Spree – Trial-based Improvements: Transferring an Enterprise 2.0 into a Web 2.0 Expert Community Application

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Abstract: The Innovation Development of Deutsche Telekom Laboratories has developed a web portal for enterprise expert communities. It combines expert matching and communication functions to initiate and support domain specific online discussions. This paper describes the move from basic features of this corporate portal to a Web 2.0 instance using the results of a field trial and a usability evaluation. Following a new short term scope and integrating an innovative location mashup, the web portal was overhauled in a completely new design. The achievements also lead into comprising an architectural review and operational experiences. The conclusion contains an outlook regarding both, new innovative features and system architecture.

1 Spree – Introduction and Motivation

The Spree background. Spree – the knowledge exchange network is a web application which supports its registered participants to establish a corporate community. They are able to "meet" new colleagues depending on their expert profile, get the possibility to chat with them and thus extend their contacts. Spree combines linguistic analysis, expert matching, notification, chat, blog and rating functions to initiate and archive online discussions. The enterprise version has been developed as an innovation development project of Deutsche Telekom Laboratories since 2009. In 2010, the focus was extended

to support dedicated external events like the Lindau Nobel Laureate Meetings[1] [Ei10] with a modern Web 2.0 look and feel, considering results from trials and surveys.

The Spree basic workflow circles. A member of the Spree community combines two roles in one person without any hierarchy. The questioner can start discussions by asking a "New question" at any time. The expert can join and follow questions addressed to him as well as any open public discussion selected from "All questions".

The rating of expertise, done by the questioner after finishing a discussion, can be used for both, to improve the future question assignment to experts and, to achieve a community push aspect by providing a public high score. Experts can adapt their personal profiles at any time to control the assignment of new questions (Figure 1).
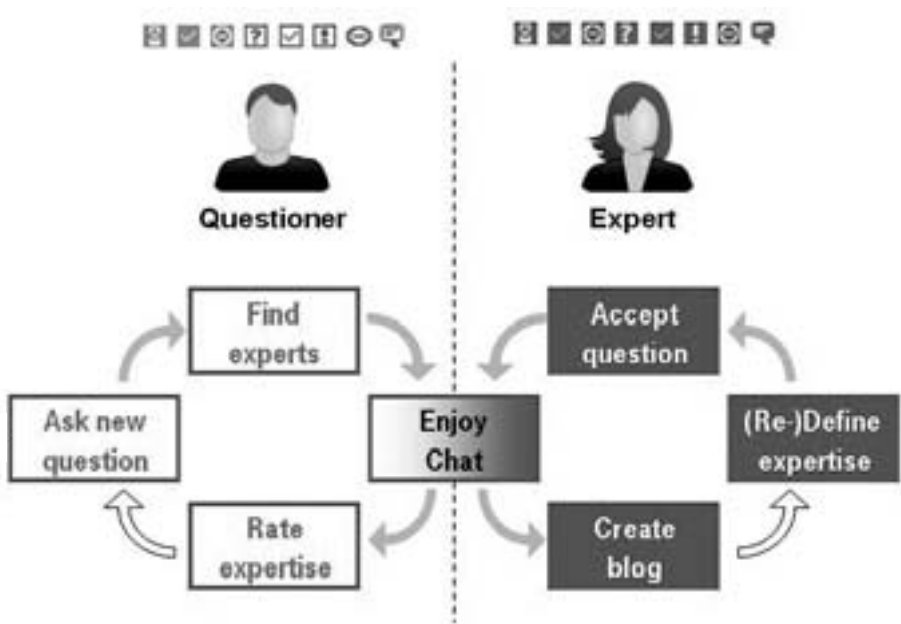

Figure 1: The basic Spree workflow cycles and roles

The expertise category tree – taxonomy. The heart of Spree to model the domain-specific theme is the category tree, also called the taxonomy. The discussion topics as well as the description of someone's expertise can be linked to arbitrary categories (nodes) of the taxonomy (multi-classification) [ELS+09]. New questions will be classified against this taxonomy to identify the best experts to be notified for joining in [WUH+08]. Each category contains a ranked list of terms (words and word groups) characterising best the part of domain in the common language of experts and questioners. The term lists are constructed automatically by analysing training documents.

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[1] URL: http://www.lindau-nobel.org/ and http://www.spree-lindau.de/

2 Spree Application Evaluation

After successful implementation and testing of the corporate version – the magenta glimmer (Figure 3) – there was a phase including multiple application evolution steps:

1. Before starting the trial, **performance** and **stress tests** were made using a network simulator.

2. The real usage of the system with about 125 voluntary experts from the domain of "Recommendation" was tested within a **user field trial**.

3. Overall handling was logged, anonymous **usage statistics** were tracked.

4. After conducting the trial, an important part was the **user questionnaire** for all participants to collect enhanced user response.

5. The final application evaluation was made by **usability experts** independently of the field trial. The application was revised from a new perspective.

2.1 Users' Conduction of the Field Trial

The eight weeks field trial phase was concluded by an extensive user evaluation. The questionnaire was structured into six criterion areas: general idea (5), quality, expertise, matching (7), usage & communication (8), usability & experience (7), usage & functions (14), and future functions (7). Numbers in brackets indicate the number of questions.
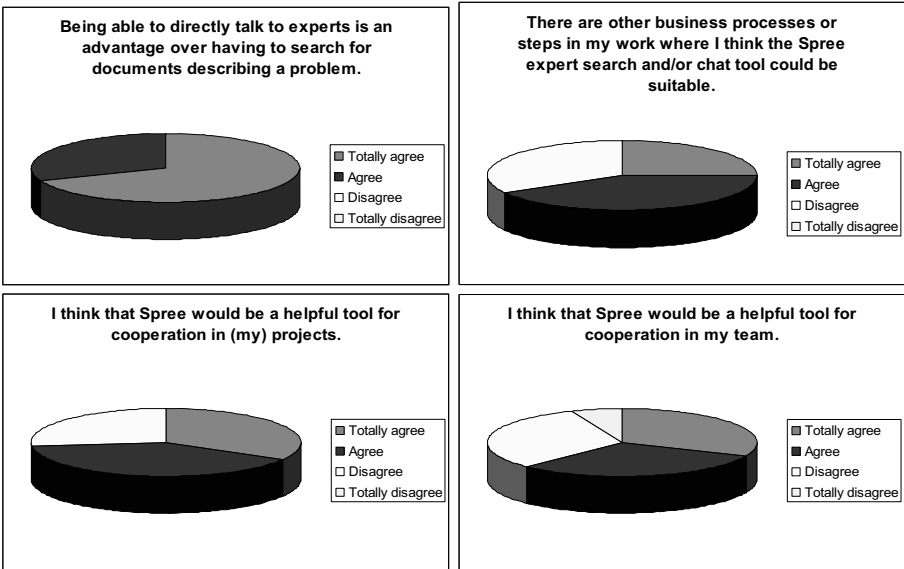

Figure 2a-d: Selected field trial results of the Recommendation domain

The general Spree ideas were understood and shared. Being a plain browser application without any installation process, a high degree of acceptance was achieved. The Spree core idea to simply establish contacts among experts received a very high score. The integration of Spree into daily processes was seen more critically (Figure 2).

2.2 Usability Expert Evaluation

Usability experts did a global functional review over the complete feature set of the application. Therefore, the following issues are only an excerpt of the overall findings. Many details were found for a future refinement of the web application moving to a Web 2.0 version. Some more issues are for further discussion. The complete study covers 51 pages, 58 figures or screens, and 47 usability issue reports [JaHi10]. The following list summarizes exemplarily selected findings of different types and does not prioritize any kind of features or items to be redesigned. The usability expert evaluation report was an important input for the redesign.

- **Roles:** The communication roles – owner of a blog or question vs. expert – imply different possibilities for the user. These capabilities are not immediately visible with the result of uncertain users.

- **Contents:** Users will have difficulties in different contexts with orientation and locating specific content (C) questions and blogs in complex tables with missing object declarations. The orientation within tabs with many parallel search objects needs to have an improved representation management e.g., content in hidden areas.

- **Categorization:** The core feature of automated categorization of questions and the connection to user profiles is not immediately visible. This affects both, the data entry dialog as well as the way to publish an existing dialog to the public.

- **Workflow:** On the one hand, Spree supports guidance through a creation of questions by a wizard (W) on the other hand it does not allow user intended interaction like handling content without a question or the pre-engagements of selected experts.

- **Appearance:** The user interface is heavily compact and text-based (T). Missing highlighting of different information areas leads to unidentifiable core functions.

- **Icons:** The indication of communication contents is not immediately visible. The supporting icons (I) are a matter of learning and partially not unique. This goes along with missing transparency of status of questions or blogs and how to change them.

Figure 3: The look and feel of the Enterprise 2.0 application following Deutsche Telekom CI/CD

In general, most described issues could be solved by training or levelled Spree expert modes and do not affect users with ongoing and extensive knowledge of the system. However, the intention of the study was also to include a user view with less Spree knowledge and little training to allow ad-hoc use of Spree.

3 Redesign and Location Awareness Integration

The main redesign motivation was the change of the Spree's scope away from a limited corporate internal portal. The new plans with Spree were mainly driven and influenced by the following side conditions.

- Spree was selected to be the communication and expert portal for the Lindau Nobel Laureate Meetings 2010 to support networking of 650 students from 80 countries.

- The integration of new community features like twitter or a location-based service.

- The foundation of a start-up with an increasing non Deutsche Telekom perspective: "SPREE Gesellschaft für Informations- und Wissensmanagement mbH"[2].

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[2] URL (setup in progress): http://spree-gmbh.de/

The implications affected the overall redesign, the selection of feature development and the prioritization of implementation issues.

3.1 Rescoping of the Web Application: from Spree Enterprise to Spree Community

With a short term usage scope during a limited time frame at a dedicated event the *ease of use* gained the highest priority. So a new scope appears to support the non experienced user and to simplify functionality. Therefore, the feature set of the Spree was reduced, and the wording was unified. A complete feature set with blogs, which are of high importance for long term usage, was removed for the specific short term SPREE@Lindau usage.

An important part of rescoping was the transformation of Spree from a corporate internal platform towards a new Web 2.0 company – with new fashionable look & feel leading into a selection process of better recognizable screens, new design, frame sizes, colours and web styles. Supported by a professional designer, an evaluation of common known format styles in the year 2010 [Gi10] was done by looking at well known web sites like facebook[3] and reducing the screen size requirements and thus modernise the web application. For better recognition of the screens, areas were fixed and the floating and screen size adoption capabilities of Spree were reduced. Both decisions were discussed intensively but e.g., the intuitive user argument for the new user was outweighed over the better usage with more text on one screen for experienced Spree users.

Figure 4: Basic frame redesign concept and specification of Spree

As there are Nobel Laureate Meetings participants worldwide, it was considered a good idea to provide an innovative location feature – so the questioner could see where the

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online discussions participants currently are and where they come from, before and during the event. As there was limited access to the meeting's infrastructure with WiFi and fixed network access, the knowledge of the infrastructure could be pulled into the localization module to locate users and questions and prepare statistics.

The mentioned main requirements led into a new partitioning of the Spree screen which is shown in Figure 4. The new simplified view for the Spree user consists of the user profile area "WHOAMI", the core relevant questions on the left "WHAT", the contacts on the right "WHO" and the locations area "WHERE".

3.2 Usability Enhancements

For the future usage of Spree – in the Enterprise 2.0 area or in an event specific context – it is of great importance to show the added value and the information users can get from or within the Spree application. The usability optimization itself cannot grant ease of use. Many issues are out of scope of the usability considerations. Intuitive use without reading an online help or manual, helpful content, appropriate categorization according the portal requirements, actuality of news and active user management are among them.

Figure 5: Spree 2010 version – an example of the Web 2.0 application

The final release for the Spree version included a location mashup, a simplified news area with highlighted core features to be performed – the "New question" and the "All questions" buttons. As shown in Figure 5 the personal profile moved to top left, the contacts to top right and the personal location to bottom right.

Not shown on this screen are additional meeting information like the Spree login with localisation enabling, the SPREE@Lindau information, event twitter channel as news ticker, a participant's competition and information about the provided infrastructure.

3.3 Differences between Spree Enterprise and Community version

Table 1 and the following points should provide an overview of the differences of the considered enterprise version from Figure 3 and the community version from Figure 5.

Spree Enterprise has

- multiple features to support blog functionalities. Articles can be created based on an existing chat, then published and archived for later usage and search.

- many shortcuts and icons, which lets the experienced user easily access often used functionalities.

- features to allow ranking and rating of articles and show statistics of user and blog rankings – including activity and usage.

- online help and tutorial, whereas the Spree Community has a printable introduction in the login area.

- as login a unique user ID, whereas Spree Community allows the subscription with a better recognizable email-address that is also used for notification.

Spree Community

- allows map view of other users if they gave their permission..

- is fixed in width for the right, left and center panel, whereas Spree Enterprise has a fixed size left and right panel, but a resizable and highly adaptive center panel.

- highlights major features – asking new questions and searching through existing questions and the user profile moved to top left with additional help information when hovering over the question links.

- login page includes additional information about Spree and Deutsche Telekom Laboratories, an event twitter ticker and some Lindau information links – and last but not least a huge and visible registration button.

Criterion	Spree Enterprise	Spree Community
Time focus	Long term	Short term
Design focus	CI/CD compliance	Freshness
Network focus	Intranet	Internet
Authentication focus	Corporate single sign on	Dedicated/twitter account
Feature selection focus	Company culture	Ease of use
Critical success factor	Worker's council's o.k.	Community acceptance

Table 1: Focus comparison of Spree Enterprise and Spree Community version

4 System Architecture Evaluation

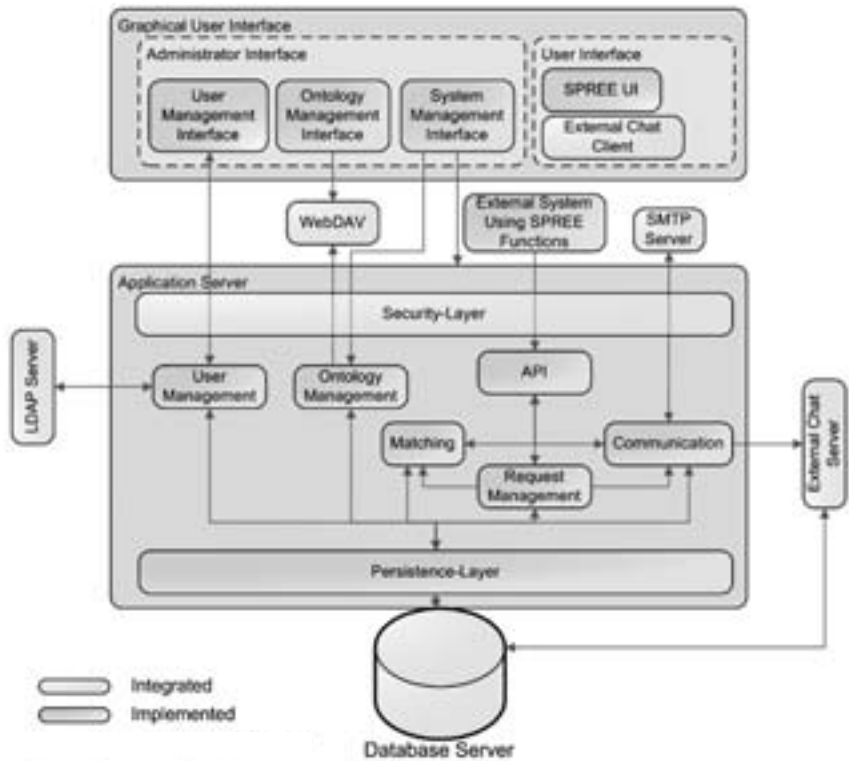## 4.1 Architectural and Development Analysis

Figure 6: Spree front end and back end – the architectural view with interfaces

The layered Spree architectures centrepiece is the Java EE based web application. The graphical user interface (GUI) is also deployed on this structure and implemented with JSF and Richfaces as supporting component library and therefore completely separated from the application business logic behind. The messaging server, the authentication module as well as the required mail server are separated from each other. They can be accessed via common protocols – LDAP for authentication, SMTP for email and XMPP for messaging. The database is accessed through a hibernate persistence layer and contains both the user and message information. The categorization information is stored in a local web application directory and is accessible via WebDAV. Hosting on virtual machines is supported. For the security layer HTTP over SSL is used.

4.2 Component and Operational Experience

The implementation extension with changes in the design, simplification of features and introduction of the location mashup brought the following practical findings. As the

original implementation was done until the end of 2009 it is still state of the art. Regarding maintenance we see possible crucial improvements for future approaches both in architecture as well as in the development environment and evaluation of used components – e.g. language and browser dependencies.

Software development environment, targeting the Java-based environment, consisting of Eclipse v3.3, Subversion v1.5, Maven v2.0, Continuum, Cobertura, Surefire and Trac was successfully proved.

Layered Java EE[4], formerly known as J2EE, architecture, is a good thing – not really new – but remarkable.

Open source components like LDAP, Openfire, MySQL and hibernate, Tomcat and Apache with standard protocols reduce vulnerability.

Openfire[5] did not work with an OpenJava JDK. Therefore SUN JDK had to be setup separately. This issue has to be followed, as the future strategy of Oracle with Java is a matter of discussion.

Java Server Faces (JSF)[6] is a Java-based Web application framework intended to simplify development integration of web-based user interfaces. The usage of JSF framework brought a good differentiation between design and implementation to allow independent work at the same time. JSF was cumbersome in the sense of bug fixing and not the easiest framework to learn. Unfortunately, sometimes firewalls interpret calls of JSF-pages as DoS attack.

RichFaces (RF)[7] was used together with JSF, it is an open source Ajax enabled component library for JSF. It allows easy integration of Ajax capabilities into enterprise application development. The additional layer for Javascript functionality reduces the control of the developer of the final response towards the browsers http-request and increases complexity for bug fixing and debugging.

Weka[8] is a collection of machine learning algorithms for data mining tasks and contains tools for data pre-processing, classification, regression, clustering, association rules and visualization. Within our translation from English to German we pointed out the strength of this component in English with necessary improvements for the German grammar.

The usage of such frameworks is comfortable, but is a task of its own to follow all versions – implementing JSF changes to JSF2 and RF migration from 3 to 4 is not a small job. Because of the need to support IE6 for the corporate version, it was not possible to update to the newest RF version, but the new IE8 brought also some findings together with the RF framework. From a more abstract view the support of developer

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[4] URL: http://en.wikipedia.org/wiki/Java_Platform,_Enterprise_Edition
[5] URL: http://en.wikipedia.org/wiki/Openfire
[6] URL: http://en.wikipedia.org/wiki/JavaServer_Faces
[7] URL: http://en.wikipedia.org/wiki/RichFaces
[8] URL: http://www.cs.waikato.ac.nz/ml/weka/

communities for all parts and versions of framework and environment is becoming increasingly important during life cycle of the application.

5 Spree – Summary and Vision

For the future, Spree will address both, the long term focus on Enterprise 2.0 and the ad-hoc focus to support Web 2.0 communities. Therefore both skins, relying on a common backend, will experience further improvements by means of the methods described in chapter 2.

More complex GUIs can be introduced to the users, either by moderation during the starting phase or by providing skill-based individual GUI settings. It is best practise to introduce a dedicated "Spree.Help" user within Spree instance to be addressed by other users with their Spree related questions, independently from the covered domain.

5.1 Location Awareness

Figure 7: Spree – user information including map-based localisation using IP information

As shown above, location was selected as a new feature for Spree. In the first phase only personal localization during the login phase with a request from the browser was performed. If accepted, the other users are allowed to check another online user's position. This feature gives the Spree communication a new taste – you cannot only see the user profile, but also the user's location. The locations are shown map mashup like with the user's position highlighted as concentric green circles.The user's position is

obtained with Javascript capabilities either from the installed Google Gears component (installable with all IE browsers, preinstalled in Google Chrome) or with the location API implemented in Firefox 3.5+. The localization is based on IP-localization and visible client WiFi access points or known fixed addresses.

The feature was worked out at an early stage and was seen just as starting point. To mention just a few conceivable future features – statistic of the answer and question origin or real event organizing for expert meets experts based on distance calculation, to consider the location as context parameter which also influences expert selection.

5.2 Mobile Spree Application

New upcoming frameworks and tools for emulation and development help nowadays to prepare mobile front ends with high usability faster and faster [DLR09]. Thus the mobile client is the natural extension for an expert community so that questions can be raised or answered from mobile devices. Increasing emphasis of location as a context element may overrule privacy considerations in the near future and can be seen as the stringent direction for an expert community [Ma10].

Mobile platform dependencies like Apple iPhone, Google Android, or Windows Mobile 7 are, although fashionable, a drawback. Therefore, a mobile browser client can feed all Spree requirements without any installation, applying the new HTML5[9] features.

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[9] URL: http://www.w3.org/TR/html5/