Modeling Work

Data Analysis

Contextual Design: Stages

- Interviews and observations
- Work modeling
- Consolidation
- Work redesign
- User environment design
- Prototypes
- Evaluation
- Implementation

Contextual Inquiry

- Three primary processes
- First, get data
  - Premise: You don't know enough about someone else's tasks to design an application off the top of your head
- **Second, organize data**
  - **The data arrives as a pile of random notes, quotes, observations, and photos. You need to wring coherence from the data.**
- Third, generalize across prospective users
  - We rarely have the luxury of designing for one individual. If you watch two or three people do the same job, what generalizes, and what is an idiosyncrasy of the individual?

Recall Interviewing

- Does your whole group go to an interview?
  - No … Maximum 2 people
  - Why?
- So … how do you share data with your absent group member(s)?
  - Today!

From the top …

- Why do you go to an user group's work environment to see what they do?

From the top …

- Why do you go to an user group's work environment to see what they do?
- Assumption:
  - People's environments are organized to help them work better.
  - Based on solid research in psychology on cognition

Cognition

- Three types …
  - Embodied
  - Situated
  - Distributed

Embodied Cognition

- Our work practices are based upon constraints of our physical bodies and the abilities we've mastered
- Examples:
  - Video post-processing
  - Clean-up artists
  - Tape drawing:
    http://www.youtube.com/watch?v=PuZJO2jGGe0
    http://www.youtube.com/watch?v=LvyzwN36PSw

Situated Cognition

- Knowledge and ability are bound to context
- Anyone watch the screencasts?
  - Online versus in-class learning environment
  - President of Stanford University: “The gold standard will always be the on-campus educational experience.”
- Your environment and who you interact with and what you have available shapes what you can do.

Distributed Cognition

- Emphasizes tangible aspects of cognition
- Framework that involves coordination between individuals and artifacts
- Two key components
  - Representations that information is held and transformed
  - Process by which representations are coordinated
  - E.g. Affinity diagram with post-it containing any and all possibly relevant data

Externalizing Data

- You want to walk through the interview and observation data you collect and share it with you group member
- Your data exists in 4 places:
  - Handwritten notes
  - Audio recording
  - Photos (or potentially video) … And ?!?
  - Memory of the people present at the interview
- Must be shared somehow

Externalizing data

- Use external representations of data: serve three purposes
  - Manage complexity of the data
    - Single digit versus six digit multiplication
  - Externalizes the data so that it is collectively owned
    - Model focuses interaction around data
  - Breaks the initial propensity to see data “in the small”
    - Need to find themes that generalize across users
    - Examining data via its external representation allows this
- Allows your group to leverage …
  - Distributed cognition!

Externalizing Data (2)

- Needed: *tangible artifacts* to represent data
- Examples of tangible artifacts we can use to represent data during design?
  - Personas:
    - Fictional characters created to represent the different user types. … In most cases, personas are synthesized from data collected from interviews with users. They are captured in 1–2 page descriptions that include behavior patterns, goals, skills, attitudes, and environment, with a few fictional personal details to make the persona a realistic character. For each product, more than one persona is usually created, but one persona should always be the primary focus for the design.

Externalizing Data (3)

- Needed: *tangible artifacts* to represent data
- Examples of tangible artifacts we can use to represent data during design?
  - Personas:
  - Work models: A set of external representations of different attributes of an end-users goals, tasks, information, intents, and breakdowns. They are a set of graphical models which externalize and make concrete the work practices of end users you study.

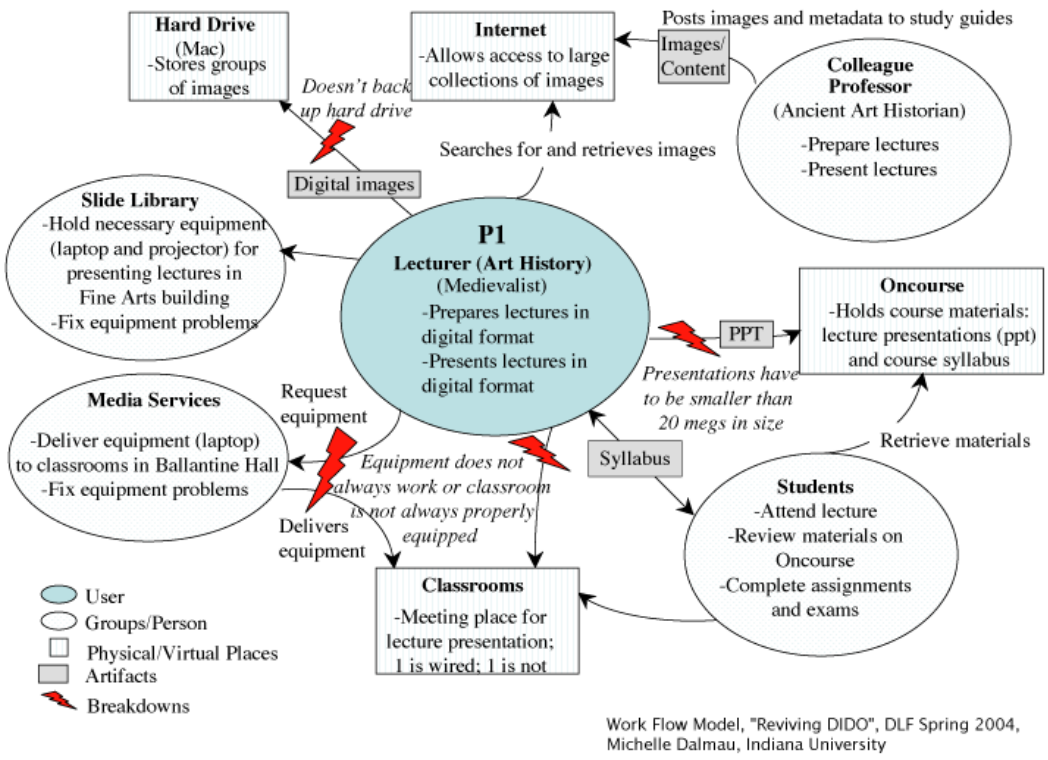
To Start Externalizing Data

- Same day:
  - Handwritten observations, memory, recordings as back-up
  - Photos on smartphone
- Next day or two:
  - Listen to audio as a group while showing photos
- More than two days:
  - Do full transcripts as well, and print out photos!
  - Why?

Work Models

- Graphical models of work
- Five models
  - Flow models
    - Depicts relationships between various individuals in work environment
    - Rare that one person does everything
  - Sequence models
    - Work is divided up into steps
    - Captures steps and the intention behind steps
  - Artifact models
    - People use and modify things
    - Understanding how and why reveals characteristics and break downs
  - Cultural models
    - Expectations, desires, policies influence work
  - Physical models
    - People adapt their environment so they can accomplish work

Flow Model



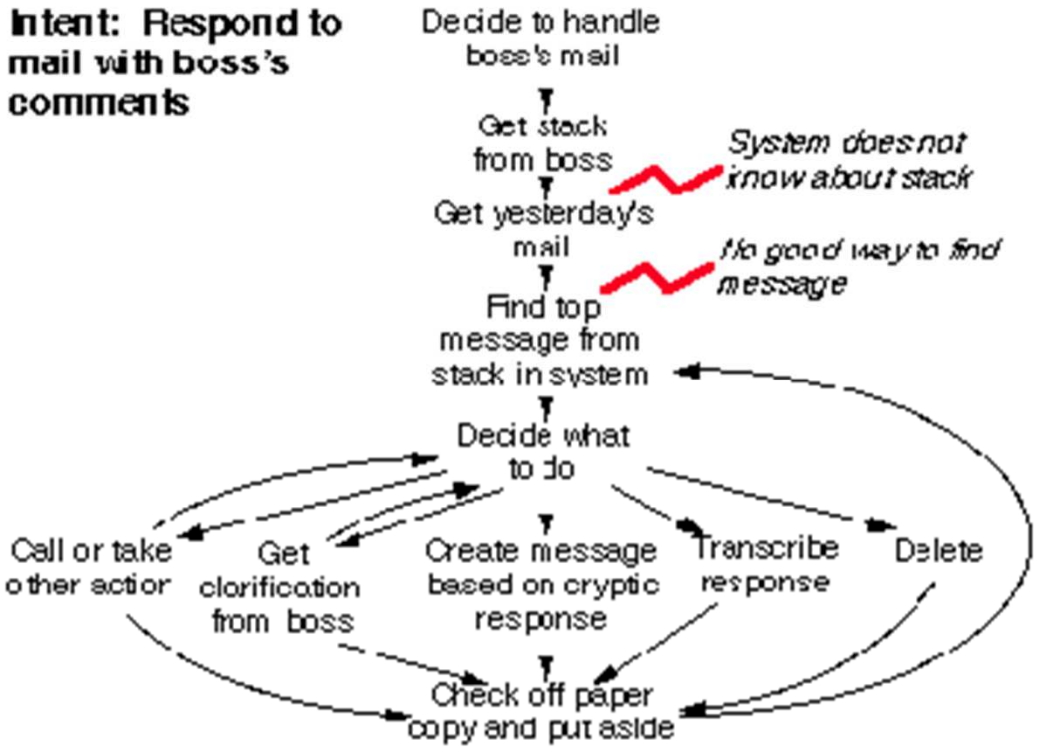
Work Flow Model, "Reviving DIDO", DLF Spring 2004, Michelle Dalmau, Indiana University

- Work flow models define how work is broken up across people and how people coordinate
- Contains:
  - Interviewee (oval in middle)
  - Other groups/people also ovals
  - Physical/virtual places (e.g. the internet) as rectangles
  - Artifacts as they pass between people as shaded rectangles
  - Breakdowns (lightning bolts)
- Done from the perspective of your interviewee

Building Flow Models

- Example: ????
- Start with subject you interviewed
  - List responsibilities
- Look at flow of information, tasks, and artifacts
  - Coordination
    - Where do artifacts come from and where do they go next
  - Strategy
    - Why are things done a certain way?
  - Roles
    - What makes a role? Knowledge, tools, procedures, or data
  - Informal Structures
    - What are out-of-band channels? E.g., chatting with Jonathan and Doug re graduate teaching assignment.
- Most important
  - LOOK BEYOND formal processes

Sequence Model



From Incontext's website

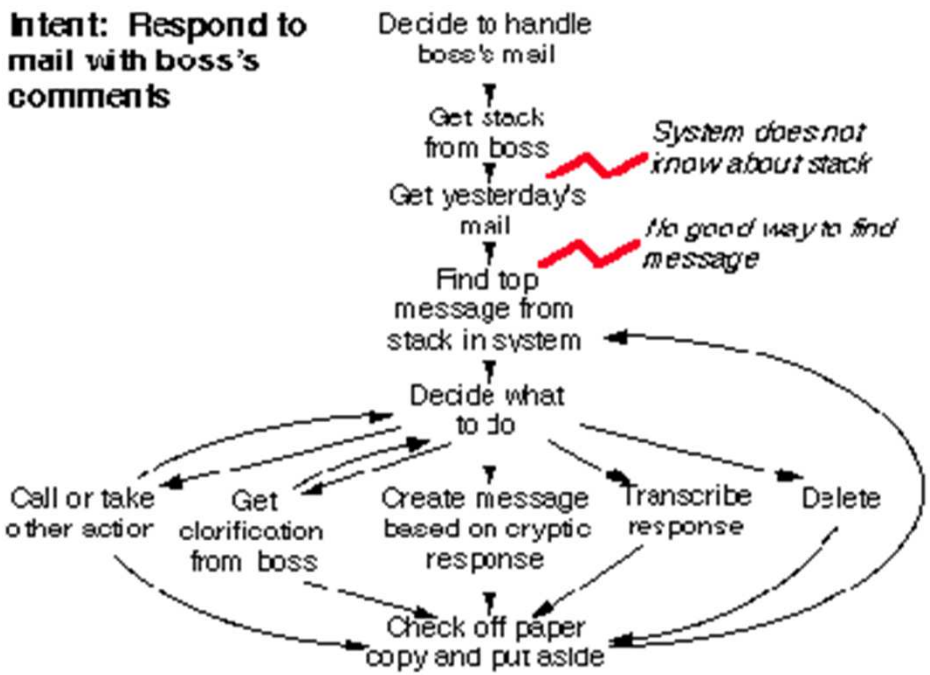
- All work unfolds as a series of steps/actions to achieve an intent
- Contains
  - Intent behind sequence
  - Trigger, which initiates sequence
  - Steps, at a reasonably high level of details (actions, but not movements)
  - Loops and branches showing order and iteration
  - Breakdowns where things go wrong
- Notice hesitations, errors, and intents
  - Intents can be overall or unfold during sequence

Sequence Model (2)

Intent: Needs to prepare 4 lectures for A214: Life and Art of Ancient Rome – Roman Religion	
	Trigger: Class meets tomorrow afternoon, need to have first lecture ready
Note: In progress: PPT, Netscape 4.x and file Finder windows open before we arrived. Loyal MAC (OS 9.x) user.	Prompted by syllabus – topic for this week, Roman Religion
Intent: Recycle PPT – use a base PPT rather than start from scratch	Find existing PowerPoint (PPT) lecture on similar topic
Note: Keeps all the existing images/PPT slides	Copies (Saves As) PPT as A214 for Roman Religion Lecture
Intent: Colleague normally teaches this class (A214)	Goes to Classical Art Historian's course web page (A210) – Bookmarked
Intent: Colleagues usually has good images (from DIDO)	Browses "Roman Gods" link (see Artifact A210 home page)
Note: Image quality assessment is automatic and very subjective	Identifies desired image /assesses quality
Intent: Expand lecture with reliable resource	*Downloads image (CTRL+Click) to "Download Image to Disk"
Note: Knows keyboard shortcuts	
Intent: Dynamically builds own image collection	*Saves image to "Roman Art" folder
	No sub-folders – many, many unique images in one folder
Note: Steps identified with * are done fluidly and repetitively while preparing lecture. Steps will not be represented for every image found as such but in shorthand: Integrates image	*Renames image (long, descriptive names)
	*Copy and Paste image into PPT slide
	*Resizes/Positions image in PPT

- A bit more detail
  - Each step has an intent and/or note
  - Breakdowns still identified
- I find this model a bit better
  - Depends on detail needed
  - Each project differs

Sequence Models

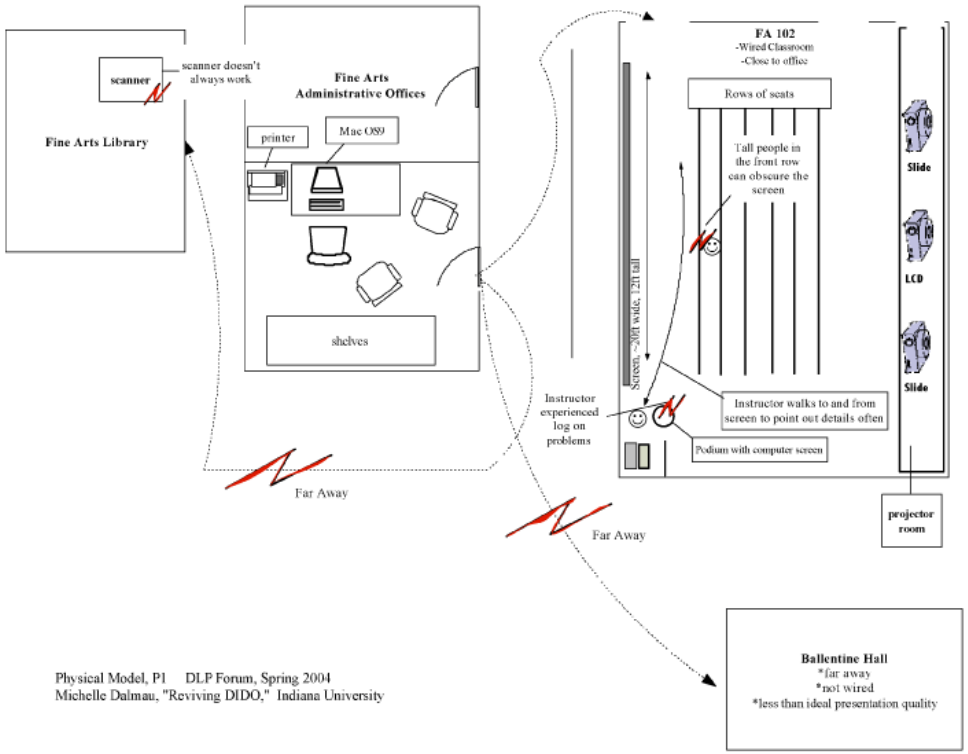


Intent: Needs to prepare 4 lectures for A214: Life and Art of Ancient Rome – Roman Religion	
	Trigger: Class meets tomorrow afternoon, need to have first lecture ready
Note: In progress: PPT, Netscape 4.x and file Finder windows open before we arrived. Loyal MAC (OS 9.x) user.	Prompted by syllabus – topic for this week, Roman Religion
Intent: Recycle PPT – use a base PPT rather than start from scratch	Find existing PowerPoint (PPT) lecture on similar topic
Note: Keeps all the existing images/PPT slides	Copies (Saves As) PPT as A214 for Roman Religion Lecture
Intent: Colleague normally teaches this class (A214)	Goes to Classical Art Historian's course web page (A210) – Bookmarked
Intent: Colleagues usually has good images (from DIDO)	Browses "Roman Gods" link (see Artifact A210 home page)
Note: Image quality assessment is automatic and very subjective	Identifies desired image /assesses quality
Intent: Expand lecture with reliable resource	*Downloads image (CTRL+Click) to "Download Image to Disk"
Note: Knows keyboard shortcuts	
Intent: Dynamically builds own image collection	*Saves image to "Roman Art" folder
	No sub-folders – many, many unique images in one folder
Note: Steps identified with * are done fluidly and repetitively while preparing lecture. Steps will not be represented for every image found as such but in shorthand: Integrates image	*Renames image (long, descriptive names)
	*Copy and Paste image into PPT slide
	*Resizes/Positions image in PPT

Constructing sequence models

- From interview, identify each main task
- Express task as an intent
  - Flow diagram can help with intents
  - Look at responsibilities from flow diagram
- Identify triggers which start task
  - Can be a regular occurrence (like arriving at the office)
  - Can be opportunistic (like a few minutes with no one around)
  - Can be on-demand (e.g. student knocks at my door)
- Add steps, showing links, loops, and branches
- Review steps, and fill in subsidiary intents that controls overall process
  - For example, in sales, maybe someone wants to up-sell once they've made the sale
- Add in breakdowns at any time as observed

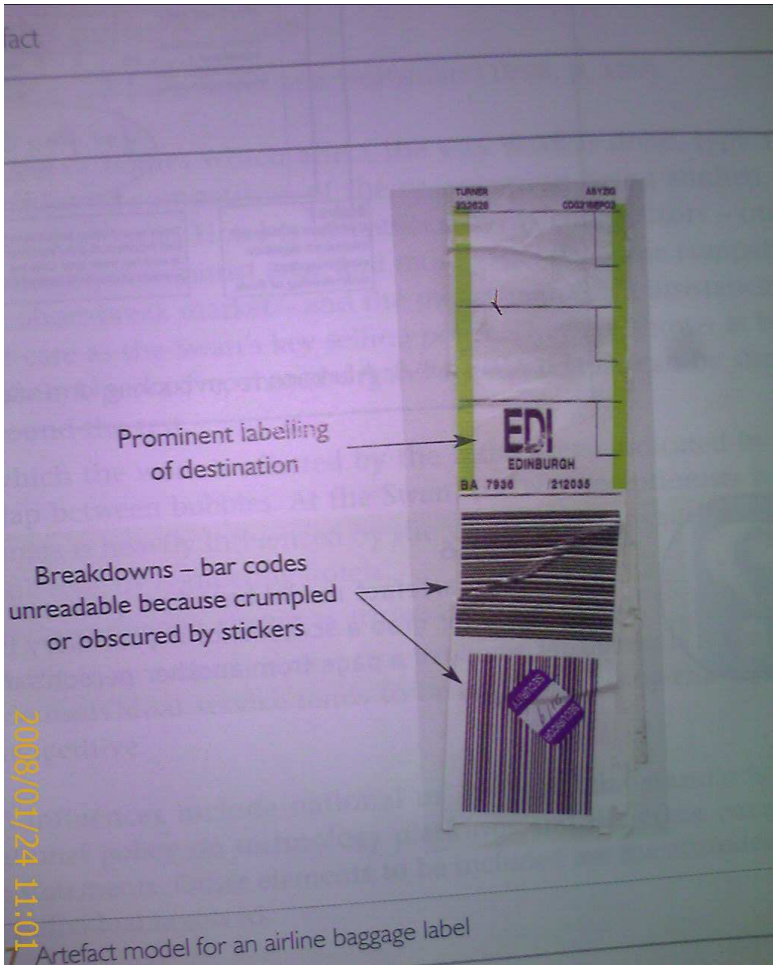
Physical Model



Physical Model, P1 DLP Forum, Spring 2004
Michelle Dalmau, "Reviving DIDO," Indiana University

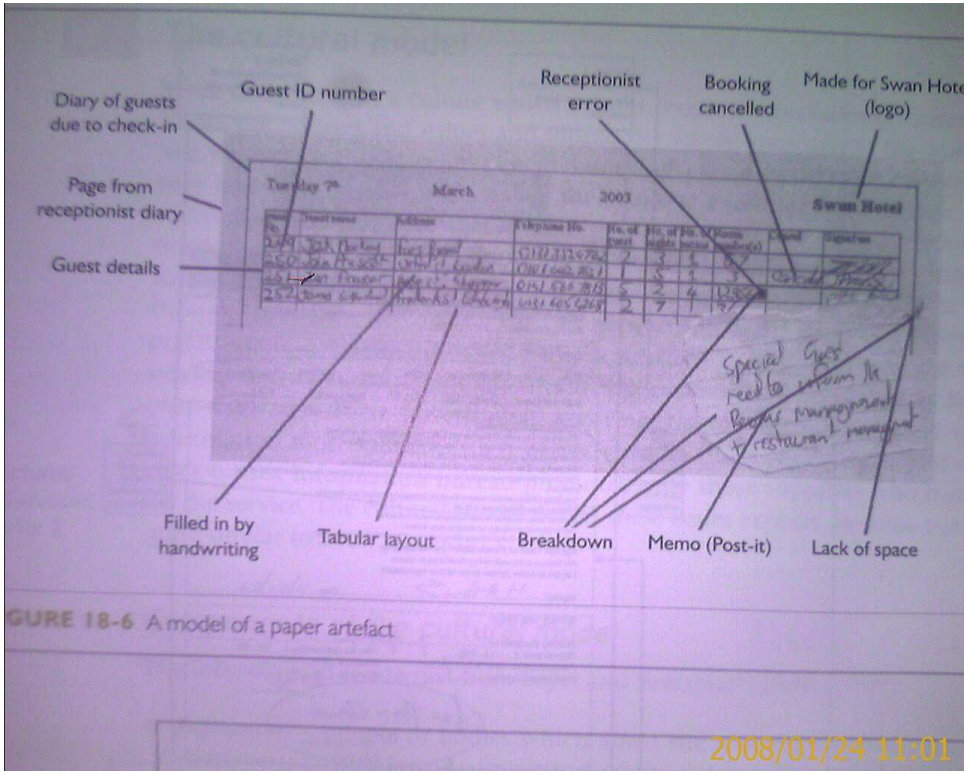
- Depiction of overall environment
- Includes:
  - Places in which work occurs
  - Structures that limit and define space
    - Walls, basements, desks, file cabinets
  - Hardware, software, communication lines, and other tools
    - Post-its, calendars, printers
  - Artifacts and their location
    - Not detailed structure and use
  - Layout of tools, artifacts, furniture and walls in relation to each other
  - Breakdowns or problems with the environment

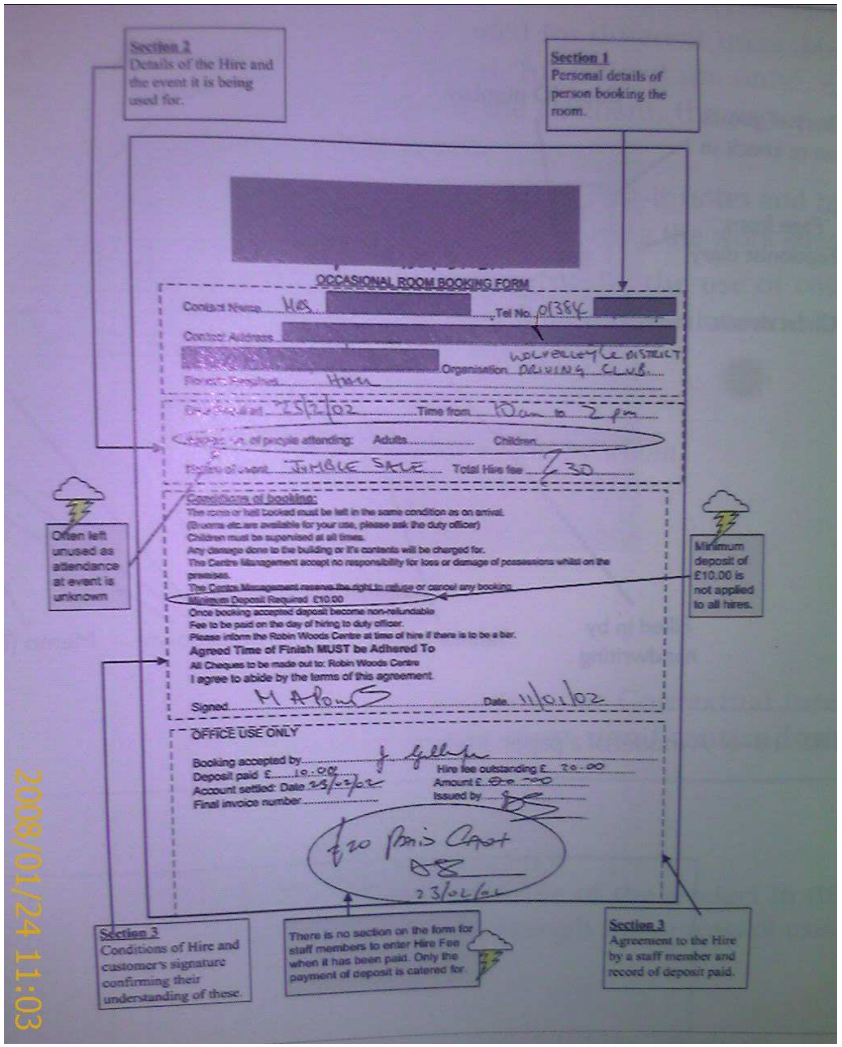
Artifact models



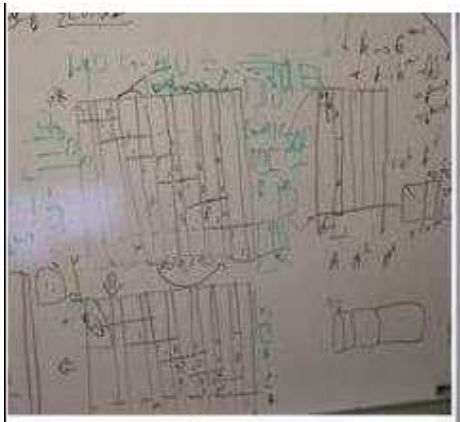
- When people use things, develop a way of working with them
- During interviews, look for:
  - Structure
  - Information content and how used
  - Informal annotations
    - Revealing about usage
    - Used for additional info?
    - Why on artifact
  - Presentation
    - Formatting and layout
- Eliminating an artifact is complex
  - Need to be careful to preserve communication
  - Stickers on baggage tag
  - Replacing = preserve communication

More artifact models





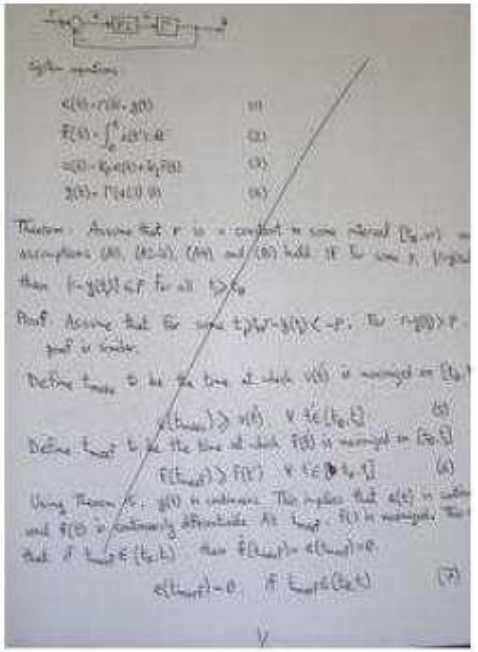
More Artifact Models



A

B

C



D

Building artifact models

- Two levels of inquiry
  - First, determine how artifact supports interviewees intent
    - Presentation, content and structure are important
  - Second, determine whether artifact is working well
    - Look for breakdowns and additions
    - Also unused areas
    - Nurses in retirement home

Building Artifact Models

- Try to collect or photograph examples that have been used or mock up new one
  - Capture stories of work
  - Makes customers thoughts and intents tangible
  - Walk through the artifact and how used during interviews

Cultural Models

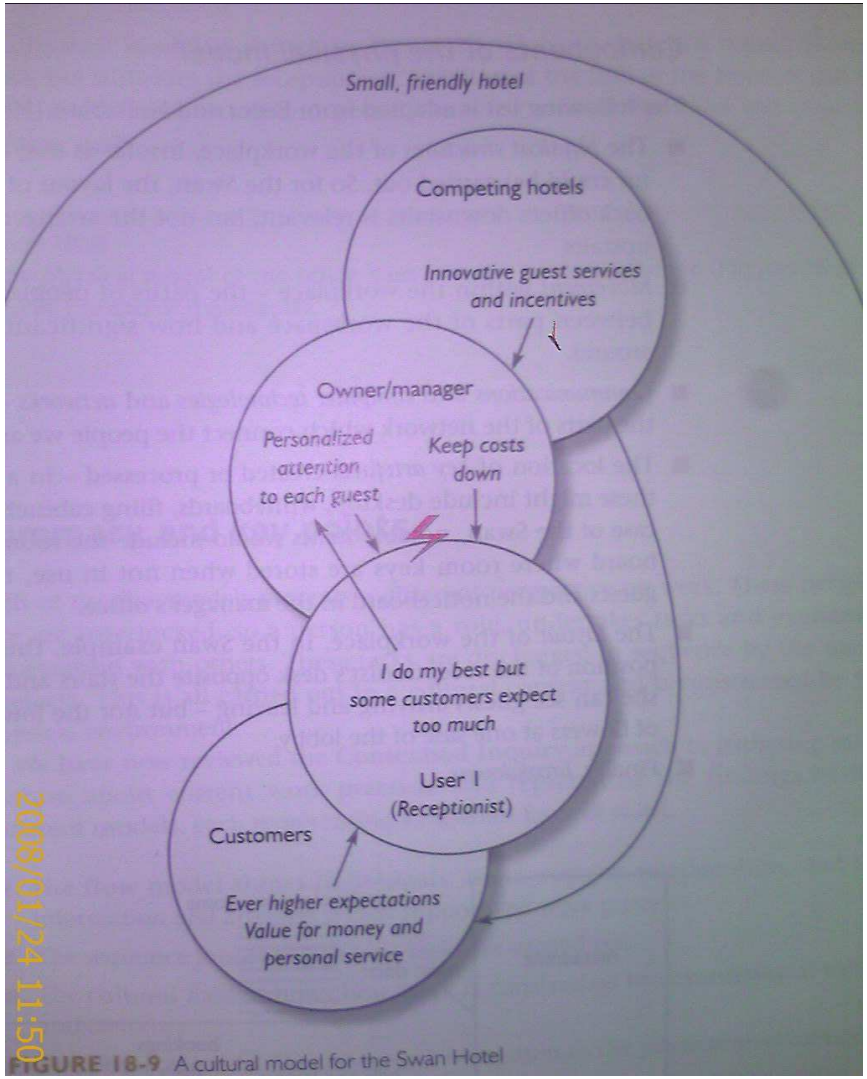


FIGURE 18-9 A cultural model for the Swan Hotel

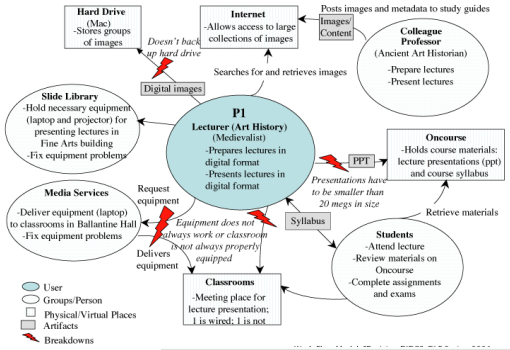
- Cultural models allow a system to understand constraints under which users perform task
- Includes:
  - Influencers, represented as bubbles
    - Can be individuals or groups (e.g. competitors)
  - Extent of influence, represented by overlap in bubbles
  - Influences, represented as arrows between bubbles
    - Direction important, and frequently incorporates push-back
  - Breakdowns

Building Cultural models

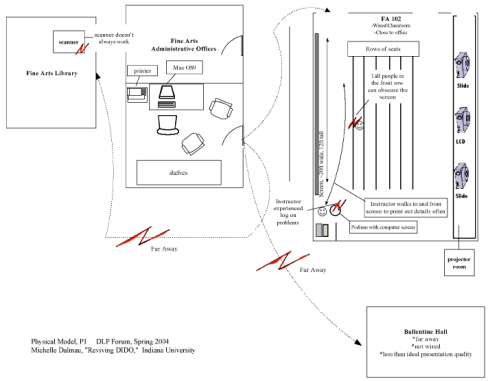
- Steps
  - Start with bubble for interviewee
  - Add bubbles for each group or individual
  - Arrange to reflect extent of influence
  - Describe overall culture, if exists
  - Identify breakdowns on model
- Pay attention to what people think, not what they say
- Culture is often implicit

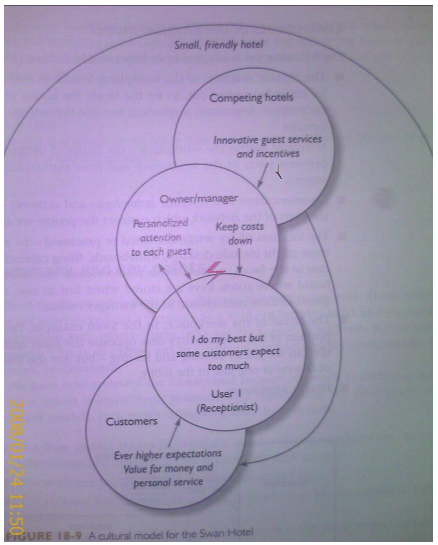
Questions

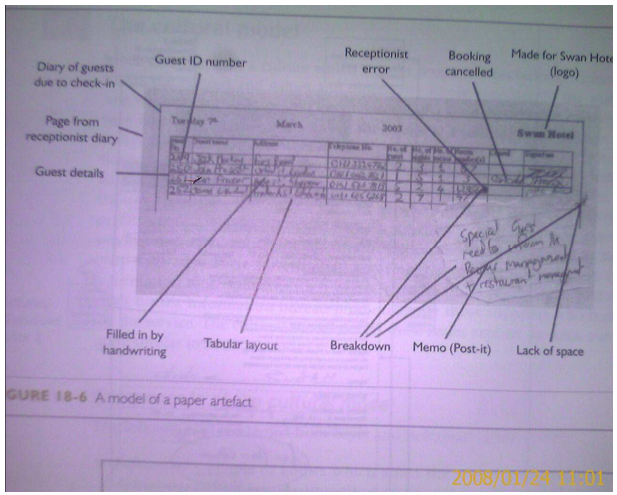
- Which aspects of cognition (embodied, situated, distributed) are captured by which models?



Intent: Needs to prepare 4 lectures for A214: Life and Art of Ancient Rome – Roman Religion	
	Trigger: Class meets tomorrow afternoon, need to have first lecture ready
Note: In progress: PPT, Netscape 4.x and file Finder windows open before we arrived. Loyal MAC (OS 9.x) user.	Prompted by syllabus – topic for this week, Roman Religion
Intent: Recycle PPT – use a base PPT rather than start from scratch	Find existing PowerPoint (PPT) lecture on similar topic
Note: Keeps all the existing images/PPT slides	Copies (Saves As) PPT as A214 for Roman Religion Lecture
Intent: Colleague normally teaches this class (A214)	Goes to Classical Art Historian's course web page (A210) – Bookmarked
Intent: Colleagues usually has good images (from DIDO)	Browses "Roman Gods" link (see Artifact A210 home page)
Note: Image quality assessment is automatic and very subjective	Identifies desired image /assesses quality
Intent: Expand lecture with reliable resource	*Downloads image (CTRL+Click) to "Download Image to Disk"
Note: Knows keyboard shortcuts	
Intent: Dynamically builds own image collection	*Saves image to "Roman Art" folder
	No sub-folders – many, many unique images in one folder
Note: Steps identified with * are done fluidly and repetitively while preparing lecture. Steps will not be represented for every image found as such but in shorthand: Integrates image	*Renames image (long, descriptive names)
	*Copy and Paste image into PPT slide
	*Resizes/Positions image in PPT







Interpretation Session

- ASAP after interview
  - Get entire group together to analyze interview
  - Same day: use handwritten notes
  - Next day: use notes annotated by listening to audio
  - Two + days: use notes + full transcripts
- Note:
  - Transcripts always best
  - Takes time
  - Immediacy is also best

Purpose

- Only one or two group members do interview
- Data from interview must become owned by group
  - Ideas, analysis
  - Think Ideo where people go out “to the four corners of the Earth” and then “report back”
    - Recall them standing there with their notes describing data to the group
- Interpretation session is designed to allow other group members to own data
  - Collective analysis of data collected by subset of group

Structure (3-person team)

- Roles:
  - Interviewer
  - Modeler
  - Participant
  - Rat hole watcher
- Before beginning
  - Print out all photos
  - Interviewer reviews notes

Interviewer

- Delivers data, not interpretation
  - Can enter interpretation discussion
  - Purpose is to walk everyone through the interview
- Stick photos, artifacts on wall or in middle of table
- Interviewer starts session with physical model
  - Gives sense of place
  - Draw during session
- Describe interview in chronological order
  - With transcripts, don't read; highlight from notes
  - When artifacts come up, point them out and transform into artifact models
- Assign each interviewee a code. Get used to using code, not names.

Modeler

- Modeler creates different models
  - Textbook suggests two modelers
  - More like a role that can rotate between other participants
- Flow models can be created on the fly as interaction unfolds
- Sequence models can be created during walkthroughs of task
  - Interviewer – make sure you get screen shots (even digital camera images)
  - Can use post-its to highlight intent
- Cultural models require iterations and whole team discussion
- Artifacts can be labeled using post-its

Sequence Model

Participant and modeler

- Ask questions to understand
- Develop insights, make observations, propose interpretations, suggest design ideas.
- Do not discuss ideas, just capture and integrate with context of data
  - Idea is to unload so you don't need to remember
- Validate model to ensure completeness

Rat hole watchers

- “Rat hole”
  - Any distraction from the mainline conversation
  - Technical feasibility, evaluation of an idea, your own experience, data from another interviewee
- Everyone watches for these and indicates when found
  - Think Ideo and bell
  - Try to be funny and constructive about it
  - Try to take it in good fun
- Suggestion: say rat hole