integrating physical and digital interactions on walls for fluid design collaboration

scott r. klemmer
katherine m. everitt
james a. landay
• Inspired by web designers use of pens, paper, walls and tables for explaining, developing, communicating, and sharing ideas during early phases of design (affinity diagramming)

• Can an augmented whiteboard interaction better support collaboration in this early phase of design?

• Integrate affordances of paper and large physical workspaces with the advantages of electronic media to support information design, possibly remote
physical and digital interactions on walls

video

The Designers' Outpost
physical and digital interactions on walls

physical vs phigital

• PROS
  Flexible
  Immersive, visible
  Calm
  Scaled for multiple people to view, discuss, collaboratively sketch

• CONS
  Update
  Lost grouping
  No multiple versions
  Co-located
  Collaboration
  Non-archival

• PROS
  Electronic capture (portability, etc)
  History/Version capture
  Remote Collaboration

• CONS
  Recognition errors
  Hi-level computer vision required for implementation
  Noticeably slower than interactions with paper, post-its and whiteboard
  Coordination in distributed outpost
  One project at a time
remote/distributed outpost

- Current practices: whiteboard, video, & email; two whiteboard & videoconference calls; collocated meetings, visio and email, online tools (ge-imagination)

- Can’t make changes, ill-suited tools, time consuming to maintain consistent representation

- The goal: symmetrically mutable physical/digital artifact

- Success: Flexible deployment, transient gestures, telepresence shadow(?)

- Problems: consistency of representation, imbalance: master/slave relationship emerges, sound presence, co-temporal?
outpost design history of physical artifacts

- Representations of an artifact’s past help us form a deeper understanding of its present.

- Structured capture has no intrinsic merit; it is through the *use* of the captured material that its value is produced.

- Current methods involve saving multiple versions of files; manually photographing, photocopying and scanning; human memory.
outpost design history continued

• Why have a design history?

  Keep track of project milestones
  Built in process document
  “Risk-free” exploration of alternatives
  Expressing design rationales
  As a learning aid
outpost design history continued

- **Main Timeline**
  thumbnail snapshots highlighting differences, physical browsing, filtered browsing, branched/linear history

- **Synopsis View**
  annotated record
take-away/homework book
bookmarks
input?

- **Local Timeline**
  lighter weight history of note, in situ
Validity of features

Features:

- Coupling of physical and digital “post its”
- Paper as input device
- Context menus
- Electronic whiteboard
  - Gestures, Erase
- Physical move tool (haptic)
- History (timeline, browsing synopsis)
- Remote
- Import into DENIM, etc.
accomplishments

• Do we think Outpost is successful in regards to the goals it set for itself?

• Do we think Outpost is successful as a tool for early web/information design? Information architects vs. visual designers? Compared to what is used in its absence?

• Do we think Outpost is successful as an integrated physical/digital wall interaction? Remote collaboration tool? Design history?

• What are the greatest contributions of Outpost?

• Unlikely contributions?
Other related remote collaboration/telepresence

- **Interactive Mural**
  (wall scaled interaction, history)
Other remote collaboration/telepresence

- **AudioPad**
  (physical/digital coupling and manipulation - collocated)
Other remote collaboration/telepresence

- MetaDesk
- Reflection of Presence (dynamic telepresence)
• DENIM

Pen-based digital system

Supports and encourages rapid sketching and organization at high levels of abstraction

Informal, intended only for use by developers

Semantic zooming
Supports both architecture- and interaction-oriented approaches (ia & vis des.), storyboarding, schematics

• DESIGNERS OUTPOST

Wall and pen (both stylus and ink) based physical and digital system

Supports and encourages informal and variant architectural representations

Informal, intended only for use by developers and for clients

Temporal browsing, tangible manipulation
Supports site-map (“top-level information architecture) development, and then migration to other tools
denim + outpost

- “Denim is an excellent complement to Outpost: it offers the ability to edit the information architecture, specify page-level details, and create the navigational structures for a website.”

- Would you want to use Designers Outpost, DENIM, and your authoring tool of choice?

- Is there a way to integrate the functionality of DENIM (or other post-site-map design tools) into the Designers outpost? Associate post-its with files that are created?
• If you were designing the designer’s outpost, what would you do differently?