Investigating Sociophysical Interaction in the Domain of Ageing Well.

Abstract
We are engaged in a project investigating sociophysical interaction conceptualised as the entanglement of tangible and social interaction. Our investigations are grounded in and by the domain of ageing well. Early findings highlight the diversity and specificity of ageing bodies and the physical and social activities they engage in. We introduce some potential theoretical and methodological directions and acknowledge the value of fundamental HCI design principles.

Author Keywords
Sociophysical interaction; ageing; sociality; actual bodies; embodied action

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
We are engaged in a project that investigates sociophysical interaction conceptualised as the entanglement of tangible and social interaction. The advent of both social and tangible technologies has quickly expanded the capabilities of people to interact with and through computer systems. Social technologies increase the connectedness and reach of individuals and social groups both directly and through
socially indexed information. Tangible technologies, that rely on touch and movement of the human body as input, extend access to and the reach of information and communication systems in physical, spatial, bodily and located ways. The project aims include the development of prototype technologies and their interrogation, through use, to inform the development of both methodological insights into how to design and build these entwined systems as well as theoretical groundings and related conceptual work.

Drawing upon the work of many in the field, Dourish [1] identified the separation of the social and the physical in our thinking about interactive systems. He called for a research program in embodied interaction that used its foundations in phenomenology to map connections between the tangible and social computing programs at the time. Human interaction is always, by definition, embodied interaction both in the sense of its dependence on bodily capacities, such as movement, language and thought and its embeddedness in a world where our bodies and the world we are in are made of the same ‘stuff’ [3]; see also [1, 4, 5, 8]. The basic argument was that the design of these technologies should not be driven by the definition of tasks and their requirements, or the development of standalone applications, or the pursuit of technology solutions for their own sake. Instead the goal is the design of technologies that support, mediate and enable human interaction, with a focus on ubiquity, tangibility, and most of all, shared awareness, intimacy and emotions. Nevertheless, as Hornecker and Buur argued [2] “the research community lacks concepts for analyzing and understanding the social aspects of tangible interaction and design knowledge on how to design so as to support social interaction and collaboration” [2:439].

Their framework has informed a great deal of research in this area since, including our own project.

With commitments to phenomenological approaches, as well as the recognition that all human action is both embodied and situated, our project is grounded in a domain to provide the actual living bodies, objects and physical environments that such research depends on. We have chosen ageing as the context in which to explore sociophysical interaction. This is not simply because of its pressing significance to many developed societies, but also because social and physical concerns become increasingly urgent and central to the desires of ageing people to remain active and in control of their lives. The design and use of entwined social and tangible technologies have contributions to make to that space where the embodied capacities for action, of actual ageing people living within familiar and specific physical environments, intersect with the policy-driven, demographically-informed perspective of governments needing to provide appropriate, adequate and cost-effective services to their ageing citizens within limited and tightening budgets.

In the remainder of this paper we provide a very brief account of some early findings from the research followed by some early reflections on their implications for the further investigation of sociophysical interaction.

**Early findings**

We have begun to explore the space where actual bodies meet both new social and tangible technologies as well as still-developing social policies through an initial series of interviews with ageing people. Major and related themes from the early findings include the unanimous determination of our participants to
maintain their independence; the uniqueness of their ageing bodies; the richness, range and diversity of their social connections; the specificity of the health and mobility challenges each faced and the direct links made between ageing well and maintaining mobility, maintaining mobility and maintaining health, and maintaining health and maintaining independence (see [7] for a more detailed discussion of the findings of these interviews).

The implications for our project are that while our participants' views of ageing well were consistent, their actual ageing bodies were not. Their bodies were the bodies of people who had led long lives. They were old enough for their various individual genetic and environmental influences to have expressed themselves, along with the inscriptions made on their bodies by their actual life experiences, such as the work they did, how well they had 'looked after themselves' and various random life events and accidents. So what it would mean and require for each to age well in practice varied enormously. And while the desire to remain active was common, the activities our participants wanted to engage in were similarly varied.

Moreover, our findings would strongly suggest that we question common assumptions about technology usage in this age group. Our participants were all already using information and communication technologies and had learned to use them when they had recognised a need or advantage to do so. While mobile phones, email and increasingly Skype were favoured as means to keep in touch with others, Facebook and even LinkedIn were being also used—typically to keep in touch with family and distant friends—but were used with less ease and frequency than more established technologies. Familiarity with tangible technologies varied but they were not used at this stage by our participants. Of course patterns and intensity of use varied and some people were more confident with technology than others. But age itself as a specific inhibitor of the uptake of new technology was not supported by the findings of our study. Instead our participants made choices about the technologies they would use and new technologies they might learn to use based on individual needs, relevance and the availability of supporting infrastructure.

Our interviews provided a number of valuable implications for the ongoing design of our research. Most importantly they highlighted issues that though already very familiar to us and basic to much of our previous research had previously remained largely undifferentiated within the general research background of the current project. Indeed this was a major motivator for the both the grounding in a specific domain and the interviews themselves. These issues included the specificity of both bodies and the actions available to them that had the capacity for generating and embedding social meanings. They included the fact of the ongoing appropriation of new technologies that were not specifically age-related but part of the general social, technological and physical infrastructure in which ageing people live. And they reminded us that our potential users' familiarity with ICTs is dynamic, diverse and unbounded.

Theoretically, our findings pointed to the potential for investigating how existing phenomenological and related accounts of bodily habit might function heuristically in the design of technologies to support sociophysical interactions; for example Merleau-Ponty's
account of how technologies of various kinds are incorporated though three levels of bodily habit into our bodily space; that is, the situated space of our bodily experience and capacities for action [2, 5]. The findings also flag that the growing connectedness of objects within our own and others’ physical environments promises both enormous and subtle configurability of systems to specific bodies; this might provide another design approach to traditional age-specific applications. Work exploring the sociality and materiality of potentially interconnected objects offers similar potentials. Our findings also support further use of the extended analytic framework Suchman used in Plans and Situated Actions as a tool in the design of sociophysical environments that rely on human movement as input [eg 6].

Final Musings
In situations where we seek "broader vocabularies and additional resources for designing" novel and complex technologies we suggest we consider the old adages and design principles that are foundational to HCI. For example, our interviews quite deliberately follow what is arguably the central HCI principle expressed by variations of know your users—its a clear explanation of why various ethnographic approaches have become defining of human centred approaches to technology design in general. Design for flexible use is another that can frame findings on the specificity and diversity of bodies, their desired activities and rich social relations, as well as our commitment to enhancing the agency of those using our systems to manage their own interactions—with other people, objects and environments of various kinds. There are many versions of these principles; perhaps the two other major ones are internal and external consistency and various versions of engineer for errors/clear and appropriate user guidance. We have learned that understanding how these basic principles might be expressed in specific situations, defined by actual bodies, technologies and environments, is neither trivial to understand nor design for. But principles become established for good reason and they are not a bad place to start!

Acknowledgements
This research is funded by the Australia Research Council Discovery Grants Program DP110101999.

References