Abstract
Collaborations between socially engaged artists, scientists and HCI researchers can provide opportunities for new thinking, enabling dialogue between the public, artists, scientists and technologists and the development of new tools for social engagement and participation. This paper provides a critical reflection on two artist led projects that specifically engaged the public with issues of sustainability and climate change, defining the space where these artistic practices occur and describing the role of technologies in supporting these forms of artistic social engagement.

Author Keywords
Social engagement, embodied technology, environmental data, performance art, sustainable HCI, participatory sensing, creative learning, climate change

ACM Classification Keywords
H.5.m. Information interfaces and presentation

Introduction
This paper reflects on how socially engaged arts practice engages with complex issues such as climate change and sustainability. There is growing interest in HCI of the role of artists in engaging the public with issues of sustainability, DiSalvo et al. suggest that...
artists can contribute to HCI through their reimagining of the relationships between technology, people and culture [1]. In this paper we raise questions for a workshop discussion relating to the role of technology - notably mobile phone and sensor technologies - in socially engaged practices, artistic strategies that combine emotional, meaningful and sensory engagements with the data and methods for provisioning socially engaged HCI artworks to meet a range of audience needs and skills. Focusing on two artist-led projects: a touring artwork that engaged the public with climate data (A Conversation Between Trees) [2], and a project involving the design of a data blogging system that was developed alongside a series of artistic activities (Timestreams) [3] These have previously been investigated through ethnographic studies and are documented online1.

Background
Notions of politics, action and revolution were embedded in many of the performance art and theatrical practices of the early to mid-twentieth century [4]. New concepts of social action have emerged from these works that suggest an emphasis on dialogue, collaboration and locality [5] where increasingly artists are presenting examples of how new socially engaged and environmental thinking can occur through dialogic, collaborative practices. These bring together scientific perspectives, critical theory and notions of artistic and social intervention [6,7]. Relevant research within sustainable HCI has previously focused on activist and participatory art taking place in urban environments [8] or considered the development of tools to support participatory sensing developed more specifically for scientific analysis or physical system monitoring [9], despite the increasing interest in the use of these tools by artists. In contrast, this paper discusses two socially engaged artist projects that employ a dialogic approach without defining a specific political stance, through multiple forms of engagement and in multiple localities, responding to research questions relating to the communication of data (both technically and socially) pertaining to energy and climate change through art.

A Conversation Between Trees
‘A Conversation Between Trees’ (ACBT) was an ambitious touring artwork that used mobile sensing technology capturing environmental data to connect forests in the UK with forest regions in Brazil. The public experience involved multiple threads including exhibitions in forests in the UK; an interactive mobile phone experience that audiences could take out into forests in both the UK and Brazil; and public interventions with schools, teachers and community groups.

Timestreams
Timestreams was part of a larger research project – the Relate Project - that followed on from ACBT, exploring the relationship between energy and climate change by developing a sensing platform combining mobile sensors, a bespoke phone app and the development of experimental artworks. The technologies supported a public programme of activities involving working with artists, hackers, and schools to sense and interpret energy and climate data across Brazil and the UK. The schools exchange involved sharing experiences of the local environment and data captured by the school.

children in each country, via the Timestreams blogging platform.

**Provoking New Thinking and Dialogue**
Both projects provide opportunities for artists and researchers to engage the public with climate and environmental data on an emotional level, provoking opportunities for shifts in perspectives around climate change and sustainability. These are examples of social engagement through exhibitions, including an interactive mobile phone experience in forests, workshops for schools and local communities that directly engage school children, teachers, artists and public audiences. Each of these experiences incorporates the use of sensor technologies and the capture, manipulation and interpretation of environmental data that enables the public to engage with climate change and sustainability in new ways. An ethnographic study of visitors to the exhibition of ACBT reveals the potential for the long-term impact of socially engaged art. Visitors continued to discuss their participation after their experiences of the artworks and were often observed sitting and discussing with friends or other visitors what the data might mean. These types of reflexive, visual and sensory interactions arose from the artists’ intentions to frame dialogue without being prescriptive: "I felt that this was more measured and let me you know derive other things from it not just to be frightened and put off by it but to actually to think a bit in a different kind of way" (Visitor to ACBT)

These projects show that people are able to engage with the data in emotional, sensory and meaningful ways. One of the teachers pointed out that this provides opportunities for new forms of sensory and accessible learning experiences: "There are children who are on our special needs register, a lot of them have remembered a lot of the activities better than some of the other ones." (Teacher who participated in Timestreams)

Another teacher describes how the artists’ strategies - combined with the use of mobile phone and sensor technologies – can bring out different forms of thinking from the children: "We could have spent a week on that visit alone, with all the links through the maths and the data, the science, the geography. The children were amazed how a piece of technology makes something come alive". (Teacher who participated in ACBT)

**Discussion**
It was clear that the exhibition visitors, schools, other artists and hackers who participated in both projects had a wide spectrum of abilities and knowledge. The artists employed distinct strategies to enable these different communities to engage with the work in order to support reflection, dialogue, emotional and sensory responses. The artists’ strategies for engaging communities at times conflicted with the responsibilities of researchers, particularly where artists require cutting-edge technology to remain in the background: "Timestreams was not really (about) the technology for me, Timestreams was the process and the process was about addressing, trying to find sensor interfaces with climate change, with the human in the environment in relation to climate change...” (Artist on Timestreams)

A key question for HCI entering this domain is how to negotiate the provision of tools and technologies across the wide breadth of skills and needs of these communities, raising questions of who takes ownership of this space and the collective needs of people.
involved? One of the HCI researchers describes the ‘chicken and egg’ nature of managing and prioritizing strategies for social engagement alongside technology development: "we need a first prototype which is something that demonstrates this ... no doubt you guys know that’s the most chicken and egg problem... its always why didn’t we have the technology when we started” (HCI researcher on Timestreams)

**Conclusion**

This research reflects on two socially engaged artist led projects that occurred in collaboration with scientists and HCI researchers. Revealing the potential for this work to have long-term impact on the public, provoking new thinking and enabling dialogue, whilst raising questions of how HCI can better understand these types of practices and how to resolve tensions between HCI research and the artists’ strategies for engagement. These reflections have implications for HCI particularly in terms of the development of new tools and systems for participatory sensing.

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**References**


