Probes

Case Studies in Design Informatics 1 - INFR11094

Week 9 – 11th November 2024

Image: Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions magazine*

Dr. Susan Lechelt
Lecturer in Design Informatics
susan.lechelt@ed.ac.uk

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What are probes?

- Often artefacts given to and left with people to elicit reflection about experiences
- A technique used for inspiring design
- Typically not data you necessarily "analyse", but more understandings that "inspire"

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What are probes?

A family of approaches:
- Cultural Probes (Gaver et al. 1999)
- Design Probes (Wallace et al., 2013)
- Technology Probes (Hutchinson et al., 2003)
- Empathy Probes (Mattelmäki & Battarbee 2002)
- Value Probes (Voida & Mynatt 2005)
- Design Fiction Probes (Schulte et al., 2016)
- Memory Probes (Tsai et al., 2017)

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What are probes?

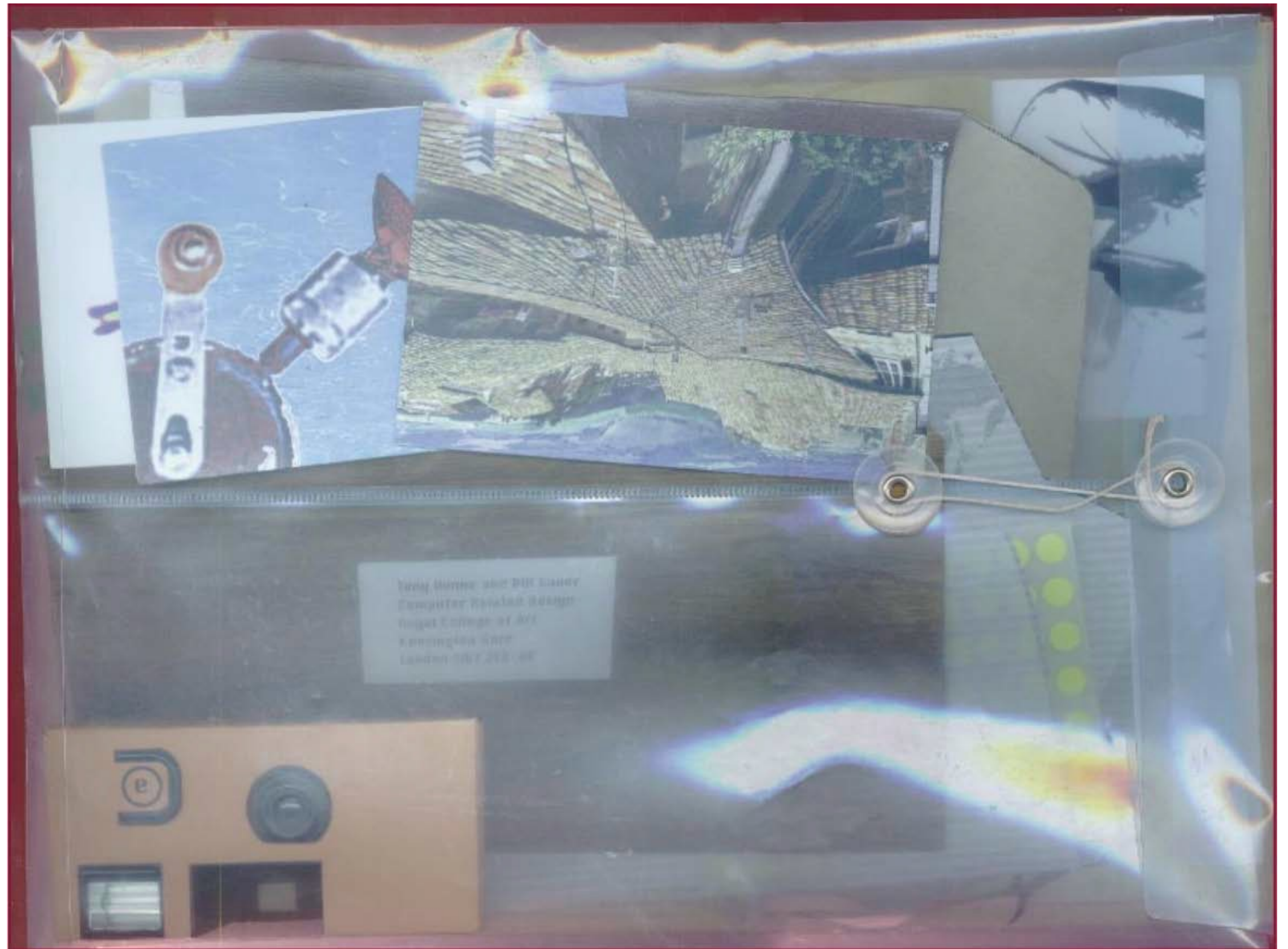A family of approaches:
- **Cultural Probes (Gaver et al. 1999)**
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Cultural Probes

- First proposed by Gaver et al. (1999)
- Group of researchers collaborating across nations (e.g., Italy, Norway, Netherlands)
- **Open-ended design brief: Increase the presence of the elderly in their local communities**
- Working with populations across distance
- Developing design responses for unfamiliar groups
- Communities all very different in terms of cultural make-up

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Cultural Probes

- Created for practical reasons
- Getting to know the communities
- Designed to provoke inspirational responses from participants

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Cultural Probes

Pack of materials with activities for participants:

- Analogue disposable camera
- Set of prompts to take photos around issues
  - e.g., Your home, something desirable, the first person you see today)
- Maps with activities
  - e.g., Map of the world, map of the local town, stickers "if Peccioli were New York"

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Cultural Probes

- Postcards with open ended questions about culture, attitude to life and technology
  - e.g., What do you dislike about your town? Tell us about a piece of insight or advice that has been important to you
- Photo album
  - Tell a visual story about your life in 6-10 photos
- Media diary
  - Record what they watched/listened to/who they spoke to on the phone

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Cultural Probes

- Participant posted completed activities back
- Get a sense of what it's like to live in a particular place at a particular time
- Foster design researchers' understanding of experience of life in communities

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Cultural Probes

Insights from Gaver et al. 1999

- **Design Brief: Increase the presence of the elderly in their local communities**
- Impressions of very different views from the three sites (Amsterdam, Netherlands; Oslo, Norway; Peccioli, Italy);
- Highlighting characteristics of the communities and the participants' relationships to the neighbourhood/geographical area

Cultural Probes

Insights from Gaver et al., 1999

- Probe responses inspired very different design proposals for each of the three groups:
  - **Amsterdam:** Strong community in a dangerous area -> Networked computer displays for communicating values about culture
  - **Oslo:** Educated and enthusiastic community -> Elders leading community-wide conversations about social issues, by publishing questions for response in public spaces
  - **Peccioli:** Relaxed community in a beautiful setting -> Social and pastoral soundscapes to amplify relaxed social life

Cultural Probes

Insights from Gaver et al., 1999

- Probe responses not sole source of inspiration for design proposals -> also site visits, pre-existing design interests, etc.

- Design proposals not the final designs -> led to continued conversation with the participants, providing room for them to reshape design ideas

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Cultural Probes

Uses in the Design Process

Returned packs not treated as "data" in traditional sense:

- Not meant for formal analysis
- More ways of inspiring design
- **"We weren't trying to reach an objective view of the elders' needs through the probes, but instead a more impressionistic account of their beliefs and desires, their aesthetic preferences and cultural concerns"**
- Understanding unobvious, idiosyncratic and real aspects of the participants' lives and personalities

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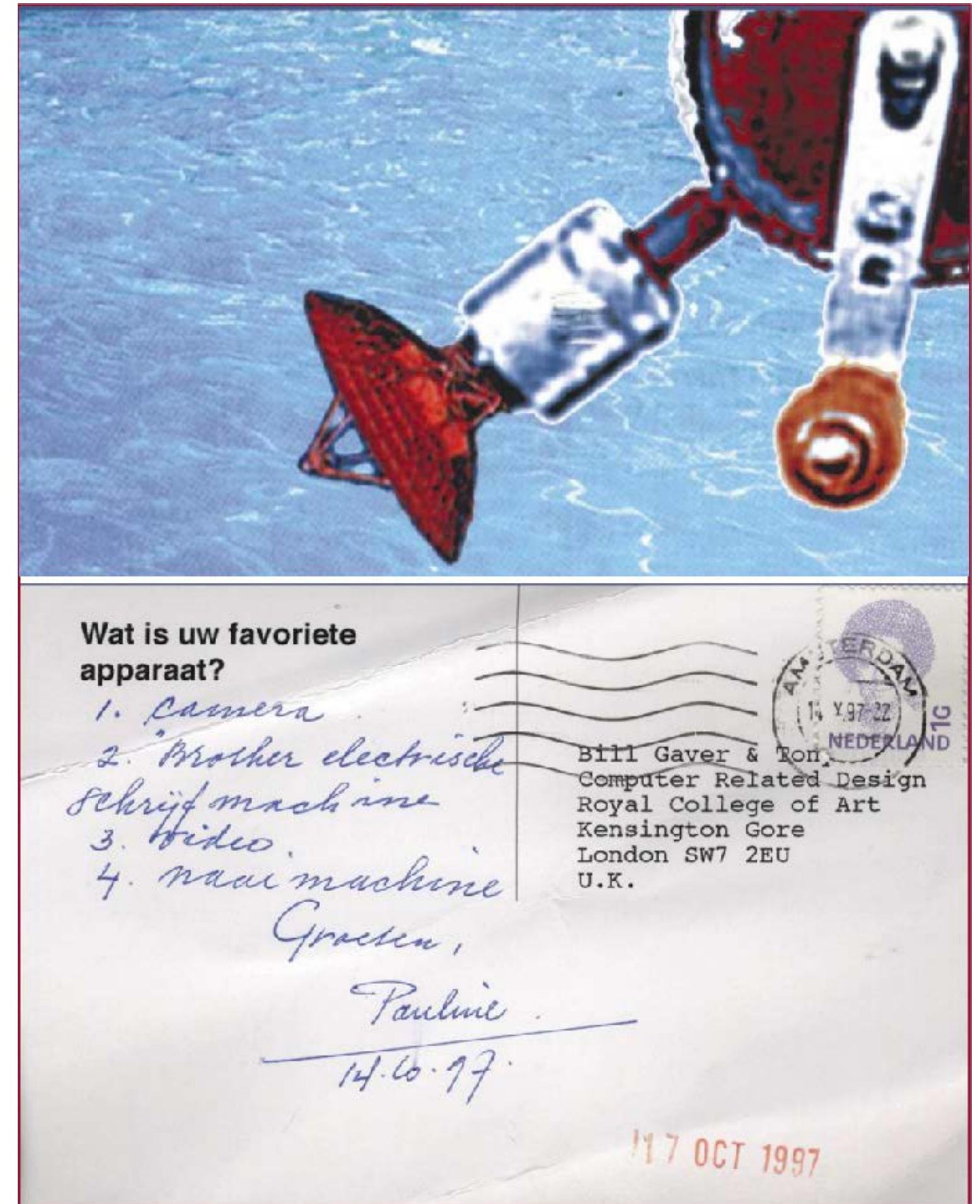
Cultural Probes

Not a "scientific" lens

From your questions:

- *How can these subjective insights be transformed into quantifiable criteria to inform and influence subsequent design?*
  Cultural probes are *not* typically aimed to be a data source you systematically analyse
- *How can we generalise from cultural probes data?*
  Not aimed to be generalisable - responses by design are idiosyncratic and tied to individuals
- *How many people to involve to achieve a reliable result? How to ensure responses are representative?*
  See above
- *Could the non-objective, interpretive feedback lead to design bias?*
  Bias and designer subjectivity is valued in probes

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Cultural Probes

Not a "scientific" lens

- Probes as 'resistance' to traditional HCI research
  - Embracing subjectivity of the designer instead of minimising or hiding it
  - Valuing the mystery of participants' responses rather than strictly focussing on verifiable user needs
  - Focussing on inspired design rather than 'usability engineering'

Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. *interactions*, *11*(5), 53-56.

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *interactions*, *6*(1), 21-29.

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Perspectives on design

- Design doesn't always have to…
  Be 'verifiable'
  Be 'generalisable'
  Be 'efficient '
   'Optimise' 'user experience'

Since the original…

- Gaver et al., 1999 cited >3,000 times
- Probes have become a family of approaches
- Used a lot in HCI, Interaction design and design practice

Design Probes
Wallace et al., 2013

- Probes have been used in a range of ways since Gaver et al.'s original paper
- Wallace et al., aimed to make sense of the dimensions of probe artefacts themselves and how they support reflection and meaning-making

Wallace, J., McCarthy, J., Wright, P. C., & Olivier, P. (2013, April). Making design probes work. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3441-3450).

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Design Probes
Wallace et al., 2013

Wallace et al.'s approach:
- Probes designed for individuals rather than groups
- Bespoke for each context or project
- Part-made objects that enable people to reveal something about themselves
- Sense-making with participants
- Designs resulting from the probes are given to the probe respondents themselves

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Design Probes
Wallace et al., 2013

Importance of:
- Balancing openness and boundaries
- Materiality of the probe
- Inviting co-creation
- Designing for pace and challenge
- Valuing relationships and reciprocity

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Design Probes

Openness and boundaries

- Probes should be open enough that the participant is able to share what they feel appropriate
- But also providing boundaries to respond within

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Design Probes

Openness and boundaries

Self-Tree:
- Oval discs attached to a branch, task to use discs to explain people important to the participant's identity

Openness and boundaries:
- What to include on the oval discs is open ended
- Size of writable space provides boundaries for what can be written down / focus on what's most important
- Number of discs available gives a sense of when the task is finished (opposed to, e.g., a large notebook)

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Design Probes
Materiality

The materiality (physical design) of the probe is important - can frame questions in a particular way

Self-Tree
- Locket-like shape provides metaphor of piece of jewellery one keeps close to their heart
- Tree branch implies organic interconnection between the discs

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Design Probes

Inviting co-creation through unfinished and un-polished objects

- Inviting co-creation
- Probes as unfinished objects
- Not overly polished

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Design Probes

Inviting co-creation through unfinished and un-polished objects

Pillow
- Invites people to write on object
- Not looking too polished and complete (e.g., researchers' handwritten note as a prompt instead of embroidery)
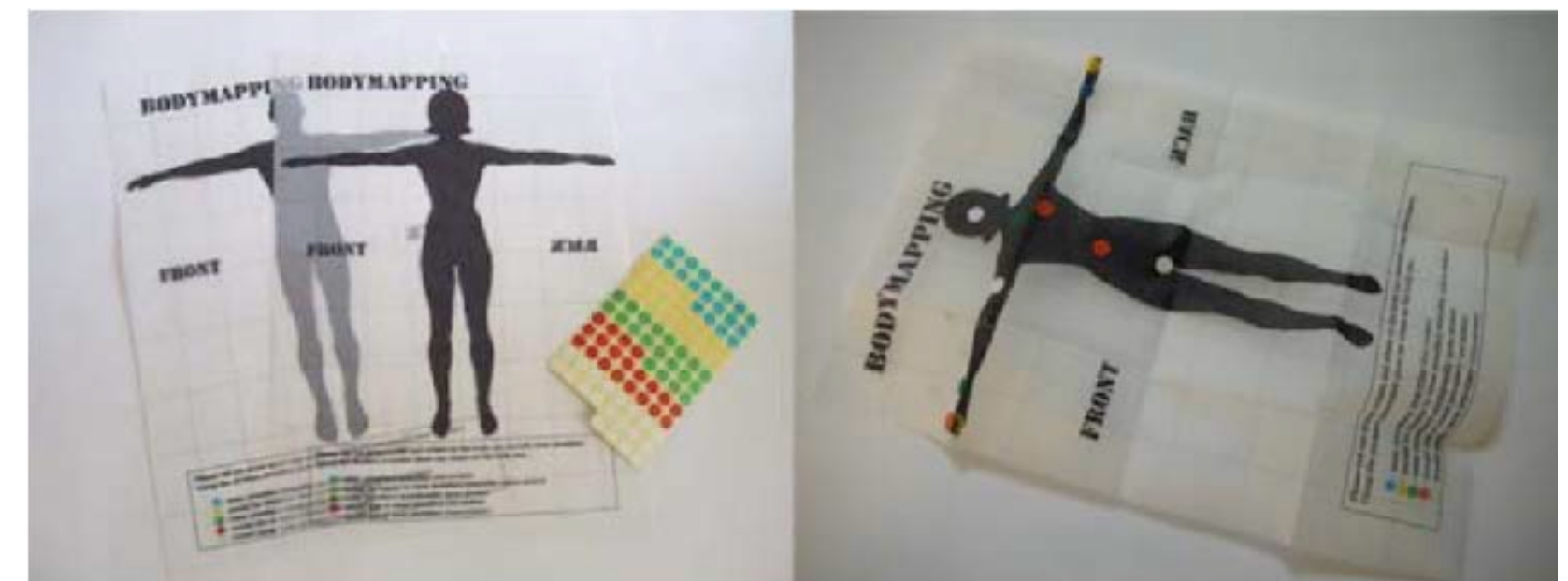

(Left) Handwritten text on pillow: "Please tell me about a dream"
(Middle and Right) Fold-out fabric: To be written on by participant

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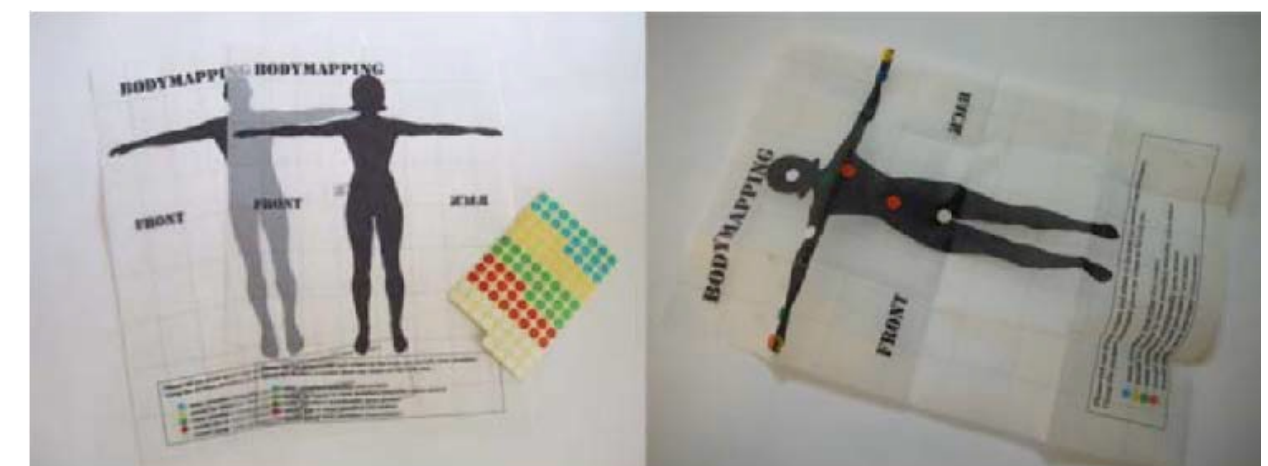
Design Probes

Pace and challenge

- Left for weeks/months
- Slowness to encourage deep reflection and space to think
- Probes with multiple units: can be completed over time
- Consider mixing faster, light weight probes with ones that require a bit more thought
- Multiple probes: approaching problem from different lenses, but also so people can engage with what they gravitate towards

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Design Probes
Relationships and reciprocity

- Importance of building a relationship with participants
- Co-creation of objects - a way of building a relationship and shared understanding
- Importance of benefit to the participant
- Using the probes as conversational instruments to reflect with the participant

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A design-led inquiry into personhood in dementia

Wallace et al., 2013

- Focussed on one couple, Gillian (living with dementia) and her husband John
- Design focussed on addressing Gillian's relationships in family life, and the progression of her illness, and how these could be mediated through technology
- Set of 10 probes: Camera, Self-tree, Personal Treasures, Self-Seeds, Pearls of Wisdom, and more...

Wallace, J., Wright, P. C., McCarthy, J., Green, D. P., Thomas, J., & Olivier, P. (2013, April). A design-led inquiry into personhood in dementia. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 2617-2626).

A design-led inquiry into personhood in dementia

Wallace et al., 2013

"**Preserves** comprised three small jars with the question: If you could capture anything (for instance any moment, sound, song, smell, view, object, place…) and preserve it in this jar for you to relive what would you choose? The label could be used to describe the choice (through writing or drawing on it) and/or something could be placed inside the jar to represent their choice"

"**Home** was a small wooden house with a note asking: tell me what home means to you personally (for instance home-like feelings, places, aesthetics, words and objects). Gillian and John were asked to use the object however they saw fit (e.g. to draw or stick anything onto or into it)."

"**Personal Treasures:** a tin with soft clay inside. Gillian and John were asked to make indentations in the clay of objects that are meaningful to them."

Wallace, J., Wright, P. C., McCarthy, J., Green, D. P., Thomas, J., & Olivier, P. (2013, April). A design-led inquiry into personhood in dementia. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 2617-2626).

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A design-led inquiry into personhood in dementia

Wallace et al., 2013

Helped designers understand what Gillian and John valued:
- The home as a sanctuary and place of comfort and familiarity
- Gillian's caring nature and the value she placed on her relationships
- Gillian's personality, sense of humour and fun

Wallace, J., Wright, P. C., McCarthy, J., Green, D. P., Thomas, J., & Olivier, P. (2013, April).
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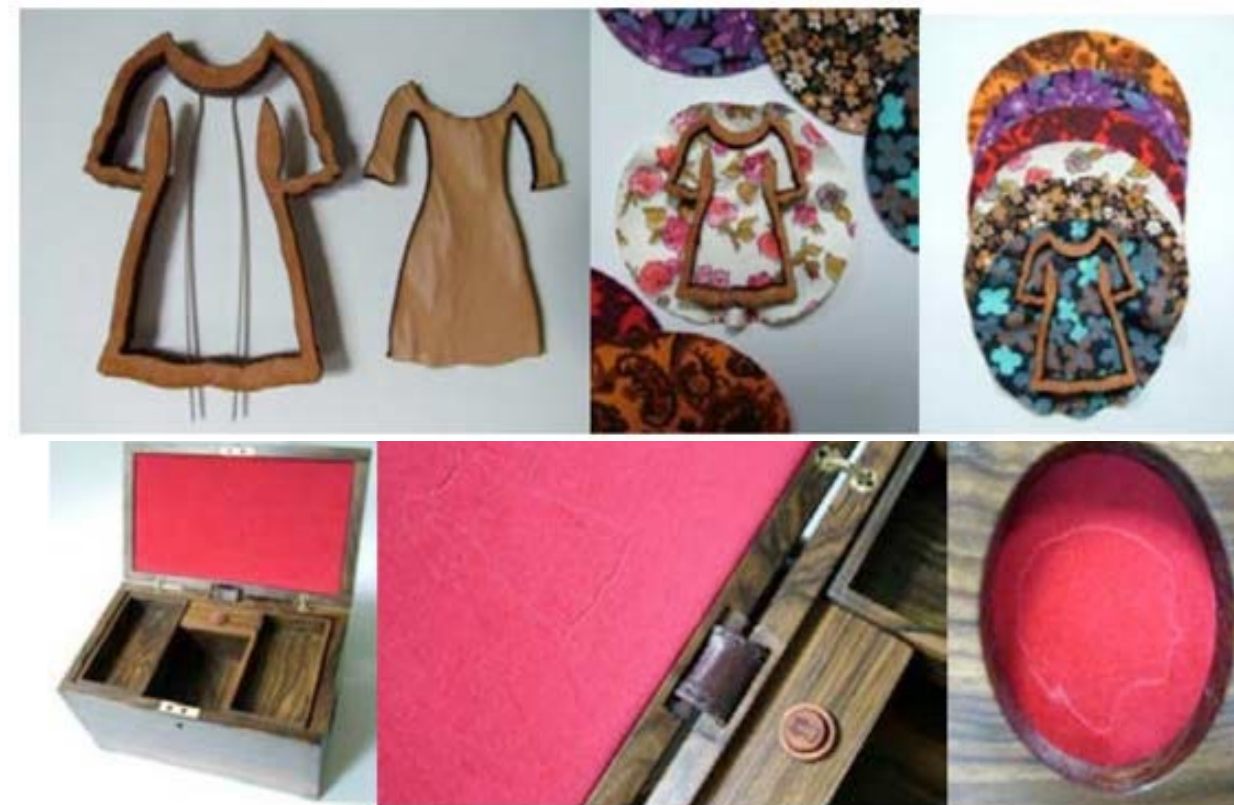# A design-led inquiry into personhood in dementia

Wallace et al., 2013

Led to the design of three objects, bespoke for Gillian and John:

Locket
Displays a different digital image each time it is opened

Cloud Watcher Necklace
Non-digital artefact inspired by Gillian's sense of humour and fun
Necklace that wobbles and has a spyglass through which everything looks like a cloud

Dress Brooch and Jewellery Box
Brooches with fabric from dresses Gillian wouldn't be able to wear again; The fabric is augmented with RFID tags, so that Gillian and her family can record sound associated with the dresses that could be played back with the jewellery box

Wallace, J., Wright, P. C., McCarthy, J., Green, D. P., Thomas, J., & Olivier, P. (2013, April). A design-led inquiry into personhood in dementia. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 2617-2626).

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Student question

"Could you use similar methodology to this to design a 'technological probe'? That is, using it to gather insights about how people use the items themselves in their daily lives - either as a way of testing out new technology, or existing technology with a specific group of people?"

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Technology Probes
Hutchinson et al., 2003

- Quite a different example than cultural probes and design probes
- An extension of cultural probes, to be used alongside them or at a different stage of the design process
- Uses novel functionality of technology to probe everyday practices and how technology might change them
- Inspiring thinking about new technologies

Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B. B., Druin, A., Plaisant, C., ... & Eiderbäck, B. (2003, April). Technology probes: inspiring design for and with families. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 17-24).

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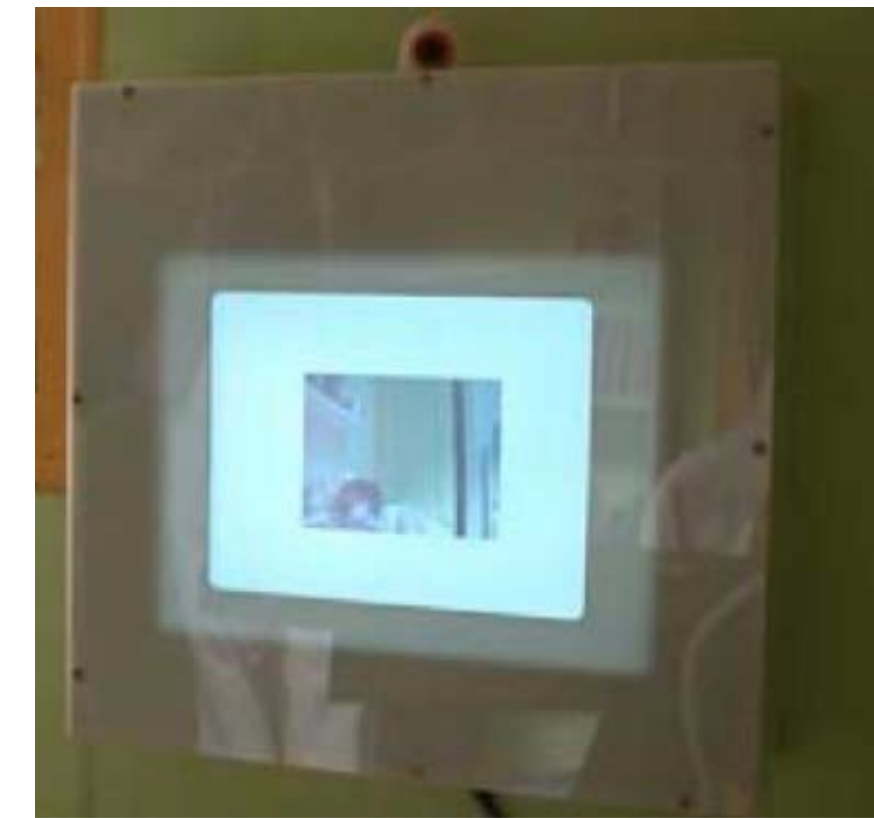design informatics

Technology Probes

Hutchinson et al., 2003

- Aimed at discovering how a new technology might enable new behaviour/interactions
- Typically functionally simple
- Limited functionality
- Not focussed on usability but novel experiences
- Should be open ended in how they can be used

Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B. B., Druin, A., Plaisant, C., ... & Eiderbäck, B. (2003, April). Technology probes: inspiring design for and with families. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 17-24).

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Technology Probes

Hutchinson et al., 2003

- "New" technologies to support communication among diverse, distributed, multi-generational families
- Wanted families to inspire and shape technologies (rather than just testing)
- Two probes:
  - **Message Probe:** Communicating via post-its on a zoomable screen with a tablet and pen
  - **Video Probe:** Video camera that takes and shares images if a still image is detected, among family members in different households

Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B. B., Druin, A., Plaisant, C., ... & Eiderbäck, B. (2003, April). Technology probes: inspiring design for and with families. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 17-24).

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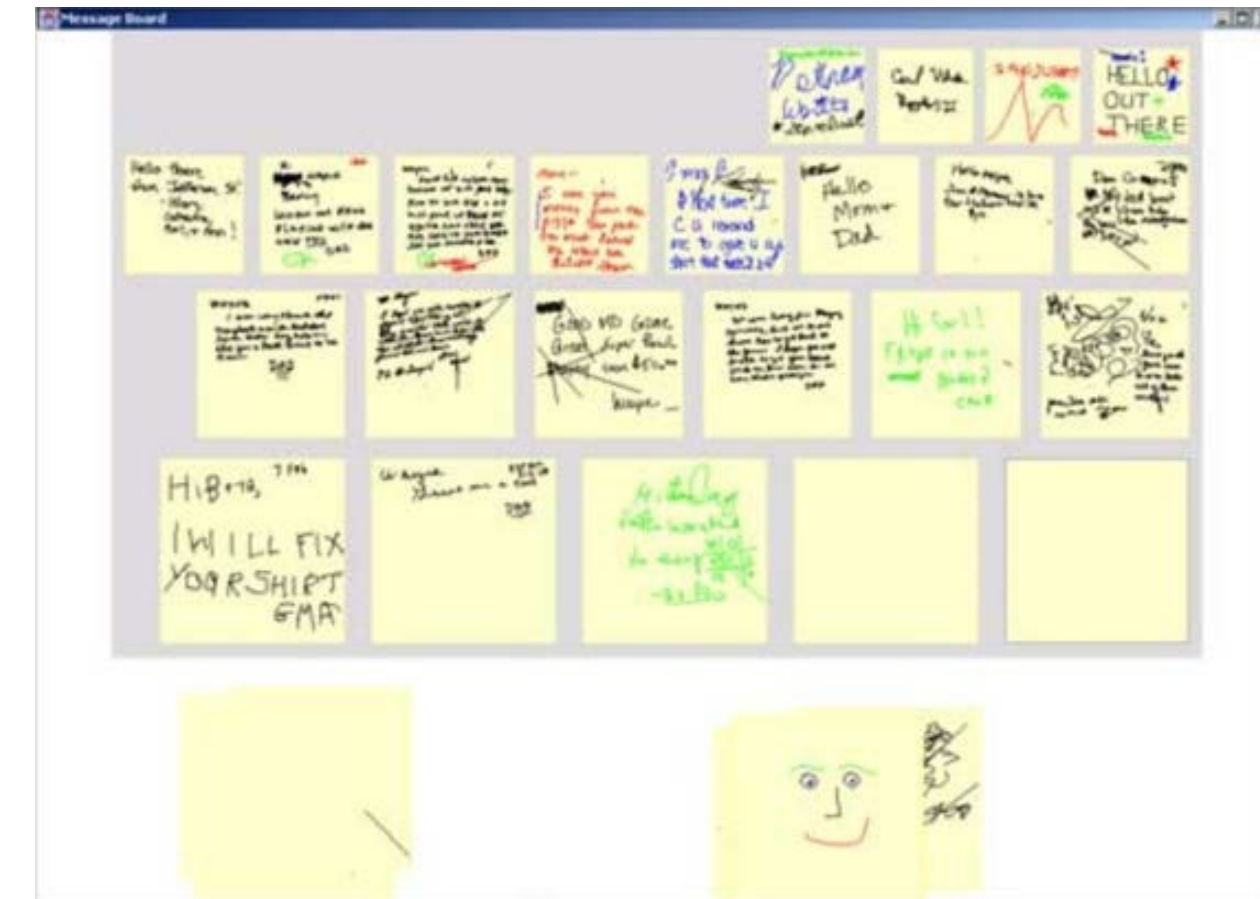
Technology Probes

Hutchinson et al., 2003

- Revealed different communication patterns between different members of families, wants and needs (e.g., keeping track of schedules, keeping track of people, not keeping track at all)
- Importance of playfulness, sharing of minor news and feelings
- Necessity of delete function, notifications to support coordination and awareness
- Some deployments were also followed up with interviews and co-design workshops with the participants

Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B. B., Druin, A., Plaisant, C., ... & Eiderbäck, B. (2003, April). Technology probes: inspiring design for and with families. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 17-24).

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Technology Probes

Hutchinson et al., 2003

- Similar principles to other forms of probes:
  - Balancing openness and boundaries
  - Leaving probes over a period of time
  - Physical design - e.g., affordances, metaphors - can be important

Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B. B., Druin, A., Plaisant, C., ... & Eiderbäck, B. (2003, April). Technology probes: inspiring design for and with families. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 17-24).

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Student question

"I wonder how probes can be integrated with design informatics. Are they used as part of the user stories in the earlier design process?"
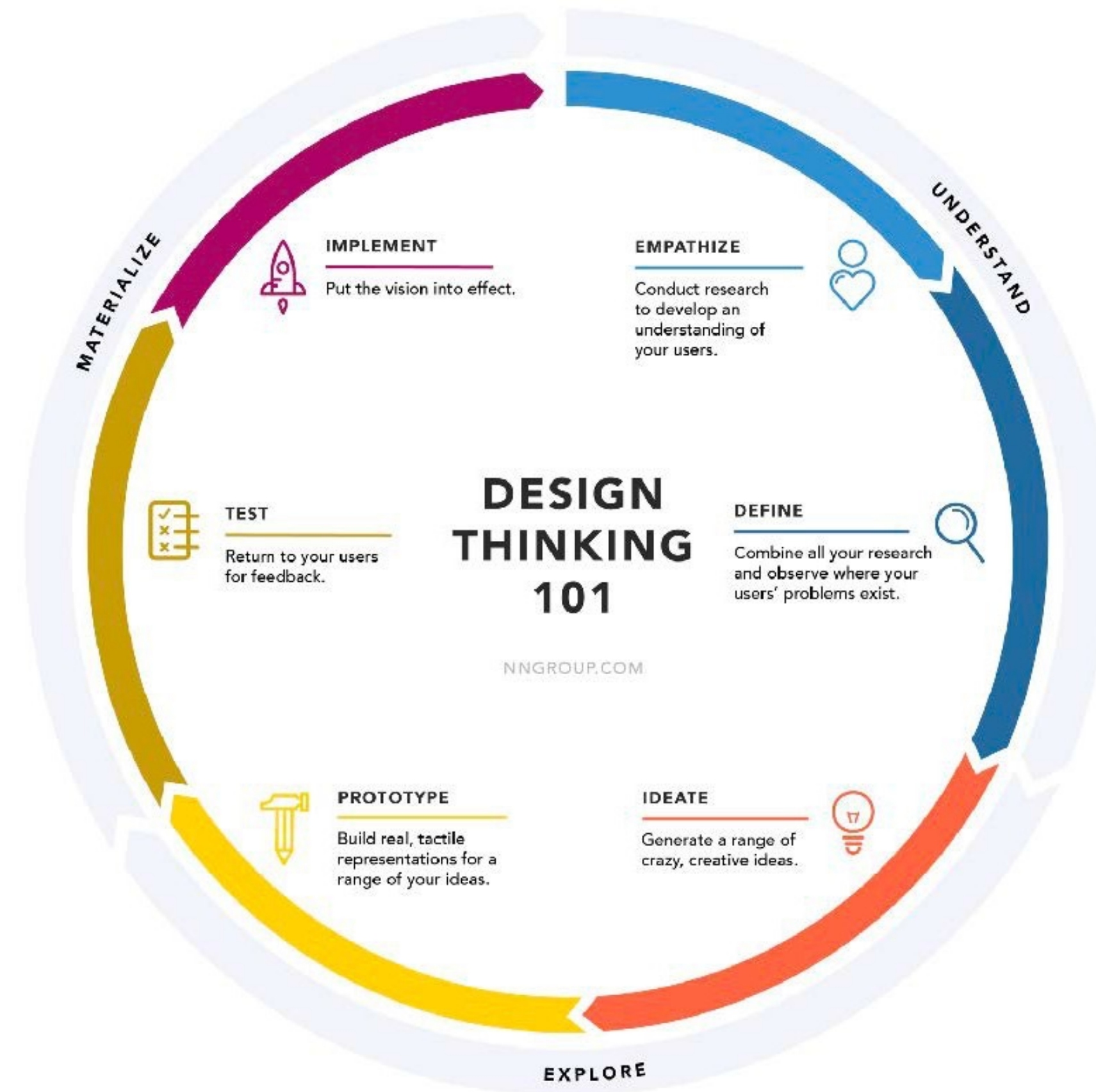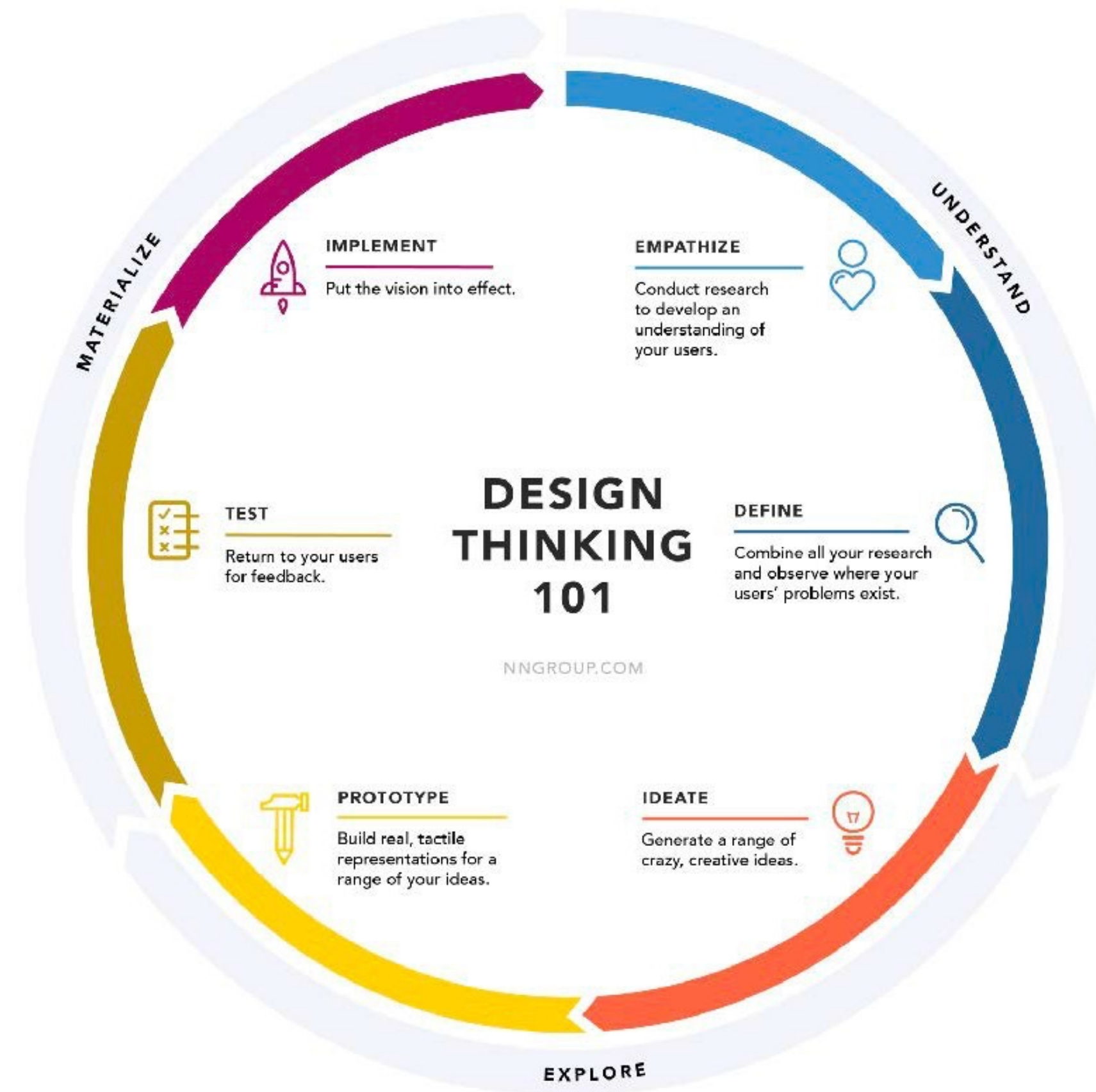
Where do probes fit into the design process?

Think (1 min)

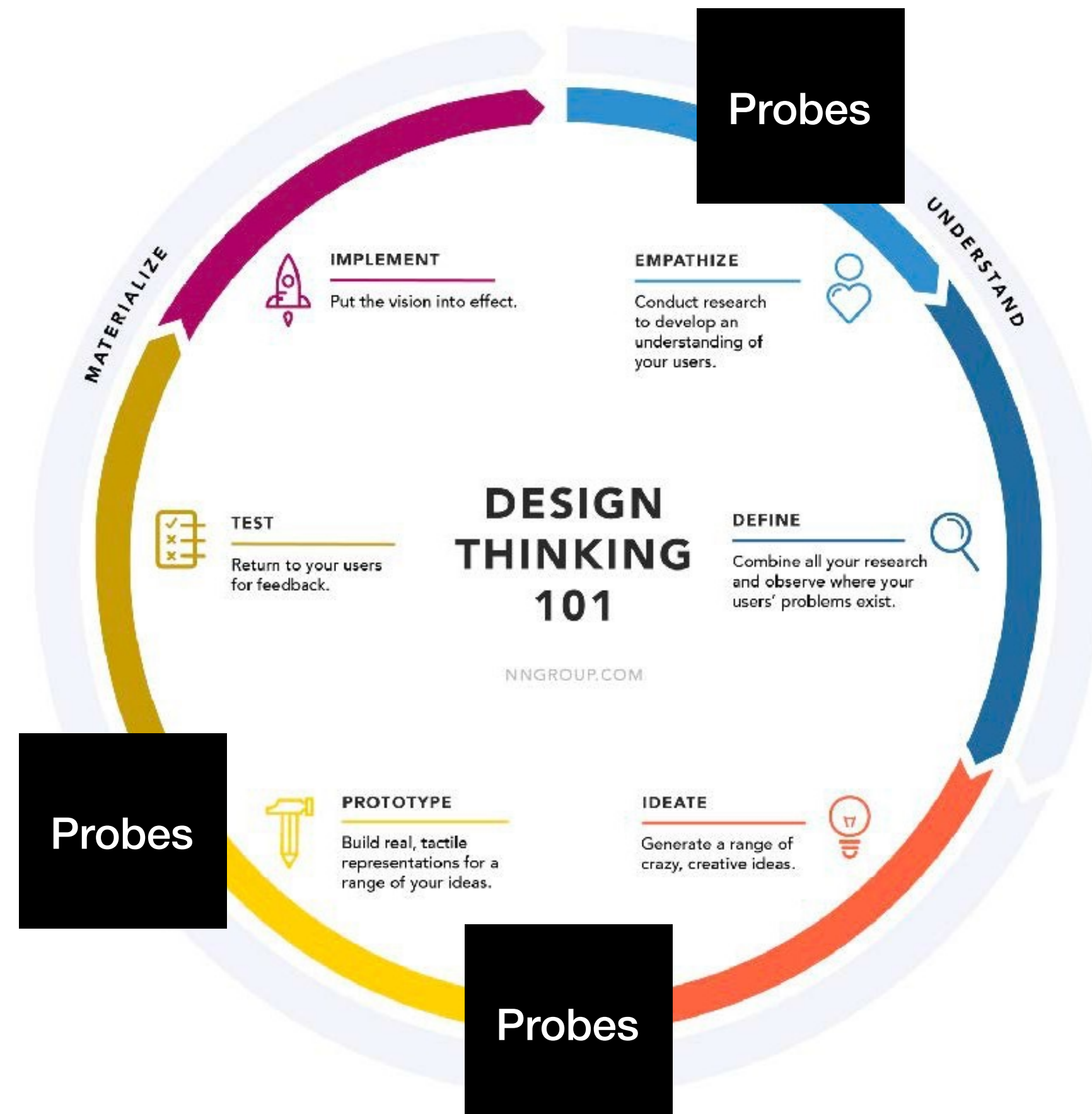# Where do probes fit into the design process?

Pair (2 min)

Where do probes fit into the design process?

IMPLEMENT
Put the vision into effect.

EMPATHIZE
Conduct research to develop an understanding of your users.

TEST
Return to your users for feedback.

DESIGN THINKING 101

DEFINE
Combine all your research and observe where your users' problems exist.

NNGROUP.COM

PROTOTYPE
Build real, tactile representations for a range of your ideas.

IDEATE
Generate a range of crazy, creative ideas.

MATERIALIZE

UNDERSTAND

EXPLORE

Where do probes fit into the design process?

Probes

Probes

Probes

IMPLEMENT
Put the vision into effect.

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DESIGN THINKING 101

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DEFINE
Combine all your research and observe where your users' problems exist.

PROTOTYPE
Build real, tactile representations for a range of your ideas.

IDEATE
Generate a range of crazy, creative ideas.

Discussion

When in design to use probes

- Probes can be used *instead of* other "traditional" methods for empathising with people
- Can also be integrated alongside other methods - e.g., interviews, or co-design workshops
- Interpretation could also be made participatory, e.g., probe respondents helping interpret the responses

Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007, April). How HCI interprets the probes. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 1077-1086).

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Student question

"How do the results actually differ in a positive way from potentially more traditional methods? And how could the results be evaluated more effectively and rigorously?"

The art and the science of Design Informatics

- Design research can but doesn't always involve scientific method
- Inspiration can be just as important as data
- Method depends on the goals:
  - Sometimes we want design research to be reliable, generalisable, and to minimise subjectivity
  - Sometimes we want to be creative, and develop interesting design responses that link to people's subjective experiences

The art and the science of Design Informatics

"**People seem unsatisfied with the playful, subjective approach embodied by the original Probes, and so design theirs to ask specific questions and produce comprehensible results.** They summarize the results, analyze them, even use them to produce requirements analyses. Appropriating the Probes into a scientific process is often justified as "taking full advantage of the Probes' potential," as if, by not analyzing the results of our original Probes, we had let valuable information slip away.

But this misses the point of the Probes. Sure, they suggested that research questions could be packaged as multiple, rich, and engaging tasks that people could engage with by choice and over time. Beyond this, however, the Probes embodied an approach to design that recognizes and embraces the notion that knowledge has limits. **It's an approach that values uncertainty, play, exploration, and subjective interpretation as ways of dealing with those limits**"

- Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. *interactions*, *11*(5), 53-56.

The art and the science of Design Informatics

"**They create relationships with our volunteers that are a little like designing for friends: We know them well, but that doesn't mean we know exactly what we should make for them.** Nonetheless, their familiarity serves as a reminder of the actualities for which we are designing, and allows us to imagine our proposed systems in real homes.

[…] **We freely admit that the responses they elicit are not necessarily accurate or comprehensive, and that they seldom give clear guidance to the design process.** Nonetheless, the Probes have been an invaluable part of our design process, and without them we would not have produced the designs we have."

- Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. *interactions*, *11*(5), 53-56.

Value of probes

- Can be more engaging and enjoyable to participants than surveys and interviews
- Support deep reflection
- Participants can choose what level of detail to share and what to remain private
- Valuable for "intimate, idiosyncratic, personal issues"
- Playful and experimental

Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007, April). How HCI interprets the probes. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 1077-1086).

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Are there any ethical considerations in using probes if they elicit personal and emotional responses?

- Gaining informed consent important, as with all research
- Ensure participants can choose what level of detail to share and what to remain private
- This can be helped by designing tasks that are ambiguous / open-ended
  - E.g., instead of "take a photo of your medicine cabinet" - "take a photo of the 'health centre' in your home"
- Don't require participants to always have to return all tasks
- Rapport between designers and participants can be helpful

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Practical ethics issues

Gain informed consent including:

- What participants will be asked to do
- What data will be collected and what it will be used for
- If/how the data will be kept confidential
- Who data will be shared with and how it will be stored
- Tell them it's ok to drop out, and inform them how they can ask their data to be deleted

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What to include in a probe kit?

From probetools.net (Interaction Research Studio, Northumbria University):

"We usually include 6 - 15 separate items in a Probe packet.   There are many reasons for this; multiple tasks:
- can gather different kinds of information
- tend to be more engaging for participants
- play to volunteers' strengths and interests
- allow participants to choose which tasks to do
- can vary in their degree of playfulness v. focus
- allow some to fail without destroying the study"

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What to include in a probe kit?

- "Probes-as-a-recipe" approach
  - Many probe studies have used a similar 'recipe' as in Gaver's original work - e.g., camera, postcards, diary, maps, instructions or questions
  - But this can lose some of the richness of designing probes to a particular context
  - Designers are encouraged to stray from the original "recipe" and consider what activities might be interesting, insightful, and appropriate to a given design context and brief

Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007, April). How HCI interprets the probes. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 1077-1086).

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How to design a probe kit?

- Based on Wallace's research:
  - Experiment with materiality, affordances and metaphors
  - Make the tasks open-ended, but bounded to a given focus
  - Experiment with pace - some tasks can be short and quick, and others longer, requiring more reflection
  - Make them valuable to the person

How to ensure people don't get bored/return all the probes?

- Timespan - often done over time
- Make it relevant and fun - valuable to the participant
- Not too professionally finished; informal -> license to adapt and play
- Don't require all probes to be completed

Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. interactions, 11(5), 53-56.

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How NOT to do probes

- Instead of asking unambiguous questions, favour open/absurd/ambiguous/mysterious tasks that are likely to be surprising
- Don't feel the need to summarise data to try to understand the "average" - focus on understanding individuals well, and on unusual responses that might be inspiring

Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. interactions, 11(5), 53-56.

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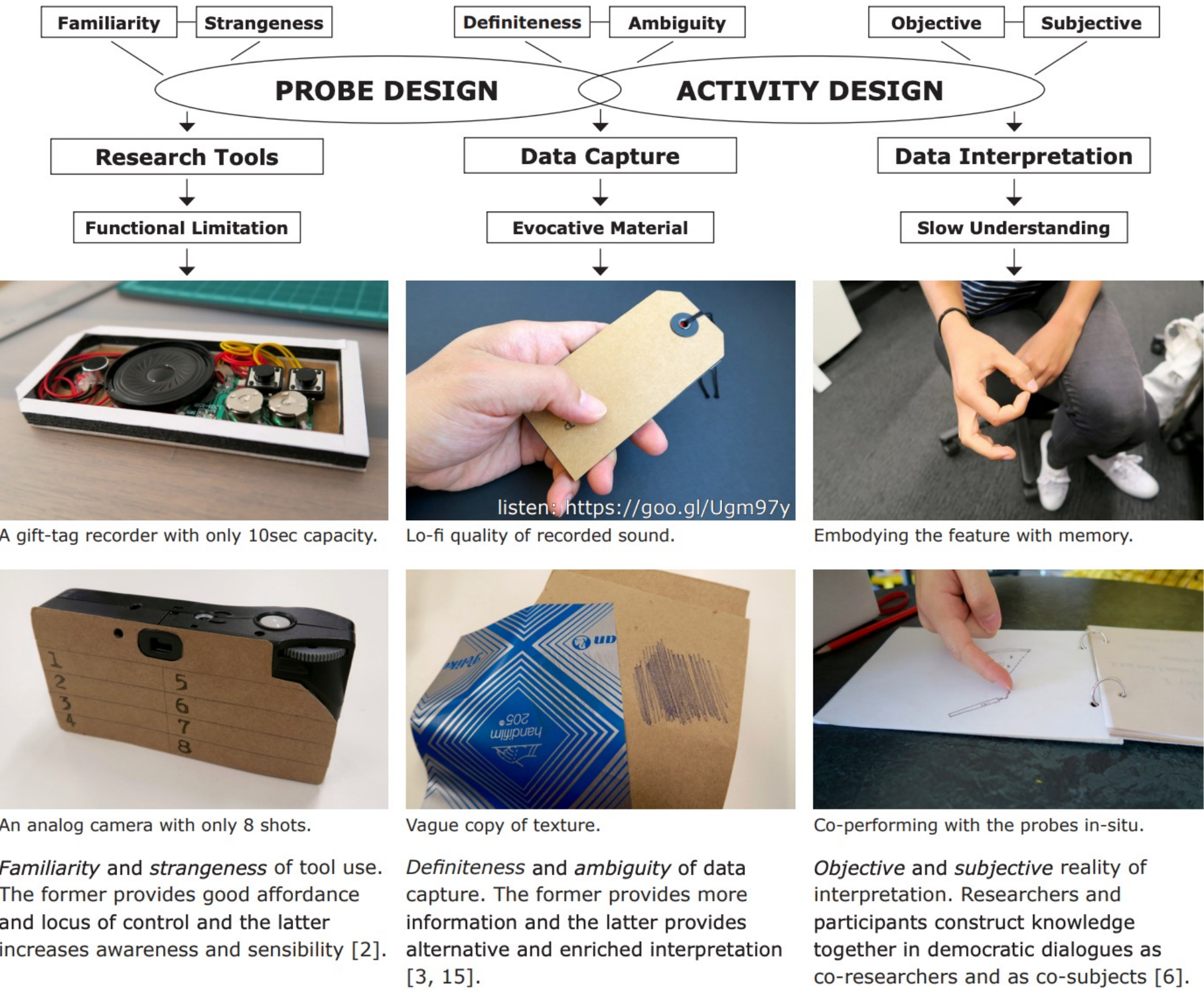# Can it be useful to implement this method in digital research?

- Some have explored how to adapt probes to online settings (see Golmohammadi, 2022).
- Important to keep in mind the design considerations of probes: e.g., pace and challenge, openness, materiality (or online -> aesthetic design, metaphor)
- Pros:
  - Can be cheaper and less time-intensive to make than physical probe kits
  - Can sometimes be adapted during deployment
- Cons:
  - Might exclude people without digital access, or without digital confidence
  - Don't have the materiality of physical probes (although could use a hybrid approach)

Golmohammadi, L. (2022). How to use online probes for social science research. SAGE Publications, Ltd. Chicago

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Documenting probes

Design Rationale

We aimed to create activities and materials that not only elicited inspirational responses from participants, but also engaged with them through meaningful interactions in which their personal preferences and personhood could manifest. Intrinsically, we attempted to explore how they determined what was important and why.

We created pairs of values to guide the design process of both the probe materials and the activities conducted with participants. Through adopting the participatory inquiry paradigm, we as *co-subjects* were reflexively involved in the constructive design research just as our participants were. The Memory Probes were also materials for our own empathetic engagement in dialogue with the participants. In other words, the Memory Probes were our cherished objects. The traces left by participants on the probes were entrances into their life stories.

A gift-tag recorder with only 10sec capacity.

Lo-fi quality of recorded sound.

Embodying the feature with memory.

An analog camera with only 8 shots.

Familiarity and *strangeness* of tool use. The former provides good affordance and locus of control and the latter increases awareness and sensibility [2].

Vague copy of texture.

Definiteness and *ambiguity* of data capture. The former provides more information and the latter provides alternative and enriched interpretation [3, 15].

Co-performing with the probes in-situ.

Objective and *subjective* reality of interpretation. Researchers and participants construct knowledge together in democratic dialogues as co-researchers and as co-subjects [6].

Tsai, W. C., Orth, D., & Van Den Hoven, E. (2017, June). Designing memory probes to inform dialogue. In *Proceedings of the 2017 Conference on Designing Interactive Systems* (pp. 889-901).

Miro

- **You are designing new smart home systems to support feelings of comfort for those living in non-stereotypical homes - e.g., vans, houseboats, converted barns, cooperatives and others.**

- Work in a small group (2-4 people) to come up with two probe tasks you might use:
  - One cultural/design probe task (10 mins)
  - One technology probe task [hint: think about what new/emerging interactions with smart home technologies might be interesting to explore] (10 mins)

- Consider how to make the activities fun, ambiguous, surprising and insightful for this context.

- Consider how they balance openness/boundaries, materiality and pace.

- https://miro.com/app/board/uXjVLGmeLYE=/?share_link_id=170789919834

A few more references

- Gaver, W. W., Boucher, A., Pennington, S., & Walker, B. (2004). Cultural probes and the value of uncertainty. interactions, 11(5), 53-56.
- Noortman, R., Schulte, B. F., Marshall, P., Bakker, S., & Cox, A. L. (2019, May). HawkEye-Deploying a Design Fiction Probe. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (pp. 1-14).
- Schulte, B. F., Marshall, P., & Cox, A. L. (2016, October). Homes for life: a design fiction probe. In *Proceedings of the 9th nordic conference on human-computer interaction* (pp. 1-10).
- Voida, A., & Mynatt, E. D. (2005, April). Conveying user values between families and designers. In *CHI'05 extended abstracts on Human factors in computing systems* (pp. 2013-2016).
- https://www.interaction-design.org/literature/topics/cultural-probes

Pre-work for next week:

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. Co-design, 4(1), 5-18. https://doi.org/10.1080/15710880701875068