The user experience of data donation: An experiment in making data governance tangible with design

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Abstract: This chapter examines the intersection of design, data policy, and climate science to address complex societal challenges. Reporting results of a series of workshops with 75 participants on the theme 'The User Experience of Data Donation to Support the Clean Energy Transition', it describes research motivations, the workshop methodology, session outcomes, and challenges faced in cross-disciplinary research on the topic of data donation. Workshop participants had a mostly ambivalent reaction to the topic of data donation for clean energy. Rather than embracing the task as a wicked problem, participants mostly treated it as a 20th-century engineering challenge that they felt they lacked the professional knowledge to address. This chapter hypothesises possible explanations and alternatives, concluding with implications for strengthening cross-disciplinary collaboration to address complex challenges outside the scope of a single discipline. Changes in user design education to emphasise public interest technology could better equip future participants to work on topics such as user data donation.

Keywords: user experience design, participatory design, policy, energy transition

1. Introduction

At the time Horst Rittel co-authored *Dilemmas in a general theory of planning*, explaining the **role of wicked problems with no right or wrong answers in social policy**, he was working as a professor of the science of design (Rittel & Webber, 1973). Fifty years later, however, the design disciplines are not always present in discussions of social policy. This chapter reports on a series of four exploratory workshops that correct that imbalance and centre the discipline of user experience (UX) design in policy. The workshops bring a **design-centred approach to data governance**

discussions by using a scenario that is a good fit with Rittel and Webber's definition of wicked problems: exploring trade-offs between communal energy efficiency and individual privacy. The workshops, titled 'The User Experience of Data Donation to Support the Clean Energy Transition', sit at the intersection of three distinct disciplines: user experience design, data policy, and climate science. The research is a preliminary attempt to break silos and strengthen cross-disciplinary collaboration to address an urgent social and environmental problem.

This chapter explains the research motivations and workshop methodology, shares the outcomes of the sessions, and identifies challenges for cross-disciplinary research on wicked problems.

2. Motivation and research questions

This section provides an overview of data donation in the context of clean energy.

a) How data donation can promote clean energy usage

During the winter of 2022–2023, energy-saving measures were an important topic of conversation in response to Russia's invasion of Ukraine and an urgent need to use fewer fossil fuels and shift energy policy. Amidst concern that electricity might be rationed, there was increased interest in alternatives to supplement or replace the existing grid. Coupled with technical advances producing new clean energy products suitable for urban infill in European contexts – for example, rooftop and balcony solar panels, companies began selling directly to consumers. These products are unfamiliar to many people and thus require new ways of thinking about energy use.

These new technologies enable new types of interactions, such as deciding to use solar energy immediately, store it in a battery, or sell it back to the grid provider. In some cases, people may need to make explicit decisions about how their energy systems perform, while in other cases, these decisions can be made automatically based on machine learning algorithms and behaviour modelling. Data about energy usage is an essential component in training systems to better manage power and use fewer fossil fuels. Because this technology is new to many people, and many customers are using green

energy equipment for the first time, there is a need for knowledge-sharing and awareness-building to improve the efficiency of these supplemental energy supply systems. Peer-to-peer data-sharing networks could help people make better energy management decisions by learning how others use similar equipment. Even people not using clean energy products can directly contribute to improved efficiency by sharing how their energy use changes with circumstances.

b) Identifying a usage scenario

This explosion of new options for energy generation and storage and a renewed focus on energy conservation co-occurred with the easing of Covid-19 pandemic measures and the return to office work. Many companies had flexible policies about if or how frequently they expected employees to be in the office, and many people were absent due to their own illnesses or caring for family members. These two trends can be summarised from a facilities management and employer perspective as, 'Should we heat empty offices? Should we track where our employees are to avoid heating unused spaces?'

Although Internet of Things (IoT) devices such as smart sensors make it possible to track building occupancy, privacy concerns and worker protections limit their use. In this exploration, building occupancy and energy usage would be shared not with a private company selling devices, such as Google Nest, but with a cooperative with a data governance structure designed to protect mutual and planetary well-being. Initial explorations of workshop activities considered data governance mechanisms for workplace data; however, after a discussion with the building director of a 16,000m^2 office facility in Berlin, the focus shifted away from workplaces and towards private homes. The reasons to shift away from workplace data were 1) the difficulty of establishing permissions and accountability when including additional stakeholders, e.g. employers, employees of various companies, building owners, and facility managers; 2) concerns that participants would self-censor or decline to participate if they felt uncomfortable speaking about an issue related to their employer or workplace; 3) recognition that workers' councils and trade unions are already involved in this area, and some individuals are in 'wait and see' mode, expecting organisational leadership to act on their behalf, whether to protect the climate or their rights.

In the interest of simplicity for an initial feasibility study, the workshops were organised in the context of citizens taking action to manage data about energy usage in their own homes. A **data governance platform** is multi-sided, and potential stakeholders could include:

- Residents of apartment buildings
- Apartment owners
- Owners' associations
- Building managers
- Hardware companies that install, develop, and potentially own energy generation and storage equipment
- Grid providers of electricity
- Data brokers or associations that hold the data.

Given this complexity, the additional complexity of a workplace environment was undesirable.

c) Goals

The initial hypotheses for this research were that 1) data donation is helpful for managing the energy transition, 2) careful user experience design would explain the benefits of data donation and motivate people to do so, and 3) the benefits of data donation are not primarily financial (energy cost savings), but psycho-social (pride in taking action for the energy transition, feeling a sense of belonging to a community).

The workshops were short and intended to be initial introductions to build awareness of the topic of data donation and to bring together new groups of people with the goal of establishing cross-disciplinary collaborations. The expected outcomes of the workshops were identifying interested partners for more in-depth workshops working directly with the public. Beyond finding interested collaborators, secondary goals included gaining an understanding of the current state of professional discourse around data donation and capturing open questions that could be addressed in future rounds of research. **'Professional discourse'** includes at least three distinct specialisations: user experience designers/software developers, policymakers, and scientists. A tertiary goal was co-developing initial design recommendations for user interfaces for data donation.

3. Workshop methodology

Four multidisciplinary workshops in Helsinki, Lucerne, Berlin, and Paris were conducted between June and November 2023 on the topic of 'The User Experience of Data Donation to Support the Clean Energy Transition'. In total, 75 people with a range of professional backgrounds, including user experience designers, service designers, data scientists, climate scientists, and policy experts, participated. The workshops were invited sessions as part of professional conferences/meetings (Helsinki and Berlin) and university symposia (Lucerne and Paris). Participation was voluntary. Attendees at the workshops chose to attend the session based on personal interest and were not recruited or compensated. There was a very broad range of familiarity with the topic, and the heterogenous backgrounds were considered an advantage for forming new collaborations rather than a limitation to overcome by restricting participation to experts. Self-reported lack of expertise did inform participants' experience of the workshops.

a) Structure and activities

The sessions lasted 60 minutes (Lucerne and Paris) or 90 minutes (Helsinki and Berlin) and began with a presentation introducing the concept of smart microgrids (solar, wind, and battery storage) for domestic use, describing use cases as discussed in section 2b. Next came a basic overview of data donation and data governance principles, followed by a sample user interface for a hypothetical energy management application. There was then a pause for questions and facilitated discussion. The Paris session ended here, but the Helsinki, Lucerne, and Berlin sessions continued into a participatory design activity with attendees prototyping user interfaces for data donation on paper using worksheets, paper, and pens. These methods are consistent with other approaches in the smart city space (Bødker & Zander, 2015; Yasuoka, 2023).

Recognising the short duration of the workshops, the activities were designed as **awareness-building advertisements** to promote interest in further collaborations and in-depth discussion in other contexts. Participants were not trained in data governance and then assigned a task to demonstrate their mastery – rather, the discussion and questions were key.

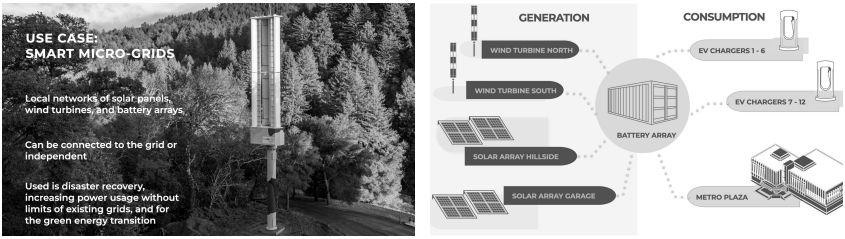

Figure 1. Slides from an introductory presentation explaining smart microgrids for using wind, solar, and battery storage for energy independence.

b) Explanatory material

The introductory presentation explained the **concept of smart microgrids** to help people move towards energy independence and away from fossil fuels. It was clearly explained this project was a general civic technology project to benefit the public sector, not a commercial technology development project, explained as follows: 'Imagine an app for people living in multi-family apartment complexes with their own solar/wind generation and battery storage. This app lets people understand their system's performance and the performance of other similar installations'.

Sharing with **'other similar installations'** was highlighted because peer-to-peer support for other people learning to manage new equipment is a relevant use case for decentralised data governance that opens the door to discussion of training for machine learning systems. Two potential use cases included 1) disaster recovery, when the existing grid was not available as a source of power, so backup power from batteries would be an emergency stopgap measure after a disaster such as a fire, flood, or unexplained outage, and 2) a voluntary shift away from the existing grid to support a clean energy transition and use power from renewable sources. After covering the basic technology, the presentation shifted to an introduction to data donation, followed by a discussion.

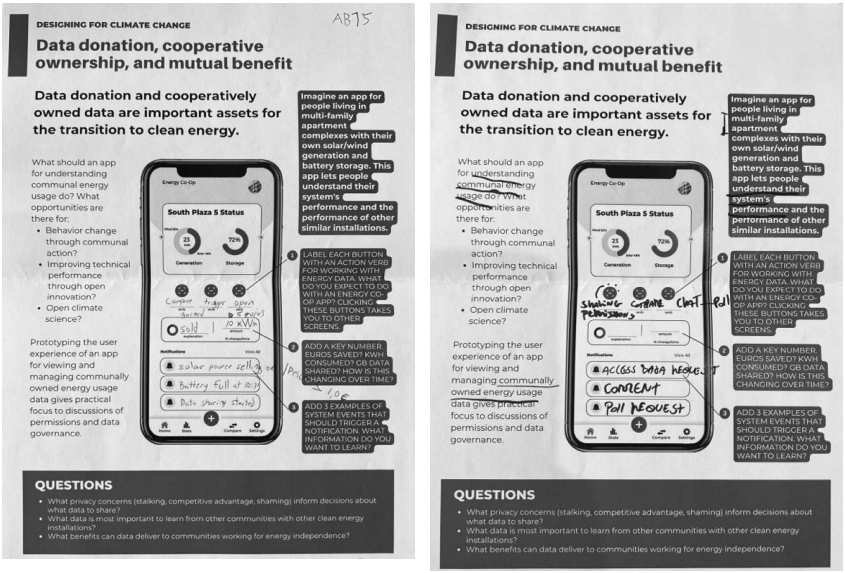

Figure 2. Worksheets used in the workshops

The following discussion questions were shared with participants to kick-start the discussion:

Data donation and cooperatively owned data are important assets for the transition to clean energy.

- What should an app for understanding communal energy usage do?
- What opportunities are there for:
  - Behavioural changes through communal action?
  - Improving technical performance through open innovation?
  - Open climate science?
- What privacy concerns (stalking, competitive advantage, shaming) inform decisions about what data to share?
- What data is most important to learn from other communities with other clean energy installations?
- What benefits can data deliver to communities working for energy independence?

These questions were presented to encourage discussion about the advantages, limitations, and harms of data donation and were not asked or answered in a structured order.

c) Paper prototyping

Two of the workshops consisted primarily of user experience designers, an audience familiar with sketching and critiquing user interfaces. One of the workshops was primarily data governance and policy experts, although some designers were present. The fourth workshop primarily comprised data scientists and climate scientists and did not do the prototyping activity.

Paper prototyping is a well-established part of design education and professional practice (Snyder, 2003), and its use by non-designers in participatory settings has a long history, as discussed, for example, in a number of literature reviews (e.g. Hollomann et al., 2018; Maartmann-Moe & Joshi, 2022). Paper prototyping was selected as a method to focus the abstract topic of data governance into something tangible and specific. The visual vocabulary of smartphone applications was familiar to all the participants, and everyone understood the task. Participants grasped that this was an exploratory exercise created for research purposes and that there was no existing software or proposal to develop actual software.

It was, however, necessary to clarify that the app depicted was a **research prototype** that did not exist and that the workshop was not providing free labour or market research for a for-profit clean tech start-up. There was initial scepticism and mistrust about who benefitted financially from such an app and how developing this type of app would be compensated. People worked independently on their own prototyping worksheets, using additional paper as necessary, occasionally sharing their thinking with a group and asking for input on their ideas.

4. Outcomes

During the workshops, handwritten notes were taken of the discussion. An analysis of the notes indicates three main categories: questions requiring further clarification (the largest groups), expression of individual opinions and preferences (fewer), and recommendations (minimal). The worksheets and sketches were qualitatively assessed in keeping with norms for participatory design projects (Bødker et al., 2022; Bratteteig & Wagner, 2016).

The primary goal of the workshops was building awareness about the topic of data donation and identifying potential partners for further research. Data donation for climate change did not spark ongoing interest among workshop participants, and there was ambivalence to ongoing par-

ticipation in research. Contrary to hopes, none of the participants were part of an existing project working in this area seeking additional partners, such as an open climate science project looking for UX guidance or climate activist groups interested in in-situ prototyping. The secondary goal of capturing the state of professional discourse revealed deep silos between disciplines, and unclear mechanisms for collaboration, while the tertiary goal of developing initial design recommendations for user interfaces for data donation was too ambitious for an initial series of workshops of such short duration.

a) Hypothesis

An evaluation of the initial hypotheses follows.

aa) Hypothesis: Data donation is helpful for managing the energy transition.

This was only weakly supported. There was broad agreement that data donation is useful, an unsurprising finding for a group of participants who chose to participate in data donation workshops. However, the dominant sense was that it has unrealised potential and lacks a compelling use case in this domain.

bb) Hypothesis: Careful user experience design would explain the benefits of data donation and motivate people to do so.

This hypothesis was disproven. The value proposition for donating data to fight climate change was not clear, and user experience design was an insufficient motivator.

cc) Hypothesis: **The benefits of data donation are not primarily financial** (energy cost savings) **but psycho-social** (pride in taking action for the energy transition and feeling a sense of belonging to a community)**.**

This hypothesis was strongly disproven. The benefits of data donation were seen as almost exclusively financial (energy cost savings). In second place behind cost savings was enthusiasm for data governance and policy generally, without any special interest in the climate and energy transition aspects. That is, data donation is an intrinsically interesting concept to some. The ambivalence was unexpected, particularly as data donation for energy issues has been reported elsewhere (Baumann & Laube, 2022; Wen-

ninger et al., 2021). Psycho-social benefits (pride in taking action for the energy transition, feeling a sense of belonging to a community) were a distant third place. This absence of positive contributions to the community was particularly unexpected and stands in contrast to patient motivations for donating medical data (Krutzinna & Floridi, 2019).

b) Potential explanations for the ambivalent response

There are many possible explanations for workshop participants' ambivalence toward the topic of data donation for the energy transition. Potential factors to change include:

- **Different participants:** Perhaps the participants were not sufficiently interested in the topic. The workshop composed primarily of data scientists and climate scientists did not take part in the paper prototyping exercise because it was outside the event structure. Maybe having participants with this type of domain expertise involved would have led to a different result. Additionally, recruiting workshop participants who already identify as motivated by climate change issues and are involved in community activism may have had a better response than conference participants. Potentially recruiting existing groups of people who are already connected – for example, residents of the same apartment building – might have garnered a warmer response.
- **Different facilitator or activities:** It is possible that a different facilitator would have obtained different outcomes. However, the author is an experienced facilitator with more than 20 years of experience leading paper prototyping exercises with different groups, including civic tech and open science projects (Elliott, 2005). Recommended changes to the activities include providing more detailed instructions and a written glossary of terms. Discussion of data donation is a very abstract topic, and paper prototyping was not successful in making it concrete and actionable in the time allowed. Alternative activities could include much longer workshop sessions with opportunities to explore more subtopics in detail or clearly marking some subtopics as out of scope for the exercise. For example, an economist participating repeatedly suggested that there could be a market for donated data, but this was never illustrated with any concrete user interface suggestion, such as sketching what a data market might look like in a phone app. No participant with UX experience built on this idea, presumably because they had not

encountered a data marketplace before. Potentially closing off topics such as marketplaces might have narrowed focus and avoided repetitive discussion during limited workshop time to attain more tangible outcomes.
- **Different topic:** Focusing on an area other than home energy usage may have confirmed the hypotheses, for example, by returning to the original concept of looking at workplace energy consumption and involving building managers. Alternately, a different example scenario, such as data donation on public transport, might have been a better choice, such as Switzerland's PosMo (Positive Mobility) data donation effort (Baumann & Laube, 2022).

c) Insights from the workshops

The absence of a clear use case explaining the benefits of data donation for the home energy transition dampened participant enthusiasm, and there was little appetite for additional collaboration. A general sense of climate emergency, geopolitical vulnerabilities due to fossil fuel purchases, or worries about domestic security in a climate disaster like a flood were not sufficient to translate into willingness to donate home energy use data.

There are some additional insights that contextualise the outcomes:

- *There is deep mistrust of smart devices in the home, and monitoring energy usage is perceived as invasive*. Questions about exactly how a hypothetical system would work and exactly what data would be shared were difficult to answer and did not lead to the kinds of generative prototyping of ideas that a data governance expert might have expected, such as differential privacy and synthetic data. Rather, it led to a suspicion that the premise of data donation was only marginally useful enough to warrant collecting such data. Concerns about corporate surveillance outweighed curiosity about other forms of communal data governance.
- *Workshop participants had positive opinions of their local power companies and expected that they would produce an app like this 'if it were necessary'*. There was a general passivity and expectation that qualified experts, particularly power companies, would develop a data donation framework and an accompanying app or potentially add features to existing apps. The app displayed below was shared by a participant who was a customer of Nordic Green Energy, and they pointed out that it handled 'everything', including car-charging management. They expected any additional information related to energy to be part of this singular app

and were sceptical that there would be another place for interacting with energy data.

Figure 3. Screenshots from the Nordic Green Energy app taken from the Google Play store.[1]

- *The level of digitalisation by power companies varied widely*. The exact mechanisms for selecting an energy provider, recording energy usage, and estimating/paying for energy use depend on regional norms. Some Scandinavian participants were already using power management apps on their phones, which they shared and discussed, and that session had little sense that this was a new topic. Some participants outside Scandinavia considered basic digitalisation a higher priority than exploring donation data, which they referred to as an 'edge case' that they did not expect a power company communicating by post to address any time soon.
- *Electricity delivery is highly localised, and everybody thinks their community is too unique for a general-purpose solution*. Workshop participants in all four locations objected to some aspect of the task, saying, 'In [Switzerland, Finland, Paris, the former East Berlin] we have a unique situation and need a unique solution'. These comments dealt with cultural identity and norms, such as familiarity with cold, habits of dressing indoors, relationships with neighbours, and standards of entertaining

1 https://play.google.com/store/apps/details?id=fi.nordicgreen.app

guests at home. For example, Scandinavian participants were proud of their high-quality insulation and cosy sweaters. Parisian participants were proud of their robust social lives, which kept them away from chilly apartments with historical character.

5. Conclusion

Although the workshops did not yield the expected outcomes, there are relevant implications for future projects, though there will not be a second round of workshops with the public due to limited support for future collaborations from participants. First, working in a cross-disciplinary manner is challenging. These workshops at the intersection of user experience design, data governance, and climate required a broad range of skills. Many participants felt that they lacked the skills to be effective because of missing domain knowledge, potentially self-reporting that they were the wrong participants, as suggested in section 4a. The downside of such a sentiment is a feeling of helplessness and passivity while waiting for other, presumably better-qualified people to intervene. But taken positively, these missing skills are a call to action.

a) Crisis of professional knowledge in handling wicked problems

In a world of increasing complexity and interrelated systemic crises, traditional models of professionalism are no longer adequate. Re-examining both norms for professional training and ways of collaborating is essential to creating cross-disciplinary teams that work smoothly. Revisiting Rittel and Webber (1973) on the topic of professional knowledge and interconnected systems is instructive:

> Based in modern science, each of the professions has been conceived as the medium through which the knowledge of science is applied. In effect, each profession has been seen as a subset of engineering. … Because it was fairly easy to get consensus on the nature of problems during the early industrial period, the task could be assigned to the technically skilled, who in turn could be trusted to accomplish the simplified end-in-view. Or, in the more work-a-day setting, we could rely upon the efficiency expert to diagnose a problem and then solve it, while simultaneously reducing the resource inputs into whatever it was we were doing. We

> have come to think about the planning task in very different ways in recent years. We have been learning to ask whether what we are doing is the right thing to do. That is to say, **we have been learning to ask questions about the outputs of actions** and to **pose problem statements** in valuative frameworks. We have been learning to see social processes as the links tying open systems into large and interconnected networks of systems, such that outputs from one become inputs to others. In that structural framework it has become less apparent where problem centres lie, and less apparent where and how we should intervene even if we do happen to know what aims we seek.

Data donation is a complex topic, weaving together multiple socio-technical systems in ways that transcend efficiency. Workshop participants struggled to identify and articulate the value of data donation in terms other than efficiency and cost savings, not embracing the nature of wicked problems and treating the task as a 20th-century engineering problem. Future efforts should begin by providing a better theoretical grounding in the nature of the problem as opposed to jumping immediately to attempted solutions. Beginning by providing a more defined point of view could also lead to more impactful workshop outcomes.

b) Helping design professions serve the public interest

About half of the workshop participants had formal training in design, primarily user experience design and service design. Design education does provide training in addressing ambiguous, systemic problems (Vorvoreanu et al., 2017), but despite this training, many designers found it difficult to engage with the abstract concepts of data donation and the energy transition. Showing money saving by sketching a $ in an app is easy and familiar. Demonstrating the benefits of data donation in an app is unfamiliar and difficult. Designers have the skills to address wicked problems, but the socio-technical context of policy differs from commercial product development. To effectively contribute to cross-disciplinary policy challenges, designers should build and maintain professional practices for working in the public interest. The language of 'users' and 'consumers' of products and services is firmly situated within a market-based framework for decision-making, so it is logical that designers found cost savings the easiest impact of data donation to quantify. An opportunity for future work

is to more explicitly prepare the design professions to work on different types of policy problems without financial exchange as the central idea.

Adequately addressing complex systemic problems requires a cross-disciplinary approach, and more demands are being placed on professionals in every domain to stretch outside their comfort zones and work on wicked problems. The methods of user experience design have a role to play, but additional research is needed to strengthen the discipline and support work in non-commercial contexts.

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