Advanced Design
of Interactive Systems

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Cultural
Probes

Cultural probes

Purpose
   Exploration of Research/Design Space
   Challenge assumptions
   Validate predictions
   Look for unexpected
   Gather subjective, intimate material
   Dialog with users

Deployment
   Involve users
   Consider privacy
   Required resources
   Length of time

Inspire
Inform
Engage

Classic probes:

disposable camera with questions
diaries
dream recorder

PROBE IT

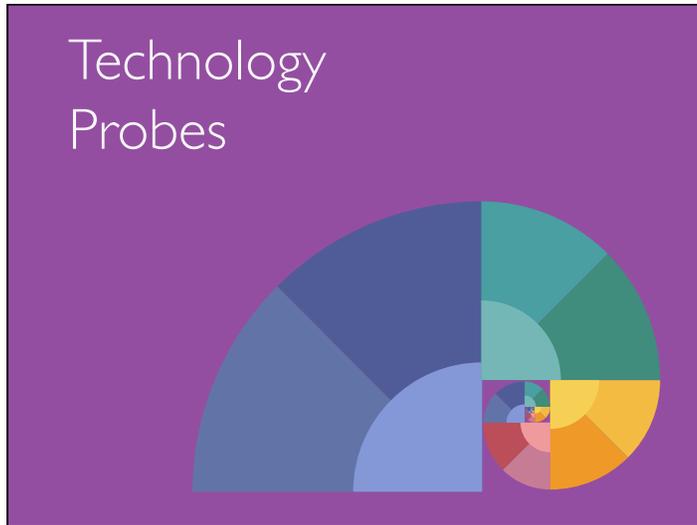## Example: Participatory design with families

Established long-term relationships
   "home" work
   interviews
   workshops
   cultural probes
   technology probes

interLiving

Designing Interactive, Intergenerational
Interfaces for Living Together. IST-2000-26068
http://interliving.kth.se

Cultural probes for InterLiving project

"Probe kit" sent to users
with stamped envelopes to return materials

Technology Probes

Technology probes

Goals:
- inspire users and designers to generate new design ideas
- understand how a technology is used in a real world setting
- study emergent behavior patterns around new technologies
- create common ground for subsequent design

Combine three perspectives:
Scientific: collect data about users *in situ*
Engineering: test technical infrastructure
Design: inspire new ideas

Technology probes

Three phases:
1. Introduce technology to users
2. Observe and interpret use in situ
3. Participatory design to explore alternatives and new ideas

Compare:	Technology probes	Prototypes
Simplicity:	Single function	Multiple functions
Usabilty:	Not the focus	Major focus
Logging:	Major focus	Secondary focus
Flexibility:	Open-ended	Specified purpose
Originality:	Unusual, provocative	Relevant to needs
Design cycle:	Early-middle	Middle-end
Longevity:	Throw away	Evolvable
Concept:	Still unclear	Mostly defined

Example: InterLiving

Goals:
  learn about family communication
  discover real-world technological constraints
  spark new ideas

Technology probe, not a prototype:
  Simple, single function technology
  Installed in home settings over time
  Open to reinterpretation by users
  Instrumented to log data
  Follow-up prototyping in participatory design workshops

Participatory design with families

Design
methods:

Cultural probes
Design workshops
"Home" work
In situ observation

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MessageProbe

Hand-written notes on a tablet screen
Synchronous or asynchronous
Zoomable interface
All notes shared among all households
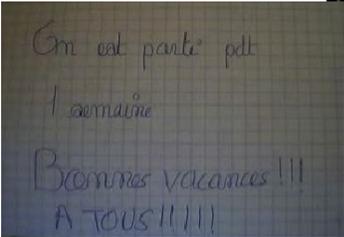Temporal or selected order

MessageProbe

conversations between   message?
grandpa and grand children   conversation?
                               game?

VideoProbe

Images captured by video camera
3" without motion = 1 image
Feedback before taking picture
Shared picture archive

On est parti' pdt
1 semaine

Bonnes vacances !!!

A TOUS !!!!!

"We're leaving for a week!

Happy Vacation Everybody!!"

Testing in the home

Use differs in
different
settings:

VideoProbe

View images with remote control
Images fade unless explicitly saved

Marker Clock

Peripheral awareness for seniors at
home
Monitoring vs. Peer-care
Implicit sharing: movement on clock face
Explicit sharing: leaving markers

Field tested with seniors in France
Easily interpretable by people who

No Activity

Weak Actvity

Strong Activity

Exercise: Design a probe

What would you like to find out about your users?

What kind of existing device can you use that will:
   capture relevant information from them
   provide elements of a new experience that
      helps inspire ideas relevant to your project?

Cultural probes: Discover user characteristics
Technology probes: Inspire new designs

TableProbe

Tangible
interface
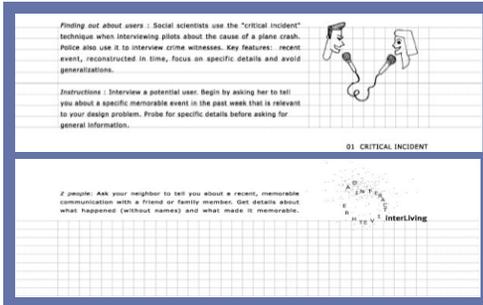   for
collaborative
video
editing

RFID tags
30" clips

Outside main
conference
room

Table Probe

TableProbe for collaborative video editing
Participatory design toolkit

What did we learn?

TableProbe: made it simpler

Inspired StoryTable

StoryTable: Tangible video editing

Physical objects represent video information
   Card with RFID tag
   30-second video clips (super-imposed)

Manage on-line video clips with physical cards

IST interLiving project   25

Example: MessageProbe

Hand-written notes on a tablet screen
Synchronous or asynchronous
Zoomable interface
All notes shared among all households
Temporal or selected order

INRIA 2
Confidential

INRIA 2004 /   27
Confidential

TableProbe ⟶ StoryTable

Tangible, Collaborative Video Editing
   RFID tagged cards control 30'' super-imposed video clips
   First, a communication table next to the front door…

INRIA 2004 /   28
Confidential

TableProbe → StoryTable

Tangible, Collaborative Video Editing
RFID tagged cards control 30'' super-imposed video clips
First, a communication table next to the front door…
Evolved into a child's interactive puppet theatre

INRIA 2004 /
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VideoProbe

Images captured by a video camera
3'' without motion = 1 image
Image archive
shared between households

" We're going
away for a
week

Happy
Vacation
Everybody!!'

INRIA 2004 /
Confidential

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VideoProbe

Images captured by a video camera
3 seconds without motion = 1 ima
Image archive
shared between households
View images with a remote control
Images fade unless explicitly saved

INRIA 2004 /
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→ MirrorSpace

Handling privacy concerns:
Distance to mirror controls
video image & communication

Proximity sensor, image analysis
Far away: blurry image
Approach: crisp image
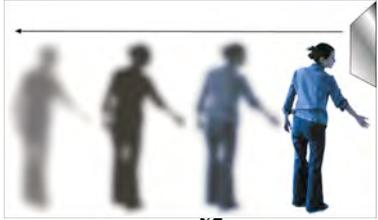
INRIA 2004 /
Confidential

⟶ MirrorSpace

Handling privacy concerns:
    Distance to mirror controls
    video image & communication

Proximity sensor, image analysis
Camera placed in center of screen
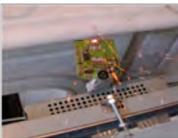
INRIA 2004 /
Confidential

⟶ MirrorSpace

Handling privacy concerns:
    Distance to mirror controls
    video image & communication

Proximity sensor, image analysis
Camera placed in center of screen
Exhibited at:
    La Villette
    Pompidou Centre

Family members get much closer
    than strangers…

INRIA 2004 /
Confidential

Home installation

We installed
    several
    communication
    appliances in the
    families' homes,
    over weeks and
    months

(Sweden,
France &
United States)

INRIA 2004 /   **35**
Confidential

Marker Clock   Interact '07, JCSCW '10

Peripheral awareness for seniors at home
    Monitoring vs. Peer-care
    Implicit sharing: movement on clock face
    Explicit sharing: leaving markers

Field tested with seniors in France
    Easily interpretable by people who
   know each others' rhythms and routines

WeMe

A "Conversation Piece" that supports
   multiple engagement and multiple interpretation.

Bubbles move in response
   to ambient sounds
   (local and distant)
1-3 people per household
   can create patterns

WeMe

Nightboard

Remote couples stay in touch

Input:
   movement detector
   laser pointer
Display:
   projection on the ceiling

Supports both
direct and implicit interaction

MissU

Sharing 'Empty Moments' between remote couples
   Private 'radio channel'
      Implicit : shared ambient sounds (dual control)
      Explicit : shared music playlists
   Exploration with 13 couples via technology probes
      Social Science, Technology & Design results

Interactive Thread

Weaving an interactive thread
Participatory research methods
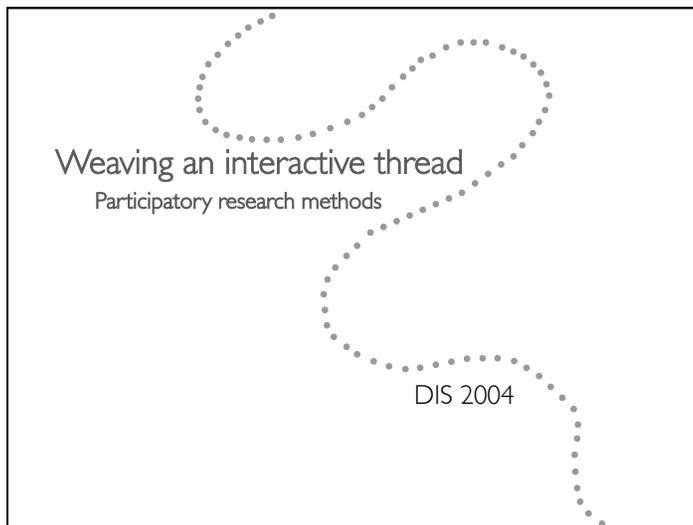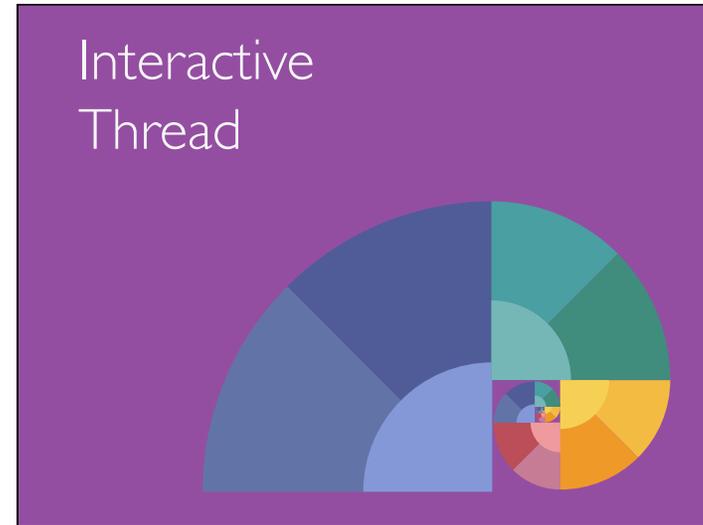
DIS 2004

Planning DIS 2002…

How to create a dynamic, interesting event that emphasizes:
    audience interaction?
    multi-disciplinary design methods?

Solution:
    An 'interactive thread' woven throughout the conference

Goals:
    Engage conference attendees
    Demonstrate diverse design techniques
    Collect user data

DIS 2004

Goal: collaborate on a common design

Create a focal point: Henrik Färling's poster with stories
                        stories from the interLiving project

Create ten
  10-minute exercises
  that build upon
  each other

interactive thread cards
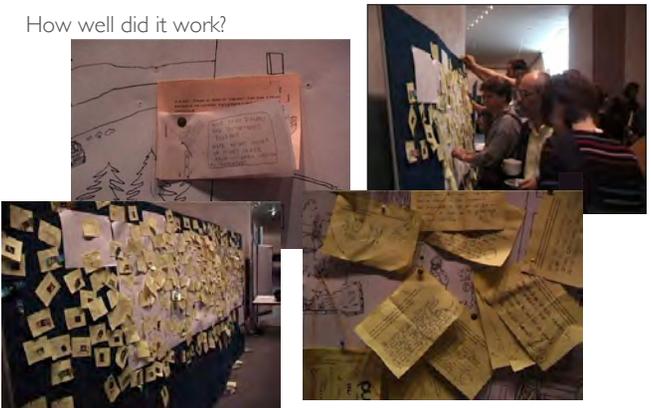
One card per exercise:

Front: Describe goal
        and instructions

Back: Specific task
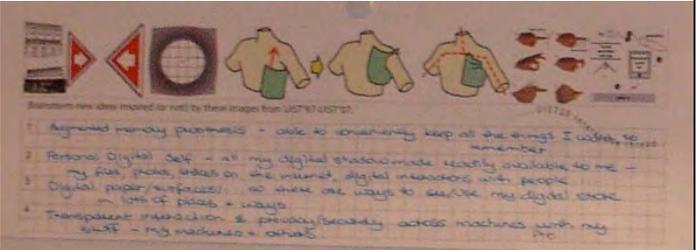   and workspace
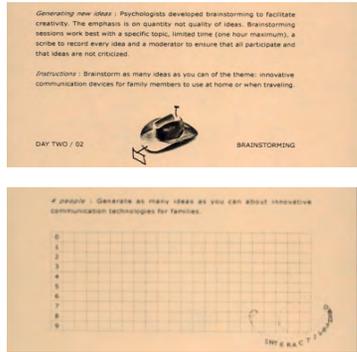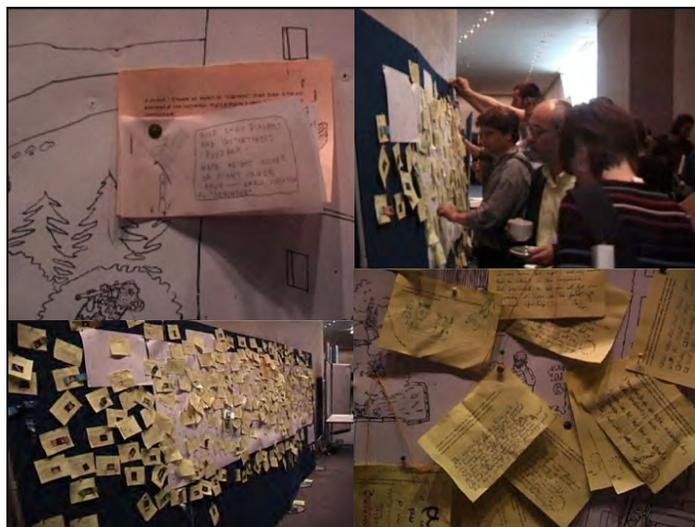
DIS 2002

How well did it work?

interactive thread
DIS 2002

What we learned

What worked well:
  Poster as focal point
  Early, short exercises
  Data gathering exercises
  Participant interaction

What worked less well:
  Removing poster after day 1
  Longer exercises
  Too many exercises
  Stress from linked exercises

Additional tests

Conference:
  UIST '07 20th anniversary
  Newport, RI

Modifications:
  Timeline poster,
  past and future
  Banquet exercise

Capturing the past on a timeline

Experts fill in the
history of interactive
technology, identifying
specific examples
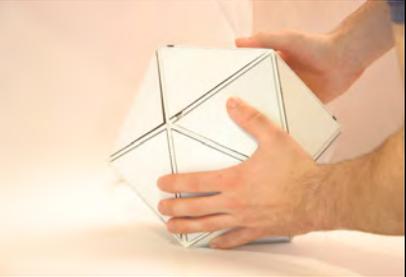and placing them
on a large timeline.

Capturing the past

Designing the future

Building on the past to brainstorm
about the future…

Possible interactive thread events

Post-class exercise
    students perform exercises just before the bell rings
Experiment debriefing
    subjects interview each other after a session
Corporate meetings
    expose everyone to interactive design techniques
Seminars or conferences (sessions or banquets)
    get specialized interviews from doctors,
    air traffic controllers, fighter pilots and
    other hard-to-access users

Participatory design Workshop

A20

Shared music player
   20-sided icosohedron
   triangular speakers

Interaction :
   movement in space

Play & share
   music

with Sony CSL

Designing the A20

Participatory design workshop with Sony :
Social interaction in Music

Participatory design workshops

Bring together users and designers
Create an environment for collaborative exploration of ideas

Activities can:
   capture experiences
   create scenarios
   brainstorm ideas
   explore ideas

Do not ASK users …
   help them to
   show, tell or act.

Borrow design activities from class

Users: Interviews, use scenarios, personas, *cultural probes*

Design ideas: Brainstorming, video brainstorming, web links

Prototypes   Design scenarios, storyboards, video prototypes
                    design concept, overview diagram,

Evaluations: Design walkthroughs, experiments, *field and user studies*

Redesign: Generative walkthroughs, interactive thread,
                    cultural probes, *technology probes*

Actively involve users throughout
       the design process

Consider which techniques work
       for which users

Try to establish long-term relationships
       not just 'one-offs'


Exercise: Design a participatory design workshop

Decide on: participants, setting, schedule, activities
       Ratio of team members to users?

Preparation:
       Materials? Pre-workshop activities?

Workshop activities:
       Which activities from class are appropriate?
       Can you think of any others?

Follow-up activities:
       What do participants get as a result of participating
       (Need not be money or gifts … but they should benefit)
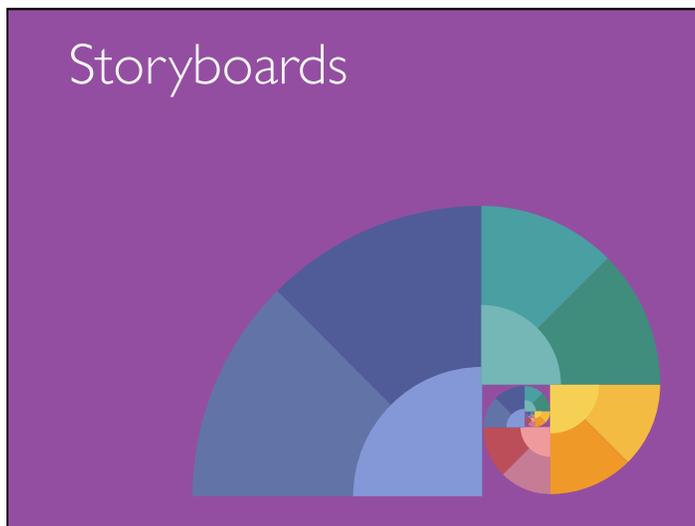
Storyboards

Storyboards

Moment   Highlight what matters, omit the rest
             Interaction points

Frame   Sense of place, position & focus
             Start with overview, then show details
             Intertitles, wide shots, close-ups

Image   Evoke characters, objects, environments
             Focus on the user's interaction
             Use simple special effects

Words   Communicate ideas, voices
             Intertitle (silent film)
             voice-over (narrated), dialogue

**Flow**   Guide reader
             Linear or branching

THESE ARE
THE **FIVE ARENAS** WHERE YOUR
CHOICES CAN MAKE THE DIFFERENCE BETWEEN
CLEAR, CONVINCING STORYTELLING
AND A CONFUSING MESS.

CHOICE OF MOMENT
CHOICE OF FRAME
CHOICE OF IMAGE
CHOICE OF WORD
CHOICE OF FLOW

from MAKING COMICS
by SCOTT McCLOUD

Regular storyboard

Identify key interaction points
    in the scenario

Examine the key ideas from
    the design space
    (brainstormed ideas)

Illustrate the interaction
    between user and
    novel system

Describe key issues
    on the right

Title
User(s)
Situation

Establishing shot
First interaction

Closeup shot
Second interaction

Mid-range shot
Third interaction

Wide shot
Forth interaction

Final credits

Branching
Storyboards

Stanford – Cognitive Aids in the Operating Room

Provide cognitive aids to doctors in crisis situations

Observational studies and interviews in real operating rooms
Observational and controlled experiments in OR simulator
Participatory design workshops to create prototypes

Shift from "cognitive aids" and "checklists"
    to resource management for people, data, processes

CURUS, 2011

Branching Storyboard

Write a tiny, branching one-act play,
    sub-divided into one-paragraph micro scenes
    that describes the interaction
Create one or more characters, each with:
    name, age, gender, motivation
    usually with a profession, expertise
    usually with a goal or motivation
Create one or more realistic setting(s):
    date, time, place, context
Identify a series of events over a period of time
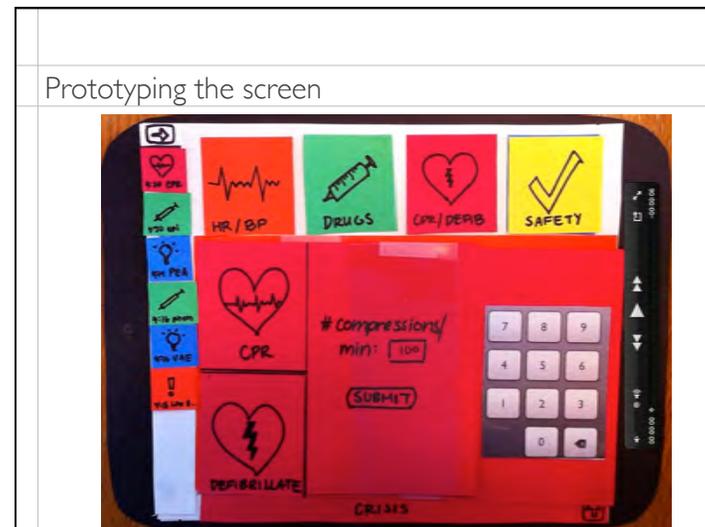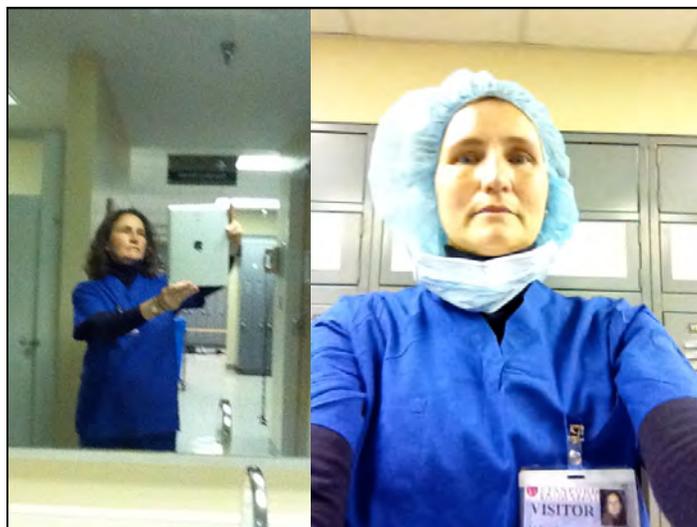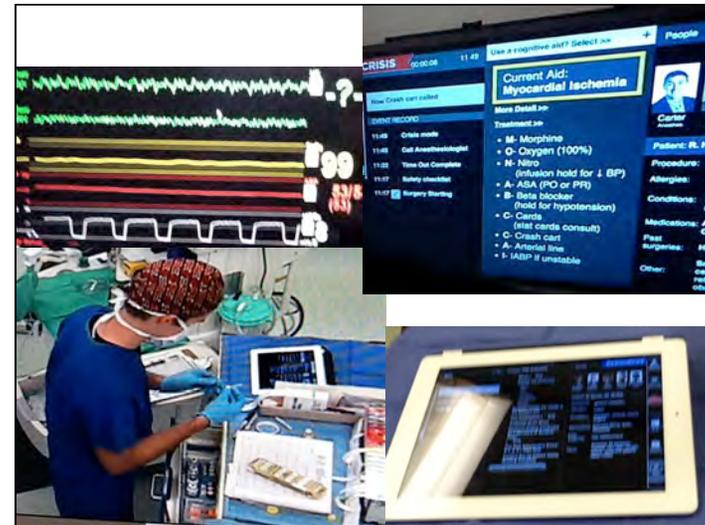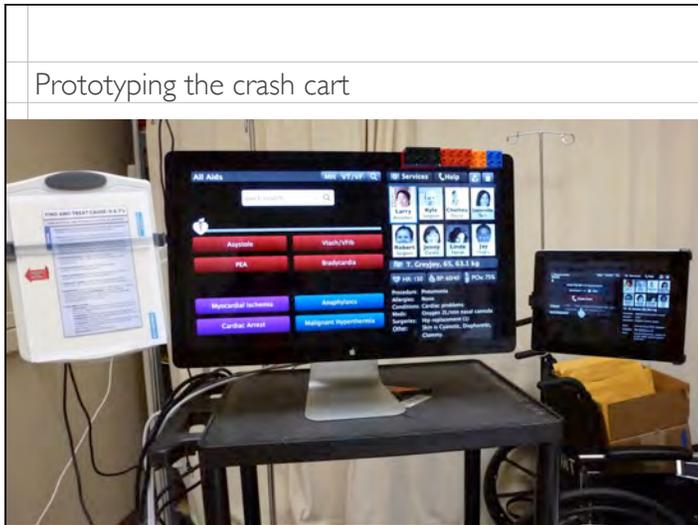
Prototyping the screen

Prototyping the crash cart

Branching storyboard

At each interaction point, consider:
    alternative ideas
    extreme uses
    effects of different situations
    breakdowns

Create an instrument
    explore new options

Did you change your design space?
Can you justify your design choices?

Design Space Dimensions

Revisit your design dimensions:
    How can you systematically explore alternatives
    along several dimensions?

For example: Remote communication
Shared data (4):
    activity level, text, photo, video
Synchronicity (3):
    live synchronous, back&forth, asynchronous
Access control (4):
    sender, recipient, shared, system

Creates a combinatorial explosion of possibilities:
    4 x 3 x 4 = 48 possibilities

Latin Square example

Shared data:
    activity level, text, photo, video
Synchronicity:
    live synchronous, back&forth, asynchronous, live synchronous
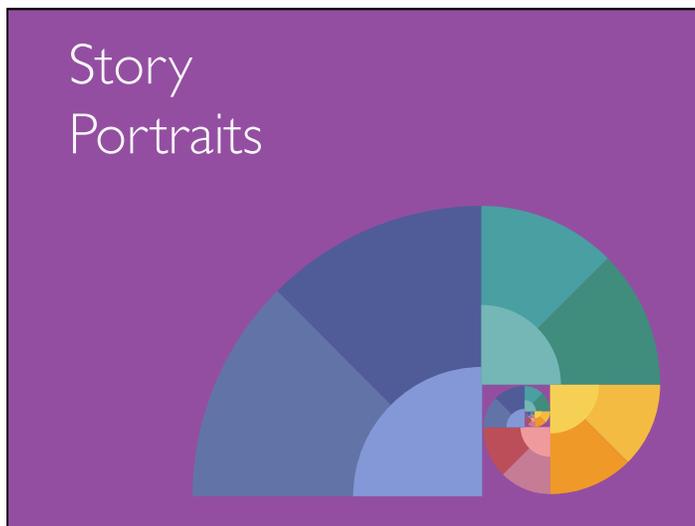*Access control:*
    sender, recipient, shared, system

Combine alternatives, one per category:
    shared activity level, live synchronous, sender control
    shared text, back & forth, recipient control
    shared photo, asynchronous, shared control
    shared video, live synchronous, system control

Use combinations for the branching storyboard

Branching storyboard

At each interaction point, consider:
    alternative ideas
    extreme uses
    effects of different situations
    breakdowns

Did you change your design space?
Can you justify your design choices?

Exercise: Branching Storyboard

Begin with your storyboard
    Identify a set of interaction points
    Create at least one instrument

Examine your design space dimensions
    Update it as necessary to match the current design
    Generate 3 interaction methods per design dimension

Use a latin square approach to recombine the
    interaction points along multiple dimensions

Record your storyboard on the interaction point forms

Story Portraits

Representing the design processes

How do you capture the key elements of a
creative design process?

Start with critical object interviews to elicit stories:
    Capture images, audio, video, hand-written notes

Summarize the process as a 'Story Portrait'
    Step-by-step, illustrate the story

Representing the design processes

How do you capture the key elements of
   an activity or process?

Start with critical object or incident interviews to elicit stories:
   Capture images, audio, video, hand-written notes

Summarize the process as a 'Story Portrait'
   Step-by-step, illustrate the story with sketches

An inverted process:
Creating a book about
being strip-searched

Setting up a grid
to synchronize with the developer

Revealing process