Connecting Associative Information Spaces

Jonathan Diehl
RWTH Aachen University
52064 Aachen, Germany
diehl(at)cs.rwth-aachen.de

Jan Borchers
RWTH Aachen University
52064 Aachen, Germany
borchers(at)cs.rwth-aachen.de

ABSTRACT
An associative information space contains all information relevant for a person organized using associations. Connecting such information spaces with each other allows the seamless integration of other's information into our own. We believe this to be highly beneficial for group collaboration because it allows sharing of information in a very natural and efficient way without the need for a uniform organization scheme. Further, we discuss the application of associative information spaces for interactive rooms to support mediation between collaborators.

Author Keywords
Associations, Information Sharing, Information Spaces, Personal Information Management (PIM).

ACM Classification Keywords
H.5.3 [Group and Organization Interfaces]: Computer-supported collaborative work.

INTRODUCTION
Sharing of information is an essential activity for computer-supported collaborative work. Collaborators need to inform each other of task items, work on synchronized documents, share notes and insights.

According to [5] sharing of information is especially important when people are collocated at a physical location. Here, sharing of physical information is simple and natural through direct interaction among the collaborators. Sharing of digital information, on the other hand, appears overly cumbersome and is usually done using physical artifacts (e.g. memory stick) or a global service (e.g. email). After all, why would I have to ask for someone's email address if the person is standing right next to me?

In this poster, we introduce the concept of interconnected associative information spaces as a new way of organizing information among groups. We believe this new metaphor can lead to a seamless way of sharing information in many situations. In addition to opportunities, we discuss challenges of the approach and how to confront them.

CSCW'08, November 8–12, 2008, San Diego, California, USA.

BACKGROUND
Associations are mental connections between ideas or things. They are used in the semantic model [3], to illustrate how the human memory works. Here, new thoughts are remembered by associating them with existing knowledge.

In the associative network, information is organized using associations: Information items are represented by nodes of the network, which are connected to semantically related nodes using associations. To find information in such a network, it can be traversed or searched. For a search, a number of related items is identified and the desired item is found in the subset defined by these items. We have shown the feasibility and acceptance of this method for PIM in the evaluation of two prototypes in [2,4].

Similarly, the information relevant to a room or a service could be encapsulated in a special information space. A meeting room, for instance, could track its inhabitants, events, and accessories. This information can be used to actively support the use of the room for collaboration.

An information space can be used to model relationships with other individuals by including representative nodes in the network. These nodes can then be connected to all

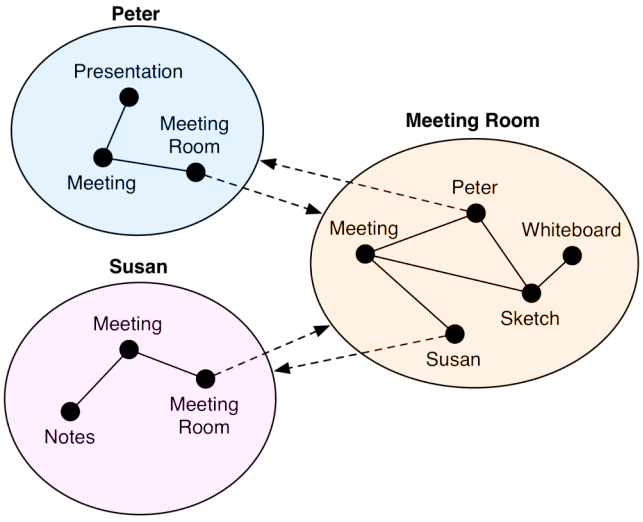

Figure 1. Example of interconnected information spaces

information related to or relevant for that person. Further, the node can be connected to the person's own associative information space, effectively extending our network with all the information the other person is willing to share.

Figure 1 shows an example of interconnected information spaces: Peter has given a presentation in the meeting room and used the whiteboard to make a sketch. Susan has attended Peter's presentation and taken some notes. Since the meeting room has a reference to Peter, Susan could ask the room to retrieve the slides and the whiteboard sketch for her. Similarly, a third attendee could request all meeting notes from the room, which would relay the request to all attendees including Susan, who could then offer to share her notes.

The concept of associative information spaces has similar goals as a common information space, which is a known research goal in computer-supported collaborative work. However, instead of unifying the organization scheme of a group, we aim at seamlessly connecting diverse organization schemes with each other. This way we avoid a general concern raised by [6].

CHALLENGES

To build a successful system, the following challenges must be addressed.

Before being able to communicate, information spaces must be paired. This pairing should be (1) universal and (2) seamless:

1. Once paired, a connection between two information spaces can be constructed independent of where the users are. Using a central server to track all client's locations and mediate between them, similar to instance messaging architectures, would be a feasible solution.
2. To initiate pairing, it is not acceptable to select the other device from a long list or to enter an identifier. Instead, a more natural way of pairing, like closure (e.g. RFID), directedness (e.g. IR), or concurrent gestures, is to be preferred.

When exploring another person's information space, the search space should be restricted to information relevant to the searcher for reasons of clutter and privacy. Here, it is especially important to keep the user in control while avoiding the unnecessary burden that is typical for access management systems. One approach could be to make an item accessible only if the requesting user's representative node is directly or indirectly connected to the information. This way, only relevant information is shared with the person. For more flexibility, associations could be marked as private to indicate that these associations should not be considered for access decisions.

Another challenge is to identify duplicate items across different information spaces. This would greatly improve search quality because it would allow searches to be spanned seamlessly over diverse networks with their results merged into a coherent subspace. Due to the nature of an associative network, classic pattern-matching and data-mining algorithms should be able to efficiently identify these duplicates automatically. Ultimately however, the user should be in control.

Finally, we want to explore how an interactive space, or rather its information space, can assist the collaboration of the people in its presence. We see particular benefit in the mediation between inhabitants and the provision of a history of use. Hence, the room needs to detect its inhabitants and collaborate with their information spaces to create the required links between the ongoing event and its participants. This way, the environment instead of the people could initiate the initial pairing necessary to connect information spaces. Further, through the use of the history, delayed retrieval of information is enabled, because the original context can be reconstructed.

FUTURE WORK

To explore and test the use of associative information spaces in a collaborative environment, we plan to integrate collaborative functionality into the third version of the Associative PDA, which is currently being developed. In addition, we want to extend our Media Space [1], a next generation meeting room, with an associative information space. In a long-term user test we hope to confirm the benefit of associative information spaces for group collaboration.

ACKNOWLEDGEMENTS

We would like to thank Eileen Falke for her dedicated work on the Associative PDA 2.

REFERENCES

1. Borchers, J. *Media Space, a next-generation interactive room*. Available at http://hci.rwth-aachen.de/mediaspace.
2. Diehl, J. *The Associative PDA*, Diploma Thesis, RWTH Aachen University, 2006. Available at http://hci.rwth-aachen.de/diehl.
3. Dix, A. and Finlay, J. and Abowd, G. and Beale, R. *Human-computer interaction*. Prentice-Hall, Inc. Upper Saddle River, NJ, USA, 1997. ISBN 0-13-437211-5.
4. Falke, E. *The Associative PDA 2.0*, Diploma Thesis, RWTH Aachen University, 2008. Available at http://hci.rwth-aachen.de/falke.
5. Groth, K. and Eklundh, K. S. *Combining Personal and Organisational Information*. Personal Information Management, SIGIR 2006 Workshop, 2006, Seattle, WA.
6. *Rolland, K. H. and Hepsø, V. and Monteiro, E. Conceptualizing Common Information Spaces Across Heterogeneous Contexts: Mutable Mobiles and Side-effects of Integration*. CSCW, 2006, Banff, Canad