**An Internet of Soft Things**

**Objectives [4000 chars]**

This project aims to contribute to the development of wellbeing and mental health provision without stigma in the UK, benefitting non-medicalised care practices through the co-design of meaningful networks of things and bringing knowledge from smart textile and wearable technology research to the Internet of Things debate. Outcomes will include a series of pilot design concepts mapping the next steps for an *Internet of Soft Things*, and the development of a co-design methodology using relational approaches to mental wellbeing. Practical outcomes for the Nottinghamshire Mind Network as primary Project Partner will include toolkits for future client work, staff development and a unique, public-facing research identity for a new city-centre venue in Nottingham. There are four key methodological objectives:

- The first is to run a series of workshops at each of the five participating Mind Network centres. Groups of clients will work with researchers and staff to create personalized textile objects with soft switches and sound output. The Recovery Star tool will be used to gather graded descriptors of individuals' ability to cope with aspects of their life; this will be used again at later stages to map areas of improved self-worth and resilience. Reflections and observations will be recorded to understand how the community invests meaning in material things and modes of expressive output, the input actions they identify, and to collect data on participants' awareness of their own and others' emotions and behaviour. This will support mental health service users in developing peer support networks as part of their own recovery agenda.

- The second approach is to augment a smart flat with textile interfaces and to run group work sessions in the resulting domestic living lab environment. These sessions will focus on experiences of living alone and with other people, and the networks of support and meaning making that are made possible through the smart textile things in the room. Participants will work through options for keeping in touch, managing their own spaces, and being heard or seen by others. Groups will consider design decisions in the IoT and use basic tools to sketch interaction scenarios as they introduce the textile nodes into the space, and co-develop networked applications. Questions of ownership and digital entities will be raised, along with the implications for this user community of 'virtual' profiles combined with tangible things. Through this layered approach, the pilot concepts will be defined and then implemented for participants, leading to the third stage of the project.

- In this phase we will work in the wild, testing and iterating the pilot concepts on days out with support staff and service users. Participants will be supported in recognizing triggers of anxiety in everyday scenarios, which routinely make their lives difficult. The pilot networked textile things and applications will enable individuals to become more aware of each other's need for support and to co-develop concepts for peer support. The 'layers' defined in the second approach will be interrogated through contextualized use, and the concept of 'big data' will be discussed as an option for sharing recovery data with peers and carers, along with ethical and security implications.

- The final phase is one of integration and reflection; these sessions will enable exploration of the 'journey of the thing' beyond its use by an individual, including production, service provision, service design, reuse and obsolescence. A Future Workshop methodology (devised by Junk and Muellert (1987) to empower citizens in the planning of urban

environments) will empower the user community to envisage the future of their new open experimental research hub in the centre of Nottingham, and to draw up feasible plans for its implementation.


**Project summary (for public) [4000 chars]**
The *Internet of Soft Things* project asks how a radically connected world can be designed to benefit human wellbeing, and in particular, what types of experience will be enabled by smart textile interfaces as an important part of this vision of the future.

One in four of us is likely to experience mental health problems at some time in our lives, and wellbeing has come to be seen as a 'grand challenge', crucial to the future of our cities and even our security. In the UK, the coalition government committed to measuring national wellbeing through an Office for National Statistics programme, and anxiety is understood to be more than a 'mere curiosity'. However, social stigma often leads individuals to hide difficulties instead of seeking help: in the past, the vast majority of clients using the mental health charity MIND would have been through psychiatric services and still be taking medication. Today the charity finds that this is changing, with increasing numbers of people walking in off the street. Managing the anxiety and distress of individuals so that they are at lower risk of becoming disturbed or dysfunctional (and therefore prescribed medication) has become an important part of MIND's work. While in the past evidencing the cost benefits of non-medicalised approaches to mental wellbeing has been difficult, research undertaken in Western Finland presents compelling figures for talking therapies (for example, presenting cases of schizophrenia are claimed to have been reduced by 90% over the last 25 years).

The project will draw on this and other relational approaches in psychotherapy and counselling. The *Internet of Soft Things* project will add to the debate in the design community about how we name the beneficiaries of design ('user', 'human', 'person'?) and champion the move from an individual to a collaborative, social model of meaning making. This new Person-Centred Approach to Design is important because it will enable us to move beyond the current deficit model and narrow focus on what people lack or need, to look at the positive things and meanings people bring to situations and communities. Design will be able to engage more meaningfully with calls for wellbeing through a better understanding of people's potential for growth and capacity for meaning making and a new ability to design for people's ongoing creativity and empowerment.  There are parallels between the scale of mental health issues and a purely technological vision of the Internet of Things (IoT); that is, that it occurs everywhere, but is often concealed. If the statistic of one in four people experiencing mental health problems is powerful, it becomes even more pervasive if we consider the mental wellbeing as a continuum upon which every one of us sits (and moves).

This project will build on recent research in smart embroidered interfaces to explore the potential benefits of an *Internet of Soft Things* for mental health and wellbeing. It will draw on recent research in wearable technology, which has challenged many of the initial assumptions of 'ubiquitous' computing, namely, that it should be concealed, and that we should not be aware when we are acting through it. These assumptions have led to a belief that no new things or forms need be developed, as technology would merely be hidden within the objects already familiar to us. In fact, what the last two decades of wearable research have shown is that an expressive use of technologies works better with the way we manage our social identities through things. There is therefore scope to explore a range of

existing new experimental forms for personal networked design concepts while addressing the pressing need for more robust and reliable textile interfaces.

**Academic beneficiaries [4000 chars]**

The *Internet of Soft Thing* project will benefit a range of academic communities in the UK and beyond, through new methodological knowledge for working across disciplines. The need for health care and wellbeing services is increasing at the same time as resources are being challenged, and the project will generate new knowledge that will enable research and development in this area. The following disciplines will benefit from our research:

Participatory and co-design in HCI – the project reflects on the role and the representation of users in the design process with reference to Hart's ladder (a model used to measure the participation of children in projects) and a shared design facilitation approach; currently mental health service users have a low level of participation in the development of the Internet of Things – this project will facilitate participation, citizenship and empowerment beyond token involvement, and contribute to the development of person centred design methodologies for the future.

Smart textiles/wearable computing – research in creating embroidered antenna for wireless systems will be generated through the Advanced Textile Research Group at Nottingham Trent University, contributing to the community as it seeks to join the IoT; new forms of decorative and aesthetic recognition codes will be developed, building on work in the Aestheticodes project to explore technical issues in embroidering and printing codes on personalized soft objects. Relationships between the interior built environment and handheld or wearable things will be explored and analysed, identified as an important direction for research by the international Arcintex (architecture, interaction design, textiles) community, led by the Swedish School of Textiles at Boras.

Approaches to non-medicalised mental wellbeing – in order to demonstrate efficiency, the UK's National Health Service is restricted in its treatment of mental health issues to time-constrained approaches; however, the Nottinghamshire Healthcare Trust is very interested in results being reported by the Open Dialogue approach, which constitutes the mental health service in Western Finland, and which demonstrates immense personal benefits and systemic cost-effectiveness through the use of a dialogical and non-time constrained practice. The *Internet of Soft Things* project will contribute to such person-centred approaches in the UK by focusing on the individual as part of a network of meaning making.

Clinical practice – the big data approach to wellbeing will be examined by the user community, developing meaningful application concepts and highlighting the importance of ethical co-design processes when applying behavioural data collection, storage and use regarding vulnerable individuals. The project will map personal 'triggers' of anxiety in everyday life, which can be used to drive further research in clinical practice. In addition, the 'sensory space' has become an important tool in rehabilitation and occupational therapies with, for example, children with learning difficulties, but despite the soma-aesthetic potential of textiles, they have been oddly missing from commercially available sensory environments to date. The project will contribute to the development of this area through rich personal accounts of experience with textile things, and through guidelines for implementing robust smart textile solutions.

Computer Networking – the computational objective in this project is to identify the potential for developing collaborative algorithms to look for identifiable patterns in the way users operate (or not) the available tool; the scope of usage of the computational resources; and the ways in which they are used. It is hoped that analyzing the use and the accessibility of the computational resources can be linked to wellbeing factors and will contribute to early detection of certain negative tendencies and to the evaluation of beneficial connectivity between the nodes in the IoT.

**Impact summary**

This research focuses on building new knowledge and practice in designing for wellbeing and mental health service providers in an *Internet of Soft Things*. Through a built-in process of reflection, this knowledge will be captured and made available to future interdisciplinary teams of designers, scientists and user communities working in the wild. The project's impact aims are to:

- o Train staff in non-medicalised mental healthcare to work with smart textiles as part of workshops with service users
    - o A practical toolkit will be co-developed as part of the project comprising basic materials, tools and instructions for building personal textile interfaces
    - o An accompanying booklet will gather the learning of the participating Notts Mind Network staff and present case studies and guidelines for running workshops with service users along a number of themes (such as significant sounds and narratives, managing privacy in networks, and confidence through skills development)

- o Inform staff in non-medicalised mental healthcare about the issues and opportunities for their clients in a networked society
    - o Through reflections and dialogue across the team, sector specific knowledge will be shared and possible implications teased out
    - o These will be brought together in a presentation format and disseminated to the national UK Mind Network, Open Dialogue groups in the UK and overseas, and members of The Consortium of Therapeutic Communities

- o Support third sector provision of wellbeing and mental healthcare provision
    - o This sector is fragmented and reliant on charity and project funding; we will bring together a range of groups to identify future research in the Internet of Things to create a meta-level network of networks so that they may support each other and share resources
    - o We will provide a number of demonstration days and discussion events to facilitate future research in this area

- o Inform wider policy change with regards wellbeing and mental healthcare provision in the UK
    - o Nottingham Healthcare Trust has shown interest in the evidence emerging from the Open Dialogue model of treatment, in which networks of family and significant others are closely involved
    - o This project will benefit from senior representatives from the NHS sitting on the board, and will contribute to ways of working towards wellbeing that do not begin with a deficit model of the individual

Our demonstration days will form part of Nottingham Mental Health Awareness Weeks, the annual ITAG Conference held annually in October in project active years at NTU; work in progress will be exhibited and presented at the Arcintex symposium being hosted by Nottingham Trent University in February 2015, and final demonstrators shown at Arcintex Feb 2016.

To maximize the desired level of impact we have brought together an advisory board of experts from the relevant professional communities in mobile and cloud computing, mental health and wellbeing, and smart textile research, including senior managers from the National Health Service in Nottinghamshire.

For the Nottinghamshire Mind Network, the outcome will be an actionable plan for providing the new Mind venue in the centre of Nottingham with a unique identity, designed around the findings and collaborative process of this project. This new venue will provide a space for increased public interaction through lower stigmatization of mental health issues, and will become a centre for future arts-led research.