lead to an expedient result. Based on the mentioned criteria, Event-driven Process Chains (EPC) (Scheer et al. 2005) as well as Petri Nets (Desel 2005) are chosen to serve as proof of the concept. The EPC has established itself as a method for the construction of business process models on a conceptual level, because of its application orientation and comprehensive tool support, especially in the German-speaking community. There is an affinity between EPC and Petri Nets, but there are big differences concerning the control flow operators. Both techniques are implemented in the prototype and stored on the basis of XML.

The technique of process modelling allows a semi-formal description of technical processes including the input- and output documents and data, the performing actors and participating organizational units as well as the required applications and tools. Moreover, it also allows describing the state of the world before and after the execution of a function which is required in order to orchestrate the execution of functions. The technique of process modelling thus can be both used to achieve a coherent semi-formal description of the business processes, to describe separate, reusable process fragments or to construct integrated process modules composed of process fragments which are part of the value added chain. The transformation of business-oriented processes into workflow models, i. e. models which are executable, is a challenging task which still requires human intervention. In order to improve this transformation, a method for the modelling of collaborative processes in cooperation environments has been developed which constitutes the core methodical concept of the collaborative model management approach.

The use of process modelling techniques allows to put emphasis on the execution of tasks related to internal or external work orders as well as to their coordination. A key role is assigned to the creation of abstract representations of reality, adequately simplified for the specifically regarded issues of interest. Current challenges to the process management in a cooperation can be seen in particular in the distributed modelling imposed via the spatial distance of the partners, giving rise to problems related to collaborative process models and heterogeneous, distributed model data stores (Vanderhaeghen, Hofer and Kupsch 2006). Hence, it must be possible to integrate models on-demand as only directly interacting partners do need the integrated model data. The semantic enrichment of process models with additional information can provide for easier handling of such heterogeneous models and enable (partial) automation of the integration process.

Concept for the integration of heterogeneous business process models

The model integration can focus on the connection of both models modelled with different languages (integration on the language-level) or on structurally and semantically integrated models (integration on the

model-level). The integration on the language level mainly deals with the representation of language constructs and is also addressed in the field of meta modelling (Karagiannis and Kühn 2002). Because the models abstract a part of reality at a time, the elements of language have to be interpreted when comparing them with elements of another language. The elements of different languages can have a different semantic, and in the case of a text based description can also poses structural and syntactic connections to each other (ATHENA 2005). Integration has to fill gaps beyond 1:1 connections so that the model does not lose its expressiveness. One cannot act on the assumption that there are accepted compromises that fill these gaps which are basically accepted by all modellers. The integration on the model level is based on the integration on the language level. The former is understood as consolidation of model fragments, existing in a common language, into a complete consistent model. For this purpose an affinity analysis of the elements and an elimination of conflicts are necessary. This creation of the complete model covers the semantic integration in the sense of unification or harmonization of the model elements. Furthermore, it covers structural aspects which concern the connection of the model fragments. The semantic integration is a content-related analysis of the model which aims to clear conflicts and work out interfaces for the connections on a structural level. Linguistic connections e.g. in form of synonyms and homonyms are especially relevant in semi-formal modelling. The system for the integration of process models has to fulfil several requirements. A fundamental requirement is that there should be no assumptions about the structure or content of the business process models which have to be integrated thus preventing the integration task from being oversimplified and hence not realistic. Therefore, the tool should support the conversion of different modelling languages. To support the integration, the developed tool has to analyse the models and propose all relevant connections between the models which have to be integrated. Regarding the cooperation between the different partners, a decentralized communication infrastructure has to be supported in order to accommodate virtual organizations without a central authority. On account of the decentralized communication infrastructure reaching consensus and agreeing on “globally” known and accepted business processes can be difficult. This comprises functionalities to show, discuss and edit models whereby changes in a model must be propagated in real time to all participating partners. Also, a real-time communication channel has to be provided in order to facilitate discussion.

The integration of heterogeneous models will be split up in different steps in order to reduce the overall complexity of the task. The procedure can be divided into eight different steps. These phases can be grouped into the preparation, transition and main phase. The preparation phase comprises three steps which are prerequisites for the transition phase. The first step is to interchange the common vocabulary which is precisely defined by the means of a „formal, explicit specification of a shared conceptualization“ (Gruber 1993). The ontology enables firstly to increase the comprehensibility of models for humans by providing additional information and definitions not contained in the model element labels or the attributes of model elements. Secondly, the ontology also allows machines to interpret the semantics associated with an individual model element.

In addition to the exchange of a shared vocabulary, the integration partners may exchange reference models in step (2) which are used to assist the tool in finding appropriate connections between the models which have to be integrated. This step is optional, as it is sufficient only if one participant has developed a reference model and distributes it to all other partners. In the next step (3) the models are semantically enriched by the means of a semantic annotation. However, before annotating a model element, the user decides if he wants to share that model element with other partners. Limited to the possibilities of the modelling language, he can decide to delete a couple of model elements in order not to publish private organizational information. To annotate a model element, the user simply has to drag and drop an ontology class onto a model element.

In the transition phase (steps 4-6) the focus changes from isolated modelling to the collaborative modelling as a basis for the integration of models. The models are added to the process of integration and distributed by the software to the integration partners. The tool translates now – if necessary – unknown model formats of the cooperation partners into the appropriate modelling formats of the other modeller and shows it in their language. This procedure is executed locally on each instance of the software. The phase runs mainly automatically. The results however have to be revised and extended in the third and last phase.

The main and last phase covers the steps 7 and 8 of the procedure model. Step (7) supports the modeller with the structural integration of the models in a semi-automatic manner and at the same time provides real time consistency checks, which guarantees semantic and syntactic correctness of the model. After the conversion, conversion errors must be detected and/or gaps have to be closed. Upon completion, the remaining model fragments are connected by a path search which will be applied in step (8). In order to perform the path search, the tool accesses the information of reference models, which are stored in the local repository of each user. The integration results in the form of new connections in the model are visualized to each integration partner in real time. When the process of integration has completed, the models of each modelling partner can be stored in the local repository.

Cooperative Model Management Tool Implementation

The modelling tool CoMoMod (Collaborative Mobile Modelling) was implemented which supports the prescribed aspects of collaborative business process modelling, like distributed and collaborative construction of models. This can be used in both decentralized settings where global models have to be constructed as well as for modelling private processes. Contrary to conventional tools, CoMoMod offers the possibility of modelling collaboratively and synchronously with different modellers in the role of peers and of communicating with these over the exchange of chat messages during the modelling process. The chat-supported model construction aids in the coordination required in collaborative business process management scenarios.

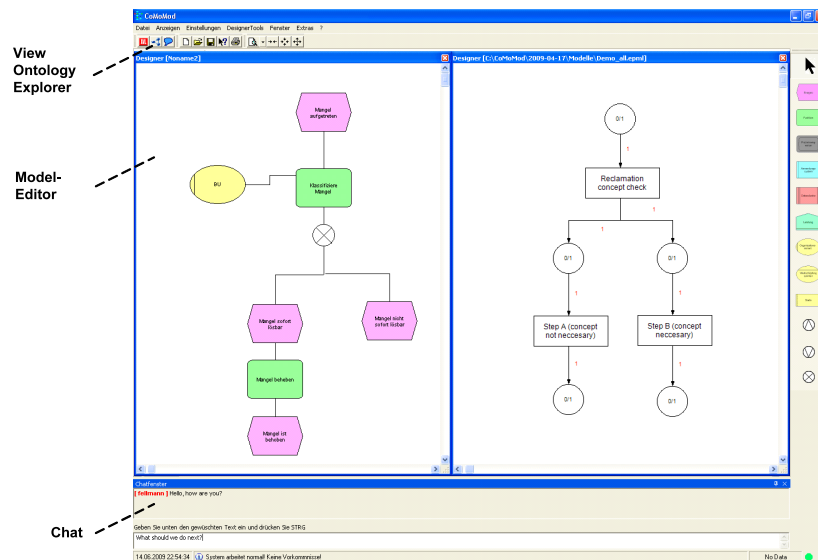


Figure 2. CoMoMod instances and chat interface (screenshot)

The heterogeneity of the models, which is partly caused by the usage of different modelling languages, must be overcome in order to enable a structural integration of the models. Apart from semantic heterogeneities, also the syntactic-structural differences must be overcome. As main condition for the integration, the individual modeller should be able to keep modelling in her preferred modelling language and should not be forced on a new one to change. Thus, there is a need to mediate between the different languages rather than to standardize them. Hence the conversion of the respective languages is considered to be an effective aid. Therefore, a mapping has been created which provides for a bijective assignment of the model elements. The tool provides automated functionalities for the translation of models, which are constructed using different modelling languages such as the EPC or Petri Nets. In order to adjust inaccuracies by the conversion, consistency checks are used to monitor problems that are left open to the user for a manual rework.

Each model of an integration partner is distributed in the transitional phase in the format of the respectively used language to the remaining partners via network. If n partner are involved, then additional $n-1$ models appear in the tool of each modeller (Figure 2). For every of the n integration participants, the local models are translated on the basis of the presented mappings. Every model developed in such a way is extended now around those of the other participants (still without connection between the models). Subsequently, an inverse transformation of these models takes place into the necessary format, as the mapping is executed now in reverse conversion direction. After the inverse transformation and distribution to the integration participants, the n models cover all model data needed in the context of a co-operation. Subsequently, the correctness of the models can be examined and improved if necessary on the basis of the consistency checks. Since the users see each model in their preferred language format, they understand the models content better and consensus can be reached. If it is not possible to produce an equivalent model due to incompatibilities of the involved modelling languages (e.g. one modelling language is inferior regarding its expressivity), the modeller has only the opportunity to approximate a translation and has to work out the detailed conversion manually but might be supported by other modellers using the collaboration functions of the tool.

Figure 2 shows CoMoMod with two different model windows. In one model window the EPC model is shown. In the other model window a second Petri Net model of a partner is shown. The two processes are to be integrated for construction of a common collaboration model. For this, at first a connection between the two CoMoMod instances of the modellers is established (since the screen shot shows this in one individual CoMoMod instance, four modelling windows are to be seen). Each modeller sees the original and goal model.

After successful conversion, the converted models appear in the respective modelling window of the modeller. Modeller 1 is now able to see his own Petri Net as well as the converted Petri Net of modeller 2.

Further functionalities provided by the tool are the integration of model fragments into a complete model. In the last step of the integration, after all activities presented so far have been done, a connection of the individual model parts takes place which reflects the necessary cooperation relationships of the involved partners.

IMPLEMENTATION OF A PROCESS COLLECTIVE

The profile assembly as well as the interconnection of profiles within the process collectives are realized by either through CollMap or by integrated external applications. CollMap delivers in the model encapsulated information, who is member of which collective. Moreover, further collaboration stakeholders within the process collective can be identified for the purposes of the model management.

The role of a central interconnecting application within the prototypical implementation will be taken over by the freely distributed Skype software. Skype is software, which can be used for interconnection and communication between users on the basis of internet protocols. Through Skype it is possible to use both instant messaging (chat) and simultaneous voice communication between up to 5 users. The selection of Skype for the prototypical implementation comes as a result of its usability, availability on different platforms and its decentralized implementation ability. The software adaptation meets the requirements, resulting from the collaboration scenario. A further external software product besides Skype is the application Dolphin by BoonEx, which ensures a comprehensive build-up and management of user accounts. It offers needed functionalities to the formation of process collective, while allowing a simple and uncomplicated installation, integration and maintenance on the CollMap infrastructure.

Both of the above mentioned applications were integrated in CollMap. This ensures the direct interconnection between a CollMap user (e.g. process owner) and the personal Skype contacts. A further feature is the possibility to check the current availability status (online/offline) of a user. By this means it is possible to contact a specific user in order to coordinate a business process or to discuss procedural matters within the collaborative business process management. The Dolphin application allowing profile search and the formation of a process collective was also integrated in the CollMap application. This allows process collective members to be represented with their profiles. A further plus is the mapping of interconnections between the collective members working within a single process. The members of the process collective can be characterized through the use of service tags, so that a better search can be realized.

For the purpose of realizing the tagging functionality the existing internet application Delicious was integrated in the prototypical platform implementation. Delicious is used as social bookmarking application for tagging of internet sites. Due to its simple handling, clearly structured user interface and good ability to integrate it is regarded as one of the most popular social bookmarking services. The tagging functionalities were embedded in the CollMap (comp. Figure 3). A contextually independent tagging was realized, which allows the definition of new tags regarding process problems, problem solutions, environment data, causes and effects by the process actor. Different application fields for the implementation of tags were identified within the scope of process management.

- Tagging of actors and services: actors take the central role of solution providers within the business processes. They represent the bearer of information and qualifications which are required for the handling of processes required for the present of future solution of possible problems. Consequently, it is important to identify, search and contact beneficial actors with specific competencies within the process collective for the solution of possible process problems. This requires the consequent and universal typified tagging of the special services or competencies provided by a specific actor.
- Tagging of process problems and solutions: A process problem and a process solution are specified through their tags. The actor, confronted with a dynamic process, specifies a name for the process problem and provides a description of the corresponding reference object. The solution steps for the problem solution are being documented with tags. The problem causes are similarly documented and classified as reference parameters for a structured representation of possible problem factors. Tags characterizing present and future consequences coinciding with a specific process problem can be merged as process problem related tags resulting in a problem-solution-effect pattern which can be regarded as generalised process problem/solution description.
- Tagging of process patterns: the previously described tags for the classification of process problems and solutions are geared to spontaneous, tailored and situational-oriented tagging of processes. These patterns can be transferred in model-based process patterns, in turn suitable as reference models for future problems solutions. For example the detection of correlations between tag combinations can indicate the

increased occurrence of a specific process problem. Accordingly, the identified patterns can be represented through a reference model and classified and stored in the process module library.

For the developed prototype it is assumed that the required process models are documented and made available through a publishing function at the modelling platform, bearing in mind, that specific business like tasks need only to be named, without being thoroughly modelled. The tasks described on the single HTML web pages are available and readable for social bookmarking applications. Figure 3 shows the user interface of the realized modeling platform. By opening of the tagging modus a pop-up window of the Delicious web application shows up, in which a user can create new tags. The newly specified tags are then available to the process collective. They can now be utilized for the characterization of models on the modelling platform.



Figure 3: Prototypical implementation of tagging functionality (screenshot)

CONCLUSION

This article aimed at presenting enhancement for tools supporting collaborative business process management. For this purpose the conceptual development of a support-platform was described which can be used for collaborative business process management tasks. The framework architecture and the realization of constitutive platform elements as well as the implementation were presented. The described idea of a process collective which uses the collective intelligence in collaborative processes within a self-organising manner is mostly based on the technological possibilities of current Web 2.0 applications. Thereby, a tool for collaborative modelling was developed which supports various aspects of collaborative business process modelling, like distributed and collaborative construction of models. This can be used in both decentralized settings where global models have to be constructed as well as for modelling private processes and offers the possibility of modelling collaboratively and synchronously with different modellers in the role of peers and of communicating with these over the exchange of chat messages during the modelling process. If collaboration partners use the tool as model users, then the chat-supported model construction aids in the coordination required in collaborative business process management scenarios. Furthermore a web-based platform was realized which can be locally used in cooperation scenarios when managing collaborative business processes. This platform integrates existing modelling tools at the collaboration level and supports a self-organization by use of integrated Web 2.0 services.

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