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Convenience and energy consumption in the smart home of the future: Industry visions from Australia and beyond

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ABSTRACT

Resonating with the industrial revolution of the home (Schwartz Cowan, 1989), the smart home 'digital revolution' reinvigorates promises for convenience. This paper analyses the industry vision for a 'simple life', and asks what energy implications it is likely to generate. We draw on an international magazine and online media content analysis of the 21st Century smart home, alongside 10 interviews conducted with Australian smart home industry professionals. The analysis explores the contradiction between complexity and simplicity embedded in smart home industry visions, where an expanded range of devices, services and options are marketed as a way to simplify and enhance everyday practices. A promoted side-benefit is reduced and more efficient energy consumption. We unpack the expectations embodied in this current convenience narrative to show how smart home devices may transform everyday practices in ways which result in *increased* energy consumption and household labour. The paper concludes by calling for energy research and scholarship which seeks to disrupt the convenience and other smart home narratives.

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1. Introduction

Making everyday life more convenient has been a long-running concern in consumer marketing. Appliance manufacturers, utility providers and home designers have sought to position their products and services as ways to make life easier and save time ([1,2]). This endeavour has been highly successful, to the point where the very definition of convenience has become 'synonymous with lack of complications and with a lifestyle rendered easy by countless consumer products and services' ([3]: 107). The smart home is no exception in its ambition for easier living achieved through digital and connected consumerism. At the crux of this idea is the enrolment of internet-enabled devices and appliances in the creation of an *even more* convenient lifestyle. Smart home advocates assume that an important side benefit of this more time-efficient lifestyle is more energy-efficient consumption, achieved through a process of simplification and streamlining.

Histories of convenience reveal at least three reasons to be cautious with this vision. First, the pursuit of convenience is not an attainable 'end point', but rather a constantly changing concept which has failed to produce either linearity or stability. For example, modern household conveniences, such as showers [4] and freezers [5], have taken convoluted paths from novelty to normality. They have simultaneously made life easier and more complicated as they have become entrenched in everyday life. Many other convenience devices have failed along the way, or lost their convenient status in contemporary societies [1]. Baths, for example, are no longer commonly associated with convenience, but rather provide an opportunity to relax and rejuvenate [6,7]. Convenience is therefore an elusive goal that is forever changing in relation to the devices intended to achieve it.

A second related point is that convenience narratives have rarely unfolded as their storytellers predict. In some accounts, convenience ambitions have backfired. For example, Schwartz Cowan's [2] account of the 'industrial revolution of the home' shows how the introduction of labour-saving devices, such as vacuum-cleaners, fridges and washing machines, failed to relieve women from the time-consuming burden of housework. Instead, Schwartz Cowan weaves a convincing narrative which argues that these domestic technologies raised expectations of cleanliness which in turn *increased* household labour. Similar convoluted storylines emerge when considering specific household technologies and infrastructures. For example, when first released the electric iron saved women hours of domestic labour in heating and pressing linen and clothes; whereas nowadays the labour involved in ironing is considered increasingly unnecessary and time-consuming by many.

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Other accounts of technological change demonstrate how modern conveniences, while intended to save time, have enabled the increased pace of everyday living, potentially resulting in people feeling *more* harried and time pressured [8], or in the case of ICTs, resulting in the *multiplication* of household practices [9] which has the effect of squeezing more things into the day. Ironically, convenience devices have freed and can continue to free up time so that people can become busier.

Finally, as well as failing to save time *overall* (even though many practices have undeniably become faster and easier), the pursuit of convenience has often failed to save energy. Shove ([6]: 3), for example, has labelled convenience one of three 'environmental hot spots of consumption'. She shows how ordinary household devices, like the freezer and washing machine, have normalised and legitimised practices of food storage and laundering that are at least partly responsible for significant *increases* in energy demand. Such changes are often referred to as rebound effects or the 'Jevon's paradox' [10], whereby efficiency improvements (in time and energy for example) are outweighed when the users of convenience devices redirect their 'free' time (and other resources) into other time- and energy-consuming activities and services. This explanation, however, fails to acknowledge the role that convenience narratives (and devices) *themselves* play in shaping future practices and associated energy consumption.

With these insights firmly in mind, this paper critically interrogates how the convenience narrative enrolled in smart home visions is imagined and rearticulated by industry proponents. While recent attention has been paid to the rationalist discourses and ideas permeating energy industry and policy understandings of household consumers and their expected engagement in smart grid and metering projects [11,12], much less attention has been paid to industry visions of the smart home. As Wilson et al. [13] observe, the smart home is an emerging field full of promises and aspirations, accompanied by very little empirical, social or cultural research.

This paper draws on an international content analysis of magazine and online articles written about the smart home, and interviews with Australian practitioners working in the smart home industry. We ask how industry proponents depict convenience in the 21st Century smart home, and how this emerges and differs from past narratives. We show how smart convenience is intended to simplify living at home and produce new forms of 'pleasance' [14] – a luxurious aesthetic experience which permeates all aspects of the smart home. We ask how this pursuit of convenience potentially generates further complexity and labour in the home. Finally, we consider how notions of smart convenience are intended to reduce energy demand, by automating existing and new practices in the home. We find that convenience masks and legitimises opportunities to *increase* household labour and energy demand, through the promotion and circulation of new lifestyle expectations. We conclude by calling for energy research and scholarship which seeks to disrupt convenience and broader smart home narratives.

2. Researching visions of the smart home

The smart home has been described as a 'digital revolution' [15] and the 'next great disruptor' [16,9]. It encompasses home ICTs, connected and automated devices and appliances, and the Internet of Things (IoT). We follow Aldrich ([17]: 17) in defining the smart home as 'a residence equipped with computing and information technology which anticipates and responds to the needs of the occupants, working to promote their comfort, convenience, security and entertainment through the management of technology within the home and connections to the world beyond.' However,

we also concur with Berry et al. ([18]: 242) that the smart home is 'not so much a clearly defined phenomenon as a fluid and unstable field of possibilities'. Within this field there is an ever-expanding range of products and services, as well as a continual expansion of space itself, with the smart home extending outside the physical dwelling and into outdoor and communal spaces, digitised bodies and mobile devices. Differences are also apparent across the market spectrum—from affordable off-the-shelf and do-it-yourself (DIY) devices—through to high-end, architecturally-designed, fully integrated and professionally installed homes. Despite this divergence and instability, we find that ideas of convenience permeate this diffuse field in relatively stable ways.

In order to investigate visions of the 21st Century smart home, we conducted an international content analysis of articles published in industry and consumer magazines, newspapers and online between 2000 and 2015. We used common search terms such as 'home automation' and 'smart home' to identify 221 articles for analysis, the majority of which were published in the United States, United Kingdom and Australia. We began our search in mid-2014 and completed it in late 2015 once saturation was reached. Online databases such as Scopus and Proquest were used to undertake the search, as well as Google. We also followed smart home Twitter feeds to source additional content. In addition, we targeted smart home magazines *Connected Home* and *Electronic House* and browsed back issues for articles that matched our search criteria. We excluded articles discussing specific devices or products, unless they made claims about home automation or the smart home more broadly. Most authors of the articles were closely associated with the industry, and were clearly advocating home automation and smart home devices.

In this article we draw only on the analysis of text (not images), which was coded thematically using qualitative inductive methods [19]. Where possible we used an 'in vivo' coding method [20], which involved coding text based on common words or phrased used by the authors of articles we were analysing, and grouping these together into related themes. Images are excluded from this paper due to space restrictions, and because we are primarily interested in the convenience narrative, as it is 'told' by industry proponents in both articles and interviews (see below). Coding was undertaken by both authors. Nodes (themes) were established by the first author after an initial analysis of approximately 20 sample articles. After jointly coding several articles together, the second author then analysed a further small sample using the existing nodes, and proposed several more based on the content. Both authors cross-checked the nodes before establishing a final selection for coding. Some nodes were adjusted or added during the remainder of the analysis in cases where the content was not reflected in existing nodes.

In addition, we draw on ten interviews conducted with 13 home automation industry representatives in Australia, either in person or via Skype. Participants were recruited through our attendance at home technology or improvement exhibitions; direct contact with businesses identified through web-based searches, articles and advertisement; and referral from other industry participants. Interviews were conducted by either the first or second author with the most senior representative of the business available (e.g. director, owner, sales manager). A summary of participants is provided in Table 1.

Interviews were digitally voice-recorded and transcribed verbatim by a professional service and thematically coded using inductive techniques as per the content analysis. While we didn't deliberately seek them, all interviewees are middle or advanced-aged men, reflecting the gendered make-up of the smart home industry and smart home visions more broadly [21,12,22]. The content analysis is international in scope; however our analysis is biased towards the Australian experience and may vary in other situations and locations.