

# Designing in Rural Highland Contexts

Exploring the role of technology in facilitating human connections

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**Abstract—** There is a need when introducing new technology in health and social care settings to involve those who will use the technology, or be affected by it, at an early stage of the design process. Experience Labs employ a participatory approach for different stakeholders to share lived experiences, and collaboratively create ideas and solutions for health and social care challenges. The Labs serve the whole of Scotland, including the remote Highland areas, and are designed bespoke to the project goal and context. In this paper, we propose that the participatory approach of the Experience Labs provides a valuable space for collaboration to explore the potential and impact of supportive technology in rural communities. Initial findings suggest that participating in Experience Labs leads to a better understanding of communities of care as established by individuals and support structures in place, and how these can be mediated by technology. We conclude that the introduction of technology in these rural Highland communities of care needs to support existing networks, unique to each community, and consider the impact on changing existing structures.

**Keywords-** rural health; participatory design; community; technology; experience labs; care structures; collaboration space; experiential learning.

## I. INTRODUCTION

### A. Health care in rural areas of Scotland

The Highlands and Islands of Scotland has a population of approximately 466,00 [1] and is ‘one of the most sparsely populated parts of the European Union’ [2]. The existing care infrastructure is facilitated by NHS Highlands and the area is served by one general hospital in the Highland capital of Inverness. The National Health Service (NHS) in Scotland encompasses 14 regional health boards. Each board is responsible for providing services and resources to their local region. Health services in remote and rural contexts are served by GPs, community health care staff, Scottish Ambulance Service, and local council [3].

### B. Challenges for rural communities

Several challenges exist for rural communities in relation to health and social care including access to services [4], geographic challenges [4], recruitment and retainment of professionals [3] [5] and lack of integrated care infrastructure [3]. Although the benefits of telehealth and digital innovations are recognised in terms of supporting

communities and reducing hospital admissions [6], there is a scepticism surrounding the usefulness, organisational fit, and quality of communication of telemedicine [7]. To date telehealth impact has been small [3] and therefore a new approach to designing is required for rural communities.

The role of design in shaping future health and social care services is now increasingly recognised across the health service. Research in the field of rural primary healthcare is also beginning to embrace community participatory approaches and outcomes suggest that involving communities adds value to the process [3]. Within the NHS, design thinking and approaches such as user-centred health design and evidence based co-design have been employed within the context of health improvement [8] [9]. Online design tools and toolkits have also opened up design to those who are not formally trained designers [10]. The toolkits are useful for healthcare staff to involve patients in ongoing service improvement, however, their capacity to create transformative and sustainable innovations to public health and care challenges is not clear.

The scope of wellbeing and quality of life extends beyond enabling patients to experience a good state of health, to ensuring that they have dignity, positive relationships and feel included in the process. This cannot be created and maintained using digital means alone. There is a need to ensure that technology is designed to support both professionals and patients rather than replace existing services and resources, as this can contribute further to experiencing feelings of loneliness and isolation. This highlights the importance of ‘community’ when considering a rural context such as the Highlands and Islands of Scotland.

Design can play a key role in crafting technology to facilitate connections between individuals and communities by enabling communication, and overcoming some of the existing barriers to participation and access. We term this process creating ‘communities of care’ which aims to enable individuals to become active agents of their own health, and support each other in their community.

This paper seeks to contribute to the understanding of the role of technology in the rural health and care context, and the role of design in co-creating sustainable futures with health professionals and patients. We begin by introducing our design-led Experience Lab approach in section 2, highlighting the collaborative and temporal nature of the research approach to explore the potential and impact of

technology in the delivery of care in rural communities. In section 3 we present three case studies of Experience Labs in the rural context to illustrate the approach and way in which the community of care is established for each. Finally, we discuss the knowledge we have gained when designing in the rural context and the resulting implications for technology innovations.

## II. EXPERIENCE LABS: MOBILE TEMPORAL SPACES FOR HEALTH AND SOCIAL CARE INNOVATION

When considering the role of technology in health and social care innovation, there is a need to involve those who will use or benefit from the innovation at a much earlier stage of the process [11] to design and develop technology that is appropriate within the context.

Experience Labs are led and developed by the Institute of Design Innovation at The Glasgow School of Art. The Labs are currently applied within the context of health and social care, forming a core part of the Digital Health and Care Institute (DHI) [12]. The DHI is an innovation centre funded by the Scottish Funding council and is tasked to deliver value for the Scottish people and economy by innovating in the health and social care sector. The Experience Labs employ a participatory design approach to provide a space for collaboration and enable co-creation with different stakeholders across a range of projects. We are exploring the potential of our approach across the health and social care context in order to share our knowledge and learning with the wider design community and researchers in this context. We hypothesise that our participatory approach can respond to the challenges faced in this context through the space we create for collaboration and creativity, where we support participants towards creating “preferable futures” [13]; through designing bespoke tools and artefacts to support design activities to make ideas tangible; through the interdisciplinary skills of the Lab team; and an evaluation approach to communicate the value and impact, and share the knowledge and learning.

It is recognised that Experience Labs are not a new concept, however, there are elements which make the Experience Lab approach unique in their context. The location of the Lab team is distributed: based in Forres on the edge of the Highlands and Islands, and Glasgow in the central belt of Scotland. Experience Labs are mobile and serve the whole of Scotland with projects taking place in several locations, for example Wick and Thurso on the North coast, the Isle of Skye in the west, Fort William in the South and Inverness, the capital of the Highlands in the East (see Figure 1). As described previously, the Highlands present unique challenges for health and care services and rural communities. The Experience Lab team needs to have a presence in the area and engage with the local communities and organizations in order to gain an understanding of the context and landscape, and address the local care challenges appropriately. The mobility of the Labs provides the opportunity to create temporary spaces, bespoke to the project and context, in which concepts can be explored quickly.

The participatory nature of the Labs aims to support the development of collaborative relationships through creating new communicative spaces and experiential learning [14]. Participants are invited to design and evaluate solutions, together with the Lab team and with relevant stakeholders, with a focus on how proposed solutions would have an impact on their individual lives and context. The Lab team design the tools and artefacts to support participants to make their ideas tangible and use methods such as prototyping and role-play to test and iterate ideas during the Lab [15]. The collective skill of the team allows for a non-linear process that is flexible and can respond to the needs of participants. The participants’ lived experience is at the core of the insights and concepts emerging from the Labs. The asset-based approach [16] [17] of the Labs focus on empowering participants to be creative, and to share their skills and experience towards identifying opportunities for healthcare innovation. This allows participants to tackle challenges and identify opportunities for change or improvement rather than focussing on problems and deficits [16] [17].

## III. EXPERIENCE LABS IN THE RURAL CONTEXT: CASE STUDIES

The following section describes three case studies of projects carried out in the rural context with communities in the Highlands. The projects focus on the needs and expectations of people to ensure that health and social care services are accessible to all in ways that are relevant and desirable. In each case study, we describe the context of the project, the design of the Experience Labs and the community of care established in the context. Figure 1 provides a map of Scotland, including population density. The map illustrates areas in the Highlands where Experience Labs discussed in the case studies have taken place using red markers.

### A. Case study 1: Digital brokering

1) *Context:* The Digital Brokering project explored the potential of a digital platform to connect those who need small services to those who can provide them, with a particular focus on rural communities. The need for a platform was identified by Albyn Housing Association and the University of the Highlands and Islands [18]. It was found that accessing and exchanging small services between residents would have a positive effect on rural communities.

2) *Design:* The Experience Lab provided the opportunity for multiple stakeholders, including Highland rural residents, public sector and third sector representatives to come together and map their experiences of accessing services in rural communities. The mapping method employed in the Lab [19] provided participants with the tools to identify people, places and things that were important in terms of accessing services. A second session then focussed on the potential impact of a digital platform in accessing these services in terms of the technological requirements and the effect on existing relationships and structures.

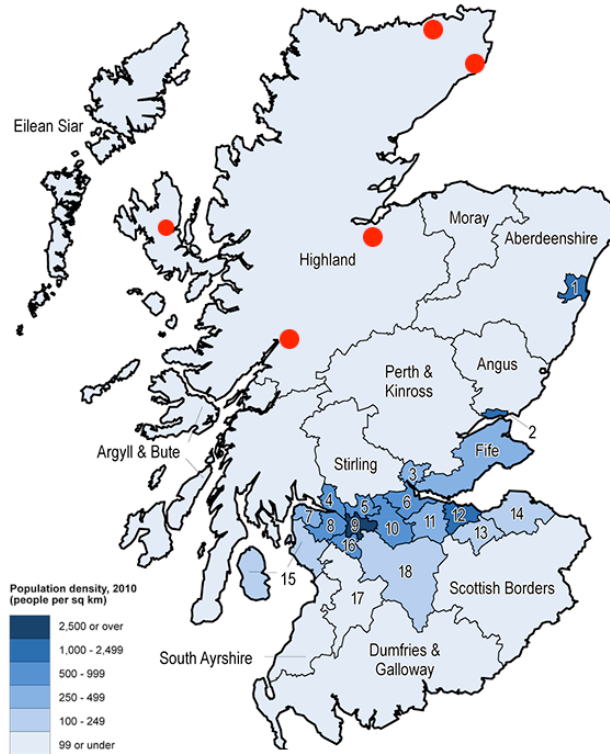


Figure 1. Areas of the Highlands where Experience Labs took place (red markers) and population density in Scotland [20]

3) *Community of care*: In order to explore the potential of a digital platform, the Experience Lab made the current experience of accessing services and the potential impact of technology support tangible. The community of care in this context described the relationships and structures within rural areas. The project specifically suggested how an envisioned technology would strengthen rather than replace structures through offline accessibility, accreditation of services and moderation of feedback. Furthermore, it was discussed that the platform could indicate opportunities for service providers to start/expand a business to benefit the community in supporting unmet needs. However, this would require careful consideration of an organization with local knowledge to prevent bypassing of local businesses and potentially damaging existing structures.

#### B. Case study 2: Virtual hospice

1) *Context*: A key objective of Hospice care is to empower individuals and carers to live with life-shortening illness in their own communities, by offering support and increasing their confidence. This project involved a collaboration with Highland Hospice with the aim of widening access for patients and professionals and enabling higher quality palliative care to be delivered through a 'Virtual Hospice.' The project involved designing a sequential series of Labs in order to define the various elements of the Virtual Hospice.

2) *Design*: The project involved a series of Experience Labs with Highland Hospice staff, healthcare professionals, patients and a carer. The aim of the Labs was to explore

awareness, use and barriers to use of Highland Hospice services and identify opportunities for Hospice services that could be delivered at a distance, as well as ideas for potential future services. One of the Labs was replicated across four different locations in the Highlands (Inverness, Fort William, Isle of Skye, and Wick) using an iterative approach and focussed on identifying opportunities for delivery of hospice care tailored to the local context.

3) *Community of care*: The Virtual Hospice was initially envisioned by Highland Hospice as a room within the main Hospice building where digital services could be delivered. Over the course of the Labs, this definition expanded from a purely digital platform to involve a multi-layered and interconnected network of people and places supported by technology. Across locations a number of key barriers to accessing Highland Hospice services were identified. Some participants proposed that one of the ways to overcome these barriers would be for Highland Hospice to build on existing networks of people in the community, and for this to be mediated by technology; not for the solution to be digital. This led to ideas specific to the local context – e.g. collaborating with Men's Shed in Skye and a Care Home in Fort William. Both ideas focussed primarily on leveraging on existing community or care groups as points of delivery for Hospice services.

The community of care therefore involves the linking of networks involving people, e.g., local healthcare professionals, social and care groups, patients and families; community spaces, e.g., the Men's Shed and Care Home; and digital platforms supporting delivery of improved palliative care.

#### C. Case study 3: Directory app

1) *Context*: A third case study provides an example of a different type of community of care but highlights challenges in a rural context compared to more urban areas, and how these could be addressed. The Directory App project explored ways of developing a directory of service application providing information about alternative services and points of care for the Scottish Ambulance Service [21].

2) *Design*: The Experience Lab began by exploring the current services available to ambulance clinicians across a number of health boards through a mapping session. The mapping session involved marking health and care locations accessible to each clinician in their respective NHS regional boundary on a physical map. The Lab also involved a role-play session of an ambulance call out scenario where the ambulance clinician required access to information about alternative services in the area (see Figure 2). The role-play session provided insights, which led to the co-design of a paper directory of services. The first prototype was tested by role-play using a mock tablet with the paper screens inserted. In the final design session the prototype was further iterated to develop the 'ideal' directory of services (see Figure 2).

3) *Community of care*: In this case study, the directory of services was initially envisioned to serve as a digital directory of contact information for local services available to ambulance clinicians in their current healthcare boundary.



Figure 2. Images from the Directory App Experience Lab including role play and design session of the ‘ideal’ directory of services.

It became evident during the Lab that participants wished to have the ability to make contact with and refer patients to local services in the community, rather than simply have a directory of contact information. Therefore the community of care involves connecting ambulance clinicians with appropriate local services in their current healthcare boundary which best serves the needs of the patient, avoiding inappropriate transfer to A&E. This would provide ambulance clinicians with an awareness of points of care within their own regional boundary as well as other health care boundaries in Scotland and enable the patient to receive the most appropriate care.

#### IV. DISCUSSION

The findings and knowledge gained from the projects presented within the case studies, provide important considerations when designing in the rural care context, and highlight a number of implications for rural technology innovations.

##### A. Designing in the rural care context

###### 1) Identifying needs through a participatory approach:

The Experience Lab offers a participatory approach to designing for rural care contexts. The Lab provides the opportunity to ascertain the needs of individuals and

communities living in rural contexts in order to ensure that the types of solutions proposed during the Lab meet the needs of the people involved. Early stages of the Experience Lab approach enable a deep understanding of participants’ lived experience. It is important when designing in the rural care context to understand the experience of the participants, their communities and the wider rural landscape to have an awareness of existing support and infrastructure. The case studies presented support the participatory approach of the Lab in giving voice to individuals and communities living in rural areas, allowing them to feel a level of ownership over the outcomes.

2) *Imagining future possibilities through tools and artefacts:* The Labs allow participants to imagine and express their thoughts on technology through the use of artefacts and tools. These make ideas and solutions tangible and also help participants to see them in the context of use by weaving on their daily lives and relationships as part of the narrative. This helps to prioritise technology or solutions that are not only ‘possible’ or ‘feasible,’ but also preferable [13]. This is important for change, especially in health and social care where success of new systems rely on positive attitudes and behaviours. Participants in the Virtual Hospice case study could envisage how both the Men’s Shed and Care Home hubs could work through a visual tool and props, which helped to develop the idea and create a narrative. In addition, the case study of the directory of service application for ambulance clinicians took this a step further by enabling participants to experience the co-designed application through role-play.

###### 3) *Creating value and enabling new collaborations:*

The collaborative nature of the sessions and the use of bespoke design tools bring issues and challenges to life between different stakeholders. In the case studies, rural participants expressed their appreciation of being heard and having the opportunity to share their experiences. Institutional stakeholders involved in the collaboration valued the depth in the scenarios being created through the tools and artefacts used in the Lab, and the level of detail expressed in relation to the needs and desires of people who may use the proposed solution. By focussing on communities and context of use, the relationships and exchanges are enhanced through the new ideas that emerge. This will potentially support the adoption of a new technology because it will be used by the same people in the same environment as those involved in the Lab.

The communicative spaces facilitated by the Experience Lab, enables collaborations and relationships to be established for new ways of creating communities of care. For example in the Virtual Hospice case study, a potential collaboration which emerged involved the Hospice engaging with a local care home in one Highland region. By being involved in designing and trialling this model in the Lab, a senior care home nurse could imagine part of being a system that does not yet exist and feel more inspired and open to try a new way of working.

## B. Implications for technology innovations in the rural care context

1) *Technology as an enabler:* The case studies presented in this paper highlight the emerging theme across the Experience Labs conducted in rural contexts to date; the role of technology in enabling and mediating connections with others i.e. enabling a ‘community of care.’ In this case, technology is not the single solution to the challenges which are experienced in rural contexts, but is a way of facilitating support through existing networks and connections. We therefore suggest that participants in Highland communities have deeper incentives to rely on human contact potentially due to the rural context within which they live. In the case studies, participants talked about the human support, which in rural areas automatically means connecting people locally.

2) *Low risk, iterative model for technology innovation:* In all the three case studies, the technology proposed by participants were simple existing technology that people use in their everyday lives, or adaptations of the same. This provides an opportunity for trialling new health and social care models quickly and without very high set-up costs. At the same time it can significantly cut down the development time for completely new technology. In order to inspire individuals and clinicians to adopt new ways of living and working it is important that they use these everyday technologies they feel confident with and fit with their everyday life. As there are no high costs or lengthy development time associated with the iterative approach, this instils more confidence in rural health boards to invest and trial new models of health and social care delivery and enables them to gather evidence quickly, which can then inform further iterations and development of the technology-supported solutions.

3) *Practical issues of technology in the rural context:* A practicality of using technology which is evident in rural areas is internet connectivity. A service which relies on an online platform would quickly be rendered useless if people cannot access it when required. In the Digital Brokering case study, this issue was resolved by adding an offline directory to a platform aimed at connecting people to exchange services. In this situation the technology was primarily being viewed as a mediator with the reliability on other people being the main goal.

4) *Long term impacts of technology on communities:*

Participants are aware of the wider impacts of technology on the community they live in beyond its functional use. In the Digital Brokering case study, it was suggested that a platform for brokering of small services between residents would need careful moderation by an organization familiar with the community. Participants described the potential impact of negative feedback on the dynamics of a community, and how a platform might lead to bypassing existing local small businesses. When considering the

introduction of a technological solution to a rural context it is important for participants from different backgrounds to collectively explore the impact of proposed technologies on their specific community and existing structures. The fragile nature of small Highland communities requires particular attention to the impact over time, not necessarily for the functioning of the technology, but for its position within a community.

There are also important implications in terms of ensuring people do not become isolated or lonely through the introduction of technology-focussed solutions. The case studies presented proposed solutions aiming to connect individuals. We anticipate that the resulting innovations may also provide ways to address social isolation and loneliness through the support provided by the community of care, enabled by technology.

## V. CONCLUSION

Communities of care in the rural Highland context depend on providing support through existing networks of people and care infrastructure within that community. Technology is the enabler to ensure that people have access to care and services that meet their needs. The Experience Lab approach highlights the importance of the impact of new technologies and services on the people involved and in the context of use, rather than focussing on the functionality of technology or service alone. In this way, the Experience Lab approach allows people to imagine a wide variety of possibilities and identify those that are preferable. The collaborative nature of the sessions can assist in overcoming some of the scepticisms surrounding the introduction of new technologies.

The participatory research approach of the Experience Labs offers an insight into the potential for technology in the delivery of care from a community perspective. New collaborations are enabled through the participatory approach. The use of design tools and artefacts help to explore future possibilities and empower participants to create value within the community. The Labs help to better understand what a local community of care entails in a rural context, and how it can be supported by technology.

Based on the case studies presented, it is suggested that in order for technology to effectively enable delivery of care in rural contexts there is a need to consider existing networks of support within the community and adapt and tailor the technology based on the local context. The case studies suggest that adopting a low risk, fast and iterative approach ensures appropriateness and acceptance when designing and implementing new technologies in the rural context. However, there is also a need to consider practical issues as well as long-term impacts of technology on communities.

Traditionally when designing new technologies and services, there is a focus on designing to address the needs of the general population, which results in gaps when applied to rural contexts with their unique challenges [22]. The focus on the rural context and the mobile nature of Experience Labs ensures that the innovations are more applicable to the local needs.



Future work will explore whether the solutions, which address the unique challenges in rural Highlands are applicable and relevant to the development of similar solutions for the urban context.

#### ACKNOWLEDGMENT

We would like to thank all our participants who took part in the Experience Labs described in the case studies. We would also like to thank our project partners: Albyn Housing Association, The Glasgow School of Art, Highland Hospice, Scottish Ambulance Service and the University of the Highlands and Islands. We would like to acknowledge the support from our Experience Lab colleagues throughout the projects.

#### REFERENCES

- [1] H. Smith, N. Sobey and C. Ross, Highlands and Islands Area Profile, Highlands and Islands Enterprise, May, 2014.
- [2] The Scottish Government, Highlands and Islands Scotland: European Regional Development Fund 2007-2013: Structural Funds Operational Programme, July, 2008.
- [3] J. Farmer and A. Nimegeer, "Community participation to design rural primary healthcare services," *BMC Health Services Research*, vol. 14, March, 2014, doi: 10.1186/1472-6963-14-130.
- [4] L. Philip, A. Gilbert, N. Mauthner, and E. Phimister, "Scoping study of older people in rural Scotland," *Research Findings*, vol. 3, 2003, pp. 1-4.
- [5] J. Farmer, W. Lauder, H. Richards, and S. Sharkey, "Dr John has gone: assessing health professionals' contribution to remote rural community sustainability in the UK," *Social Science Medicine*, vol. 57, August, 2003, pp 673-686.
- [6] A. Roberts, L. Garrett and D. J. Godden, "Can telehealth deliver for rural Scotland? Lessons from the Argyll and Bute Telehealth Programme," *Scottish Medical Journal*, vol. 57, February, 2012, pp. 33-37.
- [7] G. King, H. Richards, and D. Godden, "Adoption of telemedicine in Scottish remote and rural general practices: a qualitative study," *Journal of Telemedicine and Telecare*, vol. 13, 2007, pp. 382-386.
- [8] S. Bowen, K. McSeveny, E. Lockley, D. Wolstenholme, M. Cobb, and A. Dearden, "How was it for you? Experiences of participatory design in the UK health service", *CoDesign*, vol. 9, 2013, pp. 230-246.
- [9] G. Robert, J. Cornwell, L. Locock, A. Purushotham, G. Sturme, and M. Gager, "Patients and staff as codesigners of healthcare services", *BMJ*, 350, 2015, pp. 7714.
- [10] H. Bevan, G. Robert, P. Bate, L. Maher, and J. Wells, "Using a Design Approach to Assist Large-Scale Organizational Change "10 High Impact Changes" to Improve the National Health Service in England", *The Journal of Applied Behavioral Science*, vol. 43, 2007, pp. 135-152.
- [11] E. B. N. Sanders and P. J. Stappers, "Co-creation and the new landscapes of design," *Co-Design: International Journal of CoCreation in Design and the Arts*, vol. 4, 2008, pp. 5-18.
- [12] Digital Health and Care Institute, Available from [www.dhi-scotland.com](http://www.dhi-scotland.com). [retrieved: March, 2016]
- [13] I. McAra-McWilliam, Available from: <http://tinyurl.com/odual6h> 2014. [retrieved: March, 2016]
- [14] P. Reason and H. Bradbury, *The Sage Handbook of Action Research*. London: Sage Publications Inc., 2008.
- [15] T. French, G. Teal and S. Raman, "Experience Labs: co-creating health and care innovations using design tools and artefacts", *Design + Research + Society DRS 2016*, In press.
- [16] J. Foot and T. Hopkins, "A glass half full: how an asset approach can improve community health and wellbeing," London: Improvement and Development Agency, 2010.
- [17] A. Morgan and E. Ziglio, "Revitalising the evidence base for public health: an assets model," *Promotion and Education*, vol. 14, 2007, pp. 17-22.
- [18] G. Roger and S. Bradley, "Feasibility of delivering assisted living services to vulnerable Albyn Housing Society Customers," *Centre for Rural Health*, April 2012.
- [19] M. P. Johnson, "Mapping design things: making design explicit in the discourse of change," unpublished Ph.D. Thesis, 2015.
- [20] Office for National Statistics, *Scotland population density: by council area*, 2010, August, 2012.
- [21] T. French and G. Teal, "Co-designing a digital directory of services," *Procedia Computer Science*, vol. 63, September, 2015, pp. 445-450, doi:10.1016/j.procs.2015.08.366.
- [22] R. Chapman and T. Slaymaker, "ICTs and Rural Development: Review of the Literature, Current Interventions and Opportunities for Action," *Overseas Development Institute, Working Paper 192*, 2002, pp. 5.