DR AMANDA BRIGGS-GOODE, DR MARTHA GLAZZARD,
SARAH WALKER, RACHEL LUCAS
NOTTINGHAM TRENT UNIVERSITY

AN INTERNET OF SOFT THINGS

TEXTILES | SMART MATERIALS | PERSON CENTRED
TEXTILES PRACTICE | INTERNET OF SOFT THINGS

ABSTRACT

THIS PAPER WILL REPORT ON THE FIRST TWO PHASES OF AN ONGOING INTER-DISCIPLINARY, EPSRC FUNDED RESEARCH PROJECT, 'THE INTERNET OF SOFT THINGS' WHICH SEEKS TO BRING SOFT SURFACES, SMART TEXTILES AND WEARABLE TECHNOLOGIES TO PART OF THE INTERNET OF THINGS DEBATE.

The project involves researchers from academic disciplines: design, computing and mental health in collaboration with a project partner, the mental health charity Nottinghamshire Mind Network. This paper will reflect upon the research project and specifically the development of a co-design methodology using relational approaches to mental wellbeing. This was conducted through a number of practical workshop activities with Mind client based user groups with varying mental health challenges. The workshops focused upon the creation of personalized textile objects with soft switches and various output and also recorded the clients' descriptions of their sense of ownership awareness of their own and others' emotions and behaviour. The workshops included the researchers' reflections and observations to enable further understanding of how this community invests meaning in material things and modes of expressive output. The paper will also discuss the

second phase of the project through which an augmented 'smart flat' with textile interfaces was developed by commissioned textile practitioners. The flat created a domestic living lab environment that the clients used to explore experiences of living alone and with other people. This environment enabled us to explore networks of support and 'meaning-making' that are made possible through the smart textile things in the living lab. The clients are able to work through options for keeping in touch, managing their own spaces, and being heard or seen by others. The aim of the research project is to use textile craft practice and smart materials alongside therapeutic approaches to contribute to the development of a wellbeing and mental health toolkit to support future client work for Mind.

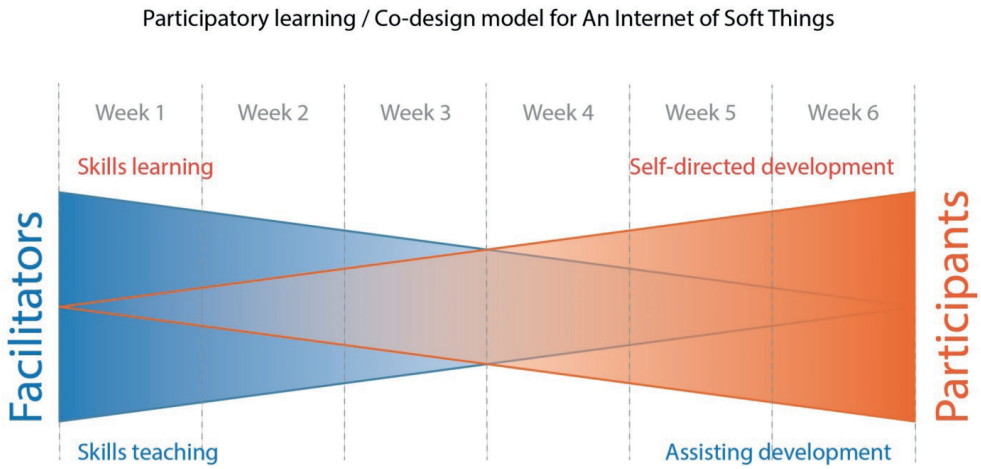
THE PROJECT

This project based at Nottingham Trent University is an EPSRC funded project 'An Internet of Soft Things' (IoSoFT), this is a unique project that brings together person centred psychotherapists, textile designers and computer scientists. Its aim is to develop a co-design methodology through practice-led critical reflection on Person Centred Approaches (PCA) in order to benefit non-medicalised care practices using electronic textiles and interactive computing to develop networked textile objects. In short the primary aim of IoSoFT is to challenge how a radically connected world would be designed to benefit human well-being, and in particular, what types of experiences can be instigated from smart textile interfaces. The theoretical framework for the research questions how design can engage with PCA to inform a new methodology for design and making. PCA originated with Carl Rogers' (1957) theory and practice; a method used extensively in healthcare communities. One of the key drivers of this theory is that those participating should be able to do so within a non-judgemental environment or 'unconditional positive regard' (UPG). The PCA is therefore, both non-directive and non-judgemental (Levitt 2005). It takes a holistic view of experiencing that is in opposition to the deficit model of the medical world and behavioural psychology. The medical model assumes an objective norm that is irrelevant to subjective experiencing. The behavioural model assumes that individuals are predicative based on previous experience. However, PCA emphasises the person's movement towards growth, shown by open, flexible responses in the here-and-now (Rogers 1961). In IoSoFT we are not concerned with medical diagnosis of participants. We are researchers, not counsellors and we aspire to provide co-researchers, not clients, with a framework to support their own journey of therapeutic change.

Thus the research enables people with lived experience of mental health issues to participate in workshops using a co-design methodology, in the creation of personalised textile objects. The involvement of therapeutic communities is central to the research process and this includes co-researchers from the Nottinghamshire Mind Network (working with those with mild depression and anxiety through to individuals with severe and enduring mental health issues) and the Oakfield School for students with special educational needs who often experience 'diagnostic shadowing' receiving less support in tackling their mental health problems. To enable us to create a PCA working environment and co-design methodology, important tools were established such as a 'group agreement' along with a 'check in' and 'check out' at the beginning and the end of each session and established tools such as the 'recovery star'. These 'tools' encouraged openness and reflexivity and gave each participant a voice to describe their progress and their hopes and fears for the next session. It also gave the co-researchers instant feedback on the level of progress for planning and timings as well as enabling reflection on the experience of the time spent making within the group context.

THE PRIMARY AIM OF 'AN INTERNET OF SOFT THINGS' IS TO CHALLENGE HOW A RADICALLY CONNECTED WORLD WOULD BE DESIGNED TO BENEFIT HUMAN WELL- BEING, AND IN PARTICULAR, WHAT TYPES OF EXPERIENCES CAN BE INSTIGATED FROM SMART TEXTILE INTERFACES.

This paper will reflect upon two sets of workshops that occurred during phase 1 of the project. It will also



1

provide an outline of phase 2 where invited designers and researchers were commissioned to develop ideas for networked textile objects to be sited within a 'training' independent living flat, created in conjunction with Oakfield School.

WHO WERE THE PARTICIPANTS?

In phase 1, during the pilot study, the participant group included several staff from the research team including Mind staff members. The pilot study acted as an opportunity to share skills and experience some of the processes involved in making electronic textiles first-hand, as well as acknowledging that all people have mental health. We also acknowledged that the division between 'facilitator' and 'participant' can be informal or blurred (Jacobs 2007). In addition to the team, there were three product design students, who had expressed interest in the project.

For the second iteration of the 6 week workshop, the participant group consisted of five members of the research team (in joint roles as participants and facilitators), six Mind service users, and a combination of Mind staff and volunteers.

For phase 2, textile designers and researchers were invited to develop novel smart textile interfaces for a site specific environment, situated within Oakfield School, where there is a purpose built flat for students to experience challenges around independent living. Participants were sourced from within the NICER group. The NICER group (Nottingham International Consultants in Educational Research) is formed of adults with severe and profound learning difficulties and/or physical difficulties. During these sessions we worked in consideration of present or potential mental health issues faced by the NICER group. Subsequently, textile interfaces have been developed in conjunction with the Mind and the NICER groups.

HOW THE CO-DESIGN METHODOLOGY SUPPORTED THE MAKING OF PERSONALISED TEXTILE OBJECTS

The workshop content was structured to enable participants to acquire basic e-textile skills. The first three weeks of the course focused on learning about e-textiles through practical sessions with the participants. The remainder of the workshop sessions encouraged participants to explore the potentials of e-textiles and apply the skills learnt through the preliminary sessions in order to design and make a personalised soft e-textile object. During the transition from skills-based learning to more autonomous design, the roles of the participants and facilitators shifted and blurred as shown in the diagram in figure 1.

The role of the facilitators throughout the phase 1 workshops were to assist the participants in learning e-textile skills and to provide support in the making of their individual design projects by creating a scaffold of support (Sanders 2006) to encourage creative thinking towards the making

of textile objects. During the skills development stage of the workshop sessions, each participant was given guidance however when the participants began to explore their own, individual projects, the role of the facilitators adapted to fit their changing needs and requirements. This change in dynamic between facilitator and participant encouraged meaningful interpersonal relationships to be formed through the act of making. These relationships asserted the importance and impact of making and the therapeutic benefits this has on individuals engaging within creative activities (Fowler 2011). The benefits of the workshops were shown through the reflections of individual participants during and after the workshops. To highlight the participants' feelings about the group some quotes from the feedback state:

> *It was sort of like everybody got on together. You are focused on what you are doing and focused on the person by the side of you.*
>
> *If an arrangement has been made or if something has been said to you that this is going to happen. It should happen definitely. It's all about trust, yes it is. I think in this group there was a lot of trust.*

In regards to personal experiences and wellbeing in the sessions:

> *During the sessions my concentration has been much higher. I have only left once for a cigarette, it would usually be much more frequent.*
>
> *To begin with I was apprehensive about the group but as the weeks have gone on I feel more confident in the group.*

These comments from the workshops from the Mind service users' feedback give honest reflection about the experiences of participants within the group and make up part of a rich data collection using various methods in consistency with the person-centred approach.

The co-design methodology itself became integral to providing a framework that enabled those relationships to form and for the making to happen. Person-centred values of trust, empathy and unconditional positive regard (UPR) (Rogers 1957) were transferred and nurtured through these newly formed relationships. Although our intention was not to present the workshops as group therapy, we framed them within the values of the person-centred approach and feedback suggested the experience of participation to be therapeutic.

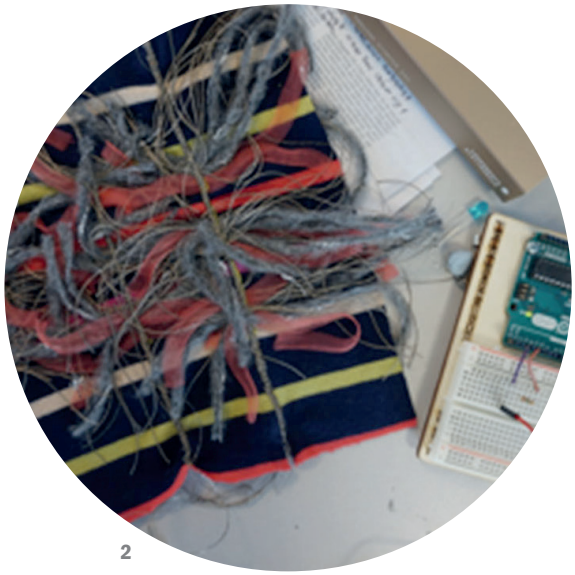
This co-design methodology and PCA was also used to inform the designers and researchers who were invited to participate in a week long textile residency held at NTU in the summer of 2015. The participants were briefed on: what had occurred in the phase 1 workshops; their values; the details of the flat; and the ultimate networking aims for the textile objects that were to be produced. The designers were asked to describe their concept, their intended objects, the materials, process and potential interaction possibilities. This week also included some participatory workshops during which the textile objects would be interacted with. The textile objects were also taken to Oakfield School for the NICER group to explore.

WORKSHOP MATERIALS

Sourcing materials for the workshops were based on the different making tasks over the course of six weeks. Weeks 1-3 concentrated on learning basic textile and electronic skills (e.g. how to make a simple textile circuit) and weeks 4-6 allowed participants to develop their own ideas with the assistance of the facilitators (see figure 1).

During the skills stage, each participant was given the materials separated into kits to complete tasks throughout the session. At various points of the workshop sessions, new materials were introduced. For example, introducing a range of pre-made switches that enabled participants to consider different interactions with their textile objects. The electronic components became tools to facilitate participants' creative thinking and decision-making along the way. The textiles used, incorporated assorted fabric remnants as well as felt and other materials, which were pre-selected by facilitators for their bold colours and ease of use.

Sourcing materials for the workshops was difficult due to the open-ended nature of the making tasks in weeks



2

3

THE RESEARCH ENABLES PEOPLE WITH LIVED EXPERIENCE OF MENTAL HEALTH ISSUES TO PARTICIPATE IN WORKSHOPS USING A CO-DESIGN METHODOLOGY, IN THE CREATION OF PERSONALISED TEXTILE OBJECTS.

3-6. The facilitators found that it was difficult to meet the demands and expectations for participants' design ideas, while trying to keep making tasks realistic and achievable. Sometimes it was found that specific materials, colours or electronic equipment were not on hand for some of the participants to experiment with. This led to a discrepancy between motivating creativity with new materials and limiting it with pragmatic constraints of the equipment that was available.

During phase 2 there was a range of technologies, both analogue and digital, for the production of textile materials using processes such as print, embroidery, weave and knit as well as a broad range of technologies for both input and output. Examples for output included: colour changing inks, phase changing technologies, materials, vibro motors and LEDs. Input sensors included touch sensing surfaces, ambient conditions and gesture recognition technologies. It was also important that the designers saw the project as being a component in a potentially larger network structure. All of the designers were asked to produce an initial proposal to outline their focus for the week. There were a number of different approaches suggested in these plans and examples of ideas put forward were: objects to enable you to 'check in/check out' creating a physical manifestation of the process which had been used during phase 1; an anxiety tracker that would network those who suffer from anxiety with someone else who can offer support and reassurance; an interactive mat where people can communicate using iconography; an interactive HUG; an interactive communication panel for sensory and reassuring experiences. These ideas were explored across the course of the week and were later shared at the flat with the NICER group. Examples are shown in figures 2 and 3.

WORKSHOP CONTENT

During the workshops, therapeutic practitioners were present to facilitate several therapeutic exercises with the group. We used 'check-ins' and 'check-outs' to discuss the daily feeling in the group. A group agreement was produced as a kind of contract to make the group feel at ease with each other. In addition, participant feedback was collected using Recovery Stars (MacKeith et al 2013) and specially designed forms.

The research team considered the workshop to be successful. They were able to adapt to challenges presented and to meet individual participant needs. One challenge in particular during the Mind workshops was the need to review the workshop content on a weekly basis in order to tailor the following week's content to suit the needs of the participant group. The facilitators found that in comparison to the pilot study, they had to consider more carefully and regularly the needs and wellbeing of the individuals participating in the Mind workshops. In the pilot study, participants' expectations to quickly build a sophisticated e-textile item needed to be managed to accommodate the individual and group needs. In contrast, the Mind participants usually felt happy to achieve one task at a time and did not necessarily set out to create complex items. Optional tasks were also introduced within the session plans to enable individuals to be aware of their options and choose their tasks according to what they wanted to make, or thought they could achieve.

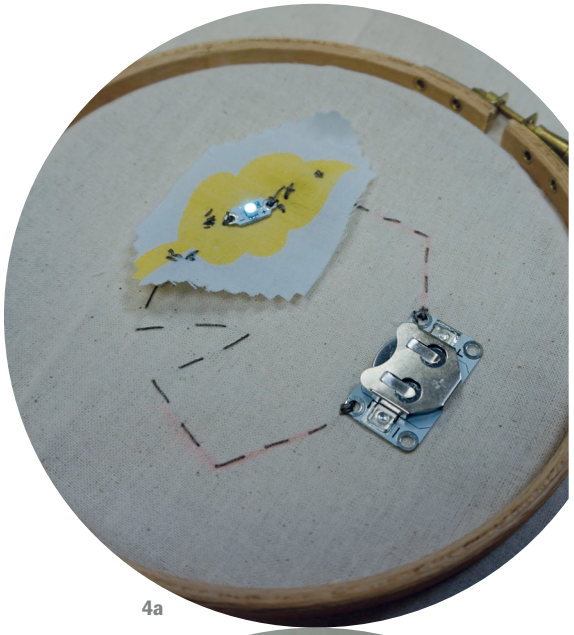
As part of the creation of safe, open environments for the workshop participants, facilitators described themselves as individuals during the introductions, discussing their skills, rather than their job titles, and doing so with openness and transparency while using informal language.

PERSONALISED TEXTILE OBJECTS

During the tasks in weeks 1-3, participants were asked to make simple switches and circuits. These could be made with different aesthetics of participants' own design (figures 4 and 5). Participants in the pilot study created ambitious, personalised textile objects during weeks 4-6 of the workshops. The objects made showed complexity in their aesthetics, purpose, interaction, electronics and artistic concept. Many of the objects made were planned to be, or developed significance in the life of the participant outside the workshop, such as a guitar strap to share with bandmates; a light-up Christmas tree completed with family over Christmas; and objects made to share with children at home (Glazzard et al 2015).

The workshop participants created objects with personal significance such as the sun and moon in figure 6, which reflected the participant's personal life. Figure 7 shows a project that was designed and made in collaboration between a participant and a facilitator, where each made a wristband and the two were attached.

From the perspective of the facilitators involved, the pilot study group worked competitively and made overt statements about their intentions to make sophisticated or complex objects. In contrast, the perception of how the Mind participants approached the task was not as overtly ambitious as in the pilot study. Although the objects that the participants produced were advanced and complex, participants seemed content to achieve individual tasks. Both groups showed strong desires to finish the tasks they had started before the end of the sessions, or at least to make sure the task could be finished in the following week.



4a

4b

5

REFLECTIONS ON THE WORKSHOPS

At the beginning of each workshop, each participant was given a pack that consisted of stationery items and feedback sheets that could be filled during the course of the workshops. These feedback sheets aimed to encourage participants to reflect on their experiences of the workshops and whether they had impacted on their wellbeing. Two feedback sheets were used, one for use at the end of each session and one which was used two or more times over the course of the workshops at the discretion of the participants and therapeutic practitioners. The feedback given by the participants expressed the reaction they had to participating in the making activities. Participants referred to the challenges of meeting new people and engaging with a new skill or discipline. Apprehension lessened and confidence increased across the weeks. Engagement and participation with the making, emerged as positive experiences, allowing for absorption and temporary distraction from current stresses. Participants reported awareness of shifts in mood throughout the workshops with calmer, happier thoughts and feelings more present after each workshop session. The feedback from participants in both sets of workshops gave very positive reflections. After the workshops, three films were made documenting conversations with Mind participants. These films show first hand reflection on the experience of the workshops regarding: making (textiles and electronics); personal response to the work and environment; and experiences of working in a group (other participants and facilitators).

During the pilot study workshops most participants acted autonomously to make their personal projects. Many worked individually and were able to apply decision-making and problem solving skills, such as those within design processes (as several participants had experience in design). Each participant articulated their choices in materials, design and use of electronics to develop a considered and sometimes meaningful object. In contrast, the Mind workshop participants were not necessarily aware of these design processes and did not necessarily feel obliged to justify their decisions towards their projects. The finishing of projects emerged as highly important to participants. Taking the items home to share with family members extended the sense of personal achievement generated by completing tasks. The facilitators

6a

6b

formed co-design relationships quickly with the Mind participants, forming pairs, which in some cases, lasted throughout the course of the workshops. This tendency to form exclusive pairs put a demand on the ratio of facilitators to participants (1:1). Support was drawn from Mind staff and volunteers to enable each participant to have a co-worker. One key success of the Mind workshops use of co-design and person-centred approaches came from the development of genuine, inter-personal relationships over a short space of time. This applied to all participants, including those who had experienced difficulty with interacting in social relationships. Mind staff gave positive feedback that certain participants had engaged above expectations with the workshops in terms of communication, enjoyment and attendance.

As facilitators we can reflect on our own perspectives as textile practitioners and co-designers in An Internet of Soft Things. The adoption of PCA could be compared to simply being more understanding, patient and empathetic, but it carried with it a weighted responsibility. The people in the workshops were to be considered above the processes being taught and shared. This sets the workshop design apart from a typical teaching activity within the scope of experiences we already had. This responsibility, though serious and potentially daunting, did not stop our enjoyment of the workshops. We were able to build relationships with individuals and bring their perspectives into our project. The satisfaction of helping somebody to make something was not lessened by the 'research' context.

7

8

In order to deal with the responsibility of working with people who have, and continue to face mental health issues, the facilitator team had weekly de-briefs about their experiences and interactions in the Mind workshops. This helped to alleviate anxieties about our personal interactions with vulnerable individuals and helped to reinforce our use of person-centred values. These de-briefs became an important part of the therapeutic process for the facilitation team and encouraged us to adapt the workshops appropriately to be fun, engaging and well-positioned for the whole group.

Reflecting on phase 2, the project researchers noted that due to the time constraints of the residency (1 week), the designers had unintentionally developed small scale personal devices rather than objects that could function within a larger environment. Residency members of the core research team worked on developing the ideas that had emerged to form a 'bridge' between handheld scale and domestic scale items for the next phase of the project. In a meeting at Oakfield School, the NICER group members interacted with the objects (figure 8). This provided the researchers with a better understanding about how individuals interacted with the objects. In addition, the meeting helped to determine the transitions required for handheld objects to become domestic scale. For example, interaction with a small object that involved brushing a hand across a surface could be replaced by a sweeping arm gesture for a wall-sized textile. New possibilities emerged in relation to some of the interactions, suggesting throwing and rolling balls. Documentation using photographs and recording of discussions occurred during this meeting and from this a plan for the next stage of the project has been designed.

OUTCOMES

One of the outcomes of phase 1 Internet of Soft Things project is the development of a set of teaching materials for the production of simple, smart textiles. Various tasks and processes have been developed to support the running of such workshops, which can be taken forward to use within different contexts around mental health, or around smart textiles. Phase 2 is still in development. Currently the objects created at the residency stage are being developed to full working prototypes so that the networking stage can begin and be tested in the

THE INTEGRATION OF PRACTICAL EXERCISES; THERAPEUTIC METHODS WITH MAKING; SUPPORT FOR CO-DESIGN; AND REFLECTION ON THE RELEVANCE OF THE METHODS USED FOR A NON-MEDICALISED INTERPRETATION OF MENTAL HEALTH, ALL PROVIDE METHODS BRINGING THE EXPERIENCES OF PEOPLE'S MENTAL HEALTH INTO THE CONVERSATION ABOUT HOW WE AS SOCIETY WISH TO ENGAGE WITH ELECTRONIC TEXTILES AND THE INTERNET OF THINGS.

site specific flat as well as in the wild, all of which will include co-design opportunities with the co-researchers.

The integration of practical exercises; therapeutic methods with making; support for co-design; and reflection on the relevance of the methods used for a non-medicalised interpretation of mental health, all provide methods bringing the experiences of people's mental health into the conversation about how we as society wish to engage with electronic textiles and the internet of things.

REFERENCES

Glazzard, M., Kettley, R., Kettley, S., Walker., Lucas, R., Bates, M., (2015) Facilitating a 'Non-Judgmental' Skills-Based Co-Design Environment. In: *Proceedings of the Third European Conference on Design4Health 2015, Sheffield Hallam University, 13-16 July*. Sheffield Hallam University: 1-12.

Levitt, B. (2005) **Embracing Nondirectivity: Reassessing Person-centred Theory and Practice in the 21st Century**. Monmouth: PCCS Books.

Rogers, C. (1957) The Necessary and Sufficient Conditions of Therapeutic Personality Change. In Kirshenbaum, H. & Henderson, V. L. (eds.) (1990) *The Carl Rogers Reader*. London: Constable.

Fowler, M. (2011) Creative Approaches to Recovery for Adults with Mental Health Issues. (19 December): 25-26.

Jacobs, M. (2007) **Dual Roles – Blurring the Boundaries in Professional Relationships.** Lutterworth: BACP.

Sanders, E. B. (2006) **Scaffolds for Building Everyday Creativity, Design for Effective Communications: Creating Contexts for Clarity and Meaning.** New York: Allworth Press.

FIGURE CAPTIONS

Figure 1: Diagram showing the co-design process across the six weeks workshop course.

Figure 2: Examples of work in progress from phase 2 of the project.

Figure 3: Example of work in progress from phase 2 of the project.

Figure 4: Examples of switches from pilot study showing different personal interpretations of the task.

Figure 5: Adapted glove from pilot study designed to turn light on when finger and thumb touched together.

Figure 6: Sun/moon object from Mind workshops (front and back shown) with LEDs in 'cheeks'.

Figure 7: Co-dependent wristbands from Mind workshops with tilt switches, demonstrated by a participant and a facilitator.

Figure 8: A member of the NICER group interacting with one of the prototypes produced during the residency.