



X-services - eXtended avatar-services with integrated human – driven knowledge management – a new service galaxy Case Study



Abstract: Based on four case studies, a new concept of “X-services” - eXtended avatar-services with integrated community driven knowledge management is introduced. The concept is demonstrated with a demonstrator eMe-x applied with a SME shopping mall and the e-service cuponline.se The basic idea is that the brokerage and filtering functions are augmented to a solution where the clients/users themselves can create, test and share the service profiles by controlling the avatar-service behavior.

1	Introduction	Fel!Bokmärket är inte definierat.
2	Objectives.....	Fel!Bokmärket är inte definierat.
3	Case	Fel!Bokmärket är inte definierat.
4	Methodology used	Fel!Bokmärket är inte definierat.
5	The Method applied	Fel!Bokmärket är inte definierat.
6	Development of some key points in the method	Fel!Bokmärket är inte definierat.
7	Conclusions and Summary Recommendations	Fel!Bokmärket är inte definierat.
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1 Introduction

The field of Service-Oriented Architecture (SOA) has received much attention in recent years. This software architecture is designed around loosely coupled software components called services, which can be orchestrated to improve business agility. [1]. Recently, trends in software development have shifted from software systems to service-oriented systems, based on software services with an architecture style that enhances and enables the development of such systems. [2]

According to this trend most things in a near future will be service oriented and even products are now increasingly developed and integrated in service packages. As a consequence, technologies are designed and developed to meet the demands of service-oriented architectures. We talk these days about e-services. e-services are teams of applications and humans (participating electronically) that work together to provide a service or a product.[3]

When the e-service environment is closely integrated with the information technology we can talk about I-services (integrated) or U-services (ubiquitous). Ubiquitous computing (ubicomp) aims at the non-intrusive availability of information about our physical environments, through a world of wirelessly connected computing devices (such as sensors, processors and actuators) integrated into the physical world and virtually invisible to human users[4]. This integration and its potential intelligence promise to enable us to create systems that can improve efficiency, convenience, and human safety.[5]

I-services can also be viewed as implemented knowledge in action (Forsgren, Johansson (2010) If we are to that add humans as integrated co-drivers of the knowledge management process in the service producing and service consuming process, we can talk of integrated electronic/human services or extended e-services – X-services. We can see an upcoming market of new types of service packages developed on the base of existing services supported by extensions like software communities and marketplaces for service-parts or "apps". These services are developed with input and stakeholders, from technical, social, cultural and art perspectives in a, typical co-design process.

The co-designed service packages can be portals, web pages, links, search engines, databases, calculators, simulators, agents etc. Every design can be connected to one or more metaphors or concepts. In the design process the metaphor/concept gives a direction on what to design and how to design it. Metaphors are very important when it comes to developing good concepts for I-services. Relevant metaphors comprise potential needs and characteristics for a service and give the first signals of what we should expect from the service.

One such powerful design metaphor is the human itself. When we design a service interface based on the human and human behaviour metaphor, we usually call it an avatar. The phenomenon described as avatar in this paper has been given several different terms in previous research, such as virtual agents, animated interface agents [6] or virtual assistants or virtual servants.[7] Other popular names are chatbot or just bot. They have been described as computerized agents that appear on the screen as embodied characters and exhibit various types of life-like behaviours, such as speech, emotions, gestures and eye, head and body movements"[6]. A wide spread term that has become even more popularized by on-line virtual world "Second Life" is "avatar". It has its derivation in Sanskrit language and refers to the embodiment of a supernatural being on earth; an incarnation or God's appearance on earth.[8]

In the beginning there were lots of expectations on the avatar as a powerful tool for e-services. Many companies and organizations developed avatars as a user support tool and interface offering the users this as a part of their web pages. Many of these avatars are now gone (e.g.

Case Mark, below), but there are still successful ones helping and serving customers and clients. Our case studies suggest a revival of the avatar concept integrated with human knowledge management, dynamically developed to an effective integrated electronic/human service. Based on that conclusion a concept for a new type of eXtended avatar-services with integrated human – driven knowledge management, has been developed. For instance “eMe-x”, is an X-service, with the users/clients themselves as knowledge managers. The basic idea is that the avatar-information brokerage is augmented to a solution where the clients/users themselves can create, test and share the service profiles, by that controlling the avatar’s behavior.

2 Objectives

In this paper we are presenting a theoretical, technical and conceptual background, possible practical applications and future perspectives and scenarios for the use of human behaviour as a base and model for co-designing a new type of enhanced and adapted e-service called X-services, meaning eXtended avatar-services with integrated human – driven knowledge management. Theory and case studies show that knowledge management and broker functionality are important keys to successful implementations and use of the services. Based on this a new type of services will be developed. Some possible future extensions are also presented.

3 Methodology

Two types of case studies are reported where the avatar/human being has been used as the main design metaphor/concept. The cases are different in settings and time but the results are consistent in the sense that they are pointing to the importance of integrated knowledge management functionality. The knowledge management, driven by a human or an avatar, analyses, translates and gives feedback about the user behaviour and interactions with the service system to the X-service’s infrastructure and extends the way the service works, i.e. making the service smarter. Based on the outcome of this process and the work within a co-design community driving the knowledge management, a concept of eMe-x as an X-service is developed. The users themselves co-design the profiles that control the X-service behavior. The enhanced concept is outlined and a prototype for implementation is described, in the Cuponline – service case below. The example opens a wide range of options for a new galaxy of X-services.

4 Business Description

Three e-service cases where a humanoid avatar or human being has been used as the main design metaphor are reported and discussed below.

The cases differ in settings and time but the results are consistent and pointing in the same direction. In the first three cases an avatar designed as a web-assistant complementary to a homepage is summarized. In the fourth case an earlier reported case with the avatar designed as a web-assistant for students is briefly described.



Case Mark: During 2007 and 2008 a research project was conducted with the Municipality of Mark in Sweden. The purpose was twofold: to (1) analyse and evaluate the electronic contacts between citizens and the municipality; and (2) to develop a methodology that the municipality could use in their own evaluation and development of both electronic and interpersonal contacts with citizens. A special focus was on their Avatar, called Elin, on the webpage www.mark.se. Key staff was interviewed and workshops were carried out with three different categories of citizens: Retirees, parents and teenagers. During these workshops the users were also observed while using the Avatar solving tasks identified in scenarios based on their own life situation. The conclusion was that the business case for buying the Avatar was weak, the knowledge managers input was limited in time and effort with a premature launch. One respondent even said 'Elin is stupid'. It was ultimately removed in 2008.

Case SAS: The Avatar Eva was implemented as part of SAS webpage www.SAS.se. Key SAS staff as well as Artificial solutions (the software supplier) staff were interviewed. The observations were made during co-design workshops involving customers as well as researchers and representatives from the SAS airline company in 2009. As a complement a number of interviews were performed after the workshops with each respondent. Thanks to strong efforts from the Knowledge Management team Eva is well accepted and serves answers to direct questions with high accuracy, according to respondents. However, dialogue capability and interactivity (e.g. check-in) is not yet in existence.

Case IKEA: In 1993-1995 the first attempts to develop e-services to customers were developed and evaluated by IKEA. Based on results IKEA was expanding tests and development of customer e-services. 2003-2004 the first tests with the IKEA avatar was made. Information from this period is gathered from an interview with Allan Lidforsen, IKEA project manager for Artificial Solutions (who's also the supplier for the SAS and the Mark avatar) since Jan 2008. A statement from Lidforsen summarizes Ikeas experience for success: "*I believe we need to keep driving and pushing and not stop, to make sure that the change management in the progress is not stalled! You must review the competence and how we distribute the work. The technology must be there and together with further analysis build an improved solution. We need technology updates and changes in unison with change management.*"[9]

Case eMe The eMe is a concept of a (personal) electronic assistant that helps people in organizing their life. The e-Me was first explored as a filter and an electronic agent for students both in their professional development and as actors in collaborative environments. The core of the e-Me now consists of: Shared Calendar management, Mood management, Mail aggregation, Contact Management, Shared Archives, Assignment Management and Community, where the stakeholders; users, developers, eMe project management and service providers can discuss and improve the eMe.

The eMe architecture is based on plug-ins which consists of producer plug-ins and consumer plug-ins. A producer plug-in provides the e-Me with information and knowledge while a consumer plug-in forwards this knowledge to the end user. The eMe core handles the information and the profiles and makes sure that the right information are delivered to the correct consumer. The architecture and techniques of the developed prototype is based on well-established technical standards such as Java, Grails, Hibernate and the spring framework. In the first pilot study 120 students became a part of the eMe project. The results [10] show that student direct involvement in the co-design of the eMe was crucial for the positive results.

Important findings from the above listed cases

In the first three cases the importance of a skilful knowledge manager was observed. In the cases where energy and skill was invested in building the knowledge base, the avatar/e-service supported the targeted business and public service cases. In the e-me case it was shown that the

users themselves can be actively involved in the knowledge management process.

In all cases we found a lack of systematic method of maintenance of the knowledge base supporting the knowledge management function. This lack of systematic method can be approached in different ways. One usual approach is to organize a knowledge editorial staff representing different views and expertise. Another approach is to trust a chief editor managing the information. The CIO and more recently the CKO position are results of this approach. The third approach is to involve the clients and customers in a co-design process as we tried in the eMe case.

This approach is in line of what [11] suggests that participatory design should be more widely taken into account when designing and coding avatars in virtual worlds. Based on experiences in the above cases and a number of workshop activities eMe-x was created as one possible solution for the knowledge management problem.

Case eMe-x

eMe-x differs from e-Me in two important ways.

- eMe-x has a general core controlling input, output and filtering. Connections to other communities and services are performed with plug-ins following an easy eMe-x protocol.
- eMe-x also connects to a community (eMe-profile service) for uploading and downloading eMe-profiles. An eMe-profile consists of five parts.
 - A name of the profile
 - A short scenario describing the ideal expected result when the profile is operating
 - Four key words selected from the ideal scenario
 - Plug-ins for the selected producer services
 - Plug-ins for the selected consumer services

A producer service provides the eMe-x with information and knowledge while a consumer service forwards this knowledge to the end user.

A consumer service can for example be e-mail-, twitter-, Facebook- and mobile-plug-in. Producers of information services can be for example communities like Facebook, newspapers, blogs, Twitter and e-service providers.

A set of producer- and consumer services connected to a user scenario with related key words constitute an eMe-x profile. As an example a profile with the name “my friends activities” have a user scenario “eMe-x tells me about important activities of my closest friends” and a number of names of specific friends as the related key words. As producer services, plugins for TripIT, Bloglife, Twitter and Inneland are chosen and configured. As consumer services, plug-ins for a mobile application and mail are chosen and configured.

The result of the operating eMe-x profile is that the user will get noticed on mobile and mail (consumer services) about activities where the names of the closest friends are active. All based on the data and information provided by the producer services.

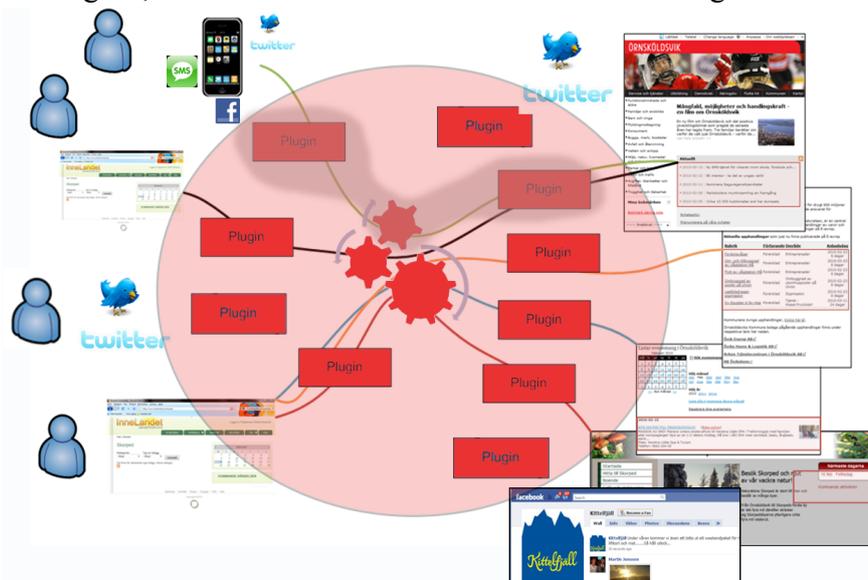


Figure 2 Illustrates the flow of information from a producer (to the right) to e-Me-x and later to the consumer plug-ins that provide the user with the information

Knowledge management in eMe-x

The design and tuning is the core of the knowledge management process. As a support for this knowledge management an eMe-x profile can be shared, graded and downloaded interacting with a community platform also serving as a producer service.

eMe-x will have an easy-to-use interface, tested and evaluated by potential users during the build-up of the service. This user-driven process will ensure that anyone should be able to try and use eMe-x and comment and suggest improvements in a profile or suggest a new profile. The idea is that all people should be able to download, try, grade and comment a profile. It should also be easy to change key words and input/output plug-ins to create a new profile and to create a new eMe plug-in.

Each profile is a representation of knowledge in action. Since the eMe-profile community also can serve as a producer service it's possible to design profiles monitoring the development of new profiles. That means a knowledge broker can monitor the emergence of new profiles. As an example a dealer can monitor new profiles connected to his products or services and send to result to a business intelligence community. Results can also be sent and published on an open website.

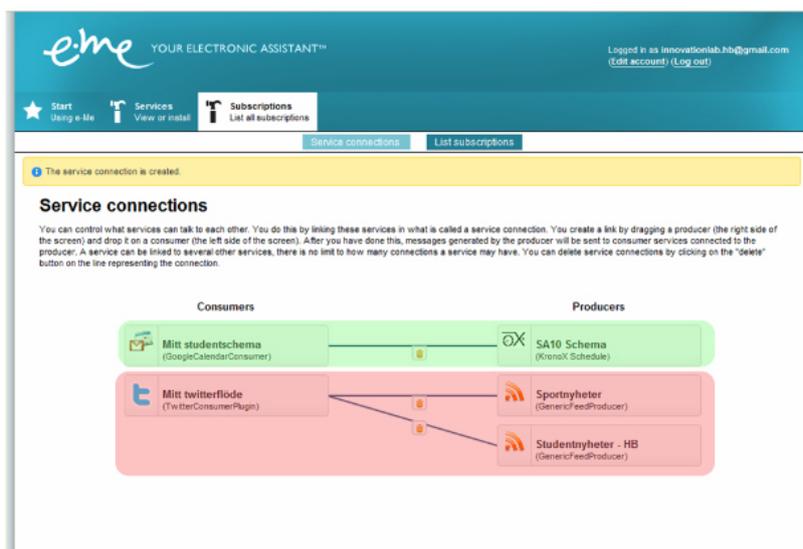


Figure 3: Illustrates two different profiles for a specific avatar (marked in red and green). All together the profiles create the complete identity of the avatar in eMe-x.

As illustrated in figure 2 the links between the producer and consumer services form the core of different profiles (in the figure two different profiles are linked). The linked services together with a scenario and keywords forms

the eMe-x profile. Each profile can be classified, graded and shared between the other avatar users in the eMe-x.

All together eMe-x with an operating profile forms an X-service that is an integrated human – electronic service with a human driven knowledge management, handled by a community as a knowledge broker function. In the community some people can serve as knowledge brokers supporting other users in setting up and upgrading the user's needs and preferences in a profile. That can be public if the user allows that. The knowledge broker upgrades the eMe-x knowledge database as well as builds a library of scenarios and different generic profiles. The knowledge broker suggests upgrades to the service provider and updates the X-service community. Every X-service can have a specific human knowledge broker, and is as well a node in an eMe-x knowledge network.

The CupOnline case and the Virtual Mall

The following case is now being developed and tested.

During the spring of 2011 a team of researchers, entrepreneurs and representatives of companies from industry came together to discuss and evaluate the concept of eMe-x. The project is ongoing and the results will be reported in the autumn of 2011. The result was a project aiming at integrating a well-established community service on the Web (www.CupOnline.nu) with the eMe-x concept.

The producer service will be CupOnline and the consumer service will be Facebook, Twitter and the community called innelandet.se including an integrated Virtual Mall for SMEs. CupOnline is a web service for managing sporting events for example, ice hockey, floor hockey and soccer. Support for additional sports and alternative functionality within a specific discipline are being developed continuously. The latest major update handles curling with its specific requirements.

Currently users are mostly parents, children, siblings, relatives and friends using the system to obtain information about a specific cup and the matches played within this cup. By integrating eMe-x in this context, value is created for all parties.

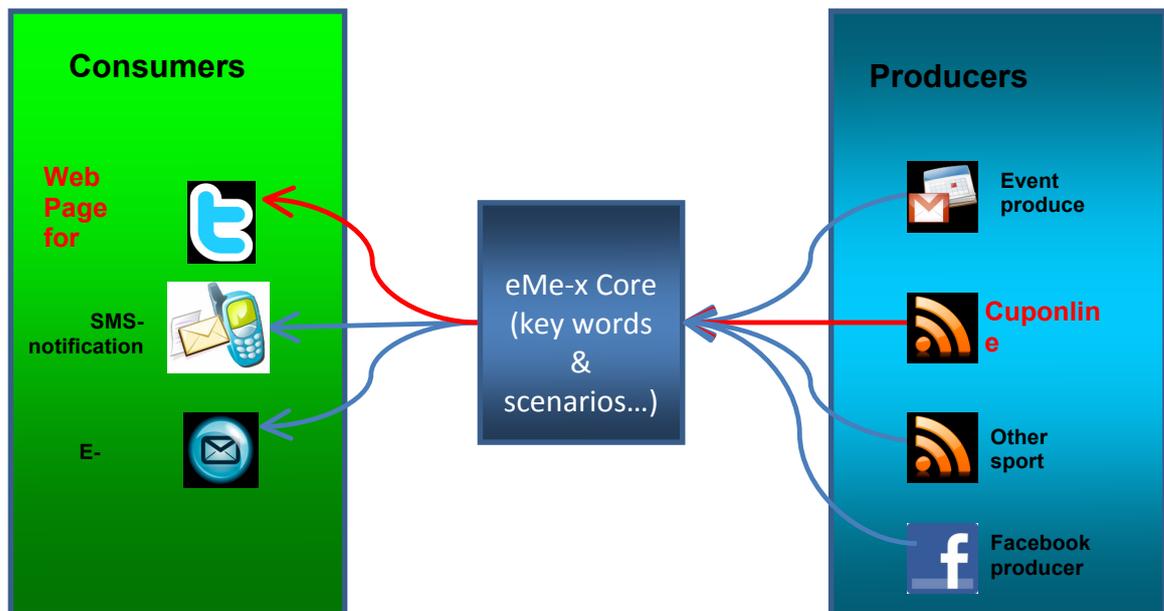


Figure 4: Illustrates the Cuponline as a producer together with other producer services that send information and knowledge eMe-x core.

The integration of eMe-x makes it possible for users to: filter out info they are interested in, complement the info with external information related to the topic, share a personal profile with other users. In this context just one of many possible useful eMe-x profiles could be as follows.

Profile Name: eMe-shoes, *Scenario:* My favourite good football players/teams will have good sponsored shoes and the sponsor will have good advertisements.

Key words: "Name of players/teams", "scoring"

Producer service: Cuponline

Consumer services; 1) webpage of the sponsoring SME company in the mall, 2) My e-mail 3) SMS-notification

Result: When my favourite and sponsored team scores I will be notified and the sponsoring shop will get a message on their homepage that one more of their shoes had been part of a winning team.

5 Some speculation for the future

Following the line of the above example it is rather easy to imagine the possibility of eMe-x profiles developed to serve with innelandet.se and its Virtual mall as producer services for sending information to various market-/virtual meeting places like Pricerunner, Facebook, etc. as consumer services, for example, sending out information about locally produced food, furniture, handicrafts, destinations, attractions, events etc.

eMe-x will naturally also be a customer/consumer and look up and retrieve information on potential markets for example, furniture making, handicrafts, etc. In fact it is possible to foresee a new galaxy of X-services.

In a future design of the eMe-x services it should also be possible also develop a number of other supportive functions in the community. The client can for example be advised what new producers services that could add to an new or existing avatar profile depending on the key words he has selected. It is also possible to think of, a set of more advanced automated profile-controlled and creating, self-learning agents, taking over some of the human knowledge manager's tasks. Such agents could for instance propose new profiles to a new user. The proposals will be based on what kind of information the new user are interested in or what other profiles (sets of consumer and producer services) the user already uses. A new user can also "borrow" a profile to get acquainted with another person's hobbies/interests and actually try to live another person's life regarding information and knowledge.

6 Conclusions

Co-design workshops with an early prototype of eMe-x have been carried out with representatives both from industry as well as from public service organizations. During the development, students have been test users. The preliminary results point to important opportunities for e-business and e-government and a pilot implementation (see above) is financed and under way.

7 References

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