A.1 Fishification - Visualizing Activity Streams Using the Aquarium Metaphor

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Abstract

Large screens in semi-public spaces are already used in different organizations for presenting information. To make these information radiators work, the visualization and interaction have to be as attractive and intuitive as possible. In this paper, we present a new way of visualizing social activity streams on semi-public large screens. In order to keep the user interface simple, and to attract people that are passing by, the aquarium metaphor is used. Apart from describing a prototype implementation, the paper elaborates on an evaluation of the prototype.

1 Introduction

More than ever our daily work in the information society relies on creating, searching and combining information objects like documents, emails or similar digital content.

While in the recent past, time and location independent access to information were the main challenges (e.g. [Bannon and Schmidt 1989]), the general availability of information is not a problem anymore. Nowadays, information is available in the Internet and in many different data repositories in the organizational context.

Due to the ongoing growth of the information pool, one main challenge for efficient knowledge work is finding individually relevant content. In the different enterprise data silos, pieces of information are not sufficiently visible until they are pro-actively viewed or retrieved.

Large and interactive screens installed at semi-public places like lobbies, coffee corners or conference rooms within companies might help here. Many companies

have acquired such devices, but in contrast to mobile and tablet devices, the stationary multi-touch systems are currently rather used as gadgets than being deployed for helpful business scenarios. In most of the cases the devices are either turned off or show some static presentation. The potential of using these (touch) screens for real business objectives so remains unexploited [Czerwinski 2003].

Based on these ideas and developments, we have created the concept of CommunityMirrors™ as large interactive screens extending the benefits of Social Software for knowledge work beyond the physical barriers of single user desktops. CommunityMirrors are peripherally recognizable "information radiators" that show "info particles" from existing enterprise IT systems. The screens can be installed in different semi-public places, like e.g., beside the elevator, in the coffee corner or other social areas where people come together [Koch & Ott 2011, Ott & Koch, 2010, 2011, 2012]. Figure 1 shows some first prototypical implementations and installations of the CommunityMirror concept.

Figure 1: Different CommunityMirror installations in action

As amendments to classic desktops (not replacements!), the interfaces can help to create visibility about what is going on in the organization (awareness) and facilitate the "accidental" discovery of relevant information without having to

explicitly look for it (serendipity). The re-integration of information objects into their social surrounding enables people to directly talk about the discovered information without computer mediation. Thereby, the additional interfaces can help to efficiently generate a better "common ground" for successful collaboration.

One important issue to make the CommunityMirror concept work is that the display is attractive for the user, and that it is intuitive and appealing to interact with the display. The visualization on the display should be playful to achieve information awareness and trigger social interaction in front of the screen.

In this paper we report about an experiment to achieve this playfulness, using the aquarium metaphor for displaying information from social activity streams on large screens. Our intention is to attract people that are passing by, and to allow them to easily grasp the visualized information.

In the following we first present the idea of the aquarium metaphor (for visualizing social activity streams) in more detail (Section 2), then elaborate on the prototype implementation (Section 3) and on the prototype evaluation (Section 4). Finally, we discuss the potential of the solution from the findings and elaborate on future work (introducing gamification ideas into the application) (Section 5).

2   Aquarium Metaphor for Visualizing Activity Streams

For our experiment, we have taken up the visualization of social activity streams, i.e., streams of messages about activities coming from one or more social media platforms. These might be internal social media platforms or external ones.

Social activity streams consist of a set of small to medium sized (status) messages that in addition to the message multimedia body usually have a title and are associated to one or more persons (authors) and to a source stream where they come from (context).

The goal of the visualization is to make the display look interesting and easy to interact with – even for people that are walking by, and only notice the content peripherally at first.

There is quite some related work on visualizing information for peripheral reception – e.g., the InfoCanvas system tries to include awareness information in personalized artworks [Stasko et al. 2004], or "informative art" that tries to create new artwork from awareness information [Holmquist & Skog 2003].

Since the approaches towards informative art showed that this way of visualizing information makes reception of information even harder than standard visualizations [Holmquist & Skog 2003], we decided to go for a different approach – the aquarium metaphor.

Using a metaphor usually has the goal to reduce the complexity of the user interface by exploiting prior knowledge that users have of other domains [Mann 2001]. Examples of metaphors are the book metaphor, or the newspaper metaphor. Another example is the aquarium metaphor, which already proved to be useful in various applications [Mann 2001, Bryan & Gershman 2000]. In this metaphor, fish move slowly, almost randomly, in an aquatic environment. Occasionally, some fish are attracted to other fish. They can temporarily form an organized group (school) by adjusting their speed and direction to other members of the group.

Since such aquarium settings are something, people seem to like to look at – and which they see as playful – it seemed to us to be a good idea to utilize large screens in semi-public places as some sort of aquarium.

In a first experiment, we added several fish overlaying another visualization from the CommunityMirror project (Figure 2). These fish were continuously moving, which resulted in a permanent change of what was visualized on the screen. We observed that people were attracted by the screen, and that they were encouraged to interact with it. Even experienced CommunityMirror users, who stopped interacting with the original application a long time ago, were attracted again after

introducing the fish. Observations further showed that the users expected that the fish have some sort of meaning, and that they can interact with them.

Figure 2: Fish overlaying another visualization

Based on these observations, we took the decision to build an application where fish actually have a meaning, and where people can interact with them: There is a fish for every message – displaying a nice visual of the fish and the title of the message in a banner the fish is carrying. The type of fish represents the author or the source of the message. If a user touches a fish, the fish stops moving and a bubble is visualized above the fish. This bubble displays the whole article. If the user touches the fish again, the bubble disappears, and the fish continues to move.

3   Implementation of the Aquarium Application

Figure 3 shows our implementation of the aquarium metaphor in a standalone application. Besides the aggregation and visualization of data, the most important feature of the application is that the user has the possibility to sort the visualized articles in different ways: At the moment, a source-centric as well as a person-centric mode are available. In the first mode, each type of fish represents a message source, e.g. Twitter or blogs like Sociotech.org. In the second mode, each type of fish represents a person.

Apart from the shape and texture of the fish, other criteria could be used for categorization: The size of a fish could be used, for instance, as a measure of actuality, importance or ranking. The area, in which a fish moves, could also be used as a category.

We also started to add special content on a regular basis to keep attraction high. As a first experiment, we added a new fish, a Christmas Fish, which carries a Santa hat, and which, once touched, shows a Christmas greeting message.
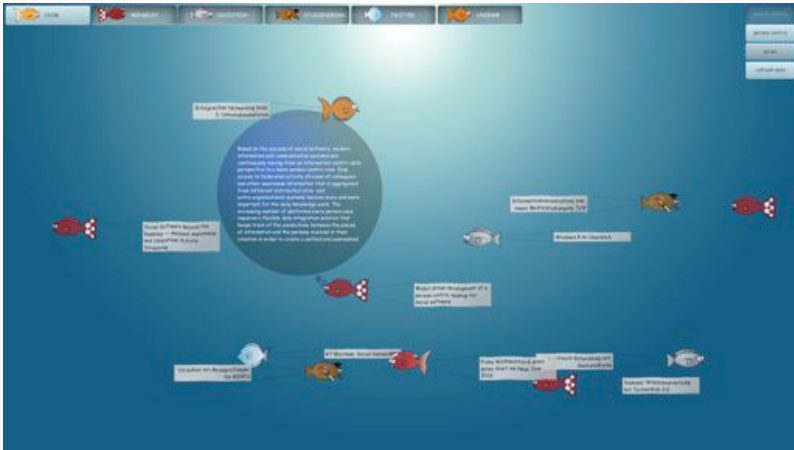

Figure 3: Aquarium Application

Technical Details of the Aquarium App

Figure 4 shows the architecture of the Aquarium Application. On the server side, the CommunityMashup [Lachenmaier et al. 2012] performs the data aggregation and handles the data exchange between server and its client side. On the client side, the use of the CommunityMashup Application Framework enables the Aquarium Application to visualize data from various information channels, and to show data shortly after it was created in the source system.

The CommunityMashup is a data integration solution with focus on social media data. It aggregates the data in a person-centric manner and unifies the information from different systems according to a defined data model. This way, a clear interface for data access is provided for applications. The unification of data and the distributed environment allow for an easy integration of new data sources without touching the applications built on top of the CommunityMashup.

The Aquarium Application can be used as standalone application or integrated as an additional view into CommunityMirrors. Due to the separation from a particular data set, new configurations for mashed information can easily be created via a web interface on the server side. The Aquarium Application can simply be connected to these data sets. The Aquarium Application itself is written in Java and JavaFX [JavaFX 2013] for platform independency and multi-touch support.

Figure 4: Architecture of Aquarium Application

4 Prototype Evaluation

To learn, if the visualization helps to draw attention, we did a small explorative evaluation.

We installed the Aquarium Application end of the year 2012 on a large screen (Figure 5) that is located in a community area at our university (in front of the seminar room of our institute). The area is frequented by faculty members passing by, as well as students either passing by or waiting for their classes to start.

Before installing the Aquarium Application, the screen already showed another visualization from the CommunityMirror project for more than one year. The Aquarium Application displayed the same information as was displayed before, drawing activity feeds from Twitter, Sociotech.org, Mendeley (a cloud based reference manager) and three internal blogs.

Figure 5: Aquarium Application on large and interactive screen in a community area

Based on our observations from our first experiment – where fish were overlaying another visualization of the CommunityMirror project - we formulated the following hypotheses:

- H1: The application encourages people to experiment with it.

- H2: The people that are passing by grasp the visualized information.

During a period of two weeks we conducted an informal monitoring of students as well as faculty members in front of the screen, and automatically monitored the interaction performed with the screen. Additionally, we interviewed about forty users. The majority of the interviewed faculty staff and students were already familiar with the previous CommunityMirror visualizations. Additionally, a few new users were interviewed.

In summary, the evaluation showed that the application made experienced as well as new CommunityMirror users curious, encouraged them to experiment with the fishification visualization, and initiated conversations in front of the screen. Some details are given in the following.

The same information was visualized on the screen, before and after installing the Aquarium Application. Nevertheless, we repeatedly got feedback, such as: "Wow, you added new content." This gives evidence that people did grasp more information after the application was installed (H2).

The other comments can be summarized as follows:

- "It is fun playing with this application." "Could you add more features?" (students, faculty members)

- "Developing such an application seems to be fun." "May I help?" (students)

Faculty members, in particular, raised the question about wether the aquarium metaphor will be accepted in business environments:

- "We cannot show this application to our project partners." (faculty members)

- "They will dismiss it." (faculty members)

Statistics

Our Aquarium Application automatically collects anonymous usage data. Amongst others, each touch event, together with the fish touched and its associated information, are gathered. After installing the application, fish were

frequently touched. The numbers give evidence that the new application encourages people experimenting with it (H1). The plot shown in Figure 6 also shows that the Christmas Fish was clicked more often than the other fish after it was added. Hence, adding new features over time seems promising.
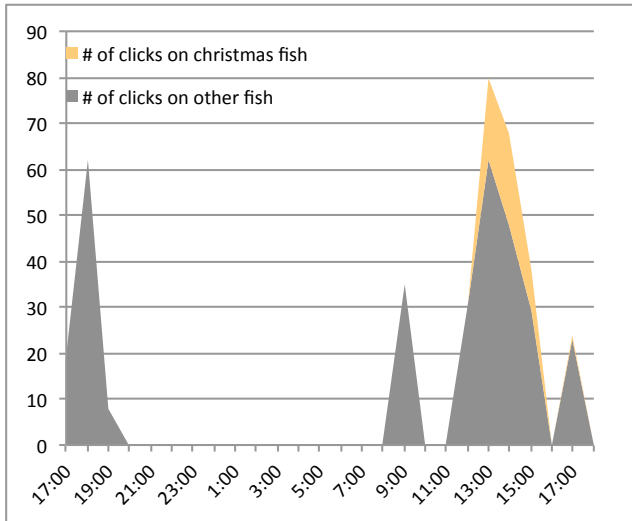

Figure 6: Usage statistics

5   Summary and Future Work

In this paper, we introduced a new way of visualizing social activity streams. Apart from presenting the application itself, first evaluation results were given. The purpose of the application was to visualize information, which is aggregated from different social activity streams, such as Twitter or organizational blogs. The application was designed to run on a large interactive screen in semi-public places and make interacting with the information interesting for the users. The first evaluation shows, that this goal was reached. Further investigations have to include an assessment of frequency and sustainability of use, as well as acceptance and effectiveness in business environments.

Up to now, the main purpose of the Aquarium Application is to visualize information. In the future, the application is also meant to enable the collection of data, mainly the collection of metadata (like ratings or tagging information) from the users. To motivate users to participate, introducing gamification ideas [Deterding et al. 2011] seems promising. For instance, a small game is planned, with the purpose to assign tags to articles. Here, a game similar to the ESP Game [Robertson et al. 2009] could be used. This game was designed to make use of the human intelligence to assign labels to images.

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