Exploring Participation Needs and Motivational Requirements When Engaging Older Adults in an Emerging Living Lab

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" *You know, having participated in that little bit of research, it obviously links into something else, and it could be nice if you can hear about it and think: 'Well, I feel quite proud of that, because I helped'.* "

Research participant interviewed for this study

There is a growing body of literature regarding living labs, which are seen as an effective way to develop and evaluate research for novel products and services with the actual end users. With growth in the living labs model, there is an increasing need for guidelines to steer and support the set-up and maintenance of initiatives, and to facilitate relationships and engagement with stakeholders and users in this context. This study seeks to address this need, in part, by exploring the needs, expectations, and motivations that older adults have in relation to research participation in an emerging living lab. This work is part of a wider research project to develop an integrated framework to guide emerging living labs. Eight semi-structured interviews were undertaken with six residents and two family members from two residential settings for older adults that were collaborating to establish a living lab environment. A concept-driven coding frame supported the coding and analysis of the interview transcripts. The results provide insights in relation to participant motivation to take part in research, and they identify some issues of concern for participants, both residents and family members, related to living lab initiatives. As a first step in developing a successful living lab culture of collaborative research, this study has demonstrated that open discussion with residents and their families should continue to guide processes and research design as the emerging living lab initiative continues.

Introduction

As the European Network of Living Labs (ENoLL) highlights, living labs are defined as "user-centred, open innovation ecosystems based on a systematic user co-creation approach, integrating research and innovation processes in real life communities and settings" (ENoLL, 2006). Research has shown that living labs and living lab initiatives have been conceptualised in different ways, with some researchers arguing for the need to reconcile them under a more consistent definition to address diverging theoretical and methodological approaches (Habibipour, 2018; Leminen et al., 2012; Schuurman et al., 2015; van Geenhuizen, 2014;

Yazdizadeh & Tavasoli, 2016). The need to have formalizsed guidelines, particularly in terms of ethical processes to guide and support the relationships and engagement with the living lab stakeholders and users, has also been highlighted (Pino et al., 2014; Sainz, 2012). The need for a guiding framework is due, in part, to the nature and characteristics of living labs and the different ways in which they develop and emerge. They are heterogeneous; for example, with different research or development foci, they draw on different participant groups and settings and involve a variety of subject specialties and expertise (Burbridge, 2017; Müller & Sixsmith, 2008; Novitzky et al., 2015; Schuurman et al., 2015; Yazdizadeh & Tavasoli, 2016). Although there is a

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significant body of information related to ethical approaches and well-established codes of conduct for different professional bodies (e.g., BPS 2018, UKRI) to guide research, we argue that it can be difficult to draw this information together, extract the key principles, and then apply them when guiding the set-up and running of an emerging living lab.

In England, Coventry University has sponsored an innovative and ambitious initiative, the Data Driven Research and Innovation (DDRI) Programme, as an emerging living lab involving close collaboration between university partners, residential facilities, and commercial partners. The programme aims to use data-driven analytics and insights to learn from and support residential provision for older adults, with a focus on future innovation to support healthy and independent living. This study focuses on two of the residential environments currently involved in DDRI. The first residence, Setting A, offers day care, long-term residential care, and short-term respite care for older people, and it specializes in support for people living with dementia. The second residence, Setting B, offers an independent living environment for adults over 55 years, with extra care support available for those who need it.

A number of living lab projects have been developed and launched within these two living environments. For example, a study entitled "Applied Sleep Interventions for Elderly Residents in a Care Home Setting" has explored ways to improve sleep and provide innovative ways of responding to night-time waking in Setting A. A second study, entitled "Innovation for Dementia Care: Evaluation of Digital Health and Wellbeing Apps in 'Real-Life' Living Labs" has explored the potential for digital innovations to improve health and wellbeing for frail older adults, including people living with dementia in both Settings A and B. To date, three 12-month projects and eight 3-year PhD studentships have been developed in conjunction with these settings.

This study forms part of an overarching project that recruited multiple stakeholders, including researchers, subject experts, and management, staff, residents, and families, from Settings A and B, to explore their experiences, perceptions, and concerns related to the set-up and implementation of living lab initiatives involving older adults. Here, we report specifically on the views of residents at Settings A and B as potential participants in living lab initiatives as well as family members of representative residents.

Literature Review

The relevant literature considers some of the challenges associated with engaging older adults in living labs. Although many of the challenges are common to other types of research with older adults, a number of specific ethical challenges have been identified in relation to the management and implementation of living lab projects (Habibipour, 2018; Sainz, 2012). These include how data protection and protection of privacy between studies is maintained (Sainz, 2012; van Wynsberghe & Robbins, 2014); how informed consent is established at the beginning of any living lab research initiative, and renewed during and between projects (Pino et al., 2014; Sainz, 2012); how user participation and withdrawal are managed, particularly where the living lab is a residential space (Georges et al., 2016; Habibipour et al., 2017a; Habibipour et al., 2017b); appropriate mechanisms for thanking and encouraging participation (Buitendag et al., 2012; Dutilleul et al., 2010; Georges et al., 2016); and ownership of any intellectual property (Draetta & Labarthe, 2010; Sharp & Salter, 2017; van Geenhuizen, 2014) that emerges from the living lab due to the involvement of participants in co-creation and developmental activity (Nyström et al., 2014; Ståhlbröst & Bergvall-Kåreborn, 2013).

The involvement in living labs of older adults, and potentially adults with reducing cognitive and physical capacity, poses additional challenges. These challenges are not specific to living labs necessarily, but they need to be negotiated and managed in establishing a living lab and include fluctuating capacity or loss of capacity to provide informed consent, and they may require the involvement of third-parties, such as children and carers of participants as decision makers and consultees (Novitzky et al., 2015; Panek et al., 2007; Pino et al., 2014; Sanchez et al., 2017). The approach to academic research in a living lab context will require formal ethical review and approval, but commercial development work may not. There is clear guidance related to research involving vulnerable adults from specific professional bodies that guides conduct, the development of research protocols, and applications for ethical approval (Bollig et al., 2015; BPS, 2009; NSW, 2015; Walsh, 2009). We would argue, however, that the issues brought together in living labs are complex and multidisciplinary due to the range of disciplines involved and the potential involvement of commercial (as opposed to research) organizations. Navigating the range of information available and route to ethical approval

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involving potentially both university ethics committees as well as national organizations (e.g., NHS/Health Research Authority Social Care Research Ethics Committee in the UK) continues to be complex.

User engagement and motivation to participate in research and development are critical to develop sustainable living labs (van Geenhuizen, 2018). The involvement of end users as participants and/or as partners of the living lab initiative may ultimately increase the user acceptance of new products, services, or processes, and hence reduce the failure rate in the market (Dell'Era & Landoni, 2014; Habibipour et al., 2017b). Projects may seek different levels of user engagement, from users as leading co-creators, to users as passive subjects (i.e., involved in testing /evaluating living lab products and/or services) (Almirall et al., 2012; van Geenhuizen, 2014). Engaging users throughout the lifetime of a project or through a sequence of projects can be challenging. Interest, motivation, and expectations can change over time, which can lead to drop out (Habibipour & Bergvall-Kåreborn, 2016; Habibipour et al., 2017a; Habibipour et al., 2017b).

The intrinsic and extrinsic motivations of users are key drivers to open innovation research activities (Habibipour & Bergvall-Kåreborn, 2016, Ståhlbröst & Bergvall-Kåreborn, 2011). Motivation can be triggered intrinsically (i.e., without external incentives) such as due to the desire to feel competent and self-determined, or extrinsically (i.e., activated by external factors), driven for example by financial compensation or the recognition by others (Chasanidou & Karahasanovic, 2016; Georges et al., 2016; Habibipour, 2018; Ståhlbröst & Bergvall-Kåreborn, 2011, 2013). Ståhlbröst and Bergvall-Kåreborn (2011, 2013) explored the motivation of different innovation communities. They found that intrinsic motivations such as knowledge seeking (learning something new), stimulating curiosity, and being entertained, as well as testing innovative products and services that are new to the user are the most important motivators for participation. These motivators have been reinforced by other research (Baccarne et al., 2013; Lievens et al., 2014) with key intrinsic motivators for taking part in living lab research identified as personal interest (i.e., connecting with the existing interest domain of the user); contribution (i.e., the ability to participate and to contribute actively to a certain problem, and to offer possible solutions); and curiosity (i.e., being keen to find out new things, having a curious personality). Learning something new and gaining additional knowledge about new technologies and products are especially relevant for long-term engagement (Lievens et al., 2014).

The current research on motivation and engagement in living lab projects and initiatives has not specifically involved older people as participants of the living lab activities. It is argued that, with an ageing demographic, insights from older adults themselves are critical.

Sustaining participation and reducing drop-out is important to delivery timescales, cost efficiency, quality assurance, and the trust and motivation levels of participants and stakeholders in living lab projects (Habibipour & Bergvall-Kåreborn, 2016; Habibipour et al., 2017a). Factors such as a lack of perceived added value of the innovation, the extent to which the innovation satisfies the user needs, and smooth setup and running of projects play a role in drop-out rates (Georges et al., 2016). Influential factors on drop-out behaviour can be classified by adopting a socio-technical approach (Habibipour et al., 2017a). Impact has been seen at the macro, meso, and micro levels (Habibipour et al., 2018), influencing the field test process for projects as well as for the living lab as a collaborative environment. The literature suggests that, to achieve a sustainable environment, living labs need to build mutual trust and identify a set of shared objectives with all stakeholders involved (Dutilleul et al., 2010; Gualandi & Leonardi, 2018; Habibipour et al., 2018; Kröse et al., 2012; Nyström et al., 2014; van Geenhuizen, 2018). Multiple perspectives can bring value to partners in an integrative way and contribute to the living lab innovation process and outcome (Habibipour et al., 2017b; Pino et al., 2014; Ståhlbröst, 2012). It is critical, therefore, that stakeholders' needs and expectations are considered throughout the living lab project development (Dutilleul et al., 2010).

The engagement and care for older users/participants in a living lab is critical. Although the importance is recognized in the literature outlined above, there is little direct guidance on how to establish a living lab initiative that is informed by the users/participants themselves. In order to build a collaboration and shared vision for the emerging DDRI/living lab, this study provides a voice for older adults. Specifically, it aims to explore their views with respect to their participation in, and motivation to take part in, living lab research projects as the environment they live in becomes an emerging living lab.

Method

A qualitative research approach was applied for the data collection and analysis (Blaikie, 2009; Ritchie et al., 2014). The study received ethical approval from Coventry University Research Ethics Committee (P59886). A

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letter of support was provided by the residential organizations (i.e., Setting A and B). The principles of the British Psychological Society Code of Ethics and Conduct (BPS 2018) and UK Research Integrity Office's Code of Practice for Research (UKRIO) guided the research.

Research participants
The eight participants that took part were recruited from the two residential settings (Settings A and B). In Setting A, participants were recruited with the support of the staff team, who facilitated the identification of interested residents. In Setting B, flyers were distributed to advertise the study, and coffee morning events were organized at which the lead researcher gave an overview of the planned research to residents.

Six residents took part (5 female, 1 male); the average age was 79.5 years (range 56 to 90 years). Two participants lived in Setting A, whereas the other four had been living in independent apartments in Setting B for an average period of 17 months. None of the participants had a cognitive impairment diagnosed, and all were able to provide informed consent.

The views of relatives of residents should also be considered in the design of living lab studies, as often they are actively involved in the decisions related to the living environment or participation in a research study, and they may act as a consultee advising on their family member's wishes and feelings if a potential participant

is unable to provide informed consent for themselves. Two family members agreed to take part in the research. Their parents, diagnosed with cognitive impairments, were not directly engaged in this study but lived in Setting A. A summary of participants is provided in Table 1 below.

Data collection and procedure
Semi-structured interviews (Yeo et al., 2014) were undertaken at Settings A and B. A concept-driven interview guideline was developed based on the study objectives and key themes raised by the literature review, but the interviews were relatively open to allow exploration of issues raised by the researchers. Questions were related to the following topics:

• what participants would want to know to consider participation in a research project

• views and concerns about participation based on exemplar DDRI/living lab projects

• exploring individual motivation to participate

• discussion of research design and ethical concerns (e.g., the design of participant briefing information, informed consent and data protection)

• the involvement of wider family members and support network

Table 1. Participant demographics

#	Role	Gender	Setting	Duration in Setting
RE1	Resident, age 56	Female	A	4 months
RE2	Resident, age 90	Female	A	12 months
RE3	Resident, age 88	Female	B	16 months
RE4	Resident, age 87	Male	B	10 months
RE5	Resident, age 84	Female	B	18 months
RE6	Resident, age 72	Female	B	24 months
FM1	Family member: mother and father live in Setting A; mother has been diagnosed with dementia	Male	A	12 months
FM2	Family member: father lives in Setting A and has been diagnosed with Parkinson's	Male	A	5 months

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The interviews were audio-recorded and transcribed verbatim. Overall, the average interview length was an hour. Participants were allowed to take breaks as requested.

Data analysis
Interview transcripts were saved, coded, and analyzed using NVivo (v.11 Plus for Windows, QSR International). An NVivo project (entitled "DDRI-Driven Research and Innovation") was created to contain the data sources, the selected literature articles, and the memo journal keeping track of all activities and decision-making points agreed throughout the development of the research (Bazeley, 2007). Qualitative content analysis (QCA) was applied in NVivo and the concept-driven coding frame built to code and analyze the raw material (Schreier, 2012). This analysis reflected the themes within the interview schedule and therefore the data collected (Saldana, 2012; Schreier, 2012). Within the NVivo project, a tree-node structure was created, with the parent-nodes (i.e., high-level categories) reflecting the relevant themes of the research. A number of child-nodes (i.e., the subcategories) specified each parent node. Figure 1 provides an overview of the coding frame used.

An intra-coder reliability test was run. As suggested by Schreier (2012), the proposed coding frame was tested twice, the second time after 14 days. The K-coefficient was .92 (i.e., "excellent agreement", being ≥0.75) and, therefore, the coding frame was consolidated (Boyatzis, 1998). All eight interviews were coded using the proposed coding frame. The segmentation strategy used as coding unit was the "meaning unit" (that is, any portion of text, regardless of length, to which it was be-

lieved a code may apply) (Coffey & Atkinson, 1996; Grbich, 2013; Saldana, 2012). To do so, all selected quotations coded into the coding frame categories were analyzed and commented upon in the findings. To gain a full understanding of the codified data, we made use of the different NVivo tools to run statistics and make data inferences. For example, the "word cloud" in Figure 2 highlights recurring words meaningful to the participants.

Data reliability and validity
To ensure data reliability and traceability of key-decision and development points, the NVivo project was used as a social platform where all activities could be monitored in a systematic and transparent way between project researchers. To ensure validity, the findings were reviewed and validated by key informants (i.e., the stakeholders involved in the DDRI Programme).

Findings

Here, the results have been brought together from the resident and family member participants and organized under the main themes emerging from the interviews.

Interest and participation needs
Participants, perhaps unsurprisingly, having agreed to take part in this study, were interested in research participation more broadly. Their responses to exemplar DDRI/living lab projects were broadly positive.

Name	Sources	References
LL Ethical issues	6	45
Opt-out	5	10
Paperwork and consent	5	19
Involving Family	5	16
LL_DDRI projects	8	161
Perceived needs	6	21
User Intrinsic & Extrinsic moti	6	23
Expectations set	6	27
Involvement in research	8	35
General views on LL projects	8	33
Engaging with older adults (C	7	22

Figure 1. Concept-driven coding frame used to categorize the study data

Figure 2. Word Cloud based on participant quotations (produced in NVivo)

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"This sounds interesting." [RE1]

"Well, I think that's a brilliant idea." [RE3]

"I'd very much welcome something like that." [RE4]

Participants (particularly in Setting B) were drawn to projects that they perceived as offered a benefit to their health or to the health of another. For example, a project regarding sleep interventions raised particular interest in both settings, as it was recognized as an issue affecting many older adults.

"I think that's a really good idea, because of the thing with dementia is that your sleep patterns are all over the place, especially when it goes further down the line." [FM1]

Queries were raised in relation to the potential side effects of a project involving dietary supplements including dosage and impact on food sensitivities. This questioning suggesting a willingness to interrogate the nature and focus of projects.

"This is another one that's right in my area of concern. I notice that, in your project, you've got separate ideas, like the milky drink – but I'm sensitive to milk and any dairy, cheese, or anything of that sort, so that rules that out for me, but I get the tryptophan from bananas and dates, dried dates. You know, I got a lot of faith in a nutrition book that I've got down here." [RE4]

A project focused on measurement of bodily hydration levels led to a discussion on wearable technology, which was of interest to the participants. In the discussion of the individual projects, the residents provided examples from their personal experience, which highlighted the features of the project descriptions that were drawing their interest and the importance of the participants perceiving value in taking part.

"I recognize the importance of hydration, and my general health dictates that I do have a good intake of water [...] I've got severe heart problems and hydration is quite serious for me because, if I have too much fluid, it affects the heart working properly [...] but research into it is wonderful." [RE3]

Study design and potential ethical challenges
Interviewees highlighted the importance of their needs and capabilities being considered in the design and delivery of living lab studies, including the pace of the re-

search activity as well as the appropriate design of the materials used. One resident provided guidance on how to respond to some individual needs:

"You see, there are people with slight irritability problems, [they] get het up [agitated] very quickly – the sight of a piece of paper that they have to listen to and do anything with, it is beyond them. Apart from that, don't put any pressure on them. You know, it's how much they can cope with, and you don't know whether it's because of their underlying illness or not – you just accept them as they are, and then just work around them. [...] You know, refer back to what you did, and if somebody has a better feeling, than they might do it anyway." [RE4]

Family members were also very aware of their parents' specific communication and interaction needs, for example, the need to time an activity appropriately, repeat any questions as required, and consider how questions are phrased.

"...it would be good because I know how Mum communicates [...] by her pointing, so even without saying anything that's communicating. [...] The only thing that I think that would be difficult is if you were to spend an extended period of time with her to get her to do one single thing. Because of her concentration levels, she'd get tired very quickly. So, it should be a gently, gently approach, really." [FM1]

Mechanisms for sharing information and gaining consent were discussed during the interviews. The family members had relatives with dementia that may have no capacity to consent or this capacity may fluctuate. It was recognized that this was not necessarily a barrier to participation (depending on the nature of the research and approvals in place). However, participants did recognize that both physical and cognitive capability may change or deteriorate as the research proceeds and that the researcher would need to respond appropriately.

"That's part of the thing – if this is no longer suitable for my Dad's condition or somebody else's condition, we just need to step outside the trial, please." [FM2]

Involving older adults in a living lab, and potentially adults living with physical or mental conditions, requires consideration of potential mechanisms for information provision and processes for consent. A well-designed and inclusive information sheet is important, and the

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involvement of family or others as consultees may be required. Information about the DDRI projects was circulated in the two residential settings by means of project information sheets. Colour images and short paragraphs of text in a large, sans-serif font (Arial 14) were used to describe the different active projects and engage resident interest. This approach was regarded positively. When developing information, participants highlighted the need to take into account individual needs:

> *"Sight and hearing are important. We all look normal enough, but everyone's got some kind of underlying problem. For the people who are partly blind or blind, it could be read out to them. You would have here a few with sight problems."* [RE5]

The involvement of third parties in the process of consent to participate in a study (as consultee) was also discussed. Involving the family, or a "carer network" is well accepted by all residents, as it is something that is discussed as part of the care they receive.

> *"Well, I mean, if you as the researcher think that the person is no longer quite capable of doing it, then I think that's reasonable [to involve the family]."* [RE6]

In the context of research, it was recognized that participant wishes and attitudes should be well understood by the family, as the research may be beyond the boundaries of previous discussions residents had had with their families.

> *"Family or carers then need to know what the [person's] attitude was in relation to research."* [FM2]

Motivational requirements
Questions probed the factors that motivated participants to take part in the research. It was found that intrinsic motivation was driven by the subject of the research and whether it was felt to relate to a participant's own health and would satisfy their interests, and the perceived value of the study. The participants commented that supporting research and the "general good" was important to them, either because they believe in what the research is aiming to achieve, or due to their personal and educational background.

> *"Well, if they were told that, by doing research, that they were likely to get better, have better sleep, they would – should – be taking part. And, even if they didn't, I mean, it would help somebody somewhere."* [RE5]

> *"I know Mum wouldn't have problem at all [taking part in the research] if she knew she could help someone or something. She'd do it – she's been involved in various medical studies, I think, many years ago."* [FM1]

The resident participants also indicated that they were keen to be engaged in something challenging and mentally stimulating:

> *"I like to get involved with these sorts of things because I think it keeps my brain working. To be honest with you, it's just like if you just sat here in this flat and did nothing. I couldn't do that – I have got to be doing something, and I say it I don't mean physically, I mean mentally!"* [RE3]

> *"But then it depends on the background of the person, you know they wouldn't normally, well, they've just never heard of it. I think that's for your educational background and what sort of research."* [RE6]

Other factors affecting motivation included the perception of research. In more than one interview, it was highlighted that the word "research" seemed to convey a negative connotation and consequently led to a feeling of distance from the issue.

> *"I feel that as soon as you say research, they'll say 'Oh no – I'm not interested, thank you.' I think so because they think of researchers are really going inside you."* [RE2]

Reflections suggested that, during later life (e.g., living in senior living settings), participants may lack energy and enthusiasm for engagement.

> *"I can only tell you the impression I get from talking with people here. I feel that quite a lot of people, they are not really interested. They got to the stage in life where they just really don't want to be bothered."* [RE3]

Personal beliefs and perceptions may also deter some from participating.

> *"Getting involved with things like these, I wouldn't do it, not knowing your background, knowing where you came from, that sort of thing. I mean, I wouldn't do it to anybody who just came to the door and asked me to do it."* [RE1]

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Whether to compensate or pay research participants raises much debate and potential ethical questions. Payments can be to reimburse expenses, to compensate for time, or as a gesture of appreciation for participation. When prompted about the topic, both residents and family members confirmed that participation should happen without the need for rewards.

> *"We should all do our bit and not expect a reward."* [RE5]

> *"I think if you're interested, you do it, just do it. I mean, I can't see why we need to have a reward."* [RE2]

> *"No. No rewards. That drives the wrong behaviour, doesn't it?"* [FM2]

However, residents indicated that they would like acknowledgement, and to know about the impact of the input they made, or potential future impact in society. They did not necessarily expect a personal thank you, but they expected to receive information about the outcomes the project had achieved and next steps.

> *"You know, having participated in that little bit of research, it obviously links into something else, and it could be nice if you can hear about it and think: 'Well, I feel quite proud of that, because I helped'."* [RE3]

The same view was shared by the family members.

> *"It would be nice to get the outcome, be it in the form of an email, a general email to everyone, and what the contribution was and how it's resulted."* [FM2]

Discussion and Conclusions

This qualitative, exploratory study forms part of a larger initiative, the DDRI programme, sponsored by Coventry University. It involves close collaboration with university and sector partners in their respective fields and residential facilities. Over a 12-month period, pilot research projects were launched and implemented in the two partner residential settings, and with different stakeholders engaged. The literature highlights some recognized challenges for living lab research. These include user engagement and motivation, managing the needs and expectations of multiple stakeholders, and some ethical issues. This study provided an opportun-

ity to explore some of those issues in the context of the experiences and views of living lab participants.

The study was undertaken at the outset of the DDRI programme and was prospective, asking residents to imagine – based on specific exemplar projects – how they would feel about participation, and what would motivate them to take part. The study enabled exploration of some critical ethical concerns for an emerging living lab involving older adults and adults living with physical and cognitive impairments. These included the nature of participation in living lab research initiatives, the use of motivators/incentives, and the involvement of family in the decision making to take part.

The findings indicated that residents were interested to take part in research activities, particularly in those studies that they could directly identify with or where they could see clear value to others from their participation. The research was introduced into the participants' living environment while they were living there, rather than being a feature of the environment when they moved in. The residents and family members, despite recognizing some important elements to consider during research design, were not concerned about research being undertaken in this way and were broadly positive about the initiative.

Participants were particularly motivated to engage with research when the topics were close to their current health needs or interests. This leveraged their intrinsic motivation to participate. This is in line with research elsewhere on living lab user motivation (e.g., Habibipour et al., 2018; Lievens et al., 2014; Ståhlbröst & Bergvall-Kåreborn, 2011, 2013) that highlights the importance of "nurturing the users'" personal interests (specifically when the research topics address health issues), and the value of research providing a stimulating and engaging activity and enabling users/participants to contribute to finding solutions to their problems. The findings here show that the motivation to participate seems to be closely linked to the idea that being involved in health-related projects might bring benefits, not only at personal level but especially at a wider/community level. Supporting the research and the value "for the general good" were important. The rewards that older adult participants may seek are not monetary, but rather a "formal" acknowledgement of what they contributed. As such, they expressed the importance of being informed about results and future research development and outcomes (e.g., Habibipour et al., 2018).

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Participants did raise some concerns and highlighted some issues researchers should pay attention to during their research design and implementation. For example, researchers should be aware of the potential negative connotation of the word "research" to older people. Of interest were possible alternative descriptions to define and promote living lab "research" projects, including "adult caring research" or more user-friendly phrases, such as "We want your views". Feedback was also given on the design of studies, information sheets, and communication approaches. These findings are being compiled into a set of recommendations that will continue to develop through new DDRI projects.

The interviews included some consideration of capacity to consent. The literature introduces the concepts of "fluctuating consent", "process consent", or "rolling consent" (Dewing, 2007; Novitzky et al., 2015; Stirman, 2018) to ensure ongoing consent and verify willing participation. The concept of rolling consent, for example, covers the need to repeatedly provide information and ask for consent at various stages of the research, ensuring from the participants' words (and nuances of speech) that they truly understand what they are consenting to, and communicating that they can drop out at any point (Novitzky et al., 2015). When establishing a living lab with older adults, and one involving adults lacking capacity to consent, there is a need for careful training of researchers not only in informed consent processes but also in terms of recruitment and management of related family and the wider support network. The principle of "do no harm" is key, and researcher

knowledge, judgement, and integrity are important to ensure research participation is reviewed appropriately. This is an element of training that is required particularly for PhD researchers as well as more experienced researchers unfamiliar in working in this context. Collaboration and support from care staff within the settings also plays an important role.

Sustaining participation of users and wider stakeholders in a living lab is critical (Habibipour & Bergvall-Kåreborn, 2016; Habibipour et al., 2017a). Living lab projects involve medium- and long-term collaborations with research participants. We argue that it is vital to maintain the ongoing interest and cooperation of research participants, family, and other stakeholders as well as managing their expectations for successful research initiatives. This study offers the unique perspective of residents (and family members) who have become involved in a newly emerging living lab within their existing living environment.

As a first step to developing a culture of successful collaborative research within a living lab, this study has demonstrated open discussion with residents and their families that should continue to guide processes and research design as the living lab initiative continues. The findings of this study have gone on to inform co-design activity with wider groups of stakeholders at Settings A and B. As part of our collective approach, co-creation workshops were employed to develop a shared understanding of the DDRI concept and to develop and agree some initial guiding principles for researching and working together in this context.

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Janet Saunders is a specialist in user research and user centred design, with extensive experience in e-commerce and several projects as a Research Assistant with Coventry University in England. Her background includes qualitative research for user needs and digital information design, such as usability testing, co-creation, focus groups, and interviews, with an additional interest in diverse groups such as people with disabilities, people with learning difficulties, and older people.

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