Making dinner in an uncomfortable future: Comparing provocations as user insight elicitation methods

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Abstract: To aid the transition to a renewable energy future, user-centred designers need to design for a future with limits perceived as uncomfortable to users. This paper explores whether methods borrowed from critical and speculative design can elicit actionable insights to aid such designers. A comparative analysis is performed of the insights gained from two studies, using a provotype and speculative enactment respectively to situate the participants in a speculative, uncomfortable distant future. The two methods do allow elicitation of rich and deep insights surrounding values, latent needs, and tacit knowledge, but with slightly different emphasis regarding content, temporal scope, and reflective depth. However, the implementation of the methods failed to provoke the participants to question their prioritisations and views on societal development, maybe related to an inability to provoke enough.

Keywords: user insight; provocative design; speculative enactment; renewable energy systems

1. Introduction

The transition to a sustainable future society requires many of us to question our current practices and find ways to settle for less. This is the case with the shift to renewable energy systems, as a higher share of renewable generation increases the risks of disruptions to electricity supply. Much work is done to combat such disturbances including grid management, expensive grid expansion, energy storage, and smart systems that matches consumption with demand. But if smaller disturbances instead could be accepted (and adapted to) this could be a strategic complement (Swedish Energy Agency, 2016) and help speed up the transition to renewable energy (see also Hasselqvist, Renström, Strömberg, et al., 2022).

For the household, such smaller disturbances could include temporary limits to electricity use or outages to aid load shedding. Although many households already face limits or outages in some contexts due to e.g. deficient energy infrastructure or energy poverty (Abi Ghanem, 2018; Bouzarovski, 2014), electricity access and use are often taken for granted in energy affluent contexts as means to carry out everyday practices and satisfy needs of comfort and convenience (Gram-Hanssen, 2010; Heiskanen et al., 2013; Shove, 2003). Acceptance and adaption to disturbances will in energy affluent contexts require active reflection, reframing and relearning needs, values and wants in relation to energy. Therefore, a future with limits to electricity supply may appear as uncomfortable and adaptations perceived as sacrifices (Hasselqvist, Renström, Håkansson, et al., 2022).

As designers, we can aid the transition to a renewable future. Together with households currently reliant on stable electricity access we can reimagine what a good life could be despite variable availability of electricity, and design solutions that could turn an undesirable future into an accepted or even desirable future. Design is uniquely posed to work with the future, and as Margolin (2007, p. 4) states "occupy a dialectical space between the world that is and the world that could be". Nevertheless, to create the world that could be, we need insights about future people to ensure that the designs created will fit the way people will incorporate them into their lives (Sleeswijk Visser et al., 2005). To elicit such insights, user-centred designers strive to involve future users in research and design, using empathy to understand present and future needs, values, and contexts.

However, the future envisioned above is far ahead and therefore hard to reach using traditional user research and involvement methods (Sleeswijk Visser et al., 2005). While some design methods work with a more distant future (e.g. Odom et al., 2012), the future in question here is also perceived as uncomfortable, or even unthinkable. This means that as designers we need to both help users evoke the future, but also challenge their ideas of what a preferable future could or should be.

There are current approaches that use design to question societal development or challenge people's ideas of the future, including design fiction, speculative design, and critical design. These approaches do not use design as a problem-solving practice, but to provoke people to critically reflect on societal development and the role of technology (Broms et al., 2017; Johannessen et al., 2019). To do so, they use fictions and prototypes to enable thinking about the future and to critique the present (Auger, 2013). Thus, these approaches contain tools to help future users question values and rethink preferable societal development, but they are oriented towards debate, not design action.

Thus, this paper explores whether it is possible to combine the problem-solving intention and empathic nature of user-centred design with the speculative and provocative nature of approaches such as critical and speculative design and through that arrive at actionable insights that can be used to design products, services and systems that would make a future with limits desirable rather than uncomfortable. More specifically, this paper compares two different provocative methods in a case study of dining in a renewable energy future.

2. Eliciting user insight through provocation?

If we are to use the combination proposed above, it is first necessary to determine what actionable insights are, as well as explore what provocations can bring to the table.

2.1 Eliciting (actionable) user insights for the future

It is well-established practice for designers to consider the future users of the products and services that they design – either as passive subjects to be studied or as active participants in the design process (Sanders & Stappers, 2008). Involving prospective users helps designers gain insights about the users' needs, dreams, contexts, and requirements so that the designers can "design products that fit into the lives of the people who will use them" (Sleeswijk Visser et al., 2005, p. 119). However, these future users tend to be involved to impart insights about the world as is or in the time frame of the near future. Pettersson (2017) concludes that forward-looking, prospective user research is rare, especially for products that have no predecessors. Introducing such new products can reshape values and practices (Odom et al., 2012), may disrupt needs and context of use (Pettersson, 2017), which makes translating current versions of needs, practices, and context into speculations about the future difficult.

According to Sleeswijk Visser et al. (2005) conventional user study techniques are not enough to provide insight about potential future experiences, as peoples' dreams, fears, aspirations, and ideas need to be included. This requires elicitation of future users' hidden world of tacit knowledge and latent needs, that is needs that people are unaware of but that will become realised in the future. Thus, to be actionable, the insights sought in this paper have to say something about values, tacit knowledge, and latent needs.

Secondly, they go on to say that "the information should be rich and broad, but also leave room for the designer's creativity" (Sleeswijk Visser et al., 2005, p. 122). To get such richness Lindley and colleagues (2014) emphasise the need to study situated activities in the setting of everyday life. However, the challenge remains about how to situate the user in an uncomfortable future in a way that can not only uncover values and dreams, but also provoke the questioning of such values.

2.2 Speculating about the uncomfortable future

There are several design approaches that speculate about the future and use designed artefacts to question current life and directions of development: speculative design, critical design, design fiction, discursive design (for overview, see Malpass, 2013). These approaches are difficult to separate and have great overlaps (Auger, 2013; Broms et al., 2017; Johannessen et al., 2019) and Ozkaramanli and Desmet (2016) summarise them under the umbrella term "provocative design". For this paper we borrow that umbrella term, and identify three properties that could help us elicit insights about an uncomfortable future with limits:

***Societal Critique**.* The approaches included in provocative design all asks questions about how the world could be, but the critical element also has the goal to affect societal development and create discussion about preferable directions (Johannessen et al., 2019). Critical design can help visualise our activities, create awareness and give rise to discussions about the way things are. Thus, borrowing this property of provocative design future users can be aided to question norms and critically examine conventional values, which in turn may give designers insights into hidden agendas as well as explore alternative design values (Bardzell & Bardzell, 2013).

Speculative future everyday. Provocative design works with a much longer timeframe of the future than conventional design, at the intersection with future studies (Sanders & Stappers, 2014). Broms et al. (2017) highlight that design-based approaches to speculation also differ from traditional future studies in that they often explore societal phenomena at "the level of everyday life" (see also Candy & Dunagan, 2017). Thus, this property holds the promise that we could situate users in both the speculative future and the everyday.

Suspended disbelief. Provocative design builds on the materialization of the speculative to enable users to make sense of that future (Sanders & Stappers, 2014). This is done through prototypes that tell a believable story of a world and placing these in mundane settings to suspend disbelief about the future (Lindley et al., 2014). Broms and colleagues (2017) relate the introduction of this prototype into the everyday to the concept of 'cognitive estrangement', making empirical reality strange, a key part of allowing people to unlearn and relearn. Through this, we can explore and evaluate practices that do not yet exist (a speculative ethnography, Raven, 2017), and enrich the capacity for making sense of future ways of living (Sanders & Stappers, 2014).

Including these three properties in an exploratory pre-design phase of a user centred design process allows us to open the design space of renewable energy futures and find the issues to design for. However, it is important that the speculated future is materialised in such a way that it truly suspends disbelief. Materialisations can take many forms, including films, events, and prototypes of products and services (Auger, 2013). One materialisation that emphasises the provocative are provotypes, provocative prototypes, used expose tensions surrounding a field of interest (Boer & Donovan, 2012). Provotypes work to visualise contradictions within a practice and explore new ways of performing that practice. There are also forms emphasising enactment (Brandt & Grunnet, 2000; Odom et al., 2012), Elsden et al. (2017) introduce the concept of speculative enactment which involves setting the stage and inviting participants to a grounded, but unscripted improvisation of particular futures. This also unlocks a social interaction dimension that can enhance the emotional and social insights gained.

3. Method

This paper builds on a comparative analysis of two studies made to explore future 'energy resilient dining', that is, how every aspect of the activity of dining including preparing,

cooking, eating, and storing food could be made less dependent on a constant supply of electricity. The studies formed part of a thesis project (Groth & Nilsson, 2021), in turn connected to a larger project regarding what energy resilient future everyday life could look like (Hasselqvist, Renström, Strömberg, et al., 2022). The following sections describe the methodology of the two studies as well as the comparative analysis used to fulfil the aim of this paper.

3.1 Study one: the Cook-along workshop, a provocative speculative enactment

The Cook-along workshop was a digitally mediated speculative enactment, primarily aimed at identifying barriers and enablers in participants' actions, knowledge, and context in relation to energy resilient cooking. The participants each cooked a meal in their own kitchens, but together with the others through a video-meeting (see Figure 1). Two cooking sessions (à 1,5 hours) were held with three participants in each. The participants in each session knew one another and were aged between 20 and 30.

The study was organised and facilitated by two facilitators, who also observed the participants throughout. During the Cook-along workshop participants were asked to prepare a meal according to a recipe with ingredients that they had received in advance. While cooking, participants were presented with challenges prompting them to enact speculative scenarios probable in a future with less reliable energy supply, such as managing power outages, shortages, or without water. The challenges were synced with the steps of the recipe to ensure that disturbances would be experienced. By observing the participants' enactments and improvisations in relation to the unreliable energy scenarios, the facilitators saw real-time and real-life reactions to the scenarios and the participants' actions to manage the scenarios.

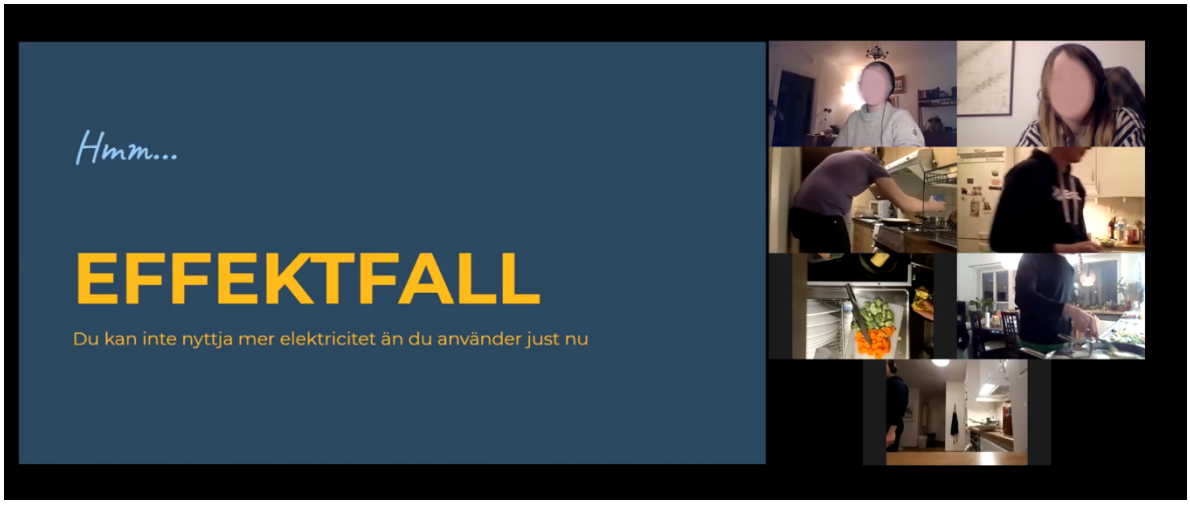

Figure 1. A screen shot from the Cook-along workshop with the facilitators (top) and the participants below as one of the challenges is presented. The challenge reads "Loss of power. You cannot use more electricity than what you are using right now."

Throughout the Cook-along workshop the participants interacted with each other, for example reacting together with initial dismay when faced with a challenge, commenting on the difficulties, but then quickly sharing tips and ideas on how to manage the situation. After the cooking part of the Cook-along workshop the participants were interviewed all together by the facilitators. The Cook-along workshops, including interviews, were recorded, and transcribed in full to enable analysis.

3.3 Study two: the Plug, a provotype embedded in everyday life

The second study, the Plug, aimed to uncover insights from a mundane setting with less reliable energy supply. As the materialisation of the speculation, a provotype was designed based on the insight from the Cook-along workshop. The provotype was a power strip (see Figure 2), a familiar product type, yet unfamiliar as its four sockets individually turned on and off depending on current load on the energy system. Active sockets were marked with lit LED-lights and a blinking sequence showed changes in activation. The (de)activation of sockets followed a predetermined schedule based on average momentary energy consumption in Sweden – high consumption meant fewer sockets available.

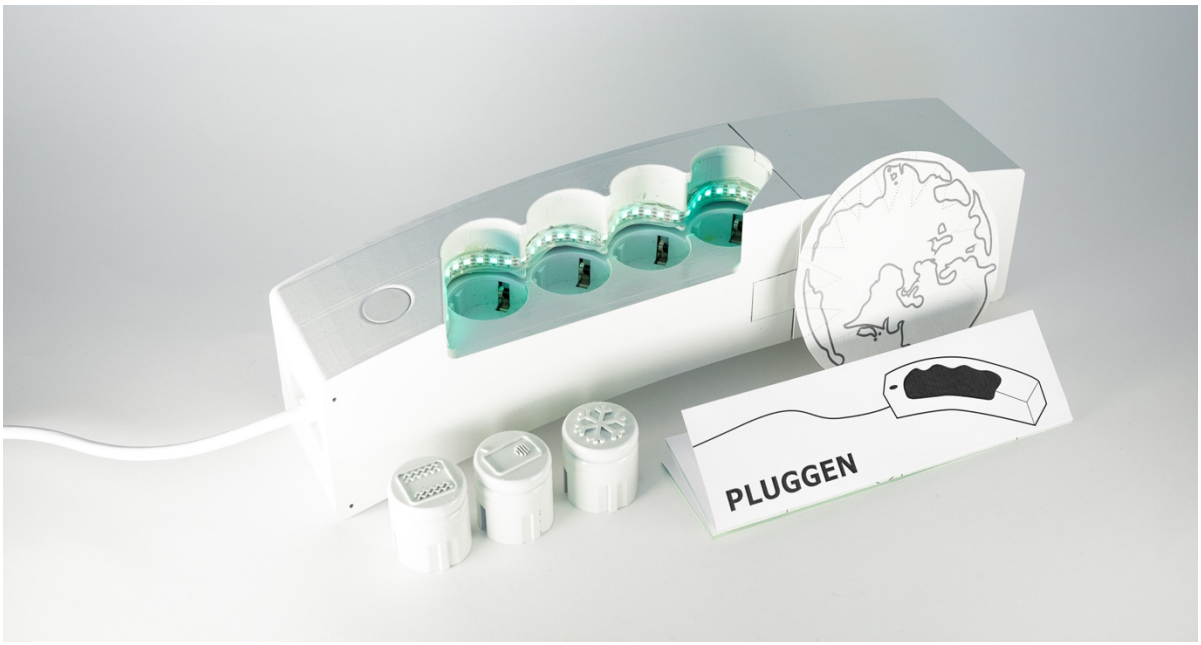

Figure 2. The power strip provotype of The Plug, along with three plugs representing kitchen appliances not possible to connect to the power strip, use instructions, and opt out possibilities represented by Earth-shaped punch tickets.

The participants were four households, all couples between 20 and 30 years of age, and living in apartments. They received the provotype, three plugs, use instructions, and a punch ticket as seen in Figure 2. The power strip was placed in the participants' kitchens during a week. As it was not technically and practically possible to connect all kitchen appliances to the power strip, fridge, freezer, and stove were represented by plugs blocking sockets in the strip. To be able to use the stove, participants were instructed to insert the stove plug.

Smaller appliances, such as coffee machines, could be connected to the power strip. The provotype challenged the status quo by limiting available energy, forcing participants to break habits, as well as make them aware of habits and prioritisations in relation to the activities of cooking and dining. An opt out or "cheating" possibility was added in the shape of a punch ticket designed to look like the Earth. The idea was to make participation easier while still making cheating tangible (through a removed punch ticket).

According to Boer and Donovan (2012) provotypes provoke on first encounter, during use, and over time. The Plug study was designed to gain insight into all three phases. Prior to receiving the provotype the participants were interviewed about their energy and cooking habits. Throughout the Plug experiment, participants received digital prompts to evaluate their experience, the first evaluation was done upon first interaction with the product. After having used the provotype for a week the participants were interviewed once again, this interview focused in part on their energy and cooking habits and on their experience from the Plug. All interviews were recorded, transcribed, and analysed.

3.4 Comparative methods analysis

The transcripts from the two studies were reanalysed from the perspective of future user insight elicitation. All quotes and the insights that were deemed relevant for future design were coded into two pre-defined types of insights: (1) empathic insights for problem-solving design in a speculated future and (2) insights about questioning of current life and speculated future. Insights within each of these two types were then inductively sub-coded to identify differences and similarities between the two studies. This coding was then deductively re-coded slightly to clarify connection to previous research. See Table 1 for the final eight themes.

4. Findings

The two studies, the Plug and the Cook-along workshop, both elicited typical empathic insights for problem-solving design and insights about questioning of current life and speculated future, see Table 1. Thus, both studies managed to situate users in the speculated uncomfortable future, provoke them to question their values and prioritisations, and at the same time provide actionable user insights based on rich and broad descriptions of the future everyday. How and the extent to which they managed to do so as well as differences between the studies are elaborated on below.

Table 1. Type (row 1) and themes (row 2) of future design insights as well as the extent to which these types and themes were represented in The Plug and The Cook-along workshop.

Type of insight	**Themes**	**Share of the total amount of insights from each study that was categorised into each theme.** The share was classified as substantial, moderate, or minor alternatively no insights or not applicable	
		The Plug	**The Cook-along workshop**
Empathic insights for problem-solving design	**Tacit and latent actions, preferences, and knowledge useful in a future with limits** Includes what participants already did, thought, or knew that proved useful when faced with limitations (tacit) *and* what participants did, thought, or knew that emerged when faced with limitations (latent).	Substantial share	Substantial share
	Latent prioritisations when faced with limitations Insights about prioritisations that participants previously did not have to do in their everyday lives (latent).	Substantial share	Substantial share
	How aspects of everyday set preconditions for a future with limits	Substantial share	Minor share
	Potential experiences of a future everyday with limits	Moderate share	Minor share
	How the designed artefact could be different Including insights related to use, usability, user experience, and associated design suggestions.	Moderate share	Not applicable; no designed artefact included
Insights questioning current life and speculated future	**The ability to estrange** If and how the studies created estrangement, or suspended disbelief about the future	Moderate share	No insights
	Elucidation and questioning of values and privileges If and how the studies made participants realise their values and privileges, and if they were made question these.	Moderate share	Minor share

	Appraisal of and reflections about speculated futures Opinions about and wider considerations of future (personal and societal) implications of limits.	Minor share	Moderate share

4.1 Empathic insights for problem-solving design

In both studies, a substantial share of the future design insights concerned what actions the participants took when faced with limitations (see Figure 3 for examples). These included actions currently performed in everyday life which proved useful when faced with limitations, such as always having a bottle of water in the fridge or being flexible in when to drink morning coffee. Insights about which preferences that are more easily catered for in a future with limitations was also revealed in the studies. These were *tacit* actions and preferences, that participants only realised were useful when faced with limitations. Participants in both studies also performed actions that they normally would not, to adapt. Knowing when and how to perform these actions can be seen as *latent* knowledge that was manifested due to the limitations.

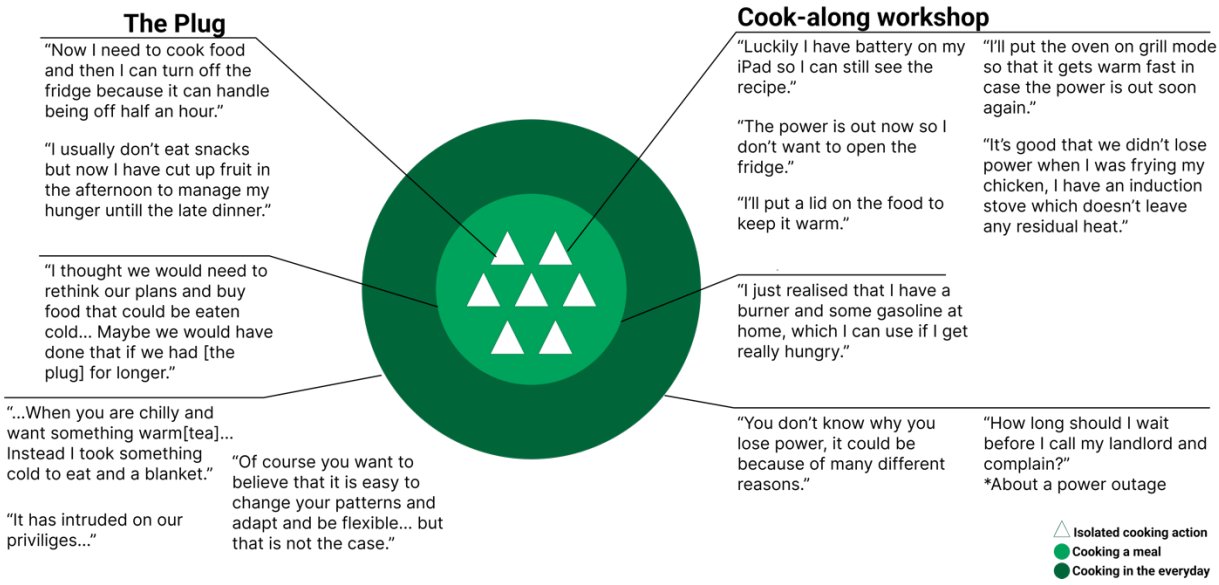

Figure 3. Quotes from participants that exemplify insights related to cooking activities, the activity of cooking a meal, and the relation between cooking and the everyday.

Both studies provided a substantial share of insights about the participants' prioritisations. These prioritisations were latent; the participants realised what they valued due to the imposed limitations and provocation. This is illustrated by one of the Plug participants: "I thought it would be easier to switch out the porridge and eat yoghurt instead… apparently I want something warm in the morning, I didn't know that, it surprised me". Another common prioritisation in The Plug was to stick to the plan of what food to prepare even though they had to wait until later to do it. Prioritisations between different areas of everyday life and

variations between household members, contexts, and days were common in The Plug. Such prioritisations were not as present in the Cook-along workshop, due to its set-up. The exception was one participant who mentioned that he would be more worried about his data servers than over half-cooked chicken during a power outage. Both studies provided insights about prioritisations between two wants related to preparing meals, for example prioritising the stove over constant energy supply to the fridge. But the Cook-along workshop provided better insight into how the participants reasoned about prioritisations in relation to different goals within one activity.

The Plug elicited a larger share of insight than the Cook-along workshop about how the everyday influences households' preconditions for a future with limitations. In The Plug, insights regarding a wide range of everyday entanglements were elicited, such as how work schedules, day of the week, and seasons influence preconditions as well as whether the meal, and the preparation of it, was part of a social event. In addition, insights about how the household's overall character influences preconditions were revealed. Households that plan less and are more flexible seemed to be less negatively affected by the limitations. For the households that made plans the lack of predictions of power availability in The Plug was expressed as a barrier for living with limitations. How the everyday entanglements influenced their preconditions can be seen as tacit knowledge made explicit through the limitations.

The Plug provided a larger share of insights about feelings than the Cook-along workshop. The participants in the Plug had a range of negative experiences: it was hard, they got hangry (angry due to not eating) and annoyed, they felt helpless and as if they "lost" quality time in the evenings when they waited for the power shortage to end. But they also had positive experiences: one of them described the expectation she felt as she checked whether she would be allowed to use the stove and another participant explained that she felt as if she was doing a good deed when not using more appliances than currently allowed. One participant explained how the experience changed during the study, "it went from exiting to annoying", and another described their experience with the Plug as "for me it conveys that it has control, and I don't". The time the provotype was part of the participants' lives led to a larger share of insights related to feelings from the Plug. Comments regarding experiences of the Cook-along workshop were more related to the set-up of the study which they thought was fun, but also a few comments that they found the limitations weird.

Even though the power strip in The Plug was a provotype the participants provided feedback as if it was a prototype for a commercial product. For example, they commented on its ergonomics and ease of use. The participants seemed to interpret the provotype as an "ordinary" product and during the study it acted as an ordinary product: it entered the participants' homes; they used it in their usual activities; and they interpreted its meaning. The interpretation of the power strip as a regular product could be one of the methods benefits as it brings the provotype closer to the everyday life.

4.2 Insights about questioning of current life and speculated future

The Plug seemed to have a better ability than the Cook-along workshop to estrange and elicited more insights about elucidated and questioned values and privileges. The Cook-along workshop, on the other hand, provided more insights related the participants' reflections and opinions about speculated futures. As The Plug was integrated into everyday activities, the future became a part of today. The provotype's combination of familiar (the power strip) and unfamiliar (sockets that turn on and off) seemed to contribute to the estrangement of the everyday – it managed to suspend disbelief. It is noteworthy that the everyday only becomes as estranged as the provotype demanded; most often participants did what the provotype asked for – they prepared meals when energy was available – but not more than that. The Plug participants also reported that through the participation as such, the provotype became less demanding, as they could "cheat" by using punch tickets. For some, the Plug became more of a game with its own rules than an everyday with new rules. The Cook-along workshop was even more perceived as a game. It had clear rules and although the "challenges" enabled full control over the provocations, it added a game show-like element that decreased the estrangement, or rather, it was only a strange experience and not suspension of disbelief about a different future. Another aspect of the Cook-along workshop was the atmosphere: joyful among friends with frequent jokes, but unrealistic for a blackout. On the other hand, the participants seemed comfortable with sharing their thoughts among friends and made the active choice to engage with all limitations.

Both studies elucidated insights about what the participants value in everyday life and their privileges, for example the value of being able to prepare (hot) meals whenever desired but also that it is a privilege not available to everyone. In the Plug, values connected to wider aspects than cooking were also elucidated, including social aspects of preparing and eating meals together, and to be hungry when dinner is ready (a problem when eating too many crisps waiting for the power to return). These values and privileges were to a lesser extent questioned in the studies.

None of the studies provided very rich reflections about the speculated future. The Cook-along workshop provided reactions to and discussions about the limitations in such a future, which could be interpreted as opinions about a future with limitations. As the Plug was situated in the everyday and for a longer time, the participants had more chance to reflect. One participant, for example, reflected on that he focused more on what electricity is used for, than where and how it is produced. Most participants' reflections were focused on what to do in a future with limitations and not about that future as such.

5. Discussion

Could the methods borrowed from provocative design approaches lead to actionable insights for a user-centred designer working with an uncomfortable future? Yes. Both methods provided plenty of insights, but in terms of actionability, the insights cannot be directly translated into design solutions, user insights seldom are, and the intention was

primarily to find which issues that would be valuable to explore further. However, the insights are rich and broad to both inform design and leave room for designer creativity – which make the insights useful according to Sleeswijk Visser et al. (2005). Any concrete design suggestions are unlikely to be useful as the provocations only materialised one part of the future (limitations to energy supply), but the real future will be different in many unknown ways, invalidating concrete suggestions.

Returning to the three properties of provocative identified in section 2 – speculative future everyday, suspending disbelief, and societal critique – we can see that the two methods' ability to situate users in both the speculative future and the everyday – to evoke a s*peculative future everyday* – varied. The character of the Cook-along workshop, an extraordinary event, limited the possibilities to create the speculative (Raven, 2017) or anticipatory (Lindley et al., 2014) ethnography argued as a strength, but the Plug's incorporation in mundane settings over a longer period allowed more of that. Situating both provocations in the participants' own homes was important to create experiences of the future scenario as if it was everyday life and provided concrete experiences to reflect on when discussing their future needs. The post interviews were thus also an important part of the implementation of the methods.

A factor impacting the *suspension of disbelief* was that some participants were keener to enact the speculated future than others. These participants had a more realistic experience and gave insights that would have otherwise been missed. In the Cook-along workshop, with its vague descriptions of the future, the engaged participants improvised around the scenarios, elaborating on the story behind and the actions they took – co-constructing it in Elsden et al.'s (2017) terms. However, what made enactment matter to the participants (Elsden et al.'s consequentiality) were the social interaction and the experience of the event itself. Thus, when planning similar studies, the social and event-like experiences are valuable to include, but will have to be balanced with the desire to evoke the everyday.

Finally, while the two studies managed to elicit actionable user insights, they did not to the same extent trigger *societal critique* in terms of critical reframings of the future or discussions about preferable societal development. Such critique might be much to expect from people not trained in for example design or futuring. Interestingly, speculative design seems effective in triggering such critique when designers are the audience (Kuijer, 2020). Another reason for the limited societal critique could be that the studies were not provocative enough. There may be an inherent conflict in having the empathic mindset of a user-centred designer and provoking people by subjecting them to an uncomfortable future (cf. Kuijer, 2020). This conflict was experienced by the designers in the Plug as a need to balance out the inconvenience and invasiveness by offering the punch ticket as a "licensed" way to "cheat". So, designers hoping to use provocative methods will have to shift their mindset, at least temporarily, to be ok with subjecting users to the discomfort. We agree with Ozkaramanli and Desmet (2016) that problem-solving designers can benefit from provocative strategies and this study has shown that even less provocative speculations can

elicit deep insights about future users' needs, values, privileges, and prioritisations in an uncomfortable future.

We believe that the methods are particularly useful for futures that participants do not consider plausible (and maybe not even possible) but that for some reasons are preferable, such as sustainability. The methods could also be used to explore alternative presents. However, placing the discomfort in the future instead of the present seemed to increase the believability of the speculation and counterintuitively facilitate for the participants to engage with possible adaptations. The distance in time enabled the participants to also distance themselves from the probable; suspending the disbelief.

6. Conclusion

To sum up, provocative design methods – in the shape of a provotype embedded in everyday life and a provocative speculative enactment – can provide actionable insights for a user-centred designer working with an uncomfortable future. Both methods provided plenty of insights but with slightly different emphasis in what types regarding content, temporal scope, and reflective depth. Both managed to reveal tacit knowledge and latent needs, as well as uncover values, privileges, and prioritisations, but did not manage to provoke enough for the participants to truly challenge or reframe those. Further research is needed to explore how to trigger such critical societal reflections (if desired) and for what types of futures (or presents) such methods are applicable.

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