Reflection

Xi Lu and Jong Ho Lee

Reflecting on Reflection: Framing a Design Landscape

Senior User Researcher
Energy Systems Catapult
Sep 2019 – Present · 6 mos
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Lecturer in Human Computer Interaction
The University of Birmingham
Apr 2015 – Sep 2019 · 4 yrs 6 mos

Researcher/Lecturer
University College London
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Amberlight UX
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Research Fellow
University of Sussex
Sep 2007 – Jan 2011 · 3 yrs 5 mos

Rowanne Fleck

University of Sussex
(2002-2007)

Thesis: Exploring the Potential of Passive Image Capture to Support Reflection on Experience. Looking at how images automatically captured by SenseCam could support teachers' reflection on practice.

Geraldine Fitzpatrick

Professor of Technology Design and Assessment and heads the Human Computer Interaction Group at TU Wien

Her research is at the intersection of social and computer sciences to support social interaction using mobile, tangible and sensor-based technologies in everyday contexts, with a particular interest in supporting collaboration, health and well-being, social and emotional skills learning, community building and active engagement for older people.

What is Reflection: "*serious thought or consideration*" (in Oxford English Dictionary)

Technology support for learning and play: "a *generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations*" (p19, Boud et al., 1985)

Support for reflective practitioners: " *'thinking about' which enables a kind of problem solving involving the construction of an understanding and reframing of the situation to allow professionals to apply and develop the knowledge and skills of their profession.*" By Donald Schön's work (1983)

Reflective design: "*combines analysis of the ways in which technologies reflect and perpetuate unconscious cultural assumptions, with design, building, and evaluation of new computing devices that reflect alternative possibilities*" by Sengers et al. (2005)

Health: *self-reflection, promoting healthy behaviour change* (e.g. Anderson et al., 2007) as well as *promoting greater awareness and learning to self-manage chronic conditions* (Mamykina et al., 2008).

A FRAMEWORK OF REFLECTION

Purposes of Reflection: learning and the material for further reflection; action or other representation of learning; reflection on the process of learning; critical review; the building of theory; self-development; decisions or resolutions of uncertainty; empowerment or emancipation; and other outcomes that are unexpected – images or ideas that might be solutions

Conditions for Reflection (the right environment for reflection): 1. **Reflection takes time**: therefore creating or allowing time for reflection is essential; 2. **Reflection is a developmental process**: people can learn to be more reflective over time and with support; 3. **Reflection needs a reason to reflect or at least encouragement to do so** because it is time consuming and not necessarily something that comes naturally to people in all situations

Levels of Reflection (five different levels, R0 (the lowest) to R4 (the highest))

A FRAMEWORK OF REFLECTION (-continue)

Levels of Reflection (five different levels, R0 (the lowest) to R4 (the highest)):

1. **R0 Description: Revisiting**. Description or statement about events without further elaboration or explanation. Not reflective.

2. **R1 Reflective Description: Revisiting with Explanation**. Description including justification or reasons for action or interpretation, but in a reportive or descriptive way. No alternate explanations explored, limited analysis and no change of perspective.

3. **R2 Dialogic Reflection: Exploring Relationships**. A different level of thinking about. Looking for relationships between pieces of experience or knowledge, evidence of cycles of interpreting and questioning, consideration of different explanations, hypothesis and other points of view.

4. **R3 Transformative Reflection**: Fundamental Change. Revisiting an event or knowledge with intent to re-organise and/or do something differently. Asking of fundamental questions and challenging personal assumptions leading to a change in practice or understanding.

5. **R4 Critical Reflection: Wider Implications**. Where social and ethical issues are taken into consideration. Generally considering the (much wider) picture.

Techniques for Supporting Reflection:

1. **Supporting R0: Technology for Revisiting**. Providing informational resources for reflection. Technology can be used as the tool through which knowledge and experience is **record**ed in a direct extension to the non-technology techniques above
2. **Supporting R1: Technology to Prompt Explanation**. Providing justifications or explanations for knowledge, events or one's actions. **Reflective question**s can be incorporated in various ways to technology to promote this aspect of reflection; annotation technologies could promote reflection through the use of reflective questioning
3. **Supporting R2**: Technology to See More. A questioning of events or knowledge, and a consideration of different explanations, hypotheses or points of view. Encouraged through the use of techniques that can enable the '**seeing of things from multiple perspectives**': produce a record of events which can be looked at again; allow you to see more than you could possibly see alone; look back on data; encourage much more contemplative reflection; share with others to get others' perspective
4. **Supporting R3 & 4: Transformation**. Resources available for reflection are engaged with at **deep levels**. These levels are much more about what people are doing with the information for change and transformation, i.e., more as internal processes.

The SenseCam in the classroom setting for reflection:

R0: as a record to revisit.

R1: The record can provide explanations and justifications for observed events.

R2: the recorded images support seeing from another perspective : remind participants of things they had forgotten or had not noticed at the time; notice patterns only observable through taking a step back from immediate events; capture things they literally could not see at the time (for example what went on behind their backs); participants could shared their different perspectives on events in the classroom.

*images from

https://www.sciencedirect.com/science/article/pii/S1071581909001268

Design for Reflection:

Ask yourself the following questions when you want to design technologies that support reflection.

1. **What is the purpose for the reflection?**
2. **What reflective behaviours do you want to encourage? Which technologies and techniques can support these behaviours?**
3. **Are the conditions for reflection (time, structure, encouragement) being met?**

Supporting Meaningful Personal Fitness: the Tracker Goal Evolution Model

Jasmin Niess

Postdoctoral Researcher
HCI Research Group
University of Luxembourg
(Luxembourg)

- Just finished her Ph.D at LMU Munich
- Currently a postdoctoral researcher at University of Luxembourg
- Also has background in Psychology (M.S. - University of Vienna)
- Areas: interaction design, user experience design, user experience evaluation, consumer behaviour

Pawel W. Wozniak

Assistant Professor
Information and Computing Sciences
Utrecht University
(Netherlands)

- Paper was published when he was a postdoctoral fellow at the University of Stuttgart.
- Ph.D from Human-Computer Interaction from Chalmers University of Technology in Gothenburg
- Main interest: mobile interaction, designing technology for sports, persuasive technology.

Background: Models of Personal Informatics

Staged-based Model of Personal Informatics: Defines personal informatics systems and sketches 5 stages to model behaviour (Preparation, Collection, Integration, Reflection, Action) (Li et al., 2010)

Lived Informatics and the Lived Informatics Model: Rooksby et al. identified different tracking styles under each felt lives of users. The Lived Informatics Model describes cycles of personal tracker use; extended Li et al.'s previous model by considering returning users after lapsing (Epstein et al., 2015)

How does this fit in?: Authors focused on understanding goals to help users in the tracking and acting phase in the Lived Informatics Model.

Background: Hedonic and Eudaimonic Well-being

Hedonic:

adjective

1. of, characterizing, or pertaining to pleasure: *a hedonic thrill.*
2. pertaining to hedonism or hedonics.

Eudaimonic:

adjective

1. producing happiness
2. based on the idea of happiness as the proper end of conduct

Background: Research in psychology regarding well-being

Research on well-being are from the following two perspectives:

Hedonic Approach: *"focuses on happiness and defines well-being in terms of pleasure attainment and pain avoidance"* (Ryan and Deci, 2001)

Eudaimonic Approach: *"focuses on meaning and self-realization and defines well-being in terms of the degree to which a person is fully functioning"* (Ryan and Deci, 2001)

Hedonia and eudaimonia are complementary psychological functions (Huta, 2015), not opposites.. But current state of the literature does not agree on a single conceptualisation of hedonia and eudaimonia (Huta and Waterman, 2014).

Source: Richard M Ryan and Edward L Deci. 2001. On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. Annual review of psychology 52, 1 (2001), 141–166

Background: Research in psychology regarding well-being

The Hedonic View:

- Aristippus (Greek philosopher in the fourth century B.C.) states that the goal of life is to obtain the maximum amount of pleasure.
- Psychologists looking at well-being through a hedonistic view focuses on pleasures of the mind and body.
- Kahneman et al (1999) defines hedonic psychology as “what makes experiences and life pleasant and unpleasant”
- Subjective well-being (SWB) (Diener and Lucas, 1999) summarizes happiness with three components: life satisfaction, presence of positive mood, absence of negative mood.

The Eudaimonic View:

- Aristotle considered hedonic happiness as a “vulgar” ideal, proposed that true happiness is found in doing what is worth doing.
- Fromm (1981) argues that optimal well-being requires distinguishing subjective desires and objectively valid needs (desires vs. virtues).
- Self-determination theory (SDT) (Ryan and Deci, 2000) states three needs (autonomy, competence, relatedness) are required for psychological growth and well-being.

Source: Richard M Ryan and Edward L Deci. 2001. On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. Annual review of psychology 52, 1 (2001), 141–166

Background: Research in psychology regarding well-being

How does this fit in?:

- Users vaguely describe what they need when they start to track.
- Users describing goals:
  - It should make you feel good
  - It should be meaningful and striving for it is strongly connected to the user's emotions
  - It should help me become 'a better person'
- Qualitative goals are formulated from abstract needs, which can be looked at from an hedonistic and eudaimonic point of view.

Managing In-home Environments through Sensing, Annotating, and Visualizing Air Quality Data.

Jimmy Moore

PhD Student
Visualization Design Lab
University of Utah

- Works on NIH's PRISMS project by help developing health monitoring systems for studies of asthma.
- Started out for scientific computing, currently doing visualization.

Pascal Goffin

Postdoctoral Fellow
Visualization Design Lab
University of Utah

- Works on NIH's PRISMS project by help developing health monitoring systems for studies of asthma
- Received PhD by doing work on how to integrate small data-driven visualizations into text.

Managing In-home Environments through Sensing, Annotating, and Visualizing Air Quality Data.

Philip Lundrigan

Assistant Professor
Computer Engineering
Brigham Young University

Neal Patwari

Adjunct Professor
Electrical and Computer Engineering
University of Utah

- Did PhD in University of Utah, worked on the PRISMS project.
- Main interests are in mobile networks, mobile computing, and wireless network management.
- Worked on building IoT architecture for in-home environmental sensors for epidemiological studies.

- Worked on NIH's PRISMS project by help developing health monitoring systems for studies of asthma
- Main interests are in sensor networks (wireless networking, radio propagation, signal processing)

Managing In-home Environments through Sensing, Annotating, and Visualizing Air Quality Data.

Katherine Sward

Associate Professor
College of Nursing
University of Utah

Jason Wiese

Assistant Professor
School of Computing
University of Utah

- Research keywords: Clinical Informatics, Nursing and Health Informatics, Medical Informatics, Clinical Decision Support Systems, Air Quality

- Main interests are personal data: designing and building systems to address challenges of dealing with unified personal data.

Managing In-home Environments through Sensing, Annotating, and Visualizing Air Quality Data.

Miriah Meyer

Associate Professor
Visualization Lab
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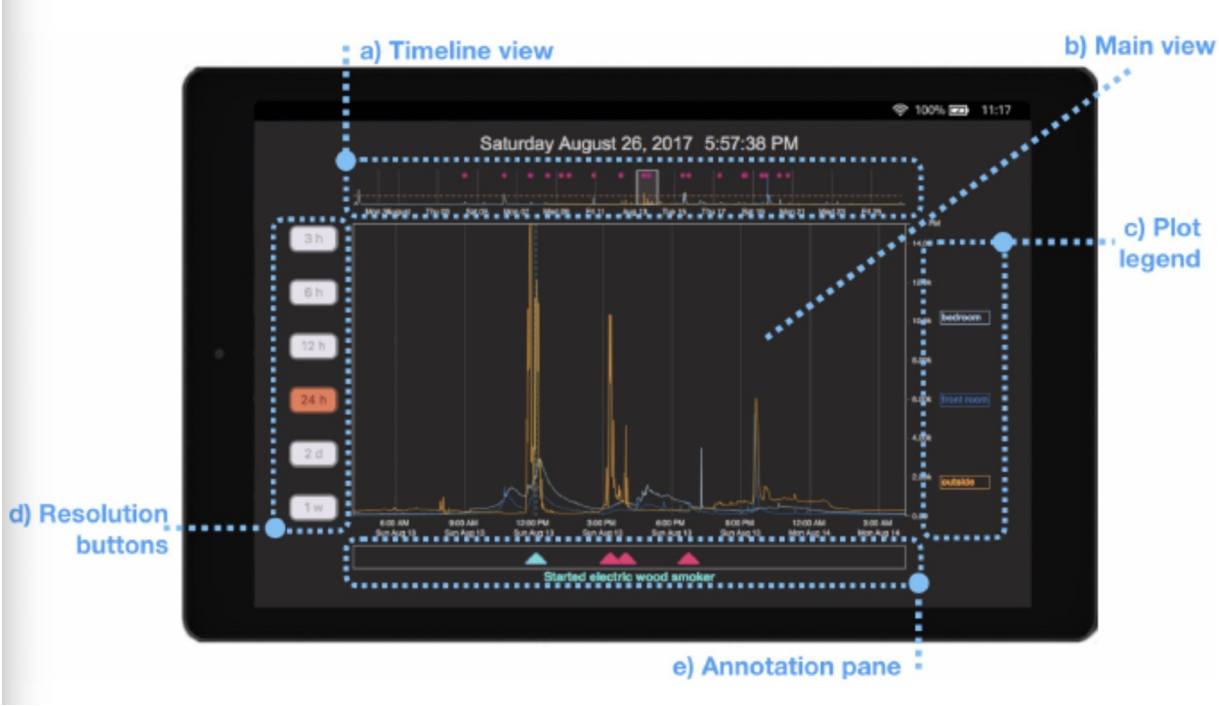
- Interests: designing visualization systems that support complex data analysis tasks for people and problems.

Previous studies that monitor air qualities: single monitor; did not support user-specified annotations

This study: collect data from multiple air quality monitors; allow annotating data through multiple modalities; sending text message prompts when it detects a PM2.5 spike; featuring an interactive tablet interface for displaying measurement data and annotations.

From left to right: a wireless air quality monitor, tablet display, Google Home and Raspberry Pi gateway computer (front). Each deployment received three air quality monitors



The tablet visualization interface. This image shows a number of indoor (blue) and outdoor (orange) spikes in the mainview related to PM2. 5 measurements over a 24-hour time span. The annotation pane shows that the earliest and largest spike is annotated with the participant message: “Started electric wood smoker”. These annotations lend context and legibility to the air quality dynamics shown on the interface.

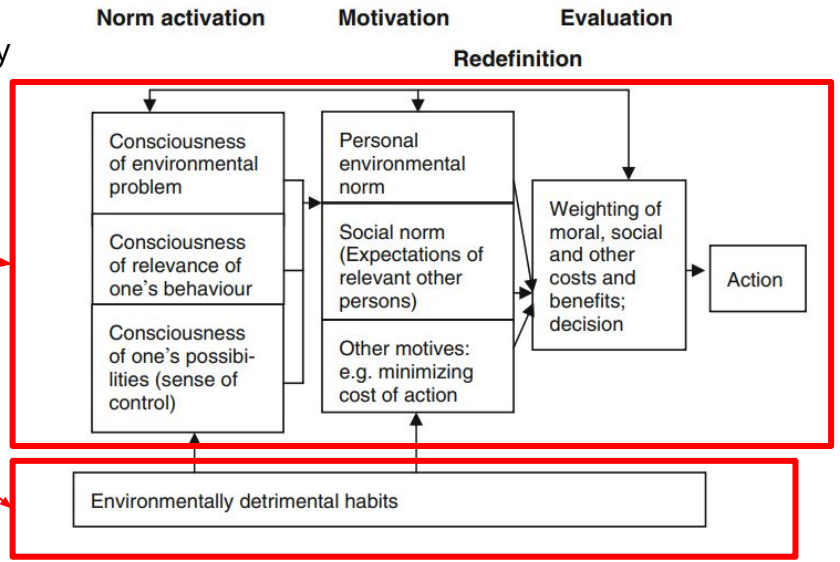
Data legibility - interactivity, annotation, comparative views, active feedback in eco-feedback

Eco-feedback: past work underlines the importance of display designs in various resource usage areas (e.g., water consumption, smart grid, energy consumption).

Feedback on household electricity consumption:

Figure on the right shows a heuristic model of environmentally relevant behaviour (Matthies, 2005). Model underlines two types of action: routinized (habitual) behaviour and conscious decisions.

Habitual behaviour is behaviour not reflected upon, and to break this loop a *conscious decision* must be taken.



Source: Corinna Fischer. 2008. Feedback on household electricity consumption: A tool for saving energy? Energy Efficiency 1, 1 (2008), 79–104. https://doi.org/10.1007/s12053-008-9009-7

Data legibility - interactivity, annotation, comparative views, active feedback in eco-feedback

Feedback on water usage: related work evaluates eco-feedback displays that shows disaggregated usage data. Study aimed to examine design dimensions in the context of water usage (i.e., data and time granularity, comparison, and measurement unit). Study also looked at how these impact the household dynamics.

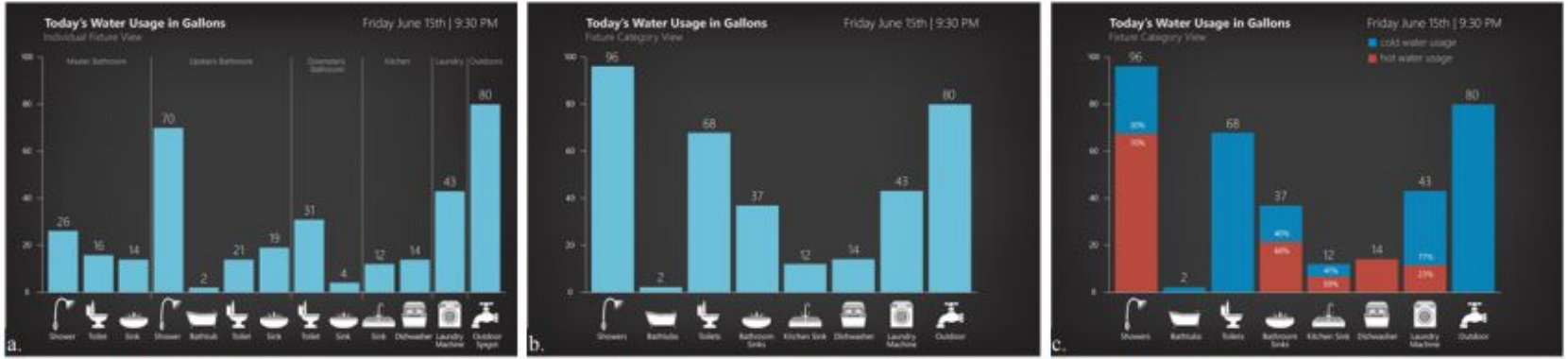


Figure 2: Three of the data granularity views: (a) by *individual fixture;* (b) by *fixture type*; and (c) *hot/cold breakdown*. The fourth data granularity view, by *activity*, is not shown but had eight categories of use including hygiene, cooking and cleaning, lawn watering, and other outdoor use. Note that (b) was used as the base design to explore the other dimensions.

Source: Jon Froehlich, Leah Findlater, Marilyn Ostergren, Solai Ramanathan, Josh Peterson, Inness Wragg, Eric Larson, Fabia Fu, Mazhengmin Bai, Shwetak Patel, and James A. Landay. 2012. The design and evaluation of prototype eco-feedback displays for fixture-level water usage data. In Proceedings ofthe SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, 2367–2376. https://doi.org/10.1145/2207676.2208397