Rules of (household) engagement: technology as manager, assistant and intern

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Abstract

Purpose – Practitioners need to understand how households will engage with connected-home technologies or risk the failure of these innovations. Current theory does not offer sufficient explanation for how households will engage; hence, this paper aims to address an important gap by examining how households set "rules of engagement" for connected-home technologies in the context of electricity use and monitoring.

Design/methodology/approach – A review of the extant psychology, technology and engagement literature is conducted and yields two research questions for exploration. The research questions are addressed via 43 in-depth household interviews. Analysis includes thematic analysis and computerized text analysis.

Findings – The results include a typology of technology engagement (the "PIP typology") and discuss three main roles for technology in assisting households: intern, assistant and manager. Key contributions are as follows: consumers in household settings may experience "compromised engagement" where the perceived middle option is selected even if no-one selected that option originally; households open to using connected-home technologies are often taking advantage of their ability to "delegate" engagement to technology, and because consumers humanize technology, they also expect technology to follow social roles and boundaries.

Research limitations/implications – Future research may examine the PIP typology quantitatively and/or in different contexts and would benefit from a longitudinal study to examine how household technology engagement evolves. Four research propositions are provided, which may form the basis for future research.

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Practical implications – Recommendations for practitioners are presented regarding the benefits of keeping consumers at the heart of connected-home technology goods and services. Specific design principles are provided.

Originality/value – This paper fulfills the need to understand how households will engage with connected-home technologies and the roles this technology may fulfill in the complex household service system.

Keywords New technology, consumer engagement

Paper type Research paper

1. Introduction

> Technology is a useful servant but a dangerous master. – Lange (1921)

Technology is indeed there to serve consumers, but how do consumers want to be served when it comes to connected-home technologies? Do consumers prefer an actively engaged role in services, or do they prefer for technology to engage on their behalf, with the value lying in consumers not having to engage? We do not yet understand the "rules of engagement" consumers set for connected-home technologies. Consumer engagement (CE) is a useful framework to apply to these questions, as it connects the three engagement dimensions: cognition, affect and behavior.

Electronic channels give consumers control over their relationships with companies (Johnson, 2007), and also give consumers control over engagement with services offered. However, consumer technology adoption is not always strong. Studies have extended the technology acceptance model (TAM) to examine how adoption varies with new technologies like the internet, online-games, or virtual-assistants, and found that more affective factors such as playfulness (Moon and Kim, 2001) and trust (Wang and Benbasat, 2005) are key. Indeed, even models such as the Technology Readiness Index 2.0, which now reflects new technologies like cloud computing (Parasuraman and Colby, 2015) tend to cover factors governing individual adoption, rather than group engagement as is the focus of this study.

Research around trust and technology reinforces the idea that to decrease perceived-risk in technology, trust must be increased (Martin *et al.*, 2015). What remains unclear is how trust and risk will apply to the connected-home, a technological innovation still in the realm of imagined experience for most. Imagined experience is a service experience co-creation dimension (Jaakkola *et al.*, 2015) and an important area of study, particularly for technological innovations where futurizing is necessary to build and adapt theories ahead of practical innovation. The nature of the service encounter is changing, thanks to technology – and so too are the roles played by consumers and technologies, leading to calls for research to help understand how service encounters should be designed for optimum engagement (Larivière *et al.*, 2017). This need to futurize goes beyond prior research about technology adoption (i.e. extended TAM) to understand how households engage with the technology once it has been adopted. We use the CE framework to understand how consumers think, feel and act with a technology post-adoption, in an imagined experience. In essence, adoption is assumed – the connected-home technology therefore functions as an interactive platform for engagement (Brodie *et al.*, 2013).

Modern technologies – unlike previous innovations (i.e. Blu-Ray players, Televisions) often have "levels" to allow consumers to engage where they are comfortable. Consider the levels of automated vehicles, or how virtual-assistants can have tasks added or removed from their purview. The intensity level sought from the engagement experience is a key consideration (Hollebeek *et al.*, 2016), as is the understanding that different relationships

vary in depth, and have emotional or functional bases (Fournier and Avery, 2011). These differences can lead to different "rules" for how consumers will engage.

To support our theory development, we use the theory that provides these levels, allowing customers to move from passive to proactive, and from superficial to deeper relationships: Web 1.0, 2.0, and 3.0. Web 1.0 is characterized by passive information sharing, Web 2.0 by interaction and user-generated content (DiNucci, 1999), and Web 3.0 is the closest approximation of fully realized connected-life, with machines interacting on behalf of consumers (Berners-Lee *et al.*, 2001). Fuchs (2010) describes the levels as the "web of cognition" (Web 1.0), "human communication" (Web 2.0), and "cooperation" (Web 3.0). A key feature of these technology interaction levels is the differing levels of interactivity. The current and emerging offers in the home energy management arena align with these three levels (e.g. connected-home lighting can operate via apps, home-assistants or proactively based on patterns). This framework is useful for classifying available technology.

While the CE literature deals with the internet as a facilitator of engagement and collaboration (Hollebeek *et al.*, 2016), there is only emerging literature and empirical evidence (van Doorn *et al.*, 2017; Huang and Rust, 2018; Kumar *et al.*, 2016) explaining how CE varies when interacting with passive, interactive, or fully-automated technologies, and whether consumers' trust and risk perceptions will allow full technology engagement. This is an important gap, as the Internet of Things (IoT) will affect household decision-making (Hoffman *et al.*, 2018) – already, smart devices provide decision inputs ("Siri, should I bring an umbrella?") and making decisions on our behalf (e.g. smart-fridges ordering groceries). Such interactions will grow in frequency and magnitude as technology evolves, leading to calls for research (Hollebeek *et al.*, 2018). Further, while previous studies have examined individuals, we examine a unique consumer group, likely to have a profound impact on engagement (Hollebeek and Andreassen, 2018): the household, which functions as a complex service system. Given the emergence of connected-home technologies, households will make choices about how to engage across all three levels within their own homes; this is a significant gap. We focus exclusively on CE experienced by households.

Hence, two gaps exist in the CE and technology literature; the first is the lack of understanding of household-level engagement. Secondly, we do not understand how households engage with different technology levels. These gaps lead to the research questions of:

RQ1. How do households engage with differing levels of technology interaction [passive, interactive, proactive]?

RQ2. How do the perceived roles of connected-home technology influence how households engage?.

This paper makes three theoretical contributions; first, the identification of compromised engagement whereby households tradeoff individual perspectives on engagement. The second contribution is that consumers who are "passive" are prone to "delegated engagement" while "active" consumers prefer "controlled engagement". Third, this research uncovers the social roles households assign to the humanized technology they seek to engage with; specifically, passive technology acts as intern, interactive technology as assistant and proactive technology as manager.

Practically speaking, this paper makes three contributions. First, it provides an understanding of how consumers engage with the different levels of technology and how this influences engagement expectations. Second, we uncover the "Goldilocks Effect" and

how this creates a situation of "compromised engagement". Finally, we provide a set of guidelines for practitioners seeking to introduce connected-home technologies.

The context for this study is electricity, a ubiquitous though unengaging service. This is an interesting context for engagement studies because it is key to the use of connected-home technologies and is an invisible service that often lacks any opportunity for engagement beyond the behavioral. It is important that consumers have a voice in their electricity services, as consumers feel the industry does not have their best interests at heart (Energy Consumers Australia, 2017).

The paper next presents a literature review which synergizes literature from the areas of consumers and the connected-home and CE with technology. Following this, methodology and findings are provided. The paper concludes with a discussion of theoretical and practical implications and future research suggestions.

2. Literature review

This literature review examines consumers and the connected-home by drawing on existing research from multiple disciplines. Following this is a more general discussion of CE with technologies in this space, and a section on household decision-making.

2.1 Consumers and the connected-home

Connected-home is used here as a continuum – at one end, technologies that foster connection are necessary (e.g. wifi and smartphones), while at the other, smart-technologies (e.g. virtual-assistants) enhance the connected-home experience. In keeping with this continuum-based approach, Web 1.0 to 3.0 encapsulate how connected-technologies form the basis for new and different CE. Indeed, the 4th Industrial Revolution is upon us, bringing with it new ways in which technologies are embedded in our homes, societies and even bodies (Davis, 2016). Hence, we will see a continued evolution of connected- technologies – especially as automation and cloud computing abilities grow.

Recent work on connected-homes has yielded important insights. Consumers using a connected-home for the first time will tend to treat the experience as an interpersonal interaction, for instance by addressing the home in day-to-day language (Holthaus *et al.*, 2016), indicating connected-homes may be a form of pseudo-social interaction. This finding aligns with seminal views of relationships in marketing (Fournier, 1998; Fournier and Avery, 2011), where relationships were integral to trust and engagement, even before the technology in question was able to think and act (nearly) autonomously.

Further, participants in connected-home studies have also insisted connected-homes should be controlled, rather than truly autonomous (Allouch *et al.*, 2009; Schiffhauer *et al.*, 2016). Acceptance of interacting with a connected-home is also context-specific, with consumers preferring to select which tasks they would entrust to the connected-home (Schiffhauer *et al.*, 2016), hence indicating a strong degree of cognition and emotion present in CE. These studies indicate that consumers are engaging socially, as well as behaviorally, affectively and cognitively, with these smart-home technologies.

There has also been a body of research dealing with the use of connected-home technologies by the elderly, a group which stands to benefit from such technological assistance when "aging in place". Studies find that while the elderly are usually positive about connected-home technologies (Demiris *et al.*, 2008) in that they provide reassurance, security and independence (Arcelus *et al.*, 2007; Portet *et al.*, 2013), there a range of issues vital for successful engagement with this group. Concerns were raised regarding security and privacy (Arcelus *et al.*, 2007; Demiris *et al.*, 2008; Demiris and Hensel, 2008) alongside issues of user-friendliness, learning and the need for human response (Demiris *et al.*, 2004),

the practical implications of system reliability (Skubic *et al.*, 2009) and fear of complex and unfamiliar equipment (Arcelus *et al.*, 2007).

While on a specific subset of the population, these studies have broad relevance for the engagement of any household seeking to augment their daily lives with technological assistance, and highlight the prevalence of cognitive, affective and behavioral barriers and enablers to engagement. However, despite these products and services already entering the marketplace, there is a lack of academic research in CE to assist us in understanding how consumers will engage. There is also no research examining the technology interaction levels consumers will encounter. Considering that connected-homes require engagement, this is a significant gap.

2.2 Consumer engagement with technology

CE with technology is still a nascent area when considering the ways consumers engage with and through technology are rapidly changing. This highlights the need for work that futurizes the interactive experience to create services theory (Larivière *et al.*, 2017), allowing CE researchers and practitioners to understand imagined experience (Jaakkola *et al.*, 2015) prior to lived experience becoming available for study.

Just as the technology interaction levels describe a move from cognitive engagement (Web 1.0) to social, behavioral and affective engagement (Web 2.0 and Web 3.0), so too are the types of engagement – cognitive, affective, behavioral – relevant to explain how consumers are engaging and imagining engaging in this dynamic technological environment. Previous studies combining CE and technology tend to focus on social networking sites (Chu and Kim, 2011), websites (Mollen and Wilson, 2010) or online brand communities (Brodie *et al.*, 2013; Dessart *et al.*, 2014). Previous studies have also been dyadic in nature (consumer-to-technology), whereas the household group experiences multiple interactions (e.g. household member-to-household member, household member-to-technology, technology-to-service) as actors within this unique service system engage with each other.

Though not in the area of connected-technologies necessarily, some work is also emerging in the context of mobile user engagement (Kim *et al.*, 2013) and smart televisions (Pagani and Mirabello, 2011). Findings from these studies indicate engagement in this context hinges on utilitarian benefits, a sense of community, intrinsic enjoyment, self-esteem, inspiration and a feeling of participation (Pagani and Mirabello, 2011), as well as perceived user-friendliness, value and satisfaction (Kim *et al.*, 2013). Indeed, Kim *et al.* (2013) propose consumers move through cognition, affect and behavior-based engagement in this technological context, with utilitarian, hedonic, and social motivations functioning as engagement motivators. In the energy sector, ease of use, usefulness, attitude, perceived behavioral control, as well as internal and external motivations have been found to influence consumer intentions to adopt and continue using an IT-enabled technology solution (Wunderlich *et al.*, 2013). Hence, again the multiple dimensions of engagement are present with these similar technologies.

However, despite the increase in consumer interest in connected-home technologies, most practitioners remain focused on the equivalent of Web 1.0 or 2.0 stages – whilst also failing to consider the social nature of technologies like the connected-home.

2.2.1 Why consumers may not engage with technology. Ensuring CE and adoption of smart technologies whilst also mitigating potential resistance is important for organizations, consumers and the economy. This is because innovations in smart technologies are resolving long-standing issues and tensions between organization and the consumer surrounding service efficiency and effectiveness (Marinova *et al.*, 2017) Reducing such

issues and tensions via consumers, use of smart technologies could thus create opportunities for enhanced value creation for consumers and organizations and the economy via service personalization and enhanced service and economic productivity.

Despite innovations, consumers do not always readily accept or engage with technological changes. The existence of all three technology interaction levels simultaneously is one such example: it is not that more advanced interaction is not possible, but that sometimes consumers are not ready to engage. The reasons for this lack of willingness to engage are multifaceted, but based on previous technological innovations (e.g. internet banking), often trust and perceived risk drive adoption behaviors (Wunderlich *et al.*, 2015).

Research around trust and technology is also shadowed by the idea of perceived-risk; that is, to decrease perceived-risk in technology trust must be increased. While mostly dealing with e-commerce environments, literature in technology and trust still provides useful insights for the future of connected-home technology. For instance, antecedents of trust in an electronic environment include company reputation (Pavlou, 2003), privacy and security measures and perceived control (Hoffman *et al.*, 1999) – all factors aimed at reducing perceived-risk for consumers.

It is expected that engagement with connected-home technologies will similarly be governed by trust and risk, particularly because the interaction will happen in the consumer's home.

2.3 How households decide to engage

Examining households in this context is important, as both connected-home technologies and energy services are consumed at the group-level, with differences between individual and group engagement likely. Research shows households – particularly families– are unlikely to follow the same decision-processes an individual would, with the relationships, shared constraints, and interrelatedness of choices all affecting the decision process (Davis, 1976). Indeed, households are an entity in themselves and their decision-making can be complex as it is made up of individual inputs (Yam *et al.*, 2017). Adding to this complexity are factors like family lifecycle and shared finances (Neulinger and Radó, 2018), cognitive biases like "social loafing" and maintaining the status quo (Frederiks *et al.*, 2015), and power dynamics of families (Lien *et al.*, 2017). Even within the electricity context, complex relationships play out with children tending to use more electricity than their parents through the use of devices, and parents not discouraging this behavior out of concern for their children's wellbeing (Schmidt *et al.*, 2014).

Connected-home technologies are part of a shared decision and engagement process, as these systems operate in a shared household space. This is unique, as previous technologies like smartphones placed renewed emphasis on the individual (e.g. using smartphones as a personal television, separate to the family television). Connected-home technologies require individual and household engagement and may therefore result in sub-optimum outcomes as power dynamics and individualized preferences play out.

Indeed, the technology is entering a complex service system comprised of multiple actors (household members) interacting in dynamic ways to create value and engage in positive service experiences (Chandler and Lusch, 2015). This means that the interaction of these multiple actors creates different theoretical relationships with engagement and value creation. For instance, if there is a disagreement amongst the household actors on the type of technology to use and only one item can be purchased, this need for consensus may result in tradeoffs for different actors relating to engagement and value. Currently there is a lack of

knowledge about how households engage with connected-home technologies, hence the group context of this paper.

3. Method

The literature review highlighted the necessity of understanding how households will engage with services via connected-home technology and showed that despite the level of technology interactivity being likely to influence engagement, there is little research available. Given the complex nature of this topic, a qualitative group interview approach was used.

An immersive household interview approach was adopted, whereby researchers entered participants' homes to facilitate a field study-like approach that yielded higher transferability. This method allowed for the interactions amongst household members to be observed, hence yielding valuable insight into household dynamics that would not have been possible using other methods, such as quantitative. A total of 43 households (totaling 116 people) were interviewed, covering household types including: working couples, retired couples, share-houses, and couples with children. Participating children needed to be school-aged and have parental consent. Interviews were conducted across four Australian states, and took place in late 2016 and early 2017. Australia was an ideal context for this study, as not only is it similar to nations in the Anglo cluster such as the USA and UK (Gupta *et al.*, 2002), but it is also experiencing an electricity affordability crisis as many other nations are (World Energy Council, 2016). Australians, as traditional early adopters of technologies such as smartphones (Deloitte, 2017), are likely to leverage technology to help them address this global challenge.

Households were identified and contacted through a convenience snowballing approach. All interviews were recorded and transcribed verbatim. Data were de-identified prior to analysis. In this paper, invented names are used in all quotes.

As part of the interview, households were asked to imagine they had been offered a choice of one of three "technology engagement" options. Projective techniques were used to start discussions with participants regarding the three technology levels.

An interview guide was developed using the three technology interaction levels and CE, and these theories were operationalized as three stimuli, illustrating passive/low-technology, interactive/moderate-technology and proactive/high-technology options (described below). These options were guided by interactivity levels, but also by the types of technologies at different levels currently available or in development within this context. For instance, local examples include "Switch your thinking", an SMS tip-based service (passive), "HomeSmart" with virtual-assistant Eddy helping households with electricity usage (interactive), and "Frank" from Save-A-Watt, who switches consumers to a cheaper plan automatically (proactive).

Our passive/low-technology option offers a text-messaging based service where households can receive energy-consumption tips. This is a primarily cognitive option (Fuchs, 2010), and users must choose whether to engage behaviorally themselves.

The interactive/moderate-technology option is an app-based virtual-assistant with personalized tips (e.g. considering appliances, weather) and offers to act on the household's behalf with permission, for instance turning off an appliance. This is a collaborative approach (Fuchs, 2010) and households make decisions before allowing the technology to engage on their behalf.

The proactive/high-technology option offers an app-based virtual-manager, where households can allow the manager to completely control energy usage – including switching to a cheaper plan. Households can read reports, override the manager, or choose to

disengage from both their own energy behaviors, and from interacting with the technology. This is closest to the "web of cooperation" with machines engaging with other machines on behalf of consumers (Fuchs, 2010).

Participants were also asked CE-related questions derived from the literature – particularly from the work of Hollebeek *et al.* (2014) which focused on the related context of social media engagement. We were also influenced by the concept of "imagined experience" (Jaakkola *et al.*, 2015) and operationalized the concepts of Hollebeek *et al.* (2014) with a view toward anticipated engagement (i.e. how consumers anticipate engaging in the future).

For example:

- *Cognitive interaction*: What are your thoughts about using this technology? What do you think it would be like?
- *Affective interaction*: How would you feel about using this technology? Why do you think you feel that way?
- *Behavioral interaction*: Would you use this technology? How do you see yourself using it?

The data were analyzed using an inductive-deductive approach (Fereday and Muir-Cochrane, 2006). Analysis proceeded iteratively and systematically, starting from the organizing theoretical frameworks, examining the data, and then recommencing the process to identify themes. Leximancer, an automated text analysis software, was used to provide initial semantic knowledge extraction and theme identification (Dann, 2010). Themes and relationships identified were then examined in line with the data again, with the process continuing until themes were refined and relationships between themes emerged across households.

4. Findings

The sample reflected a diverse population, with 57 males and 59 females, ages ranging from 5 to 77 years. Electricity bills ranged from $0 to $1,000+ per 3-monthly cycle. In this section, we include four propositions that represent the qualitative findings related to the research questions.

4.1 Trust, risk and interaction

The first research question examined the ways in which households will engage with connected-home technologies across the different interaction levels to understand how households may (dis)trust these technologies, perceive risk, and how this will guide their engagement choices. Hence, this section addresses *RQ1*: *How do households engage with differing levels of technology interaction [passive, interactive, proactive]?* This section first outlines the different levels of technology, then presents how households engage with these levels, the rules that set the boundaries of engagement and, finally, the preference for households to select the "middle option".

4.1.1 A hierarchy of technology engagement. The findings reveal that the three levels form a hierarchy of engagement. When trust is high and perceived-risk is low, households prefer to interact with the most innovative option – proactive technology (Leckie *et al.*, 2018) (Figure 1). Further, some households are attracted to innovation (if they feel it can be done well), whilst others are less trusting, preferring to remain with what is familiar. Households therefore gravitate towards the engagement relationship that suits them (Fournier and Avery, 2011).

4.1.1.1 Passive technology. Engagement with passive technology was preferred by households with low trust and high perceived-risk in technology. This is consistent with prior research on consumer reluctance to engage with technology which indicates company reputation (Pavlou, 2003), privacy measures and perceived control (Hoffman *et al.*, 1999) play a role in ensuring trust. Table I provides a simplified summary of illustrative quotations and codes, in the style of similar papers (Hollebeek *et al.*, 2017a). In Section 1 (Table I) prior experience with a technology, and company reputation, create trust and reduce perceived-risk, which then transfers to the passive technology.

4.1.1.2 Interactive technology. Engagement with interactive technology was preferred by households that had moderate levels of trust and perceived-risk. Theory indicates that in unfamiliar situations, consumers may rely on analogies of similar experiences they have had (Bettman *et al.*, 1998) to "fill in the blanks". As in Section 2 (Table I) where the consumer trusts the interactive technology because the perceived-risk has already been lowered by previous experience.

4.1.1.3 Proactive technology. Engagement with proactive technology was preferred by households that had high trust and low perceived-risk in technology, often enough to grant the technology a "trustee" role to whom they can delegate their engagement. This is in contrast to more active consumers, who prefer "controlled engagement" – that is, they will only engage if they retain final control and oversight over the technology. While this has not been researched previously, this phenomenon is an important one, indicating that the nature of service relationships is changing (Table I, Section 3).

Therefore, we propose the following:

P1. Trust and perceived-risk of technology vary based on the household, leading to different choices from the three hierarchical levels of engagement: passive, interactive and proactive.

4.2 The rules of engagement

The following section outlines the "rules of engagement" for households engaging with connected-home technologies now and in the future (Table II). These rules reflect the household's desire to set their own rules for the pseudo-social engagements they pursue with connected-home technologies, aimed at ensuring consumers feel they have not sacrificed their freedoms (Clee and Wicklund, 1980). These rules set the boundary conditions for engagement at any level, in terms of norms, communications control (Raaij, 1998) interactions, value creation, and how households expect to treat, and be treated by, the technology. The rules do not necessarily vary by traditional individual differences such as age or gender, but are a unique reflection of the household.

Figure 1.
Hierarchy of technology engagement.

Household engagement with technology	Section #	Comment	Codes
Engaging with passive technology (Intern)	1	Grant (72): "[Passive technology sends] things through to say, "Had you thought about doing this?" Because I actually go on to the Hydros tips anyway . . . I do it through [my energy providers] site and I trust that"	Trust, reputation, risk reduction
	4	Katherine (29): ". . . I don't think we can be bothered going online and reading and. . .making our own decisions. That's too hard, man, just tell me"	Effort, cognition, information
	5	Betty (27): "And that it's [passive technology] super safe. That concerns me [if the technology knows which appliances we are using]. Like if we're asleep during the day it's pretty clear we're probably not going to be here at night"	Safe, risk, privacy, rational
	14	Rita (37): "I like the idea of low-tech because that's about changing behaviors and not being reliant on something that's going to do it for you, and then you're making decisions and changing household behaviors"	Decisions, control, low-reliance
	17	Maya (24): "I think low-tech is good, actually, because I think I would be most responsive to receive just little snippets of information that I can digest"	Cognition, effort
	18	Elaine (37): "That's something that's around now, that type of thing. I think we're over that type of thing. I think in these [sic] day and age it needs to actually suggest to you what to do."	Familiarity, need for novelty
Engaging with interactive technology (Assistant)	2	Irene (39): "I would choose [interactive technology] probably. It's – I got so many apps on my phone. I love their little reminders and stuff. It's just the same"	Trust, past experience, familiar
	6	Claudia (41): "I'd want it via an App, where I could just click on it. Like, I'm going to go turn on something, click on the App, is it a good time? Tell me to do it or not"	Time, control, actions, behavioral
	7	Melissa (24): "Obviously you'd have to agree to something like this and you still have to respond to them and whatever, I just think I like that [interactive technology]"	Control, actions, consent

Table I.
Summary of quotes by type of technology

(*continued*)

Household engagement with technology	Section #	Comment	Codes
	11	Stace (30): "I like that one [the interactive technology]. It's good to be able to know that someone's actually paying attention and saying, 'If you wait that it'll be cheaper but we've got an option for you'"	Humanisation, support
	15	Matthew (14): "Yeah you've still got the control but it also helps you out at the same time"	Control, support, assist
	19	Melissa (24): "I really like the interactive tech because it's like nudging your behavior, you're still making the decisions, you feel like you're in control"	Behavioral, influence, control
	20	Caroline (40): "Yeah, an app, where you could just go in and go, ah, yeah, we're using this now."	Behavioral, novelty
		Gordon (47): "Switch the kettle on and then watch it and go . . ."	
Engaging with proactive technology (Manager)	3	Tiana (40): "I like [proactive technology] so it would switch plans for you and turn things on and off. . .Because it's doing the work for you. Because I'm busy so you know nice to be saving the money and saving the energy"	Positive affect, delegate engagement
	8	Jacqueline (56): "Whilst there'd be a level of irritation I like the bit where it says, 'We've switched you to the best tariffs' which to me is saving money, for your energy usage and turned off all unnecessary appliances which would be quite handy here at times"	Positive vs negative affect, possessions
	9	Lisa (22): "Because it seemed too much like automated, be like no, you can't use it now. It's like don't tell me what to do robot"	Negative affect, boundaries, role, reactance, control
	12	Pete (37): "I don't think I like someone else [the proactive technology] controlling"	Negative affect, boundaries, role, reactance, control
	13	Fred (44): "You're watching Home and Away and it [the proactive technology] turns [it] off"	Negative affect, boundaries, reactance, control
		Lizzy (29): "Yeah, no. That would just – no. Because I am not in control of it, I wouldn't like it"	
	16	Stace (30): "Electricity's a huge thing but, if you've got someone else that can literally control absolutely everything, that makes your life a lot easier"	Positive affect delegated engagement, trust, ease, manage

(*continued*)

Table I.

Household engagement with technology	Section #	Comment	Codes
	21	Alan (47): ". . .I'm really happy to tick [proactive technology] but I just want to know how restrictive that is, like if I've got to go in and ask, 'Can I turn the TV on at six o'clock?' That's going to be annoying" Katherine (29): "All I can think of is like all those movies where the household takes over"	Negative affect, control
Differences in preferred engagement (Goldilocks Effect)	10	Robert (58): "I just like to know I can turn things on or off. I don't trust these sorts of things where they decide you're using a lot of power but the hospital needs it more than you so you're gone. And that sort of stuff. And I'm happy to have a bit of control on what I want on or off. I'm not squealing like the electricity and I'm not paying $1000 a week or anything for it. I'm happy to be told hey it's hot, but it's okay." Mary (54): "I just wouldn't possibly want to think about it so that's why I'd go with the other option, the higher tech option because I think well if it's telling me that I'm using too much power, then I'm happy for it to tell me that I'm using too much power. And if it's saying that you're wasting power somewhere and we're going to shut it off, then I'd go yeah, okay, it's fine"	Active vs Passive Controlled vs Delegated Trust vs Risk

Table I.

The overarching theme of these rules of engagement is how consumers can be made to feel comfortable about their choices in technology engagement and allowed full agency to set their rules. This leads to the following proposition:

P2. Household preference for technology is dependent on their ability to set their own rules of engagement.

4.3 Technology interaction and household engagement

Each of the three levels of technology identified in the previous section align with different components of CE, with household responses to the three levels being influenced by trust and perceived-risk. Leximancer analysis was undertaken, where participants' comments about each type of technology engagement (passive, interactive, proactive) were analyzed. The results are presented here.

Passive technology interactions. First, the passive Leximancer results (Figure 2) show a word cloud heavy with cognitive terms (tips, information, notice). This option appears to have been perceived by households as a purely informational service (Section 4, Table I).

Rule	Explanation and example
Consumers control the communications	Supported by increased consumer power and the move to consumer-preferred channels (Raaij, 1998), this rule indicates that consumers are only happy to communicate if they can control the channel, frequency, timing, and content: Richard (42): ". . . notifications would have to [be] few and far between and I think there is already far too much nonsense coming through with everyone pushing information. So for me I think it would have to be a case of when it is useful and relevant, sure, but not like two or three notifications a day"
Technology should understand what consumers value, and what motivates them, and act accordingly	Consumers value personalization. It should be kept in mind, however, that knowing too much about consumers is perceived as "overstepping" Jenna (22): "Mapping of behaviors would be fantastic for like you use it at this time, this is an hour later but you'll save X money, send me a text and say is this something you're open to? I'd want to tick yes, and then have that instigated from then on. I still want to maintain some sort of control and to have a veto. But having that maintain itself in some way would be really beneficial . . . Like an iPhone, how it maps where you go and it learns"
Consumers will write the job description, not the technology	Consumers see two broad roles for technology: as helper or as usurper: Tiana (40): "Because it's doing the work for you. Because I'm busy so you know nice to be saving money and saving energy."
Technology will polarize a household, and often a compromise will need to be formed	This rule relates to the group nature of the evolving technology environment. When confronted with multiple differing preferences, consumers tend to exhibit "compromised engagement" and select the middle option Robert (58): "Compromise" Mary (54): "Compromise on two" Interviewer: "Compromise. So on one side low technology approach, on the other side high technology approach. You're meeting in the middle?" Mary: "We'll meet in the middle, yep"
Consumers control the control	Consumers need to feel their agency is maintained. This could be in making the choice to outsource tasks to technologies in the first place, or in choosing the settings and parameters the technology will operate under Steve (36): "Yeah, but you can change the settings of this, yeah. So you can control it controlling you, yeah"
If consumers feel like they are being told what to do, emotional, cognitive, and behavioral engagement will be negative	Reactance theory indicates that a consumer who feels that their freedom is being taken away (i.e., being told what to do) will react negatively (Clee and Wicklund, 1980) Christa (48): "That would annoy me, someone telling me it is too hot."
Consumers retain the power *not* to engage	As with engagement in the past, consumers need to retain their ability to engage in the way they choose, even if that means choosing not to engage Emmett (50): ". . .if I just get a text message, 'Would you like to receive some tips and become energy efficient?' I would just go, 'cancel'"
Consumers should not have to put effort in	Consumers tend to minimize effort required for information processing and decisions. This is no different in engaging with technologies: Steve (36): "Yeah, [the interactive technology] creates work to have to engage with it"

(*continued*)

Table II.
Rules of engagement – How consumers want to engage with technology

Rule	Explanation and example
The technology should be better than all other options	Consumers need to see the relative advantage of technology, especially if it is engaging behaviorally on their behalf. If it is something that can be easily done by the consumers themselves (or using another technology), then engaging with the new technology will lose its appeal George (71): "The first one was for the brain dead" Agnes (72): "We already know that, we can do that"
Consumers will look back at what is familiar to make decisions about their future engagement	Consumers making choices in unfamiliar situations will often rely past experience (Bettman *et al.*, 1998) Cynthia (64): "But the proactive; it's a bit like Eureka [the tv show], where what's-er-name controlled the house"

Table II.

This is in line with the conceptualized alignment of passive technology with the more cognitive side of the technology interaction levels (Fuchs, 2010). Households who prefer this option often do so due to a lack of trust and therefore a high perceived-risk in allowing the technology to act on the household's behalf. This supports previous research findings that consumers prefer not to allow full autonomy (Allouch *et al.*, 2009; Schiffhauer *et al.*, 2016), and highlights the potential security risks perceived (Section 5, Table I).

Interactive technology interactions. The Leximancer results for the interactive technology option (Figure 2) showed stronger emphasis on time, and introduced the concepts of control, decisions, household actions (having, giving), and outcomes (save) (Section 6, Table I). The reactions to this technology demonstrated more reliance on households' own behavioral engagement both with the technology and with their energy usage, though quotes here are also tinged with affective engagement (the balance between time and giving up control), showing it is at this level households start to consider what engaging with the technology will be like.

This supports research regarding consumer preferences for control over convenience when it comes to the connected-home (Allouch *et al.*, 2009; Schiffhauer *et al.*, 2016), and it is often at this level that households decided to stay. The increased use of behavioral and affective words by participants when discussing this technology option indicated that households were considering how much they wanted to collaborate, and their own agency as well as that of the technology (Section 7, Table I).

Proactive technology interactions. Finally, the Leximancer results for the proactive technology (Figure 2) introduced the concept of money as being most important, but again retained the idea of control (telling), decisions, and actions (doing). Consumer possessions were also introduced here (appliances, house) as households balanced a major positive outcome (saving money) against how much they trusted technology to engage with their personal possessions on their behalf (Section 8, Table I). Engaging on behalf of the household is what would be required for the full potential of the connected-home to be realized, yet this also spurs negative affective responses as households experience reactance and a threat to their own agency (Section 9, Table I).

Perhaps because proactive technology is new, levels of trust and risk are suffering from consumers' inability to watch their peers engaging with the technology first. This supports the need for innovators to lead the way in engagement with connected-homes, and supports the position of Wang and Benbasat (2005), that if technology is to assist households it needs to be trusted as well as having utility.

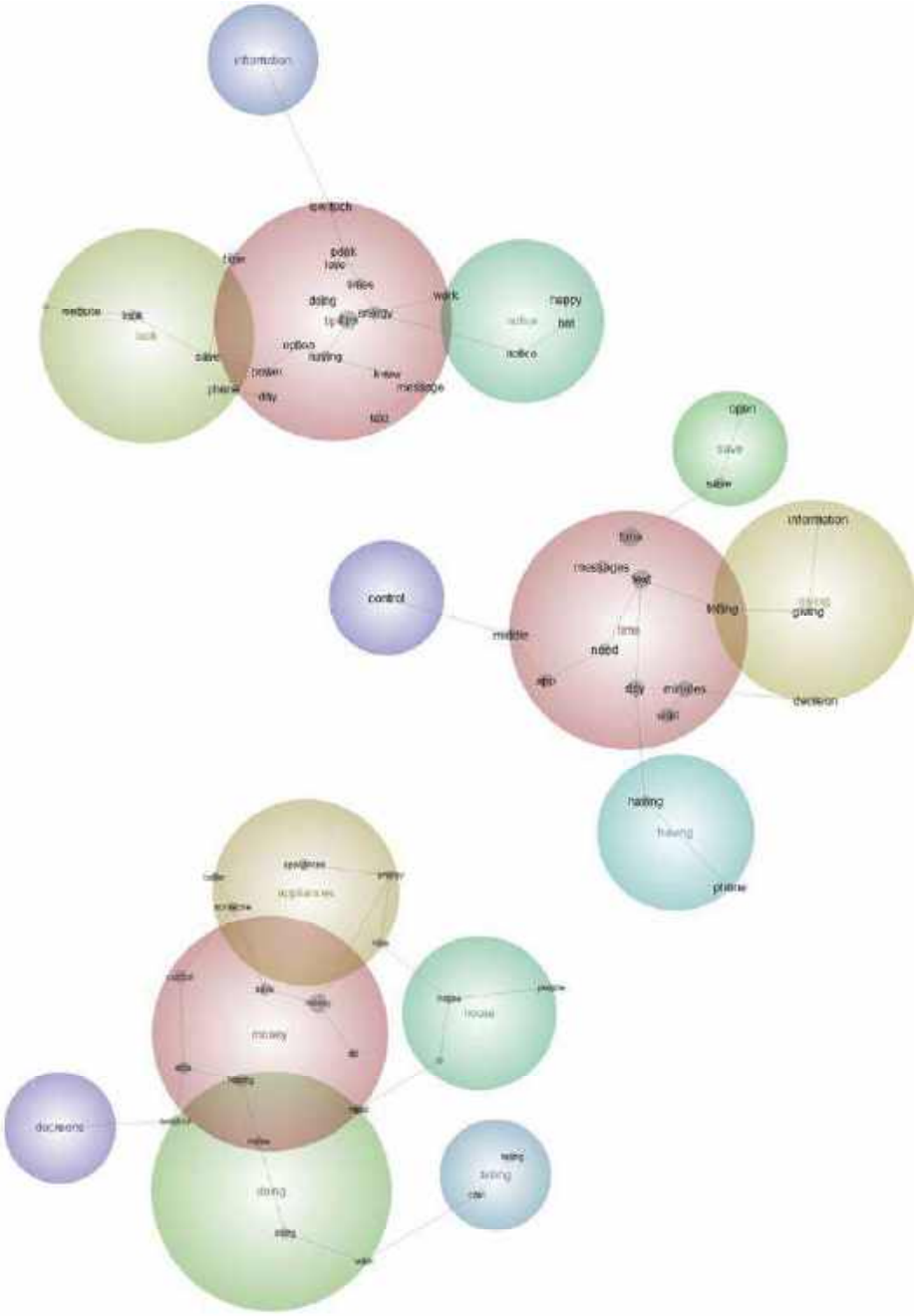

Figure 2.
Top to bottom – passive, interactive and proactive technology Leximancer result

This option was also the most controversial of the three, with households often referring to feeling like they were being told what to do, or giving up control of their homes, appliances, and energy decisions. Other participants, however, welcomed the chance to have a "set and forget" option – provided an override feature was promised. This finding leads to the following proposition:

P3. The dimensions of CE (cognitive, affective, behavioral), will apply differently depending on the level of technology (passive, interactive, proactive).

4.4 Choosing the middle option – "the Goldilocks Effect"

Another phenomenon observed was the tendency participants had towards selecting the "middle option", which in this case was interactive technology. Particularly when a household contained passive and active consumers (Section 4.3.2 and Section 10, Table I).

While householders influencing the engagement preferences of others are to be expected, it is not always conducive to technology engagement. This phenomenon was observed here because of the group-interviews, and the tendency to acquiesce to a "safe" option in group settings. This is one reason for the tendency to select the middle option, whereby a consumer who expects to be evaluated by others for their choices may choose the middle option, especially when unsure of others preferences (Simonson, 1989).

In this instance, this phenomenon of *compromised engagement* has been named "the Goldilocks Effect", describing a scenario where choosing between multiple people's preferences (cold porridge/not enough, warm porridge/just right, hot porridge/too much), while also acting in an unfamiliar environment, causes people to select the middle option.

4.5 The role of connected-home technology for household engagement

RQ2 examines the roles households may perceive connected-home technology as having, as well as how these perceived roles influence how households engage with these technologies. This section begins by presenting the PIP typology (passive-interactive-proactive), a digital support tool framework encompassing the three roles for connected-home technologies, followed by a discussion of how these roles influence CE and, finally, the roles of the consumers themselves as either passive or active engagers.

4.5.1 Households and the different roles and engagement styles of technology. Analysis revealed a tendency amongst participants to humanize the technology options– that is, despite being told that an option was a digital-assistant app or digital-manager app, households responded as if to a human assistant or human manager. This was particularly true of the interactive and proactive options, which were presented with greater agency and required a stronger investment of household trust (Section 11, Table I).

While humanized interactions with the interactive technology were generally discussed in a positive light as a helper, the proactive technology tended to be negatively humanized as controlling/semi-dictatorial. In both cases, the presence of social roles – and hence the importance of social engagement – is highlighted (Section 12, Table I).

The differences in tone can be explained by a number of seminal theories that are gaining new relevance in the evolving technological environment: the threat to human agency (Feenberg, 1991) and reactance theory (Clee and Wicklund, 1980). Consumers prize their freedom, and if it is perceived that a freedom is being removed, consumers will take action to restore that freedom, often by doing the opposite of what was requested (Clee and Wicklund, 1980). Reactance is also context-specific, and depends upon whether the consumer expects to have a choice in the first place. In the social interactions that often occur during service

provision, both members of the dyad (the service provider and the consumer) are acting out socialized roles (Solomon *et al.*, 1985) that include a precariously balanced sense of power. Hence, role theory can help explain why households tend to respond with reactance if technology is perceived as "overstepping its bounds", threatening household agency.

In the case of the technology engagement options presented, reactance is most visible in comments about proactive technology; even if the technology is making beneficial decisions for the household, the removal of the expected freedom of agency over one's own energy behaviors triggers reactance. Households seek to reestablish their freedom by either doing the opposite of what the technology suggests, ignoring the technology, or responding with anger or annoyance (Section 13, Table I).

Accordingly, households see different roles for technology based on capabilities and allowed freedoms. In support of *RQ1*, these roles align with the engagement styles associated with the technology levels (cognitive, affective, behavioral). No matter the technology role, the consumer remains in control as the CEO of this metaphor. Power granted to technology is only ever that granted to a trustee; it is the consumer who sets the rules of engagement.

Across all three technology options, cognition was the dominant form of engagement, as participants considered the new technology options by reflecting on their current understanding of similar technologies (e.g. smart televisions). Indeed, futurizing how one will engage with technology is conjecture, and hence cognitive. Emotional or behavioral engagement is imagined and perhaps less vivid than the real-life stimuli will be. Despite cognition's dominance, the secondary engagement influence for each role varied.

- *Intern – Cognitive*: Static and passive, provides information but does not act on it. Engagement is primarily cognitive, with households choosing to engage with/act on information provided. This is in line with *RQ1* findings on the engagement dimensions most relevant to each level of the hierarchy. The intern is "embodied", in that households will be interacting with an app, text messages. Hence, sensory engagement is present (Section 14, 17: Table I). However, participants also indicated greater expectations of technology, signifying some customers are ready to engage beyond static information (Section 18, Table I).
- *Assistant – Behavioral*: Interactive, provides information and suggestions, but will only act on instructions. Engagement is shifted, moving from households engaging with their own behavior (e.g., energy savings) to engaging with the technology. Emotional engagement is also present at this stage. The assistant is "embodied" by the app, and households need to engage with the app to utilize the assistant's services – sometimes valuing the novelty involved. Hence, sensory engagement is present (Section 15, 19: Table I).
- *Manager – Affective*: Independent, able to act on information without human guidance. Not only does the manager engage behaviorally on behalf of the household, but the household is no longer required to engage with the technology either. There can, however, be strong emotional and cognitive engagement with the technology at this stage. The manager tended to encourage negative affective engagement, mirroring *RQ1* findings. Emotions were underlying participants' otherwise cognitive considerations, with emotions ranging from frustration and annoyance, to anticipated fear of engagement (Section 21, Table I). The manager is "embodied" through the app but acts with complete autonomy, hence there is little in the way of sensory or social engagement unless the consumer initiates it (Section

16, Table I) – indeed, too much convenience can degrade engagement opportunities (Pansari and Kumar, 2017).

4.5.2 Styles of CEO: Passive and active consumers. Behavioral engagement offered some complex findings. Most participants were not highly involved with their energy use. However, a divergence of approaches was observed for behavioral engagement with technology. Broadly, there exist two attitudes to technology behaviorally engaging on behalf of households (Table III). These can be thought of as two different styles of consumer-as-CEO.

Connected-home technologies represent a unique type of CE; not only does the household have to be comfortable engaging *with* the technology, but also with the technology engaging on *behalf* of the household. The trust required, as well as the humanness inherently present in a technological-agent, means this CE requires unique cognitive, behavioral, affective, and social engagement strategies to orchestrate a shift in the consumer mind-set of what engaging with technology means now and in the future. This also reflects that consumers decide on the type of psychological contract they will

Table III.
Attitudes towards engaging with smart technologies: Passive and active consumers

Engagement attribute	Passive consumer	Active consumer
Behavioral engagement style	Passive	Active
Engagement preference	Delegated engagement	Controlled engagement
Driving forces	Lack of time Sense of being overwhelmed Desire for convenience	Desire for agency Need for cognition Need for control
Views technology as:	A helper/friend	An usurper/enemy
Views technology engaging on their behalf as:	Much-needed assistance	Overstepping of boundaries
Technology is a:	Partner	Servant
Trust in technology	High	Low
Willing to actively engage with technology	Usually not	Usually yes
Example quote	Stace (30): "I mean, it's a major thing. Electricity's a huge thing but, if you've got someone else that can literally control absolutely everything, that makes your life a lot easier."	Geoff (41): "I will not accept in any way, shape or form anyone actually taking control of any of my appliances. They can go get stuffed. It also comes from. . . having very big concerns about the ability for hack and use of information, so I have very big concerns in relation to that. . ."
Effect if mismatched with technology	A passive consumer provided with passive technology will likely fail to use the technology – it is asking for too much of an active commitment	An active consumer provided with proactive technology will react with distrust and likely fail to use the technology

have with a company – and this may or may not include relational elements (Guo *et al.*, 2017). A final proposition is included here:

P4. Households set roles for technology in line with the type of engagement they would like to have with the technology.

A conceptual model containing our conceptualization and propositions arising from the data is provided at Figure 3.

5. Discussion and conclusions

In addressing *RQ1*, the results show households engage differently with passive, interactive and proactive technology based on trust and perceived-risk. Once risk and trust are at acceptable levels to the household, there are ten rules of engagement (Table II) that then dictate how the technology will be engaged with, and how it may act within the service system. The Goldilocks Effect indicates a safety net is still required to enact a compromise, which offsets any lingering concerns about risk and trust for individuals in the household. This is consistent with previous engagement research that indicates the internet can facilitate engagement (Sawhney *et al.*, 2005), but this paper finds this differs by technology interaction levels, not only supporting research indicating that trust and risk are important (Martin *et al.*, 2015) but also showing how cognitive, behavioral, and affective (Brodie *et al.*, 2011) dimensions of engagement apply at different levels of connected-home technologies.

In addressing *RQ2*, the results indicate the roles households assign to connected-home technologies influence how they engage with these technologies. As households tend to humanize connected-home technologies they then treat them in a similar way to human service workers, by assigning social roles and trustee capabilities to them (Solomon *et al.*, 1985) while also retaining the role of CEO for themselves. Specifically, consumers themselves fall into one of two CEO styles – passive and active – that influence how they

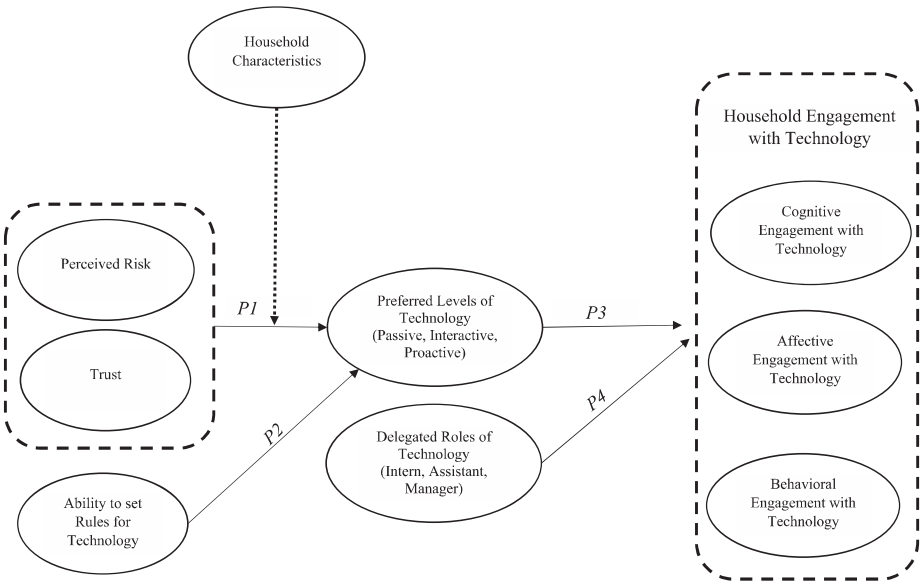

Figure 3. Conceptual model of relationship between risk, engagement and trust

choose to engage with the technology. This is consistent with the brand-as-servant and brand-as-partner framework, where anthropomorphized brand roles trigger a master-servant mindset for some consumers (Kim and Kramer, 2015), and extends this understanding by showing how consumers engage with these roles differently based on the their level of involvement (Petty and Cacioppo, 1986), and whether they were reactant to perceived technology-based changes to their freedom (Clee and Wicklund, 1980).

5.1 Theoretical contributions

The technological environment is evolving, and this study makes three important contributions to our understanding of how households will approach their engagement with connected-home technologies, hence addressing imagined experience (Jaakkola *et al.*, 2015).

First, this research identified that households tradeoff individual views on engagement, termed as "compromised engagement" to reach compromise – typically the middle option is selected (the Goldilocks Effect). In contrast to the majority of CE research, which tends to focus on individual engagement (Brodie *et al.*, 2011), this research examined household engagement, showing households often follow compromised engagement, whereas their individual choices would have been different. Compromised engagement affects not only the initial choice but also any subsequent engagements, for instance, negotiating technology settings/preferences. This supports the tendency humans have to compromise on a middle option when unsure of others' preferences (Simonson, 1989), and is represented in this paper as "the Goldilocks Effect". This represents an important step forward in understanding how households will engage (Hollebeek *et al.*, 2017b).

Second, this study also contributes to the technology engagement research by finding that only some households delegate their technology and energy services engagement, while active consumers prefer "controlled engagement". This supports the notion that consumers are not fully trusting of connected-home technologies having full autonomy (Allouch *et al.*, 2009; Schiffhauer *et al.*, 2016), but shows this approach differs depending on the consumer's level of involvement (Petty and Cacioppo, 1986), and whether they feel technology usurps (Clee and Wicklund, 1980) or extends their freedom.

This paper has devised a typology of active and passive consumers, which is partially informed by traditional involvement theory (Petty and Cacioppo, 1986) and also extends it. Unlike the traditional understanding of low-involvement products and services; however, active consumers are not necessarily highly involved in their energy behaviors (or managing them through technology), but instead are highly involved with their own agency and their wish to retain freedoms. In the case of this second group of consumers, reactance (Clee and Wicklund, 1980) occurs when they feel their agency threatened. This highlights the importance of carefully framing engagement with these technologies and, in particular, the roles these technologies are expected to play (Solomon *et al.*, 1985). In line with previous literature (Hollebeek *et al.*, 2016) we propose that the consumer remains in control of how and whether they will engage. Any choice made regarding technology engagement is an example of the consumer exercising their agency. The choice to delegate engagement to the technology is a choice about how the interaction will happen, which operant resources the consumer will contribute, and what constitutes value for that particular consumer or household.

Finally, this research contributes by finding that when households humanize technologies they see technologies as having social roles (Solomon *et al.*, 1985), meaning that not only are cognitive and behavioral engagement relevant, but also affective and social; agents that are seen as human, are treated as human (Epley *et al.*, 2007). Specifically, passive

technology acts as an intern, interactive technology acts as an assistant and proactive technology acts as a manager. We have named this the "PIP Typology".

This understanding of how households engage with humanized technologies is new to the engagement literature. Anthropomorphism can create positive outcomes for engagement, for instance: greater feelings of connectedness toward a non-human agent (Tam *et al.*, 2013), social presence perceptions (Gardner and Knowles, 2008), and altered behavioral preferences (Fitzsimons *et al.*, 2008). Anthropomorphism operates as a way to build trust and reduce perceived-risk, helping households understand and engage with unfamiliar agents. This also means the roles played by connected-home technologies will be subject to social conventions or "rules", and this must be considered. Hence, this paper proposes that theories traditionally concerned with how households engage with human service providers become relevant. Specifically, we have found that households assign roles to technology and seek to establish a dominant power relationship through their technology choices.

5.2 Managerial contributions

The three central theoretical contributions provide specific guidance for how practitioners should move forward in engaging households with the evolving technological environment.

First, with the understanding of the three roles that technology can play in a connected-home, managers should consider offering a suite of technology options at different levels, so that consumers can engage with the technology role they are comfortable with and understand that this engagement with consumers forms a pseudo-social interaction, hence providing opportunities to increase or damage brand equity.

Technology options should therefore have similar attention given to appropriate social interactions and rules as would be given to a human-human service interaction: roles here must be appropriate (Solomon *et al.*, 1985). There is a chance here to give households "someone in their corner" and improve relationships – not only with the brand or service, but with the individual component technologies in the connected-system – but the consumer rights of agency and control as the CEO must remain inalienable, else reactance will ensue (Clee and Wicklund, 1980). In order to delegate engagement to technology, strong trust and relationships must be built. Further, the ability of non-human agents to act in social roles can reduce the burden of engagement with service innovation for human employees (Hollebeek *et al.*, 2018). In contrast to non-humanised technologies, the intern, assistant, and manager create engagement and value through functioning as actors in their own right within the complex household service system (Chandler and Lusch, 2015).

Next, the Goldilocks Effect means that practitioners need to get the offering "just right" by showing the product at expos and virtually, allowing household-level trial, and offering individual programmability wherever practicable, ensuring each household member can engage on their own terms, in order to reach the potential of technology (Berners-Lee *et al.*, 2001; Fuchs, 2010). As consumer rules for how to engage with technology did not vary by traditional individual differences like age or gender, providing options for trial and personalization becomes more important. This is important as the household engagement context can also influence whether perceived value is enough to encourage trial. For instance, as the household is comprised of different actors (Chandler and Lusch, 2015), value may mean different things to each individual within the household – and yet adoption of connected-home remains a group-level factor, leading to compromised engagement. Psychological factors may also influence the relationship between value-perception and trial (for instance, while participants in this study saw value in the manager, their willingness to adopt was hampered by feelings of mistrust or reactance).

Finally, the proposed "rules of engagement" can act as design principles for practitioners, for example by allowing consumers control over the role they want technology to take. A summary of practical suggestions is provided at Table IV. This has increasing relevance for the Industry 4.0 world, where stakeholders need to make decisions on the roles and responsibilities given to automation at the group and individual level.

We note that offering this suite of technology is challenging for businesses to initiate in terms of time, money and resources. However, the benefits are realized long-term with customer value being provided and eventual cost and resource reductions in interactive and

Table IV.
Applying the rules of engagement – Insights for practitioners

Rule	Application
Consumers control the communications	Households should be granted full access to connected-home communication settings, allowing them to control channel, frequency, timing and content
Technology should understand what consumers value, and what motivates them, and act accordingly	Households must be able to choose how a device is programmed. Give them the option to program directly or allow the device to learn on its own
Consumers will write the job description, not the technology	Practitioners should offer multiple levels of connected-home technologies, allowing households to select the one that works for them
Technology will polarize a household, and often a compromise will need to be formed	Settle compromises with settings. Allow household members to control personal settings, and if possible program the device to recognize individual users and enact their preferences based on established rules. For instance, notification frequency may be increased for the 'hands on' member of the household, and decreased for passive members who prefer the device to act on their behalf
Consumers control the control	Allow consumers to control the settings and parameters the technology will operate under
If consumers feel like they are being told what to do, emotional, cognitive, and behavioral engagement will be negative	Make sure there is a way to get the consumers reaction, so the device can learn. For instance, include emoticons as response options for notifications
Consumers retain the power *not* to engage	Understand that some consumers will never purchase or engage with connected-home technologies. For those that are on the fence, understand their barriers and allow them to choose how they want to engage
Consumers should not have to put effort in	Make sure devices have a "plug and play" ability with popular settings pre-programmed for passive consumers and allow access to a short optional video tutorial. Allow them to change their settings at any time
The technology should be better than all other options	Make sure you have an answer for why this technology is better than other ways of doing the same thing, and relay these answers to consumers in simple, user-centered terms
Consumers will look back at what is familiar to make decisions about their future engagement	Find familiar examples to explain new technologies. For instance, many consumers are familiar with how Netflix and Amazon learn their preferences, so compare connected-home learning capabilities to these examples

proactive service offerings. A firm can use technology to provide both transactional and relational engagement, increasing service experience across multiple customer groups (Homburg *et al.*, 2017). A good example of a business who has adopted this approach is in the airline industry (for instance, QANTAS). If consumers prefer a passive approach to engaging with technology, they are able to seek assistance at airport check-in from a customer service person, while an interactive approach is facilitated through the app allowing self-check in, and the proactive approach is exemplified through SMS alerts that will switch flights automatically for the customer if an issue arises.

While the findings may appear intuitive and common sense that different segments of consumers will engage with a technology differently, and hence the role of the connected-home technology to customers will differ – intern, assistant or manager – for practitioners, these findings are new. In particular, some practitioners in public services do not believe that consumers differ in their some preference and use of technology, hence the consistent rollout of public policy that treats all consumers the same. Indeed recent reports have highlighted the desperate need for a consumer-centric approach in the electricity sector, where the future relies on data and technological innovation (MIT Energy Initiative, 2016; PwC, 2016).

We also note that the study findings are already having managerial impact, having informed pricing strategy and campaign decisions for two electricity companies.

6. Limitations and future research

The study findings are constrained by several limitations. First, the current study has focused on the elements of trust and risk as being two of the most prominent and important constructs to understand in the early development of engagement research in this technological area (Martin *et al.*, 2015; Pavlou, 2003; Wunderlich *et al.*, 2013). We recommend that future studies may examine other variables deserving of concentrated investigation, such as safety and privacy – both in an imagined engagement and a lived experience context.

Second, the results are qualitative and would benefit from a quantitative extension to triangulate the data, for instance by quantitatively examining variables like age and gender, which did not yield differences in imagined engagement in this qualitative study. A quantitative study utilizing cluster analysis or multi-group SEM would also provide further insight into the relationships between engagement dimensions and technology levels. There is also scope for testing in additional countries to further examine generalizability, as well as in other contexts – such as goods, or high-engagement services – or conducting a longitudinal study to examine how households' relationships with technology evolve, how different household members have individual relationships with the technologies, or indeed, how the individual component technologies are affected by being part of a connected-home. Secondly, these findings should be applied in the context of lived experience, to test the theory proposed herein once connected-home technologies are widespread. This paper has dealt primarily with imagined experience and how this influences engagement preferences; hence the findings may operate differently once connected-home technologies become familiar to households, as desire to engage and actual engagement are distinct concepts (Hollebeek *et al.*, 2018). In keeping with this idea, to expand our understanding of household technology engagement, future studies should also examine household levels of experience and expertise with using/choosing to engage with these technologies. Finally, it is recommended that future work examine different types of households, in particular how compromised engagement operates within different group consumption scenarios and whose engagement counts. It is hoped that this paper may provide a formative basis for future work that explores the unique engagement strategies households utilize in the evolving technological environment – to this end, throughout the

paper we have introduced four propositions arising out of the data which we believe will prove fruitful for future examination.

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