The Changing Role of IT Departments in Enterprise Mashup Environments

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Abstract. A new paradigm, known as Enterprise Mashups, implicates a shift concerning the service development and consumption process: end users combine and reuse existing Web-based resources within minutes to new applications in order to solve an individual and ad-hoc business problem. In such democratized operational environments, the role of IT departments is changing. They are no longer solely responsible for developing or installing business applications. Instead, end users in the business units compose their own operational environment in a collaborative manner. This paper analyses and discusses challenges and the changing role of IT departments toward service intermediaries by leveraging the St. Gallen Media Reference Model (MRM).

Keywords: Enterprise Mashups, St. Gallen Media Reference Model.

1 Introduction and Motivation

Tradition problems between IT departments and business units, such as a low service transparency, low reaction time, lack of customer orientation, and poor quality of IT support, are no longer accepted, a fact which is demonstrated by the tendency to build up independent IT resources with business units [1]. In addition, the growing relevance of information centric and situation applications to address the individual and heterogeneous needs of end users [2], leads to a new generation of Web-based applications, known as Enterprise Mashups. By empowering users in the business units with no programming skills to create collaboratively the own operational environment, IT departments are under pressure to justify their existence on the one side and to increase the efficiency and effectiveness of the IT service infrastructure on the other side [1],[2].

However, an analysis of the implications of usage Enterprise Mashups environments is missing. The goal of this short position paper is to identify and analyse the challenges in context of Enterprise Mashup environments - in particular regarding the role of IT departments. The remainder of this paper is structured as follows: Chapter two clarifies the terminology used in context of the Enterprise Mashup paradigm and contrasts the development model against traditional Service-Oriented Architectures. Based on the St. Gallen Media Reference Model

(MRM), chapter three outlines the shifting role of the IT department regarding from the MRM layers community, interaction, service, and infrastructure. Finally, chapter four closes the paper with a summary and an outlook to further research.

2   Related Work

2.1   Enterprise Mashups – Definition and Characteristics

An Enterprise Mashups is a Web-based resource that combines existing resources, be it content, data or application functionality, from more than one resource in enterprise environments by empowering the actual end users to create and adapt individual information centric and situational applications [3]. Thereby, Enterprise Mashups focus on the UI integration [4] by combining the philosophy of Service-Oriented Architecture (SOA) and approaches of End User Development (EUD) [3].

Table 1. Service-Oriented Architecture versus Enterprise Mashups

Criteria	Service-Oriented Architecture	Enterprise Mashups
Time-to-value	Many weeks, months, or even years	Minutes, hours or days
Developer Profile	IT department	Business units (limited programming skills); small teams or individuals
Integration Layer	Application Integration	Focus on UI Integration
Development Phases	Well defined, following agreed-to schedule (although with frequent schedule overruns)	No defined phases or schedules; focus on a good-enough solution to address an immediate need
Functional Requirements	Defined by limited number of users, IT needs to freeze requirements to move to development, requirement creep often caused by changing business needs	As requirements change, Enterprise Mashups usually changes to accommodate business changes; Enterprise Mashups encourages unintended uses
Nonfunctional Requirements	Resources allocated to address concerns for performance, availability, and security; robust solutions	Little or no focus on scalability, maintainability, availability, etc.
Testing	By IT with some user involvement	By users through actual uses

With the assistance of a layer concept, the relevant components and terms can be structured in an Enterprise Mashup Stack [3] consisting of the elements resources, widgets and Mashups. **Resources** represent actual contents, data or application functionality. They are encapsulated via well-defined public interfaces (Application Programming Interfaces; i.e. WSDL, RSS, Atom, CSV, XML, etc.) allowing the loosely coupling of existing Web-based resources - a major quality of SOA. The layer above contains **widgets** which are responsible

for providing graphical and simple user interaction mechanism abstracting from the underlying technical resources. Users can combine and configure such visual widgets according to their individual needs, which results in a **Mashup**.

Key driver of the Enterprise Mashup paradigm is the lightweight composition style by reusing existing building blocks in new ways - getting value out of prior investments. The mass collaboration is an additional driver. The willingness of users to offer feedback to the Mashup creator who may be unaware of problems or alternative uses, directly contributes to the adoption of the Mashup and can foster its ongoing improvement. Rating, recommending, tagging, or sharing features for the different Enterprise Mashups layers, support the collaborative reuse of existing knowledge to solve daily business problems [3].

To understand the changing development environment, table 1 summarizes the findings of a desk research [5],[6],[3],[2] and experiences taken from first implementations of domain specific Mashups with the SAP Research Rooftop Mashup prototype. The comparison of the traditional development approach and the Enterprise Mashups paradigm indicates the changing environment.

2.2   Enterprise Mashup Platforms

Driven by the consumer-oriented industry, various Mashup tools and platforms were developed in the last two years. According to the classification of [7] and by applying the Enterprise Mashup Stack [3], we can distinguish between Mashup platforms and widget editors on the one dimension and between the enterprise and consumer target group on the other dimension. Because this paper focuses explicitly on enterprise requirements, we narrow the following discussion on enterprise-oriented platforms:

– **Widget Platforms.** Widget platforms and editors allow to compose heterogeneous Web-based resources ("'piping"') and to put a visual face on the technical resources. Well known widget tools are Yahoo Pipes, Microsoft Popfly, SAP Research Rooftop, or IBM Damia. The composition results of these tools (sometimes they are also called as data Mashups) can be consumed by desktop environments (Vista Gadgets, Yahoo Widgets), mobile devices (Apple iPhone, Nokia Symbian), or Mashup platforms.
– **Mashup Platforms.** In contrast to widget platforms, Mashup platforms address the actual end user with no programming skills. By adding new widgets from a catalogue and by connecting their input and output parameters ("'wiring"'), end users are empowered to customize their individual operational environment. Examples for Enterprise Mashup platforms are IBM Mashup Center/ Infosphere Mashup Hub (based on the research projects IBM QEDWiki and IBM Mashup Hub), JackBe Presto Edge, Serena Mashup Suite, or the Open Source project EzWeb.

Both types of tools have in common the lightweight composition style and the integrated community features to share, rate, or recommend a mashable component (resource or widget) similar to electronic markets.

3 St. Gallen Media Reference Model for Enterprise Mashup Environments

In order to structure the analysis, we revert to the St. Gallen Media Reference Model (MRM)[8]. Due to the similarities to electronic markets as identified by [9] and also indicated in the section before, we leverage the St. Gallen Media Reference Model which has its roots in electronic markets. It provides a framework for specifying IT infrastructures and has already been applied in different contexts successfully (i.e., modeling electronic markets[8] or m-commerce applications[10]). Under the term medium, we understand platforms based on information and communication technologies, i.e., communication spaces of "social interaction which allow the participant to meet and which embed them in a common physical, logical, and socio-organizational structure" [11].
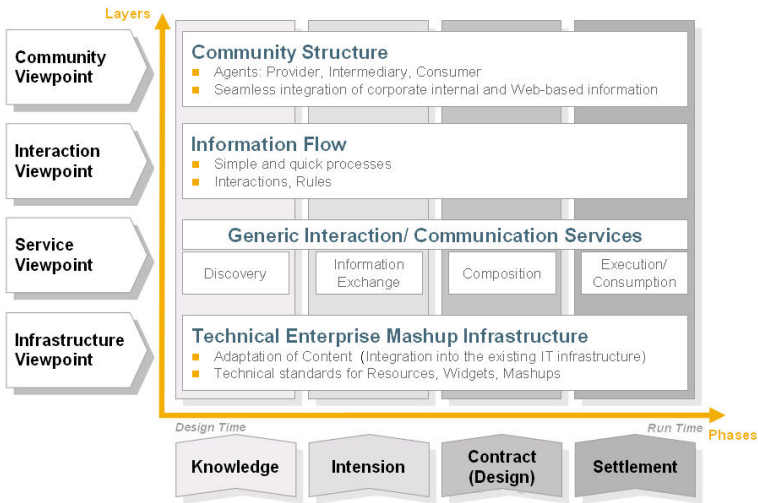

Fig. 1. St. Gallen Media Reference Model for Enterprise Mashup Environments

The media reference model provides guidelines for how to build a medium based on information and communication technology by guiding the process of requirement evaluation and by identifying the required services. It provides four layers to structure the different successive interaction goals of the participating agents. The *community view* describes the participating agents and the organizational structure. The *interaction (process) view* refers to the procedural description of the interaction events. It models the community view requirements by means of the *service view* which provides the necessary services for carrying out the described process steps in the interaction view. Finally, the *infrastructure view* contains communication protocols and standards which comprise the groundwork for the implementation of services.

In addition, the MRM identifies four phases. First, the *knowledge phase* is which information about offered services and knowledge and the media platform

itself is acquired. Second, the *intention phase* in which agents signal their intentions in terms of offers and demand. Third, the *contract (design) phase* where agents compose their individual workspace and finally the *settlement phase*, in which agents execute the designed applications, using the platform's settlement services offered for this purpose. Figure 1 depicts a first version of a reference model for Enterprise Mashup environments. Following each component of the model is described briefly focusing on the changing role of IT departments.

3.1   Community View

A critical success factor for Enterprise Mashups is a broad potential user group, familiar with the technology and willing to use it in their daily operational environment. In general, Mashups are developed in very small user groups or by individuals. The possible interactions and tasks of the agents can be described by the following model: A *provider* develops and publishes a Mashup element via a *intermediary*, where a *consumer* can find it and subsequently may bind to the provider. In contrast to SOA, users from the business units don't just interact as consumers. They are able to create their own Mashup element and provide it to the community. Besides the traditional provider role, the IT department takes over the intermediary role. It monitors continuously the parameters (such as availability and response latency) and provides performance metrics and other evaluation results (rating, tagging, recommending, etc.) which may be used by consumers to select a Mashup element [3]. In addition, the richness of Enterprise Mashups applications are based on combining seamlessly corporate internal with Web-based information sources. So Web providers have to be integrated into the Enterprise Mashup community to publish their value added Mashup elements.

3.2   Interaction View

Figure 2 depicts a simplified process describing the interaction between the main roles covering the four MRM phases. According to the findings of section two, the
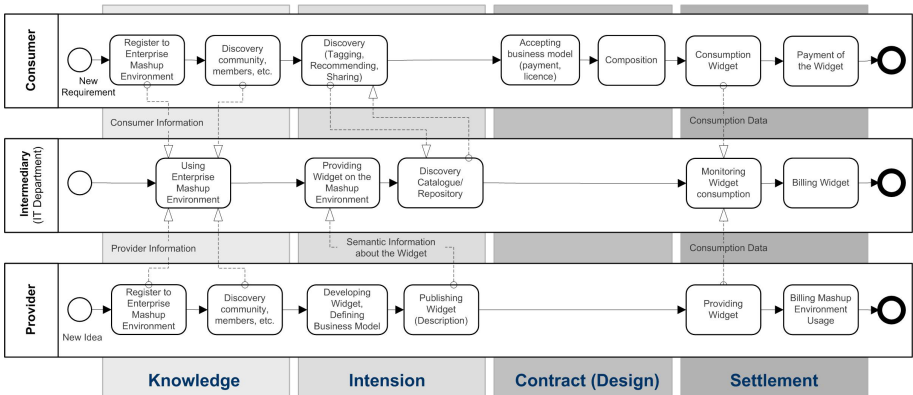

Fig. 2. Simplified interaction process between Enterprise Mashup agents

process itself has to be simple and quick as possible - in particular for the users from the business units. They focus on solving daily business problems in the sales or accounting department and not on creating or adapting their operational environment. The IT department is responsible to hide the complexity and to support the actual end-users towards a service intermediary.

3.3   Service View

The growing number of available mashupable elements requires adequate *discovery* concepts for retrieval purposes. According to the user context (profile, preferences, social network it belongs to) relevant services are presented to the users who are able to select the right Mashup element. *Sharing of information*, experiences and knowledge with the community is a key driver for Enterprise Mashups. Besides the default semantic annotations (functional and non-functional qualities) defined by the provider, consumers are able to tag, recommend, or rate the elements. By creating a folksonomy, essential a bottom-up, organic taxonomy, consumers are empowered to organize the available elements. The *composition* takes place both on the resource layer (piping) and on the widget (wiring) layer. In reference to the UNIX shell pipeline concept, the *piping* composition integrates heterogeneous resources. Aggregation, transformation, filter, or sort functions adapt and mix the underlying resources. The visual composition of input and output ports on the widget layer is called *wiring*. In contrast to piping that requires skills in programming and data standards, wiring can be done by users without special IT skills. Good enough solutions within minutes lead to a converging design and run time (*execution*). From consumer perspective, no deployment exists. They design their operational environment and execute it immediately. For IT departments, the execution means providing support for administrating, monitoring, and accounting the consumed Mashup elements.

3.4   Infrastructure View

In contrast to existing applications (i.e., MS Excel or MS Access) created and managed by business units to address ad-hoc requirements, the infrastructure of Enterprise Mashups environments are managed by the corporate IT department. Business units are empowered to integrate easily their local resources or backend systems into the environment. However, wide accepted standards (widget, Mashups), protocols for the visual composition (piping or wiring), or accounting methods are still missing in existing Enterprise Mashup environments [7].

4   Conclusion

The aim of the paper is the analysis of the changing role of IT departments towards service intermediaries in Enterprise Mashup environments. In order to achieve this, the main terms related to Enterprise Mashups were defined. By applying the St. Gallen Media Reference Model, we structure the analysis to identify the challenges implicated by the democratized environments.

However, the model serves only as a starting point and framework for further research focusing on the different views. In frame of the EU funded research project Fast and Advanced Storyboard Tool (FAST) [12], we are currently developing an infrastructure and the relevant services for the creation of widgets. By means of various real-world industry scenarios, we will analyse and observe in detail the relationship between IT departments and business units. In addition, we will use the designed reference model of this paper to analyse the economic benefits of the Enterprise Mashups paradigm.

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