Private Workspaces in Single Display Groupware and Multiple Display Environments
Outline

1 Motivation

2 Single Display Groupware (SDG)

3 Multiple Display Environments (MDE)

4 Further developments
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Motivation (1/2)

Interactive surfaces are used to support **collaborative work**:

- Share and exchange data across different platforms
- Jointly create and modify information on large displays

Tradeoff between **successful group work** (intuitive & simple) and the **protection of private data**

Figure 1: The iRoom environment
Motivation (2/2)

Two approaches:

1. Single Display Groupware (SDG)
2. Multiple Display Environments (MDE)

Figure 2: SDG

Figure 3: MDE
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2 Single Display Groupware (SDG)
   2.1 Coordination policies
   2.2 Personal areas
   2.3 User profiles and carved regions
   2.4 Limitations and problems

3 Multiple Display Environments (MDE)

4 Further developments
**SDG (1/4): Coordination policies**

**Idea:** define policies to clarify the rights of each participant on the available data

Graphical metaphors are used:

- Orientation, position and size of a document determines its privacy level
- Drag & drop → exchange data

This approach relies on social protocols only!
SDG (2/4): Personal areas

Idea:
1. Define color-coded areas on the edge of a shared surface that belong to a specified participant.

   Documents are *personal*: Visible to all users, but only editable by their owner

2. Connect an external device (PDA, laptop) via wireless LAN to establish a real private workspace

   Documents are *private*: Unvisible to other participants

Figure 5: Two users working with UbiTable
SDG (3/4): User profiles & carved regions

Figure 6: The Dynamo framework

- Media parcel (data package for a user)
- Color-coded cursor
- Personal palette
- Carved region with two participants
- A color-coded note
SDG (4/4): Limitations & problems

- Only one common output channel for all participants
  → No possibility to establish real private areas on the shared surface
  → Differentiation between personal and private areas

- Real-estate problem: disorientation and awareness overload
- Graphical metaphors have to be learned
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2 Single Display Groupware (SDG)

3 Multiple Display Environments (MDE)
   3.1 Early approach: hypermedia models
   3.2 Screen sharing
   3.3 Application sharing
   3.4 Limitations and problems

4 Further developments
MDE (1/6): Overview

Solution: environments are composed of a number of public interactive surfaces (wall displays, tabletops…) and personal devices (laptops, PDAs…)

• Intensified working with the personal devices (not only for data storage)
MDE (2/6): Early approach: hypermedia models

LiveBoard & Connected PCs

The user interface (PC):

Public space: copy of the LiveBoard contents

Private space: WYSIWYG editor

Hypermedia nodes (ASCII-Text, bitmaps, scribbles) are shared across platforms

Figure 7: A meeting with the DOLPHIN MDE

Figure 8: DOLPHIN’s private workspace
MDE (3/6): Early approach: hypermedia models

- Heavily limited abilities to include different data types → only predefined types of hypermedia objects can be shared
- Users have to manage synchronization with and structure of the public display → distraction of natural workflow!
- Users are focused on their PCs → group dynamics!
MDE (4/6): Screen sharing

Idea:
Transmit the screen images of the personal devices one-to-one to one or more public shared surfaces.

- Users can control the privacy and visibility level of their screens
- Allows individual work (laptop) as well as effective group work (tabletop)
- Natural workflow: participants use their own workspace/applications
- But: not applicable for easy document exchange

Figure 9: The WeSpace MDE
MDE (5/6): Application sharing

Idea:

Share any off-the-shelf application on a public surface and enable multiple user input on it.

Figure 10: application sharing
MDE (6/6): Application sharing: INPROMPTU

Figure 11: The INPROMPTU user interface
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Further developments

Try to combine advantages of SDG (natural group work) and MDE (privacy protection): Single Privacy Groupware

Idea: provide a private output channel in SGD environments (CrystalEye glasses)

Individual view for each participant
Thank you for your attention.

...Questions?