## Cultural probes

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Classic probes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration of Research/Design Space</td>
<td>disposable camera with questions</td>
</tr>
<tr>
<td>Challenge assumptions</td>
<td>diaries</td>
</tr>
<tr>
<td>Validate predictions</td>
<td>dream recorder</td>
</tr>
<tr>
<td>Look for unexpected</td>
<td></td>
</tr>
<tr>
<td>Gather subjective, intimate material</td>
<td></td>
</tr>
<tr>
<td>Dialog with users</td>
<td></td>
</tr>
</tbody>
</table>

### Deployment

- Involve users
- Consider privacy
- Required resources
- Length of time
Example: Participatory design with families

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

Cultural probes for InterLiving project

“Probe kit” sent to users with stamped envelopes to return materials
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

**Compare:**

<table>
<thead>
<tr>
<th>Technology probes</th>
<th>Prototypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity: Single function</td>
<td>Multiple functions</td>
</tr>
<tr>
<td>Usability: Not the focus</td>
<td>Major focus</td>
</tr>
<tr>
<td>Logging: Major focus</td>
<td>Secondary focus</td>
</tr>
<tr>
<td>Flexibility: Open-ended</td>
<td>Specified purpose</td>
</tr>
<tr>
<td>Originality: Unusual, provocative</td>
<td>Relevant to needs</td>
</tr>
<tr>
<td>Design cycle: Early-middle</td>
<td>Middle-end</td>
</tr>
<tr>
<td>Longevity: Throw away</td>
<td>Evolvable</td>
</tr>
<tr>
<td>Concept: Still unclear</td>
<td>Mostly defined</td>
</tr>
</tbody>
</table>
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

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 grandpa and grand children
message? conversation? game?
VideoProbe

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

“We’re leaving for a week!
Happy Vacation Everybody!!”

Testing in the home

Use differs in different settings:

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

Interact ’07, JCSCW ’10

Interact ’03

View images with remote control
Images fade unless explicitly saved
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 and 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

Example: MessageProbe

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

TableProbe → StoryTable

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

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

**VideoProbe**

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

**MirrorSpace**

Handling privacy concerns:
- Distance to mirror controls video image & communication
- Proximity sensor, image analysis
  - Far away: blurry image
  - Approach: crisp image

"We’re going away for a week"
Happy Vacation Everybody!!
MirrorSpace

Handling privacy concerns:
- Distance to mirror controls
- Video image & communication

Proximity sensor, image analysis
Camera placed in center of screen

INRIA 2004 / Confidential

Home installation

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

(Sweden, France & United States)

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

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 know each others’ rhythms and routines

Interact ’07, JCSCW ’10
**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.

**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.
Weaving an interactive thread
Participatory research methods

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?
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

Designing the A20
Participatory design workshop with Sony:
Social interaction in Music

A20
Shared music player
20-sided icosahedron
triangular speakers

Interaction:
movement in space

Play & share
music

with Sony CSL

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’

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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)

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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

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[Diagram of storyboards elements: moment, frame, image, words, flow]
# Regular Storyboard

<table>
<thead>
<tr>
<th>Title</th>
<th>User(s)</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify key interaction points in the scenario</td>
<td>Establishing shot</td>
<td>First interaction</td>
</tr>
<tr>
<td>Examine the key ideas from the design space (brainstormed ideas)</td>
<td>Closeup shot</td>
<td>Second interaction</td>
</tr>
<tr>
<td>Illustrate the interaction between user and novel system</td>
<td>Mid-range shot</td>
<td>Third interaction</td>
</tr>
<tr>
<td>Describe key issues on the right</td>
<td>Wide shot</td>
<td>Forth interaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final credits</td>
</tr>
</tbody>
</table>

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## 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*

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### Branching Storyboards

- 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:
- \(4 \times 3 \times 4 = 48\) 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

Revealing process
Over-riding the grid

1. I have a well-defined grid.

2. The text remains inside the grid but changes its orientation.

3. The grid is completely overridden by the new typography.

4. The content appears contained in a shape.

5. Accurate/unnecessary.