The Nexus information hub for exploring social-informational context

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Abstract

The Nexus system is an "information hub" that helps users collaboratively manage and organise "contextualised social notifications. The purpose of the prototype is to act as a foundation for research into human information-sharing activity. The paper describes contextualised social notifications in more depth, links this prototype to the earlier Scuttlebutt prototype (presented at ADCS-6), and describes the architecture of the system and research questions.

Keywords Information Retrieval, Personalised Documents, Social Information Sharing

1 Introduction

The concerns of the authors are to investigate the connections between information and social structures (groups, communities, social networks etc). Each of us have previously conducted research about information-centred collaboration which assumed the existence of some notion of "group" as an artifact in the world and discovered the limitations of modelling that notion directly as a system object.

Our focus therefore is on trying to conduct research about supporting human information-sharing activity. We hope to investigate and explore how software might account for social structures more adequately. We take an empirical approach by both employing workplace studies to understand what potential users currently do and also by constructing, deploying and testing prototypes in response to what we find. This paper is primarily concerned with our current prototyping effort, more detail on user involvement in the project can be found in [7].

Our current prototype, called *Nexus*, manages what we call "contextualised social notifications" which we discuss in more depth in Section 2.

At ADCS-6 we reported [5] on the development of a prototype called *Scuttlebutt* which we dubbed a "social portal"; Section 3 explains what happened with that work.

The current Nexus prototype initially resembled a "news aggregator"[1], but our feature set extends beyond news aggregation, so we have taken to describing our system as an "information hub". We describe the information hub concept in Section 4 and the system architecture in Section 5.

2 Contextualised Social Notifications

Our prototyping currently focuses on gathering notification-style information, particularly that with a social intent, designed to communicate with others. Some initial examples of this kind of information are: web page update notifications (gathered by polling RDF Site Summary (RSS) files[2]) and notifications generated by the Elvin Tickertape chat tool [2].

Focussing on social notifications has the following advantages:

- They are small fragments of information with minimal internal structure, so they are easier to manage and process (for example RSS items versus the web pages they refer to).
- They appear in comparatively high volume at high frequency, so they provide a great deal of data to perform matching and inference on (for example Tickertape utterances versus emails from the same person).
- They often have an explicit context, a connection to other fragments of information (for example an RSS item is at least linked to a news article and a website) or a person or group. This means that they can lead us to establish broader interconnections between people and the more static kinds of information that they reference.

[1] "software that periodically reads a set of news sources, in one of several XML-based formats, finds the new bits, and displays them in reverse-chronological order on a single page." [10]

[2] RSS is an XML-RDF format for syndicating website updates and news. See [9]

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- They are not usually critical to completing work tasks. This, coupled with the volume and frequency characteristics, means that users are more likely to be tolerant of experimental approaches.
- This kind of information (particularly RSS) is gradually gaining attention and developer focus in the technical community so tools and software are appearing to handle the basic formats.

We could refer to this kind of information that we intend to gather as *contextualised social notifications* (but we may just say "social notifications" as a shorthand). This current focus incorporates and supplants our earlier focus on "social recommendations" in the Scuttlebutt system.

3 Scuttlebutt: A Social Portal

The initial Scuttlebutt system [5] was designed to let users send recommendations to each other about web pages they found. It assumed that people communicated about a known set of topics to known sets of friends. We called the association between a group of friends and a topic a "channel". Users had a page that let them view all of their channels no matter where they came from and change the way they were laid out.

Around mid-year 2001, we had made enough progress to start demonstrating the system for users and getting feedback. We deployed the system at DSTC and initiated a sequence of field tests with usability studies to gather as much feedback as possible. Towards the end of 2001 we launched a set of more formal usability sessions that tested whether people could find their way around the system. All of this resulted in a flood of user requests for new features, UI redesigns and so on. It also questioned some of our basic assumptions in the system:

Recommendations: A minority of people regularly recommend pages to others, while most users of the system use it only to receive recommendations. This meant that the system suffered from a "bootstrapping" problem. It was hard to get enough useful information into the system for most users to find it valuable.

Channels: People who do recommend often do it on a much more *ad hoc* basis than we thought, to whoever occurs to them at the time, often on topics they had not thought of before. Forcing these users to create channels to cater for their often impulsive decisions to share information was too onerous. People largely stuck to existing media such as Tickertape or email.

Information Sources: While many people appreciated the "portal-style" of presentation, they were frustrated that other sources of information weren't present on the page, such as mailing lists, news channels from public web sites, Tickertape conversations, etc.

These factors reduced the use of the system and made it hard to adequately support people's need to share information. This meant that studying how that sharing occured in order to understand more about "communicative social interations" and their effect on software was fatally compromised. At the same time, it became obvious that we needed to provide more customisable or tailorable options in the system. These facilities were becoming more necessary to support our research goals as well. We were also becoming disenchanted with our development framework: Python web development support had improved markedly in the year since we had last surveyed the field and it seemed sensible to reimplement our codebase using one of the web frameworks (WebWare[3]) instead of using our own custom-built web application code.

All of these factors combined to suggest that rather than continue with Scuttlebutt, both its design and its codebase, we should pause for a moment and consider alternative ways to approach our research goals.

4 Nexus: An Information Hub

Our user community seemed to need a simpler (in the sense of having less *a priori* structure) and broader (in the sense of incorporating more information sources) system that allowed for more passive use. We have attempted to cater for these needs with a new system called, *Nexus* (see Figure 1).

Nexus aims to be an "information hub" that facilitates the gathering, management and presentation of contextualised social notifications by individuals in a coherent manner. The system addresses the common problem of personal information management. As the flow of information grows and the "irrelevant" begins to outweigh "relevant", it becomes more difficult for each of us to manage the information that we needed to work. As we increasingly use computers to collaborate, we need access to commonly known information which is bound to certain social- and work-related contexts.

A range of concepts which have evolved over the last decade have been addressing different aspects of these needs (shared workspaces, portal systems, systems integrating awareness information). An obvious lack so far is the integration and coherent management of information from different sources,

[3] http://webware.sourceforge.net/

Figure 1: Nexus 0.9 Screenshot

as well as the ease of sharing information in a low effort manner.

Our approach is broadly to:

- Gather these social notifications together into the hub where they can be effectively managed.
- Process the gathered information automatically to preserve and create connections between related information (news item to web site, news item to similar news item, etc).
- Give users abstractions to allow them to interactively create and express connections both between information and between information and people where they perceive them (news item relevant to friend, collection of keywords related to project etc).
- Present contextualised social notifications to users in a variety of ways to fit existing work practices.

This basic framework for gathering, managing and presenting social notifications provides a platform which lets us build and test more advanced research ideas. Currently, the following seem to be interesting questions:

- What effect does decoupling the input and output media have on potential use of a system like Nexus?
- How are shared information and shared adaptations of information control and presentation used in an organisational context?
- Is sharing and customisation a basis for supporting negotiation? What kinds of negotiation can be supported and what results from it?
- How do group structures emerge and evolve in a system that doesn't implement a rigid sense of group?
- What are the effects of making information control interdependent between individuals and social groups?
- How can a "vague" specification of shared interest (context) be used to share information within a system? (e.g. What is somebody else interested in? What are people who are interested in X interested in - where interest is defined by usage intensity, disclosure, group rating, etc.?)

5 System Architecture

This section outlines the concept of the Nexus information hub in more depth using a layered approach in which different kinds of contextual connections are introduced as new actors are introduced to the system.

- The fundamental layer of the system is a simple **information transport** that gathers social notifications, marshalls them in an information pool and presents them to the user.
- We add the individual user as an actor in the system by enabling **tailoring** in the fundamental layer. Users can select sources of information, select items using keyword filters and select the type of presentation they receive.
- By introducing **sharing**, the social network of the users effectively becomes an actor in the system. Users can share information by discussing items or even information sources and creating items via public recommendations. They can share aggregational patterns of information by sharing filters and collections. They will ultimately communicate implicitly via their patterns of use (presented with social navigation [1] techniques) and so on. This social action can unintentionally create links between items that were not evident to individuals acting alone.
- By enabling some **automated processing and inference** using Hyperspace Analog to Language (HAL) techniques [3] developed by Peter Bruza and colleagues [8] and Collaborative Filtering techniques [6, 4] the system becomes an actor as well, making connections that might be opaque to both individuals and social networks.

Each of the layers reinforces the other, contributing connections that the others would not uncover. The screenshot in Figure 1 shows an

initial inplementation of the information transport, tailoring and sharing layers.

An item collection called "Syndication" occupies most of the page. This collection is made up of items from a selection of relevant web sites and one or two keyword filters which can be changed by editing the page. A list of other item collections is shown at the top of the main navigation bar at the left. Functions to create new item collections, to manipulate the list of item sources, filters and email bulletins and to view the current list of users are arranged underneath. The search function at the top is a shortcut to creating keyword filters that search the entire item pool.

6 Conclusions and Future Work

In summary, led by a desire to investigate connections between information and social structures, we embarked on a user-centred design project aimed at exploring the notion and use of "contextualised social notifications".

We began the development of a system designed to help manage social notifications using individual, social and automatic techniques. We called this kind of system an "information hub". We plan to release that prototype to a field trial at DSTC and eventually at a participant site.

Our future prototype development and research will focus on two main goals. First, to further explore the possibilities of information sharing on the context of "social notifications" taking into account the complex interplay between the needs of individuals and communities of users. Second, to adapt our understanding of "social notifications" based on our experiences with deploying Nexus in complex "real-world" environments.

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