Navigating the Personal Information Sphere

Simon Thiel, Andreas Schuller, Fabian Hermann

CT Web Application Engineering, CC Human-Computer Interaction
Fraunhofer IAO
Nobelstraße 12
70569 Stuttgart, Germany
simon.thiel@iao.fraunhofer.de
andreas.schuller@iao.fraunhofer.de

Abstract: A major trend in information society is the integration of personal information from different sources. Digital data about persons, their behavior, their content and their social structure is merged into the personal information sphere; a multi-dimensional space containing information related to a person. In the research project di.me[1], funded by the EC, a so called userware is developed to support the management of it's personal sphere on multiple platforms.

Main requirement for the userware is to help the user keeping an overview on his personal data, while giving a powerful tool for changing all kind of aspects, like changing access rights, merging information from different sources. For this an intuitive but rich visualization of information and relations is required. A user-interface concept describes, how a user can navigate through his information sphere and which artifacts support managing it.

This paper describes the user-interface concept within the di.me userware, giving special focus on navigation and visualization of the personal information sphere.

1 Introduction

Social networks play an increasing role in the online community. To stay connected with colleagues, friends and family (multiple) accounts on various social network platforms are quite common. Keeping track on the various accounts, updates and changes, however becomes more and more difficult. One goal of di.me is to integrate several of these platforms into one personal information sphere that is controlled by the user. Assembling the profile information with files and information stored locally on the desktop helps to compile a rich semantic model of the user's personal information sphere. An easy to use, multi platform user interface enables the user to manage his personal sphere and to keep control on the information he shares.

[1] di.me = "digital.me: Userware for the Intelligent, Intuitive, and Trust-Enhancing Management of the User s Personal Information Sphere in Digital and Social Environments"

erschienen im Tagungsband der INFORMATIK 2011
Lecture Notes in Informatics, Band P192
ISBN 978-3-88579-286-4

2 Approach

General approach of di.me project describes the development of a userware consisting of a private service and several clients for accessing it. The userware consists of a private service and a client application. The private service can be installed on a private server or hosted at a third-party provider. The user can access the private service via the di.me client running on his desktop computer or by using a mobile application.

2.1 Personal Information Sphere

Core concept in di.me is the Personal Information Sphere (PS). The metaphor of a sphere (Figure 1) containing references to all information related to a person has been established in previous projects of Fraunhofer IAO [Sch09]. Information in the PS is structured along a semantic model containing meta-information about each information artifact. The meta-information covers classical elements (e.g. known from file systems) like access rights, information about the owner, date-of-creation and date-of-last-edit. But also further history information about changes of ownership is assigned to the artifact. In the semantic model the concepts (e.g. information artifacts) are interlinked by relations. These give indication about instance, composition, aggregation, or general association relationship between two concepts. For management of the personal information sphere, it's important to categorize and cluster the user's information artifacts. Humans require structure to control and oversee large amounts of information artifacts. This structure can be predefined following some reasonable default categorization or can be defined by the user following his mental model. In the best case a general default structure can be expanded and adapted by the user. This higher level of abstraction the user reaches by categorization enables him to control larger amounts of artifacts, keeping track of granted permissions and navigating through his data.

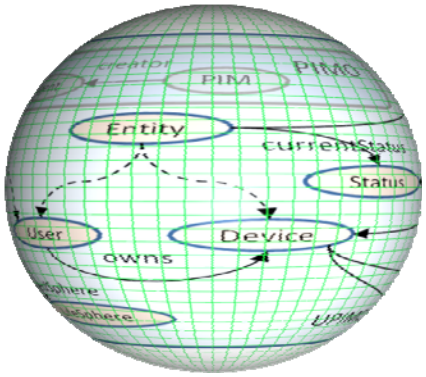

Figure 1: di.me Personal Information Sphere

A straight forward representation of this categorization can be implemented by establishing concepts for each category (or tag) aggregating the referring information artifacts or sub categories. Details about the implementation of the di.me semantic model are beyond the scope of this paper and will be discussed in separate publications. For describing the user interface, two lines of categorization are of particular interest: Categorization of persons or contacts into “Groups” and categorization of content and profile information objects as “Information Categories”. (Figure 2)

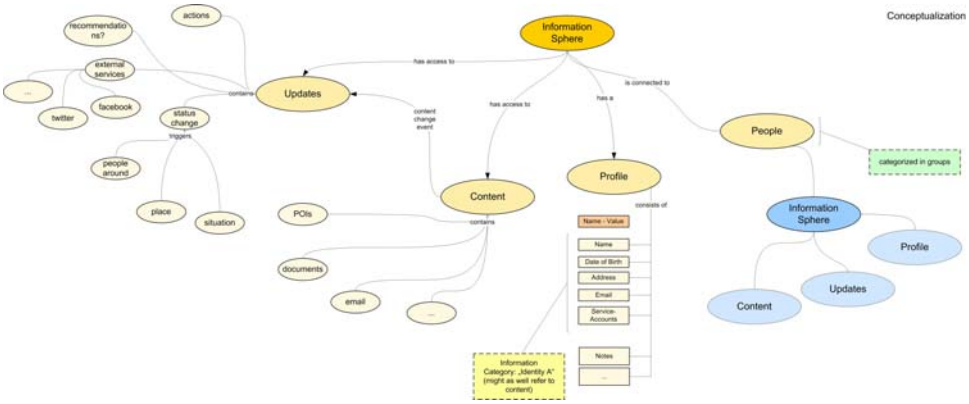

Figure 2: Conceptualization of UI-concepts

2.2 Sharing the Personal Information Sphere

di.me supports mechanisms for sharing information with persons known to the user. To give the user maximum flexibility in defining, who should be able to access a specific resource on the one hand, but on the other hand provide functionality for rich structuring and reach a high usability, the sharing mechanism allows for sharing information objects to single persons, but also supports sharing whole categories to groups (see Figure 3). However, it’s clear that assigning single pieces of information to single persons will lead to a strong fragmentation of the access model and there is a high risk for the user to loose track of the permissions granted. Therefore one challenge for the UI-concept is to encourage the user using groups and categories for setting access rights. Also the system should come up with suggestions about rearranging existing groups, creating new groups or to aggregate a set of information objects in a new Information Category.

ISBN 978-3-88579-286-4

2.3 Recommendations from di.me

Helping the user to structure his personal information sphere is one application of recommendations coming from the system. Central concept of di.me userware is to establish a powerful tool, enforcing the user to manage his personal data and avoiding to restrict the user's actions. So the system will not change (the structure) of the PS proactively, but give recommendation that the user is free to accept, adapt or deny. Within his daily schedule a user will typically have some time-slots, when he for example enjoys browsing his social networks, sorting persons into groups and photos into categories. So, recommendations don't force themselves to the user, but are supporting him when there is time for it.

di.me gives recommendations regarding to aspects as follows:

- Organizing persons in groups: adding persons to groups, splitting groups, merging groups, etc.
- Organizing information objects in Information Categories, e.g. via tagging: adding information objects to categories, merging categories, splitting categories, structure categories, etc.
- Detection of not yet specified situations
- Sharing information objects/categories with peers/ groups
- Disclose or hide status updates

To produce these kinds of recommendation, the semantic model in di.me is required to provide semantic for all information objects, categories, groups and situations. In a continuous process the recommendation engine is reasoning on the various aspects of the personal information sphere and produces recommendations accordingly.[2]

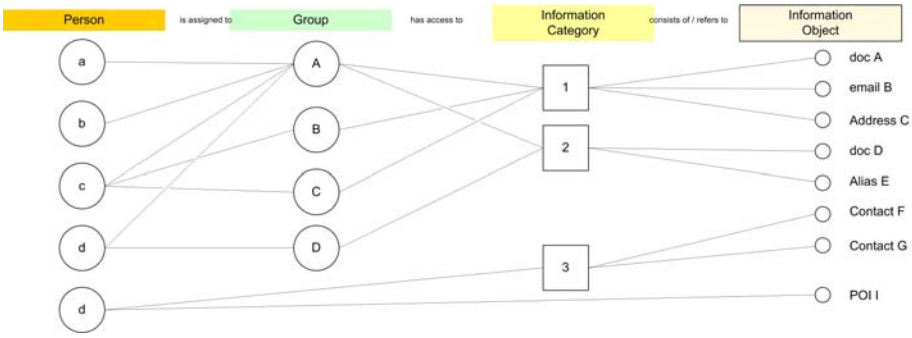

Figure 3: Categories and Access Rules

[2] Details about this recommendation engine will also be subject of further publications.

2.4 Integration of Services

Internet communities are broadly using social networks with many platforms [Bloc10], according to [Mee10] the usage of social networking exceeds the usage of email since 2009. A main target for di.me userware is to provide a platform for integration of existing user accounts for many social network platforms. For this, external services can be accessed via di.me. Personal information provided on a social network platform is presented as part of the personal information sphere in di.me. To avoid redundancy and provide convenient synchronization, artifacts like name, address, etc., relevant on many platforms are automatically merged and can be managed in a single place. It's clear that not all external platforms support APIs for editing data, but wherever it is available, automatic updates of personal information should be provided.

Another aspect of social third-party services is that they provide a rich variety of channels for communication. A concept of di.me is to support communication with a person by use of the known channels shared with this person. An example: As a result of merging his Skype contacts with di.me, Max knows that Peter is reachable via Skype, however he also knows Peter's email address. So, when sending a message to Peter, Max get's the choice: whether he wants to send it via Skype or email it.

2.5 Personal History

For all external services di.me is able to access, it will also capture status information and messages or updates coming in. The presentation of these updates is the central entry point for the user. These updates (form the system or from other users) are shown on the home view of di.me. An implementation of such a view has to provide rich filtering options to give the user control on which information to be displayed. Filtering is not only to be done manually, but generally set according to the situation the system recognizes. (Recognition of situations will be explained in the following paragraph.) Depending on the filter setting some of the updates won't be displayed when incoming. However, all incoming updates are stored in the personal history. The history is a timeline that refers to updates and events collected by di.me. So, di.me provides a view to browse and search the personal history. Again, rich filtering and sorting options allow following different aspects of personal history. Such aspects can be persons, communication channels or abstract life spheres. Filtering can also take place according to situations.

2.6 Context Sensitive UI & Situations

For further control of the client behavior in di.me, particular in the mobile context, the client is able to perceive environmental and activity information, which is assembled in the user's personal context. Following rules set up by default or specified by the user, situations are derived from life content information. These situations and particularly the change of situations are a source for triggering multiple reactions in di.me. The change of situation may cause the system to:

ISBN 978-3-88579-286-4

- Change the configuration of updates shown to the user, and how they will be alerted
- Update specified contacts about this situation change.
- Update external services about change of situation. (E.g. a service tracking persons and showing people around.)
- Provide access to information to specified persons or groups.
- Show recommendations about potential actions.

Following the specified rules, the user interface adapts according to changes of the situation recognized. This mainly concerns the set of data accessible to the user. The recommendation feature allows for interacting with the user. The simple principle of: suggestion, accept, adapt and deny, lays a basis for improving the recommendation mechanism by reinforcement learning technologies.

3 Implementation

The di.me project started in November 2010. Therefore development is still in a conceptual phase. However, UI prototypes showing approaches for navigation and visualization have been developed and will be introduced in the following section. The di.me approach covers clients for desktop and mobile devices. Within this paper, navigation aspects will be shown for a mobile scenario, while an example for visualization of the personal history is given for a desktop context.

3.1 Navigation

For mobile application development of di.me client is subject technical restrictions: The client has to comply with limited processing power and a rather small display. Thus the UI is required to restrict each view to a minimum number of details shown at a time. Nevertheless, the challenge is to give the user as much (useful) information as possible. So, the mobile scenario is most interesting from a UI-design perspective.

For the main navigation of the di.me client six items and correlating top-level views have been specified: (Figure 4)

- Home
- MySphere
- People
- Timeline
- Situations
- Settings

Since, on a smart phone, the display size is quite restricted, “Situations” and “Settings” are reachable via a “more” menu item.

ISBN 978-3-88579-286-4

The Home view serves as navigation cockpit for the di.me client application. It consists of two views “Updates” and “Tips”, where by default the updates view is shown when the application gets activated. Depending on the (filter) settings and the situation currently detected, the scope of updates to be shown is determined. Each of the updates shown in the list can be selected to see more details of the update, containing the full text, the sender as well as some timestamp. This detail view also serves as starting point to jump to the senders profile or to give direct reply on the update. In the “Tips” view, recommendations coming from the di.me system get displayed. Selecting a tip again opens a detailed view on the recommendation. Here the user can chose to follow (accept) the recommendation, adapt or ignore it.

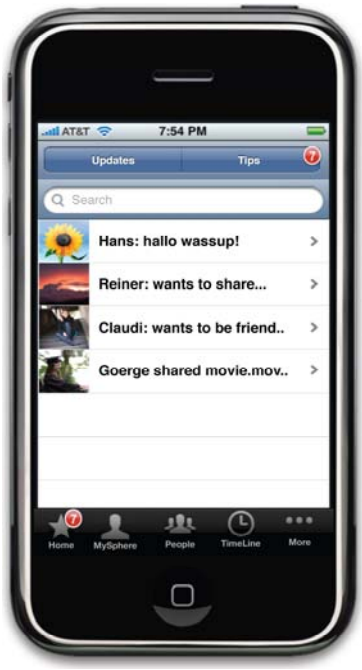

Figure 4: Home-Screen (early design prototype)

As discussed in the approach, recommendations can contain a suggestion to restructure the groups of a personal information sphere. Managing groups on a small display can easily become a confusing task. When showing the people view, the user can switch into management mode by turning the phone by 90 degrees. (Figure 5) In this view, the landscape format is split into two columns showing persons and groups at the same time. The user can now perform drag and drop operations to add persons to groups or remove them accordingly. Filter mechanisms for both columns can be set separately, reducing number of persons and groups respectively shown in the lists. This management view is provided also for structuring information categories for the view MySphere.

ISBN 978-3-88579-286-4

Figure 5: Organizing Groups (early design prototype)

MySphere allows the user to browse and search the personal information sphere. Again, rich filtering mechanisms allow for reducing the amount of information shown in this view. On the top of the view a search field allows for searching arbitrary information objects or categories.

In Situations the user is able to control and define the situations recognized and to specify the client's behavior accordingly.

Timeline shows a simple visualization of the personal history quite similar to a calendar application.

3.2 Visualization

The UI design for the desktop client of di.me adopts the look and feel that was introduced with the mobile platform. Also the main menu is structured following the six main menu items. Since the design of the navigation is not very much restricted, on the desktop challenges for visualization are of particular interest. As an example this paragraph introduces the visualization of the personal history (Timeline) on the desktop UI.

ISBN 978-3-88579-286-4

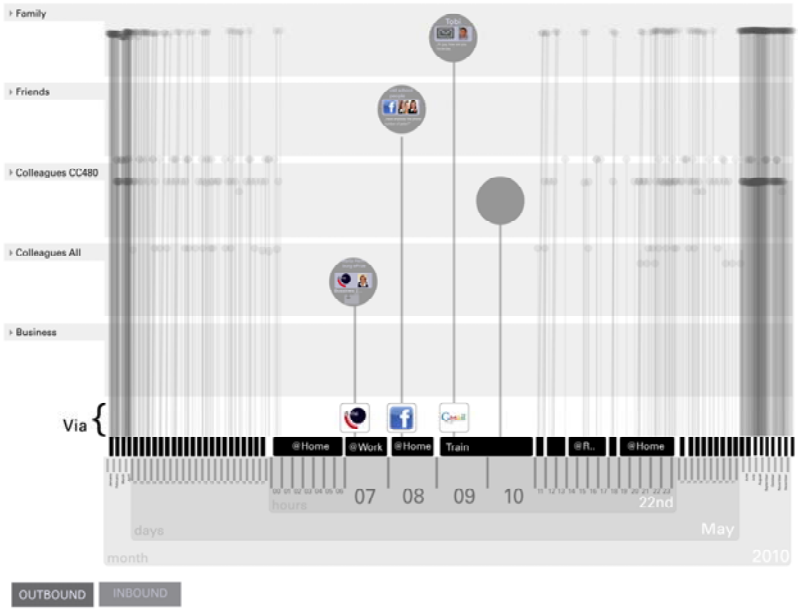

Figure 6: Visualization of History (early design prototype)

As described previously, di.me userware is collecting incoming updates and upcoming events in the personal history. Updates are coming from various sources and over time a vast amount of items get collected. Providing an easy to use, intuitive UI for browsing such a history is one main challenge for visualization in di.me.

Figure 6 shows the current design prototype for visualization of the personal history. The timescale is shown on the bottom of the page, zoomed in the middle to the highest granularity selected. When approaching the borders of the view, the timescale is zoomed out, showing a whole year as a horizon. Swim lanes with horizontal orientation describe groups that have been senders or receivers of communication acts (updates received/sent). Bubbles situated within these swim lanes indicate acts of communication sharing a close semantic relationship. The user can browse through the history by scrolling right or left, zoom in and out at the current position, select a topic to follow it through his history or jump into a bubble to read the details of each update.

4 Related Work

Related work for di.me can be found in many different aspects. Social network mash-up tools are a fast evolving field with some prominent examples. Diaspora [Diasp] providing the possibility of hosting personal data on a private server shares some general ideas with di.me. Other approaches integrate social networks into the web browser. Examples are [Flock] and [Rock]. Personal information manager cover another aspect of di.me, a technology well established, however typically restricted to email, chat and calendar functions. The di.me functionality of mining a personal sphere, in terms of a semantic desktop search, is based on related work resulting from the NEPOMUK project [Groz07].

Concerning the UI-aspects of di.me a survey to the general topic of augmented identity can be found in [Her09]. Related work concerning visualization of social networks was done by [Fre00]. Visualization of timelines and personal history has been discussed by [Plai98] with focus on medical logs. Fundamental considerations about scaling and zooming within a timeline can be found in [Bad04].

5 Summary

Main goal of di.me userware is to establish a tool for integration of personal information from local sources as well as from social network platforms into the personal information sphere. For this information about persons, their behavior, their content and their social structure is merged into a semantic model, where it can be browsed, searched and managed. The di.me userware client supports the user, when accessing his personal information sphere, giving him a powerful tool to control his personal data. For further support the di.me system gives recommendations about restructuring groups and categories and sharing information with interested contacts. To give orientation to the user, an easy to understand, but rich visualization of information and relations is described. A user-interface concept illustrates, how a user can navigate through his information sphere and which artifacts support managing it.

This paper described the basic concepts of dime and gave insight into the navigation of the di.me user-interface prototype for the mobile platform. Visualization aspects have been discussed on the example of visualizing the personal history on the desktop platform.

ISBN 978-3-88579-286-4

Acknowledgments

The research leading to these results has received funding from the European Union Seventh Framework Program (FP7/2007- 2013) under grant agreement n° 257787

6 References

[Fre00] Visualizing social networks; Freeman, L.C.; Journal of social structure, 2000

[Bloc10] E. Bloch, The 2010 Social Networking Map, http://www.flowtown.com/blog/the-2010-social-networking-map

[Diasp] Diaspora project ; http://blog.joindiaspora.com/what-is-diaspora.html

[Rock] Rockmelt, social media web browser; http://www.rockmelt.com/

[Mee10] Internet Trends - Presentation from CM Summit; M. Meeker, Scott Devitt, Liang Wu; Morgan Stanley, 07.06. 2010

[Her09] Challenges for User Centered Smart Environments; Fabian Hermann, Roland Blach, Doris Janssen, Thorsten Klein, Andreas Schuller, Dieter Spath; HCII 09, 2009

[Sch09] Mobile Soziale Netzwerke : Interaction Patterns zur Fusion realer und digitaler Welten; Schuller, Andreas; Kniewel, Romy et. al.; Berichtband des siebten Workshops des German Chapters der Usability Professionals Association e.V., Stuttgart 2009, S. 184-188.

[Plai98] An information architecture to support the visualization of personal histories; C. Playsant, B. Schneiderman, R. Mushlin; Information Processing & Management, Elsevier 1998, p. 581- 597

[Bad04] Connecting time-oriented data and information to a coherent interactive visualization; R. Bade, S. Schlechtweg, S. and Miksch; Proceedings of the SIGCHI conference on Human factors in computing systems, 2004, p. 105-112

[Groz07] The nepomuk project-on the way to the social semantic desktop; Groza, T., Handschuh, S. et al.; Proceedings of I-Semantics, 2007, p 201-211