



UNIVERSITY OF LEEDS

Tracking people: technological and methodological challenges

Report of event three, 15th June 2017

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Arts & Humanities
Research Council

Programme

9.30-10.00 Refreshments

10.00-10.15 Welcome and introduction

Anthea Hucklesby (University of Leeds)

Ray Holt (University of Leeds)

10.15-11.05 Technologies and design: applications and challenges from multi-disciplinary perspectives

Chair: Ray Holt (University of Leeds)

Ian Keller (Psychology, University of Leeds)

Andrew Kemp (Electronic and Electrical Engineering, University of Leeds)

11.05-11.30 Refreshments

11.30-13.00 Methodological challenges for tracking research

Chair: Kevin Macnish (University of Leeds)

Anthea Hucklesby (University of Leeds)

Lorea Arenas Garcia (University of Malaga, Spain)

Louise McCabe (University of Stirling)

13.00-13.45 Lunch

13.45-14.15 Design and technical considerations for tracking devices

Ray Holt (University of Leeds)

John Potter (G4S)

14.15-16.15 Designing the ultimate tracking device

Ray Holt (University of Leeds)

16.15-16.30 Closing remarks

Welcome and Introduction

The third of four Arts and Humanities Research Council (AHRC) funded events for the network of academic and practitioners “tracking people” was held at the University of Leeds on 15 June 2014. The event focused on technical challenges regarding wearable tracking devices and was attended by 57 practitioners and academics, representing a number of different organisations. These included academics from the Universities of Leeds, Bradford, Salford Business School, Stirling, and Kent; public bodies including the Home Office, the Scottish office, the Ministry of Justice, the National Institute for Health Research and NHS Lanarkshire; and private companies such as G4S, Track Group, 3M, Euromonitor and Trilateral Research.

Technologies and design

Ian Keller and Andy Kemp, both from the University of Leeds, spoke in the first panel. Keller demonstrated how technology enabled machine learning can be used to support individuals, with dementia, drug problems and mental health issues, who need to take drugs regularly. He highlighted how drug taking regimes are sometimes difficult to follow especially when normal routines are disrupted. Machine learning techniques can assist with identifying ‘risky’ situations and reminders delivered via technologies can assist individuals to keep to their regimes. He described the Medsminder project in which people were asked to record their patterns of behaviour and note when they were at risk of failing. These data were then used to programme mobile technologies to provide reminders to individuals. The self-report element of the project was important to its success as reminders were viewed as helpful rather than as irritating by participants. A scale of intrusiveness, reminders getting more frequent, was also an important component of its success.

Andy Kemp spoke about the accuracy of tracking devices and the potential problems which may arise from the methods used. He noted that location data does not accurately pinpoint individuals but rather identifies the place they are most likely to be. Location technologies measure the probability that an individual is in a given place at a given time. Depending on the technology used, location can be determined by triangulation from four or more satellites (as is the case with GPS) or it might be derived from other factors, such as time of departure, time of travel, angle of arrival and received signal strength. It can make mistakes and some of these are easy to spot – when individuals jump locations for example. In many cases, proximity, instead of exact accuracy, might be sufficient. In other cases a lack of accuracy may have serious consequences, for example when it is used as evidence in criminal trials. Technologies also do not provide the whole story – they can tell when a person has stopped or that they were in a particular place but not why or crucially what they were doing i.e. the context is missing. It is critical that organisations and individuals understand how location estimates are derived and understand complex concepts such as probability and standard deviation otherwise mistakes can happen leading to potentially serious consequences for individuals.

Ray Holt and John Potter co-presented the session on designing tracking devices. The focus of the session was an exercise where groups of delegates were asked to develop the ‘ultimate’ tracking device which Holt emphasised was a means of catalysing debate. Groups were asked to identify a target group and their requirements and discuss how these might be met by wearable tracking devices. Holt’s blog at <http://anengineeringimagination.blogspot.co.uk/> provides further information about the exercise. John Potter augmented Holt’s points by stressing the importance of designers responding to users’ requirements, making devices wearable, portable and reliable and

urging delegates to think both about the present and future state of tracking technologies, which might include implants, facial recognition, gait recognition and/or iris recognition.

Although participants were representing different constituencies, there was general agreement about certain issues. Everyone agreed that it was important to use the best device available but that one device was probably not able to meet the needs of different target groups and that a variety of technological solutions were required. Some groups attempted to design multi-purpose tracking devices, which had the potential to be used with individuals with dementia as well as people tracked by justice authorities. However, it became apparent that many compromises would need to be made to facilitate this including adjustable settings, such as frequency of tracking and changeable components, such as batteries.

A second conclusion of both the sessions and the workshop was that those who operate the devices have to understand the technology and be aware of potential problems in order to be able to overcome these. The interdisciplinary and interagency groups meant that those who understood the technological background could respond effectively to the needs listed by social care experts and justice professionals and vice versa. In this cooperative process potential limitations of devices were easier to eliminate through utilising the mix of expertise.

Methodological challenges for tracking research

The second focus of the event was on methodological challenges in undertaking research on tracking. Lorea Arenas Garcia, Louise McCabe, and Anthea Hucklesby talked about their research experiences. Garcia discussed the difficulties of researching electronic monitoring in the Spanish justice system, where bi-lateral electronic monitoring is used primarily in cases of domestic violence and on rare occasions as a part of probation supervision. One of the greatest challenges faced in her project was the difficulty of accessing data on the operation of the scheme. Garcia called for information to be made available to researchers on breach and reoffending rates and the profile of victims and offenders. She also suggested that good sources of data were interviews and public events but that these data are no substitute for the data held by criminal justice agencies and private contractors.

Louise McCabe described her research on safe walking for people with dementia. As in previous events, consent was a focus of her presentation given that it is important in relation to research about the use of tracking devices as well as the use of the devices themselves. McCabe commented that people with dementia are typically excluded from research although this was changing. She noted that capacity to consent to participation in research is context specific: individuals may not have the capacity to manage their own bank account but could happily spend one hour a week talking to a researcher. In her project, McCabe tackled questions about the ability to consent via the 'process consent' method. This involves talking about the subject to friends, family and carers in addition to the individuals involved and ensuring that consent was on-going. Furthermore, focus groups were held in familiar places, given a sense of occasion and plenty of time. They also utilised photographs and the actual devices.

In the event the responses to the trial were largely positive. There was a desire for the devices to be discreet but the overall approach was seen as a good option both for increasing independence and decreasing risk of harm. Tracking devices were viewed as tools of freedom rather than control but it was also acknowledged that they cannot and should not replace human contact. McCabe argued that technology might have failed previously because it aimed to replace rather than supplement human interactions. It was also found that the devices currently on the market were good enough for the purposes of the project. A realist evaluation approach may help to uncover the reasons of success and failure and show clearly

what works for particular individuals and the circumstances under which tracking technologies can support freedom. Hence she ended with a call to avoid 'black box' approaches to technology, arguing that researchers need to focus on both human-technology and human-to-human interactions.

The need for a greater quantity and quality of data relating to the use of electronic monitoring in criminal justice sectors was highlighted by Anthea Hucklesby. She pointed out that while the number of research projects has increased in recent years, the evidence base does not match the ambitions for electronic monitoring. She noted that effectiveness research was hampered by a lack of clearly defined objectives of electronic monitoring and a lack of useable data. What data are available is also not apparent because data are held by private sector contractors and many different criminal justice organisations. Combining data from different sources is also challenging. The Ministry of Justice had made a commitment to publish data on the use of electronic monitoring in the criminal justice system but this has not yet materialised jeopardising not only research but the legitimacy of this penal tool. Hucklesby's second point questioned the reliance on pilot projects to test the feasibility of initiatives. She pointed to the uniqueness of pilots and the disproportionate resources which were deployed which are not available when the initiative is 'mainstreamed' leading to different and often less effective outcomes. It would be preferable instead to focus on a soft launch, in which a project could be slowly rolled out to communities of increasing size.

Recurring themes

A number of themes recurred during the event which included:

Access to data for research purposes

Accessing data is made more complicated by the involvement of private companies. Who owns the data and how and when it can be accessed should be clearly outlined in service contracts. Tracking technologies provide vast banks of data which could provide important insights into individuals' patterns of behaviour, compliance and so on. However, using big data techniques raise important questions about anonymity etc.

Appropriate research designs

There was general agreement that it is not appropriate or ethical to use randomised control trials (RCTs) to measure the effectiveness of electronic monitoring because it would entail a random allocation of offenders to terms of imprisonment. There were also questions about the use of 'clinical' trials because of the tendency not to 'look under the hood' and appreciate the complexity of the interactions between individuals and technologies.

Human interpretation of information gleaned from devices

There was a clear sense that technology should enable responsive decision-making and not dictate it. For example, electronic monitoring can provide evidence of breach but discretion must still exist to decide whether action should be taken.

Technology as an enabler and assistant

Tracking devices cannot be a substitute for human contact and certainly cannot prevent unwanted events such as offences or accidents. Technologies are therefore supplements rather than replacements. Particularly in the context of criminal justice, technologies cannot replace trust – offenders still have the choice about whether or not to comply but which is

chosen may be determined by instrumental reasons. Concerns about non-compliance were potentially even greater in the context of immigration cases where individuals have arguably less to lose and could easily cut off devices and disappear. In this context, other mechanisms to encourage compliance were discussed including allowing immigrants to work, have bank accounts and providing stable accommodation through which they could be tracked far more easily than via tracking devices.

Equipment

Several issues were raised in relation to equipment including: false alarms, alarm overload and the charging of devices. The need for equipment designs and capabilities to take account of different groups of wearers was identified. It was noted that changing the colour of devices was no substitute for designing devices for different body shapes and sizes and different capabilities and disabilities.

Questions for Further Consideration

There were a number of themes which developed during the day. These included:

- I. Whether tracking is always the most appropriate response to a particular problem?
- II. A lack of available and/or published data from both governments and private companies on the use of tracking.
- III. A lack of appreciation of the technological issues arising from the use of tracking devices particularly their accuracy and suspicions about the inadequacies of the technologies.

The next and final event of the network will be held on 9 November 2017 in London and will focus on summarising the previous three workshops and looking ahead at the future of electronic monitoring.

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