Challenges in Applying Human Factors Approaches to Health Service Design

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Abstract. A participatory systems approach is a fundamental characteristic of the human factors and ergonomics discipline. However, the appropriate application of relevant methods is challenging in healthcare, since there is very limited time for staff to participate and their knowledge on design methods is usually very limited. An action research was carried out in a health service design project commissioned by a local health service commissioner. The aim of this paper is to examine and discuss challenges in applying the participatory systems approach.

Keywords. Health service, systems approach, participatory design, stakeholder engagement

1. Introduction

A participatory systems approach is a fundamental characteristic of the human factors and ergonomics (HFE) discipline. This discipline has adopted and developed many methods and tools in order to support a whole system understanding through a systems approach and a participatory approach in the design process. Given the complexity of healthcare, HFE recognized that any design changes without considering issues across the whole system, are unlikely to have significant and sustainable impact on healthcare practice (Carayon et al., 2014). Evidence also suggests that involving the various stakeholders in the improvement of health services can lead to more responsive and efficient services (Fisher, 2011; Nesta, 2013). Consequently, a variety of approaches have been proposed to engage the various stakeholders in health service improvement (Bate & Robert, 2007; NHS Institute for Innovation and Improvement, 2009).

However, the appropriate selection and application of the HFE methods and tools for the participatory systems approach is not straightforward. It requires careful consideration and balance between various factors such as problem type, design stage, level of stakeholder engagement and availability of resources (time, money, data and expertise). It is particularly challenging in healthcare, since there is very limited time for staff to participate in design activities and their skill and knowledge on the HFE methods are usually very limited. The aim of this study is to investigate what are the challenges in applying a participatory systems approach to healthcare through action research. This will provide lessons for successful HFE application for future health service design projects.

2. Methods

The study took place in the context of a health service design project commissioned by one of the London-based clinical commissioning groups (groups of General Practices that work together to plan, design and buy local health services in England). This project aimed to create integrated care pathways for safer medicines management amongst older people without compromising on cost and efficiency. A team of three experts in the areas of systems thinking (big picture understanding), design thinking (user-focused), risk thinking (proactive risk assessment) and lean thinking (flow and waste-focused) designed and facilitated three 3-hr stakeholder workshops (9hrs in total). Eight stakeholder groups were invited to participate, namely, patients, carers, district nurses, GPs, community pharmacists, hospital pharmacists, social care workers and commissioners.

Prior to the workshops, interviews with five representative stakeholders (GP, social care manager, community pharmacist, commissioners) were carried out to produce three maps for systems thinking: a location map, a stakeholder map and a pathway map. Given the limited time for the workshops, three experts decided to produce these preparatory materials in advance.

Each workshop was planned with a specific objective: (1) whole system understanding and issue prioritisation for the first workshop; (2) idea generation and solution development for the second workshop; and (3) implementation planning for the third workshop. It was planned that the workshop participants would form small teams (6-10 people for each team with one team coordinator) for discussion and design activities. Three maps were produced before the workshops and three methods for risk-based thinking, lean thinking and implementation planning were applied by the workshop participants using method application templates and examples.

At the first workshop, the workshop facilitators presented the project background and the three pre-produced maps in order to help the workshop participants understand the whole system and identify problems. The participants were then introduced to risk-based thinking and asked to prioritise the most important issues using a template we provided.

At the second workshop, the participants were introduced to lean thinking in order to identify the root causes of the high-priority issues and describe the best desired outcome for the problematic situation. A template and example were also provided. A number of benchmark solutions implemented in different healthcare settings were then presented in order to encourage critical thinking in the development of ideas.

At the third workshop, the participants were introduced to the concept of business planning in order to develop a business case of their proposals. In particular, the workshop facilitators presented the business model canvas concept (Osterwalder & Yves Pigneur, 2010) and provided a template as a visual way to guide their thinking in the specification of their proposed service models.

An action research approach (Davison, Martinsons, & Kock, 2004) was taken with the dual intention of improving the quality of a particular health service and carrying out service design method research. The researchers were actively and deliberately involved both in design practice and research. Data were gathered using several methods. In order to understand the practical challenges in applying human factors approaches, the participation patterns of the workshop participants and the knowledge flows and interactions between workshop facilitators, group coordinators, participants and applied methods were carefully observed and reflected. The observations were complemented by the analysis of the documents and content generated by facilitators and participants throughout this design process. In addition, a questionnaire on general qualitative feedback and the perceived ease of use and usefulness of the applied methods (five point

scale from strongly agree to strongly disagree) was completed by 20 workshop participants.

3. Results

Overall, the majority of the workshop participants responded very positively about the engagement process and showed the enthusiasm about their outcomes. Three quarters of the participants responded that they were willing to continue to get involved in the project after the third workshop. Three main challenges were identified in relation to the workshops: inconsistent and uneven stakeholder participation; limited time and level of method application; inconsistent information capturing and sharing.

Firstly, it was observed that the participation of stakeholders in the workshops was inconsistent and uneven. Twenty people on average (18, 20 and 23 participants for each workshop) participated in each workshop, but only half of the participants were able to attend all three workshops as shown in Table 1. Participants mentioned work commitments as the reason why they could not attend one or more workshops. In particular, some professional stakeholders groups, notably social care workers, had a limited representation in spite of their potentially important contribution to this project. Table 1 also shows the number of workshop participants by stakeholder type. It was reported that this was due to the reduced number of staff available at social care organisations. Patients and carers also had a limited representation, with only one patient or carer participating in each team. The project coordinators indicated that patients and carers were especially hard to reach in the first place and a more continual communication with them facilitated their recruitment and consistent participation. In spite of such limited circumstances, sixty percent of the respondents indicated the value of speaking with various health and care professionals and patients/carers together. In particular, patients/carers were considered as sources of inspiration (their medicine management stories) and sounding boards for new ideas.

Table 1 Workshop participants by stakeholder type and participation rate

Stakeholder group	Number of workshops attended			Total participants by stakeholder group
	Three	**Two**	**One**	
Patients and carers	3	0	0	**3**
GPs	2	1	2	**5**
Practice managers	0	0	1	**1**
Community pharmacists	3	0	0	**3**
Community nurses	3	1	0	**4**
Hospital pharmacists	1	1	1	**3**
Hospital consultants	0	0	1	**1**
Social care workers	0	0	2	**2**
Commissioners	3	1	4	**8**
Total participants by participation rate	**15**	**4**	**11**	**30**

Secondly, it was observed that the quality of method application was constrained by the limited duration of the workshops. Only core principles and a very simplified version of the methods for the various thinking approaches could be introduced and used in the workshops. The documentary analysis of the workshop outputs and the reflection on the workshop activities revealed that the participants were not able to fully and correctly apply the various thinking approaches in their design activities. For example, a lean principle such as poka-yoke (a mistake-proofing design principle) was introduced for solution development. It was reported by some participants that they were keen to think through this principle, but were not able to find time to do it due to the limited time available. The project coordinators acknowledged that the workshops were planned with a limited duration of three hours due to the busy schedule of some participants and the cost (healthcare staff backfill payment) of organising each workshop.

Thirdly, the importance of efficient information capturing and sharing was noticed during the workshops, but it was challenging to decide how much information to capture and share. In terms of information capturing in each group, group coordinators, appointed from the project team members (mostly commissioners), took a very different approach. Although stakeholder and process maps and sticky notes were provided for group discussion, only one group actively used them. Instead, the group coordinators in the other two groups captured their discussion by playing or delegating a minute-taking role. In terms of sharing information, each group was asked to summarise and present their outcomes at the end of each workshop. However, inconsistent stakeholder participants showed that information from previous workshops needed to be efficiently shared with new workshop participants. The needs for efficient information sharing between workshops were observed in order to help the workshop participants reflect on, consult and research into their ideas.

Methodologically, the support from the academic partners generally very well received by the majority of the participants, but it was pointed out that some maps produced by a researcher prior to the workshops were complicated. On the other hand, it was found that providing simple templates for method application along with simple examples worked really well under the limited time constraints. Figure 1 shows how easy to understand/apply and how useful the participants thought of each of three pre-produced maps and three methods applied with templates and examples. The slightly higher percentage of positive responses towards the second three methods (produced by the workshop participants during the workshop using templates) as shown in Figure 1 might indicate that the workshop participants found methods easier to use and more useful when they are involved in applying them themselves with some guides rather than when they are given something produced by others.

4. Discussion and Conclusion

Three main themes emerged in relation to the challenges in applying participatory systems approaches. Further research is suggested for each of the themes.

Firstly, the highly-distributed nature of the target service required the participation of many different stakeholders, as it is recognised that the involvement of all key stakeholders is crucial for the success of design projects (Smith & Fischbacher, 2005). However, the project coordinators had difficulties in recruiting and involving some key stakeholders. Busy professionals, low levels of staff and hard-to-reach patients and carers translated into some key stakeholders missing one or more workshops. Given the fact that the web has shown potential as a dynamic environment for further stakeholder engagement innovation (Hagen & Robertson, 2010; Nambisan, 2002), further research is

therefore required to understand how web-based communities can contribute to establishing further engagement with key stakeholders.
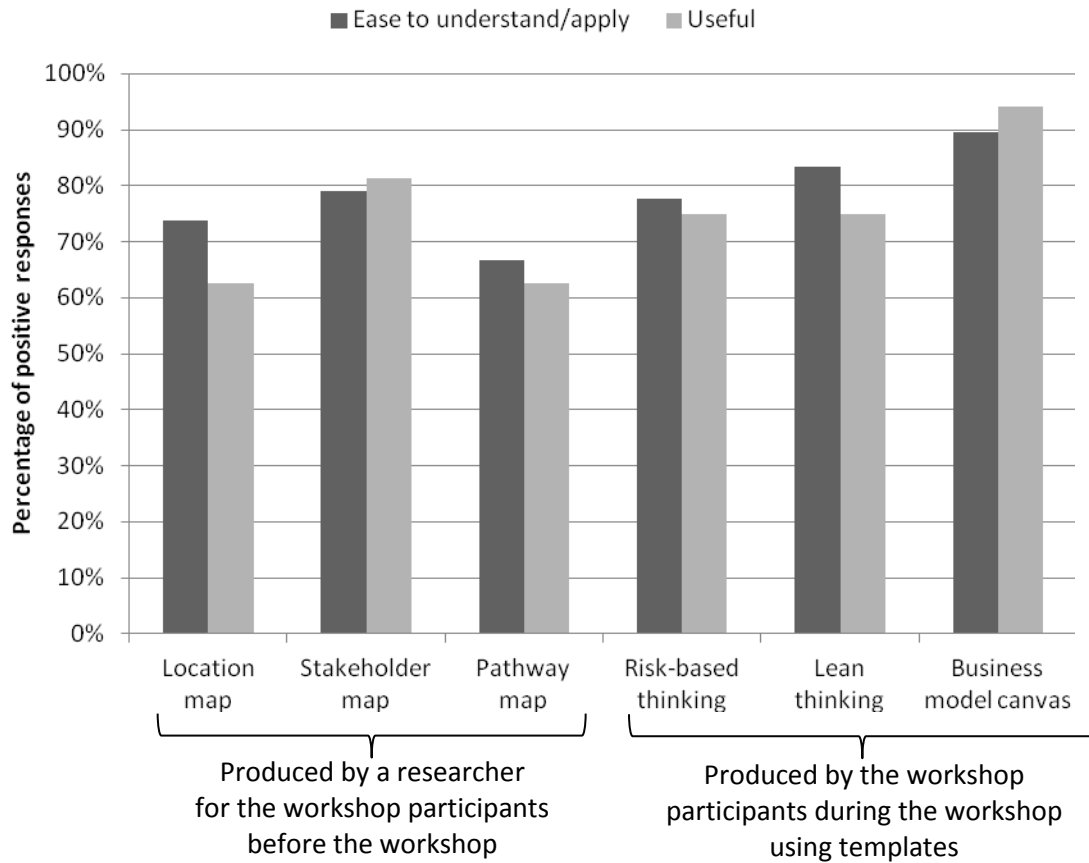

Figure 1 Ease of use and utility of the applied methods

Secondly, the complexity of the target service required a detailed analysis of the problematic situation and the proposed interventions. In particular, it highlighted the need for a whole-systems approach to the design and planning of health services (Edwards, 2005). However, the participants had difficulties to apply a level of analysis consistent with the goals of the workshop. Their analysis was constrained by the limited duration of the workshops and some participants found some pre-produced maps less easy to understand and less useful. It is important to keep the balance right between 'how much researchers should produce in advance to save time' and 'how much stakeholders should be involved in method application to fully appreciate the utility.' An appropriate use of templates and examples can facilitate stakeholders' method application.

Thirdly, information capturing and sharing were found important, but challenging. One way of improving information capturing during the workshops would be to have experienced designers as group coordinators. A new role of designers as a facilitator who enables collaboration between various stakeholders has been highlighted (Thackara, 2005) and become increasingly important. The web also could provide a base for information sharing in the health service design projects and further study is therefore required to understand how to streamline information visualization, capturing and sharing between offline and online.

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