

CMSC 838G

People, Paper and Computers



François Guimbretière

CSI 2120 Tue-Thu 3:30-4:45

Background



Key questions

- Can we design a digital interface as good as paper?
 - For a digital table?
 - For a tablet computer?
- Can we blur the boundary between computer and paper?
 - Can we seamlessly use paper while editing digital documents?
- How do these techniques compare?
 - Digitally enhanced paper
 - Tablet computer
 - Table top

Affordances of paper

(See also Sellen and Harper)

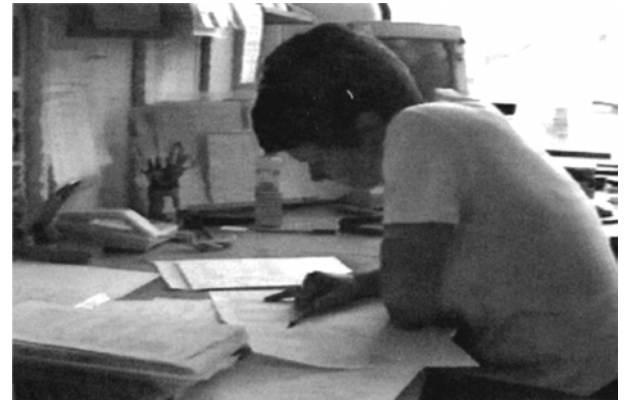
- Quick, flexible navigation
 - Two-handed interactions
 - Tactile feedback
- Reading across more than one document at once
 - Use of spatial layout
 - *No interface needed*
 - Writing on a pad while reading a document
- Easy to mark-up
 - Very flexible
 - *Large format*
 - *no power needed...*
 - Paper is static so we focus on the editing
- Collaboration medium
 - Socially accepted conventions

Paperless offices

- Use paper as a transient medium
 - Keep digital records
 - Create a hard copy
 - *Easy navigation*
 - *Easy annotations*
 - *Easy collaborations*
 - Modify the digital records
 - Shred paper documents

Tablet PC

- More paper like?
 - Interaction with the Digital table
 - Simultaneous editing of several documents
 - *Tablet PC cluster*
 - 2 or more TabletPCs linked together
 - One TabletPC linked to many thin clients
 - Connected through UWSS links
 - *Each member is a physical window*
 - Fluid interfaces

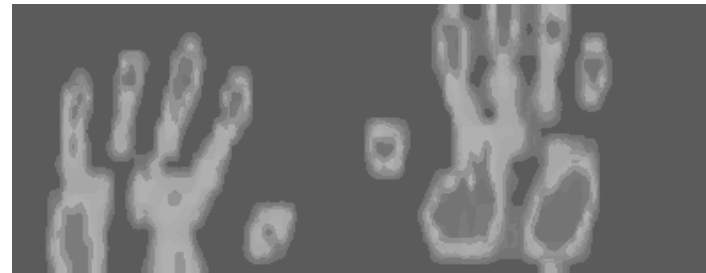
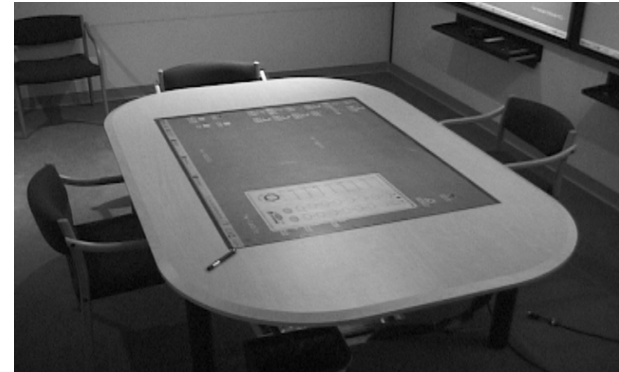


From Sellen and Harper



Digital Table

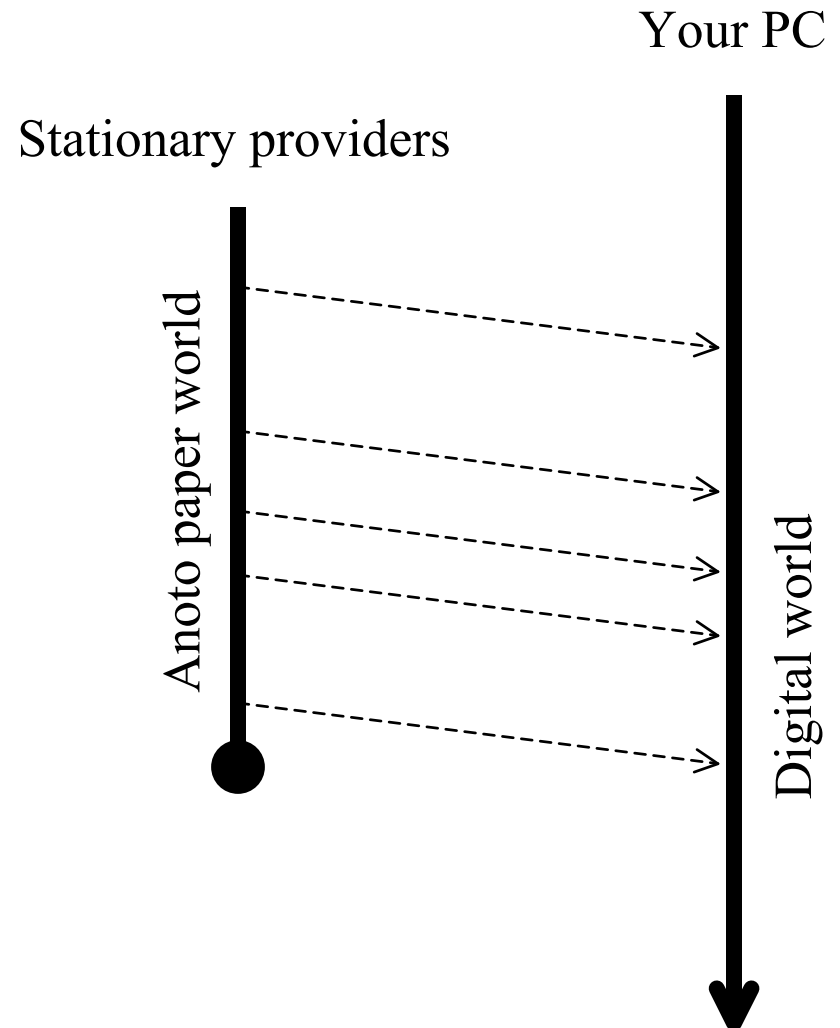
- High resolution (64+ dpi)
 - Projected/LCD
- Tracking
 - Tools
 - *Pens...*
 - Non-instrumented tracking of the non-dominant hand
 - *FingerWorks*
 - *SmartSkin [Rekimoto '02]*
- Two-handed fluid interactions
 - Tools and commands with dominant hand
 - Context with non-dominant hand



From FingerWorks

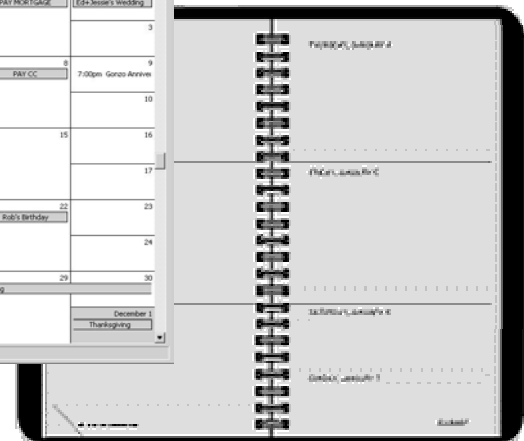
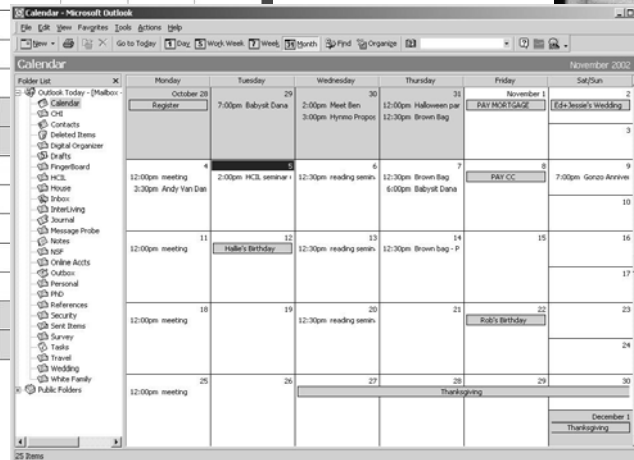
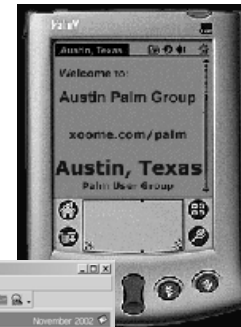
Anoto paper: typical use

- Collect and send information to a computer
 - One way channel
- Key applications
 - Calendar
 - Form filling, Note taking...

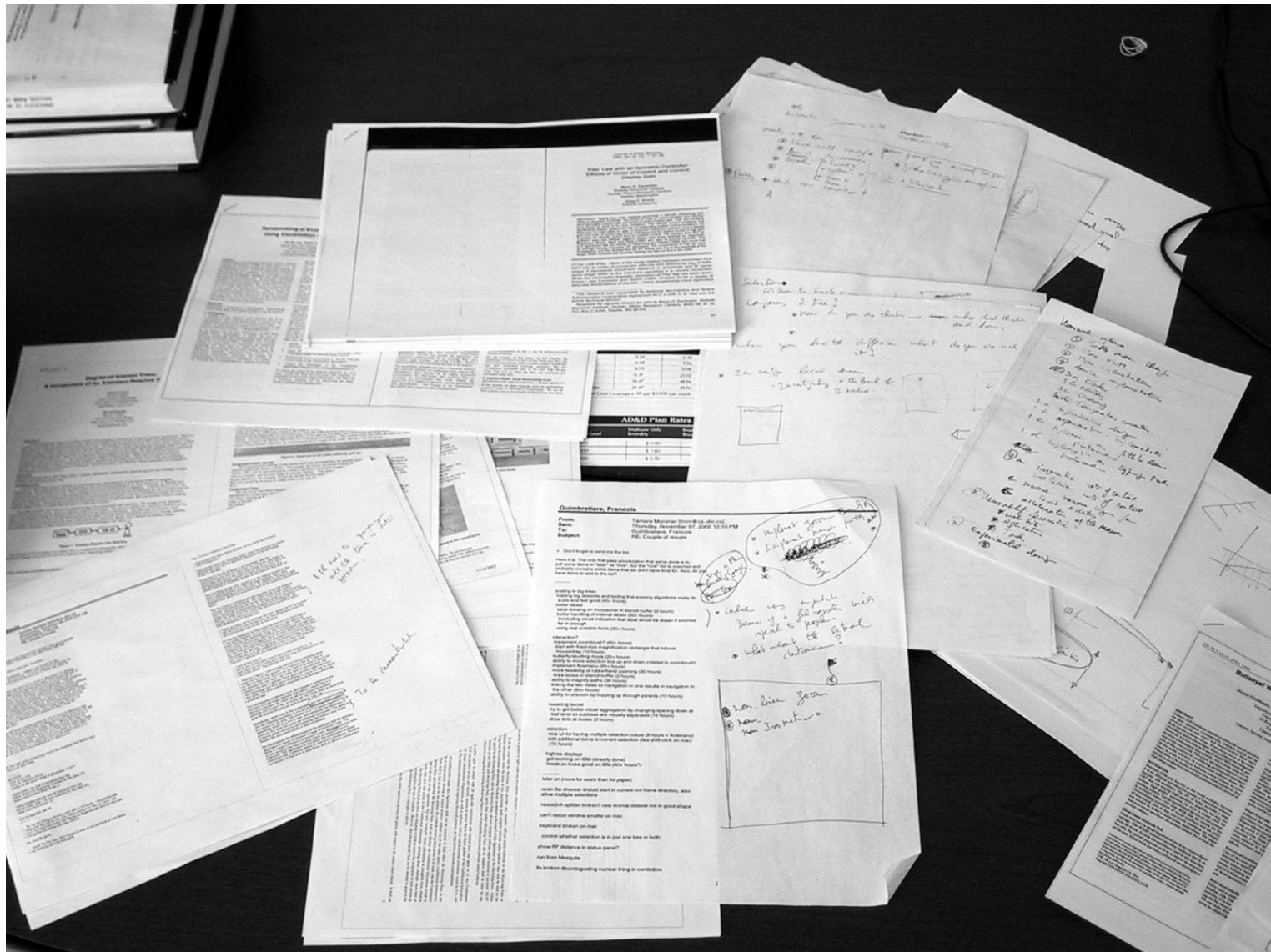


Family calendar project

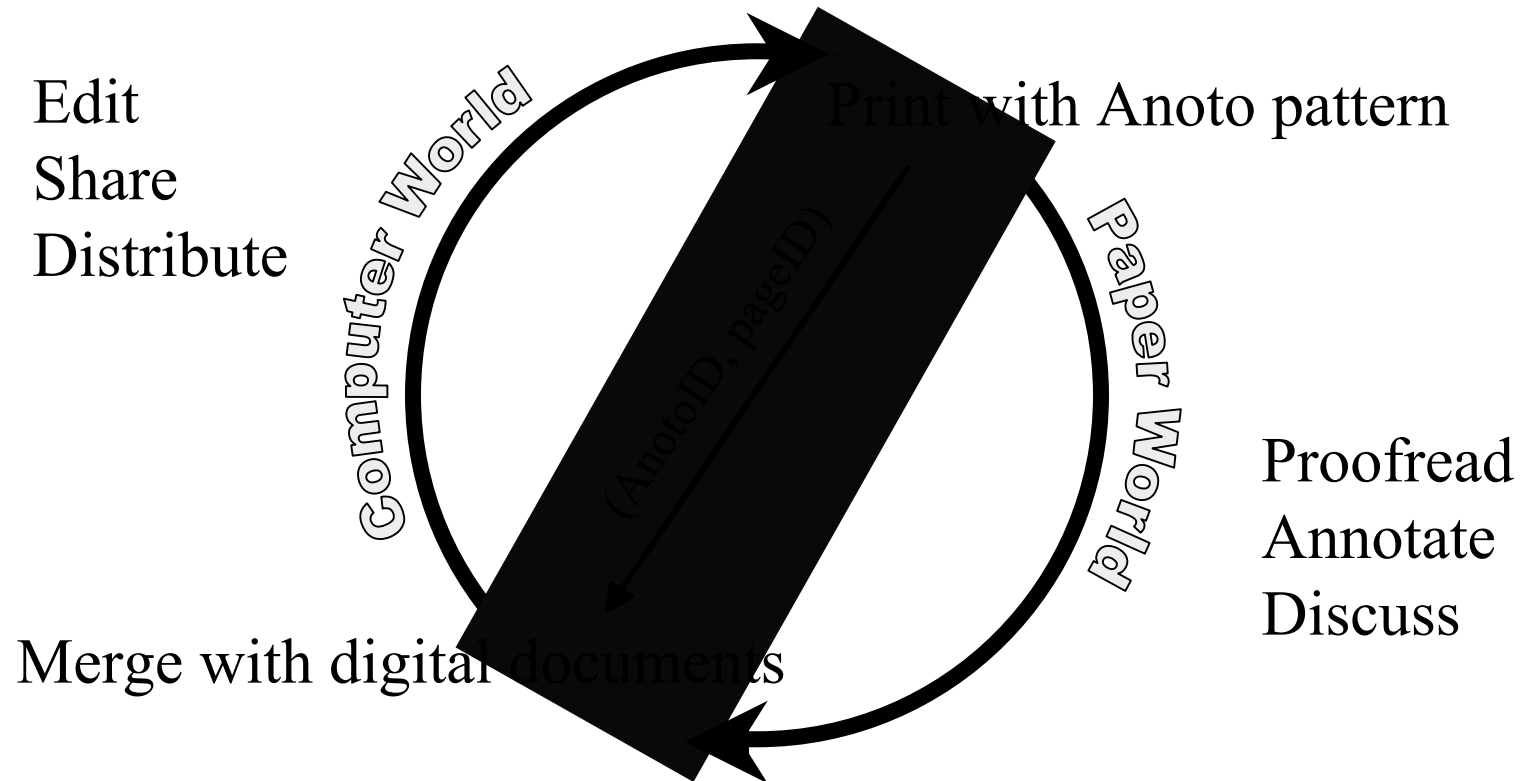
- Different family members prefer different input modalities
 - Teenagers might use a PDA or a cell phone
 - Parents might use Outlook
 - Grandparents might prefer a paper based calendar
 - All might use a calendar posted on the fridge



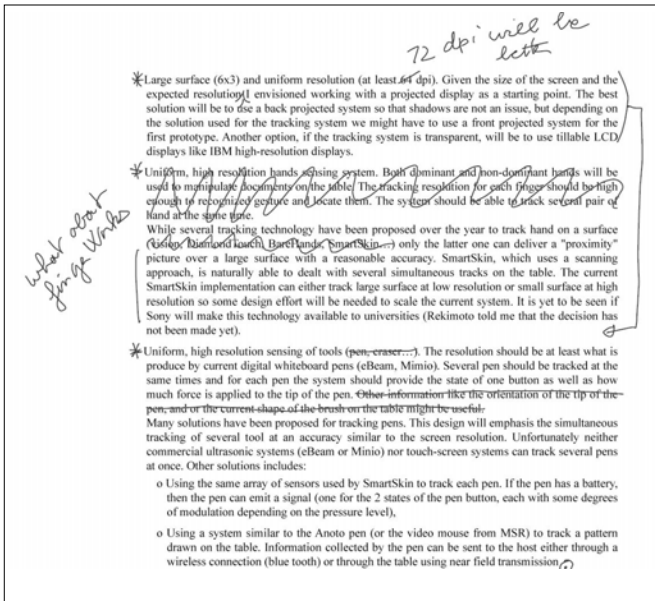
Real world note taking



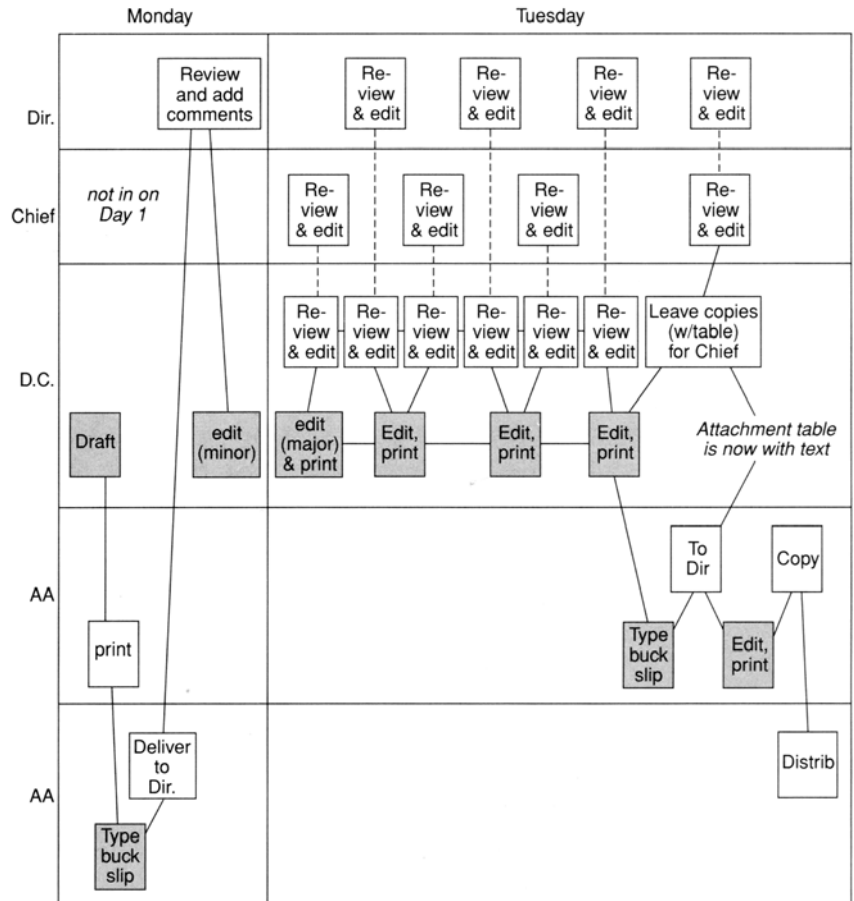
Paper augmented digital documents



Proofreading

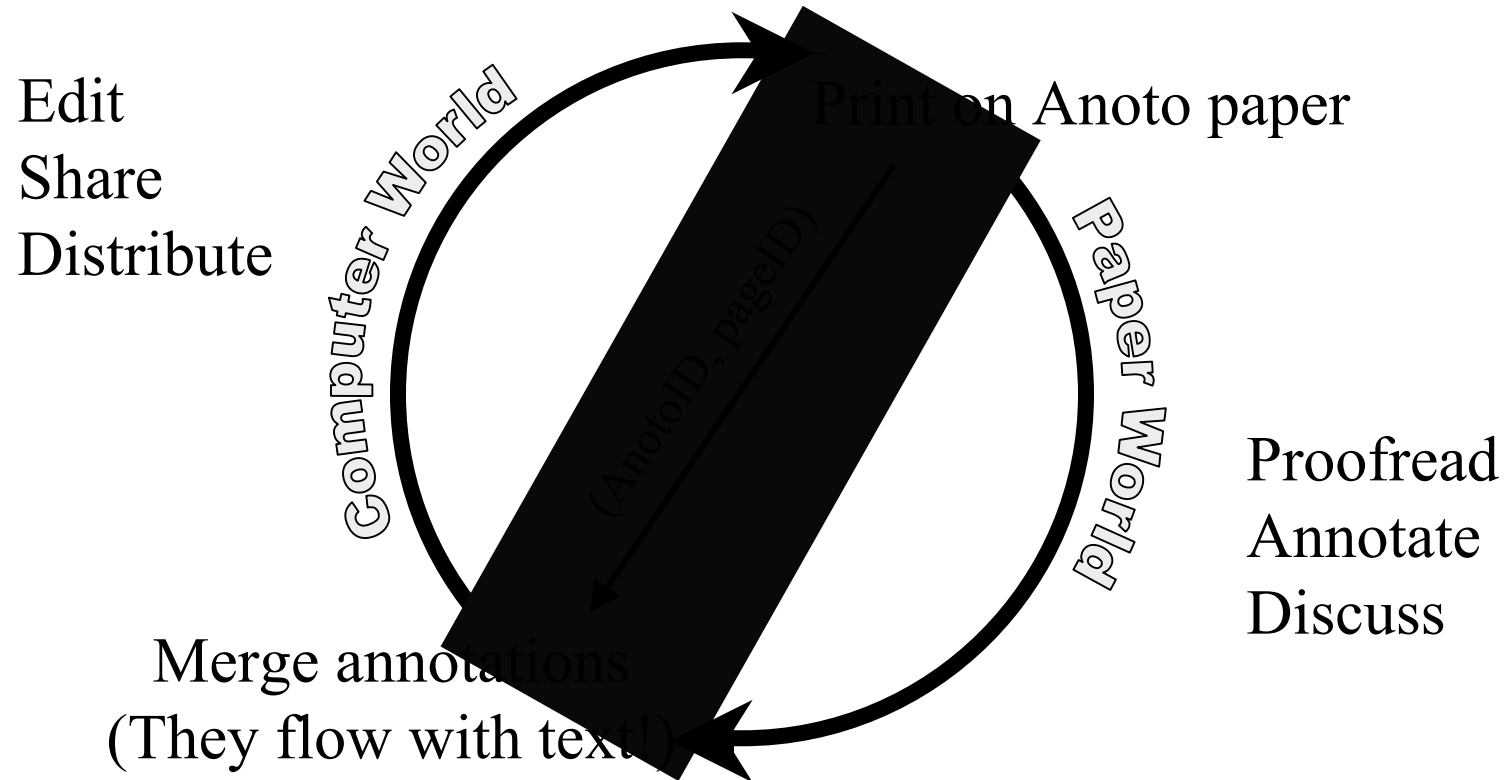


- Most people use paper
 - More convenient
 - Better collaboration
 - *IMF example*

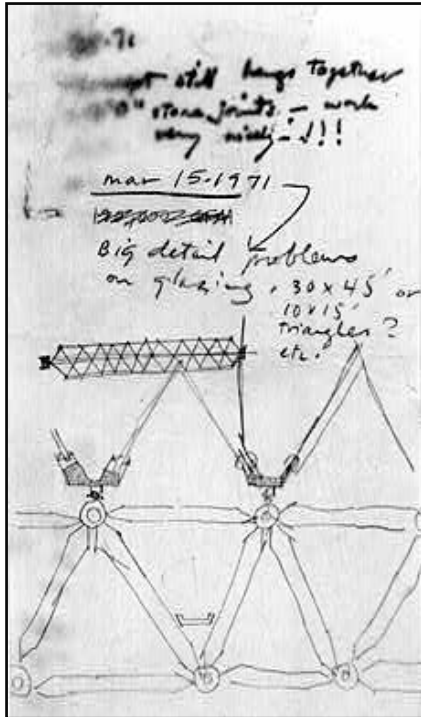


From Sellen and Harper

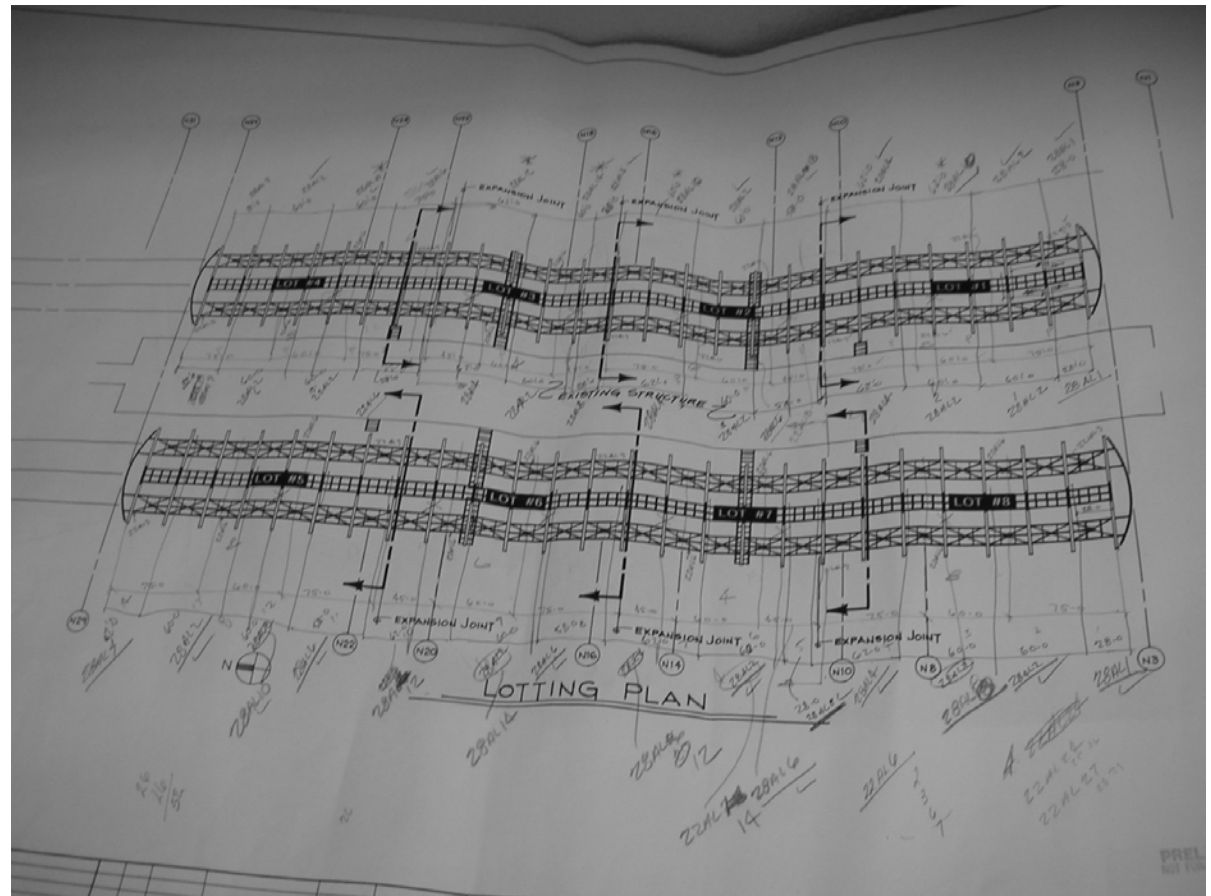
Proofreading using Anoto paper



Architecture and design



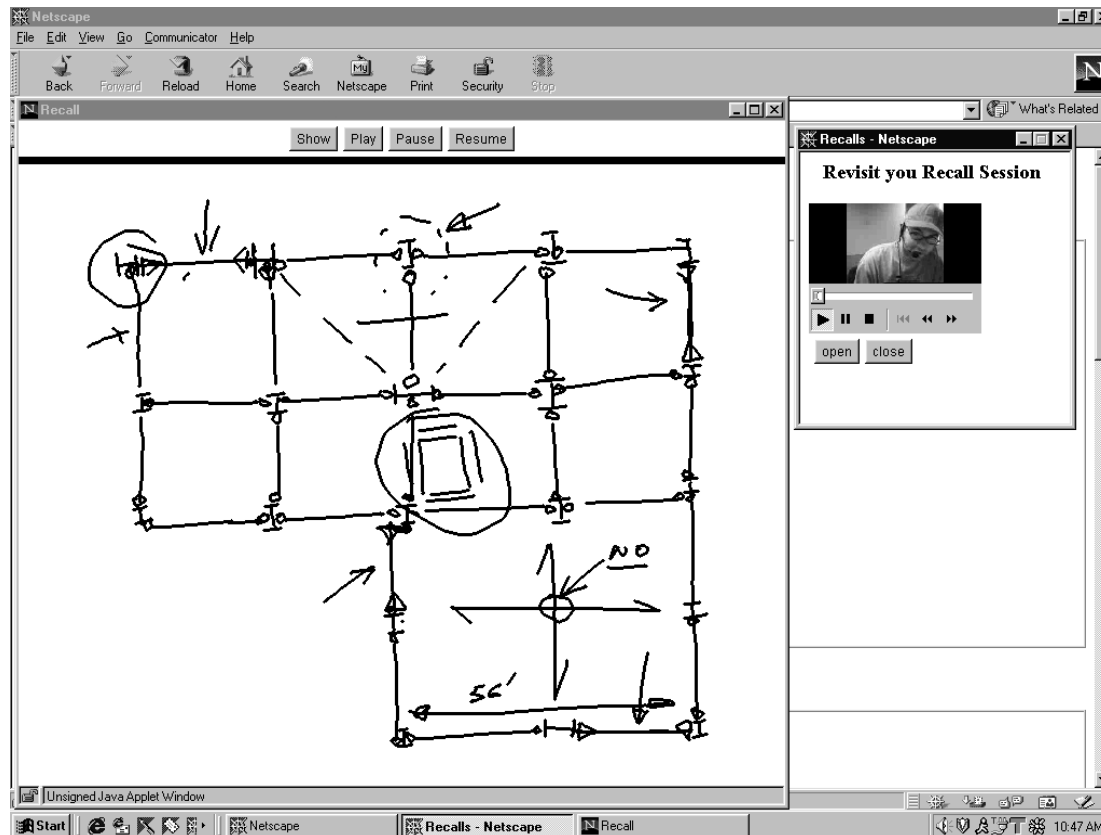
Initial design



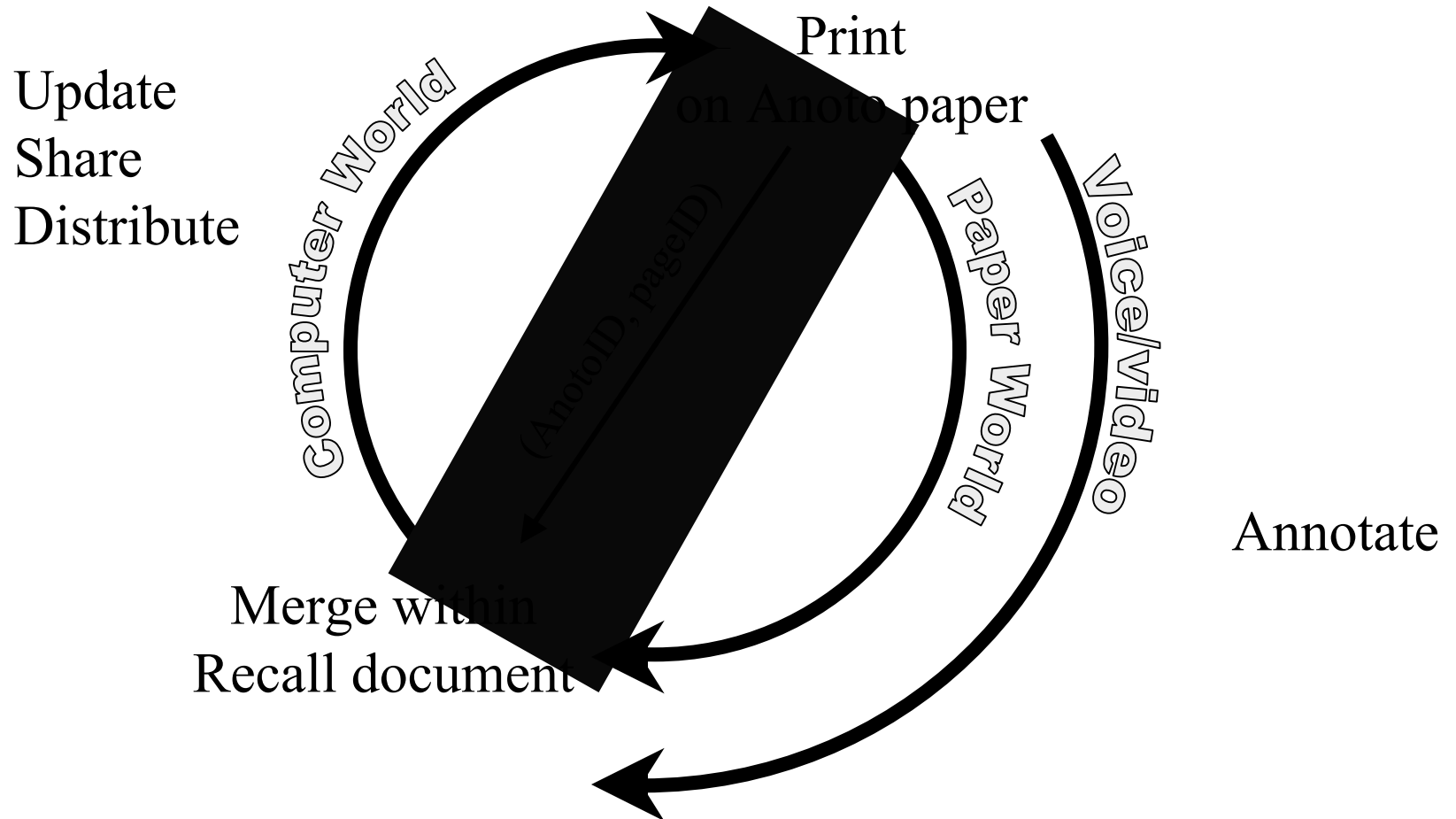
Capturing as built design in the field

The TM system

- Developed at Stanford by Dr Renate Fruchter's group
- Capture and synchronize strokes, audio and voice
- Use strokes as an indexing mechanism during replay

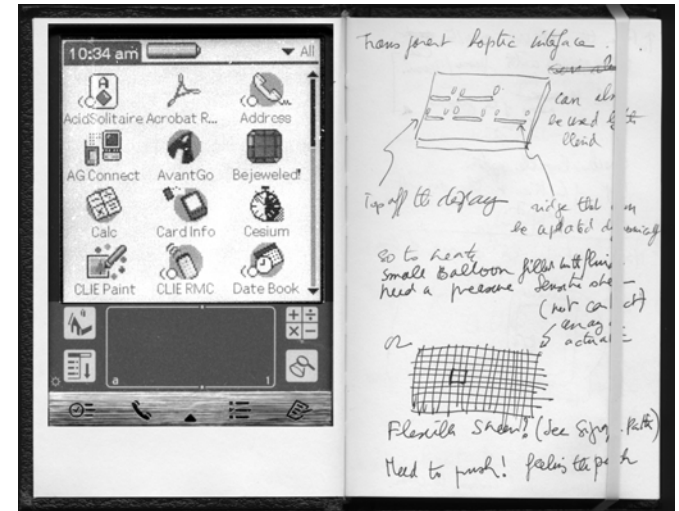


Combining Recall and Anoto

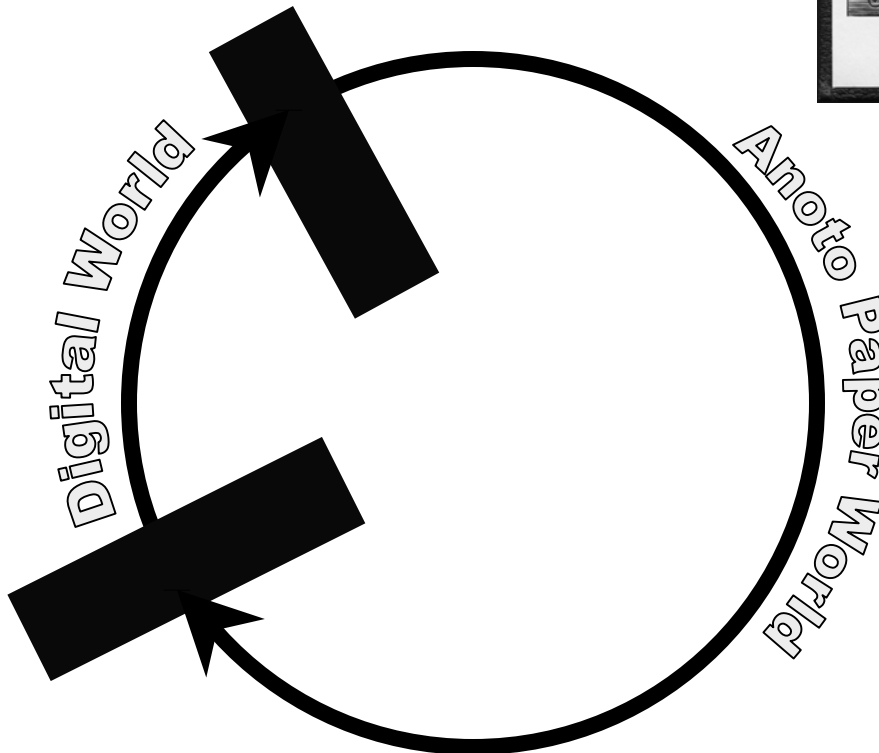


Paper only display system?

- “Print, proofread, print” cycle
- A paper based Palm Pilot?
- A designer note book?



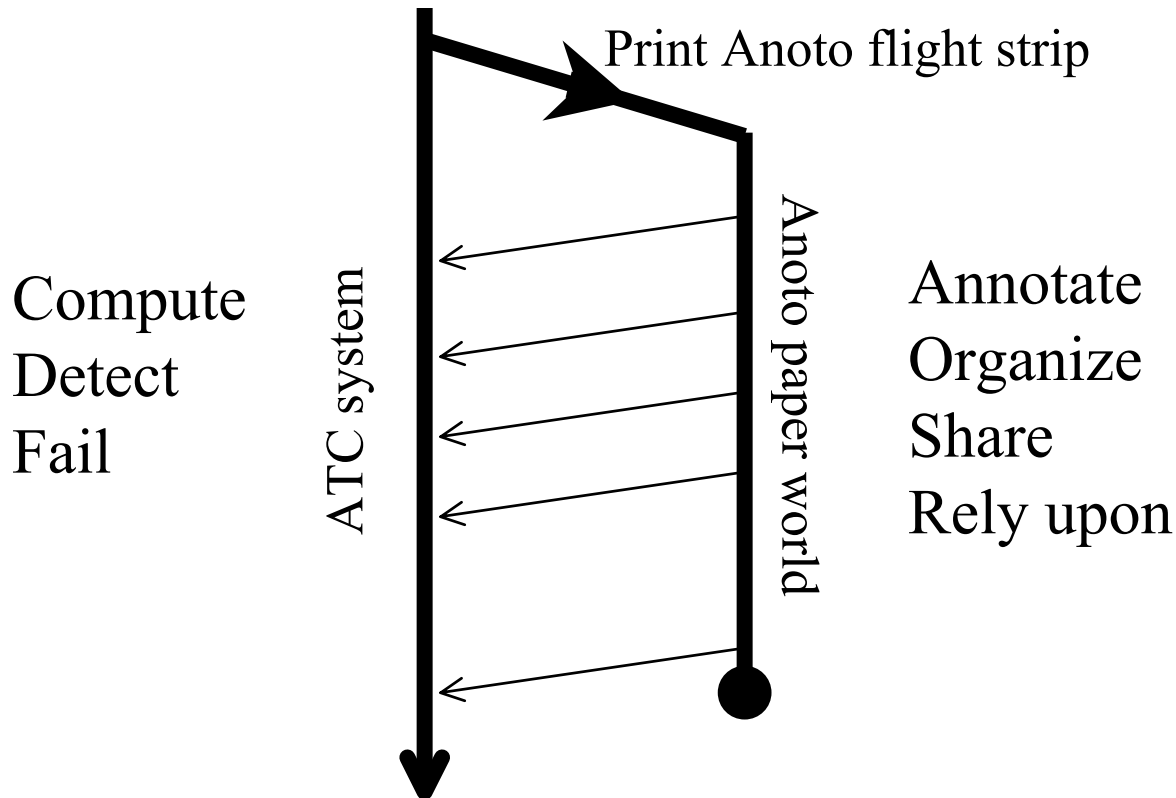
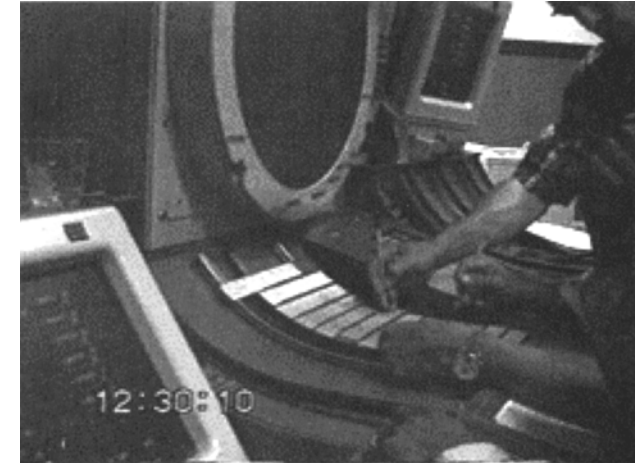
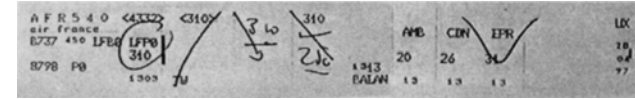
Update
Share
Distribute



Proofread
Sketch
Annotate
Discuss

Paper-Computer synergy

- ATC flight strips
 - Use to keep track flights
 - Reliable, failure proof
 - Move toward digital-only difficult.



Compute
Detect
Fail

ATC system

Print Anoto flight strip

Anoto paper world

Annotate
Organize
Share
Rely upon

12:30:10

CMSC 838G Administtrivia

- Instructor
 - François Guimbretière
 - *Human computer interaction*
 - Large interactive surfaces
 - Information Visualization
 - *Office hours (Room 3267 AVW):*
 - Mon 1:30pm – 3:30pm
 - *or* by email any time: francois@cs.umd.edu
 - *or* by appointment

Student info

- Name, e-mail
- Are you taking the class for credit?
 - Comps?
- Why are you taking the class?
 - Goals
 - Topics you would like to be covered in the class
- Additional comments

Work load

- Reading
 - Textbooks and papers
 - ~ 1-2 papers per class
- In class presentation and discussion
 - Paper reviews
 - Project presentations
- Project
 - 1 project, 4 checkpoints
 - Project proposal due Feb 13

What you will learn

- People, Paper and Computers
 - Affordances of paper
 - Paper as a social medium
 - Paper based user interfaces
 - User interfaces for digital paper
- Experimental design
 - User study fundamentals
 - Basic experimental designs
 - Non-traditional experimental designs
 - Interpretation of experimental results

How you will be evaluated

- Participation: 10%
- Presentation (reviews, project): 20%
- Project: 50%
- Final 20%

Texts

- Required text
 - ***The myth of the paperless office***, Sellen and Harper [The MIT Press], 2002.
 - ***Doing Psychology Experiments***, Martin, Fifth edition [Wadsworth], 2000.
- Course web sites:
 - <http://www.cs.umd.edu/~cmssc838G-0101>

Reading for This Thursday

- MPO: Chapter 1 & 2

Previous work (Annotation)

- Wang FreeStyle system [Wang 89]
- MATE [Hardock 93]
- XLibris [Schilit 98], [Golovchinsky 02]

Previous work

(Paper/Computer interaction)

- Projecting on to paper
 - DigitalDesk [Wellner 93]
 - Ariel [Mackay 95]
- Linking with the digital world
 - PaperLink [Toshifumi 97]
 - Intelligent Paper [Dymetman 98?]
 - Anoto
 - A-Book [Mackay 02]
- Independent paper interaction
 - Xax [Johnson 93]
 - Paper PDA [Heiner 99], [Avrahami 01]