



UNIVERSITY OF LEEDS

# Tracking People Network

## Briefing Paper 1

### Tracking People: controversies and challenges

*Anthea Hucklesby (University of Leeds, UK), Ray Holt (University of Leeds, UK) and Kevin Macnish (University of Twente, The Netherlands)*

#### Introduction

Technological developments have made tracking people part of the everyday. Our locations are tracked systematically by smartphones and apps but our movements can also be traced retrospectively using a wide variety of methods including CCTV, ANPR (Automated Number Plate Recognition), credit card transactions and so on. Whilst these data are collected and are searchable it is usually only mined if individuals become of interest to the authorities. Whilst the ability to do this raises many issues, what makes certain uses of these technologies contentious is that individuals are required to wear devices whose primary purpose is to systematically track their locations. Most of these devices are designed to be worn continuously and are made to be difficult to remove. Unwanted consequences may follow for some users if devices are discarded or tampered with.

#### Current and future uses of tracking technologies

These difficult to remove tracking devices are deployed in a variety of settings, under very different circumstances and with different aims and purposes. In criminal justice, defendants and offenders wear electronic monitoring (EM) devices to monitor compliance with bail conditions and sentences and early release/parole licence requirements. Location monitoring in these circumstances may include curfew requirements, exclusion/inclusion zones and/or standalone tracking. Location monitoring is used for a wide range of defendants/offenders who are accused or convicted of many offences. However, in most countries except the US, only small numbers of those deemed to be high-risk, including sex

offenders, are tracked. Tracking devices are also deployed with suspects, defendants and convicted offenders involved in terrorism-related offences. This includes the powers under the Terrorism Prevention and Investigation Measures (TPIMS) in the UK (Walker, 2016) but many European countries are using similar powers. Devices have also been used by the family courts in the UK in cases in which a risk has been identified that parents will take their children to Syria.

Several pilots have taken place of bilateral monitoring in domestic abuse/stalking cases (Diver *et al*, 2017; Garcia, 2017). In these cases, suspects, defendants and offenders wear location devices and their (alleged) victims also have devices and are alerted when they are within a certain distance of (alleged) perpetrators. Tracking devices have also been used to assist with the release of patients from NHS secure units by facilitating temporary leave and their transition into the community (Hearn, 2016). Some of these patients will have been convicted of serious offences.

A wide range of tracking devices are available commercially for individuals with dementia and the police and third sector organisations have been instrumental in promoting their potential to assist with the management of this group (Alzheimer's Society, 2018, Daily Telegraph, 2013). Similarly, the police and social services have been involved in using devices with children and young people in care who are at risk of harm (Diver *et al*, 2017).

An area where location monitoring is likely to increase over the next few years is immigration. In the UK, uses in this domain focus particularly on foreign national ex-prisoners awaiting deportation



Arts & Humanities  
Research Council

but also include asylum seekers and those awaiting deportation imminently.

### **Tracking devices**

A quick search on the internet will reveal a wide variety of tracking devices. Our focus is on wearable devices which are designed not to be removed. In reality it is possible to remove all devices and hence we adopt the term 'difficult to remove' devices. These types of devices, usually worn around the ankle or wrist, require cutting equipment (kitchen scissors to bolt cutters) to take them off. Importantly, a third party is alerted to the removal of devices and consequences may follow if individuals are mandated to wear them. All the devices require wearers to comply with wearing them and it is ultimately their choice to do so.

Most devices use Global Positioning Systems (GPS) to track individuals' movements. Although it is technically possible to track individuals in real time, most systems work on the basis of alerts or retrospective monitoring. A specific individual or organisation is alerted when a person leaves (i.e. inclusion zones) or goes into a specified area (exclusion zones). Wearers' movements might then be tracked in real time until they comply, are picked up or returned to safety. In criminal justice settings, alerts lead to investigations about non-compliance and may result in breach action being taken and sanctions may follow.

GPS devices require significant battery power and depending on how frequently they provide location data may need to be charged daily. There are also issues of reliability – signals can be non-existent or intermittent, especially in buildings or in built up areas, and drift can occur i.e. position individuals away from their actual location.

A second form of tracking, which is used extensively in criminal justice settings, uses Radio-Frequency (RF) technology. It enables individuals' presence in a building or specific location to be monitored and records when they enter or leave. It does not have the capacity to track them. This type of technology is used to monitor curfew requirements. It has the advantage of being mature technology which is reliable and uses very little battery power, negating the need for regular charging.

The boundaries between wearable 'difficult to remove' devices used for location monitoring and other forms of monitoring/tracking are becoming increasingly blurred. Many other devices exist including: medical devices to monitor vital signs, drug taking regimes and physical activities; smartphone apps which can be used for location monitoring; devices to monitor alcohol use; and non-wearable devices used to track individuals such as those which can be put into shoes (Hucklesby, 2017). The increasing number and diversity of devices used to track many different

aspects of life is likely to continue to grow and as they do, tracking becomes an ever more integral part of everyday life.

### **Challenges being addressed by tracking devices**

Each domain where tracking technologies are currently deployed, or their use is being considered, faces current and potentially growing challenges which devices might assist in addressing. In many cases these have been made more urgent because of a squeeze on financial resources, particularly in the public sector. In the context of widespread availability and adoption of technologies, many public sector organisations have been looking for ways to do their tasks differently.

An important driver for technology adoption is the desire to reduce populations in detention. In England and Wales, the prison population has been above 82,000 since 2010 (MoJ 2010-2018). In 2017, 6,000 individuals were detained in secure mental health units due to their risk to others and/or were serving custodial sentences (Public Health England, 2017). The UK has the largest immigration detention estate in Europe, with 2,400 individuals detained in March 2018 and 26,500 detained at some time during 2018 (Home Office, 2018). Detaining most individuals in institutions is not a long-term solution. For example, prisons disrupt lives – they do more harm than good - making desistance more difficult. Reoffending rates for those leaving custody vary by group but are as high as 65% (MoJ, 2019). These institutions are also expensive. Prisons cost between £24.6k and £41.5k per year (HMPPS, 2018) and immigration detention centres cost £91 per day (Home Office, 2018) per adult place.

Tracking devices are viewed as one mechanism to control behaviour of individuals who are deemed to be 'risky'. They can provide additional reassurance to specific individuals or the wider public that individuals' behaviour will be monitored. One group recently singled out are domestic abuse perpetrators who, by way of the Domestic Abuse Bill 2019, may be required to be electronically monitored as a condition of a Domestic Abuse Prevention Order (DAPO). However, there are very real concerns about the effects on victims – it might increase levels of anxiety and make them responsible for their own safety. It also fails to consider the often complex relationships between perpetrators and victims which may result in high levels of non-compliance.

Tracking devices are also deployed to help with the management and protection of individuals with dementia. Dementia is a significant and growing health issue – there are nearly 19 million individuals with dementia worldwide and this figure is expected to rise to 50 million by 2050

(OECD, 2018). Some individuals with dementia go missing as a result of the need to walk about. In 2017, nearly 16,000 individuals were reported missing which is a rise of 60 per cent since 2012 (NCA, 2017). Time is of the essence if these individuals are to be found safe and well and tracking devices help to locate them. Unfortunately, some are not found in time. Statistics are difficult to find but in Japan 479 of the 12,208 individuals with dementia who went missing in 2016 were deceased when they were found (The Guardian, 2016).

Similar concerns exist with children and young people who go missing. In 2016, there were over 122,000 missing persons' reports for under 18s (NCA, 2017). There is a particular problem with children in care. In 2017, there were 60,700 incidents of children going missing from care involving 10,000 children suggesting that the same children go missing on numerous occasions (APPG, 2012; Daily Telegraph, 2018). Children and young people have been identified as particularly vulnerable to sexual exploitation after several high profile cases (Jay, 2014). The cost of missing persons' investigations is estimated to be between £1325 and £2415 (NCA, 2017).

### **The purposes of tracking**

It is useful to think about three main purposes for tracking devices - control, care and convenience (Michael et al, 2006). Control mainly relates to uses within criminal justice and terrorism-related activities and is predominantly about keeping track of individuals who are deemed to be a potential risk to others. Tracking is used for the purposes of care in relation to patients with dementia and children and young people where wearers may be at risk of harm themselves i.e. safeguarding. The use of tracking for convenience was originally conceived as the everyday use of smartphones and apps. However, convenience is important in another respect. Tracking devices can be convenient for authorities (police or immigration officials) or families, allowing them to locate individuals quickly and easily when required. In relation to immigration it may be the only purpose. Although these categories are useful there is an evitable overlap between them. For instance, tracking mental health patients through their transition from secure hospitals into the community has both control and care functions with the emphasis changing depending on the context.

Within these three broad categories there are a myriad of purposes which are attributed to tracking. In common with other emerging technologies, tracking is often described as a panacea or silver bullet for some of the many and varied challenges facing contemporary societies (Hucklesby, 2017). In the remainder of this section, some of the purposes of tracking are examined.

Chief amongst the purposes of tracking is locatability. Individuals' location can be tracked: in real time, i.e. their tracks can be followed as they move; retrospectively, i.e. to look at where they have been; or only when required i.e. when an incident is believed to have happened or to check whether an individual was in a particular place at a specified time. Tracking devices, whether RF or GPS, make it quicker and easier to find people when they are missing, in the case of dementia, or because they are suspected of criminal offences or breaching court orders or are going to be deported.

Tracking devices also facilitate the monitoring of inclusion or exclusion zones. These zones may be as large or small as necessary – they may aim to confine or exclude individuals from specific addresses up to whole countries or exclude them from specific locations such as cities, airports or ports. Zones may be in force continuously or intermittently and can be visualised as electronic trip wires which if crossed will trigger an alert. The challenge is to set zones which are necessary and proportionate so that exclusion zones are not too large and inclusion zones are not too small. Zones should allow individuals to carry on activities which are necessary and/or desirable, for example, safe walking or drug treatment centres whilst disrupting any unwanted behaviour, for instance, entering a rival gangs' 'territory'.

A fundamental purpose of tracking devices is risk management. Whether this is managing the risk to others posed by defendants/offenders or managing the risk of individuals' with dementia walking off and not being locatable. The extent to which the 'risk' is managed depends on the nature of the risk, the effectiveness of the equipment, its potential deterrent effects and the willingness and capacity of individuals to comply. Careful and accurate risk assessment is necessary but significant problems have been identified with these processes, resulting in questions about whether the capability exists to predict the future behaviour of specific individuals (Douglas et al., 2017). Importantly, risks might be reduced but wearing tracking devices never eradicates risks. Some risks may also be increased by wearing tracking devices. For example, wearers may be stigmatised or wrongly identified as (sex) offenders or become 'sitting ducks' for criminal associates (Hucklesby, 2008). Very much linked to risk is the purpose of 'safeguarding' whether this is the wearers, specific individuals, such as victims or children generally or 'the public', at large.

Tracking devices provide reassurance to various individuals and groups depending on the domain. In terms of dementia, wearers themselves may take comfort from the fact that if they go missing someone will be alerted and they are more likely

to be found. Carers are similarly reassured that they will be alerted if an incident takes place. This also has the effect of relieving some of the burden of care on carers and reduces the concerns that wearers may have about being a 'burden' to their loved ones (Bantry-White and Montgomery, 2014). In relation to criminal justice, decision-makers may be reassured that victims and/or witnesses are more likely to be protected and the public kept safer and if an incident happens the police will be alerted and able to take action. They may also be reassured that they are less likely to be criticised for making a decision which turns out in hindsight to be wrong because the imposition of tracking devices provides clear evidence that a risk was identified and mitigated.

Tracking devices also provide a means and a reason to keep in contact with individuals. This may be via telephones, visits, monitoring boxes or the devices themselves. The contact moments are an opportunity to check on individuals' well-being, provide general support and advice and/or motivate individuals to comply (Hucklesby, 2009).

Instrumental purposes for deploying tracking devices are less explicitly discussed but are important motivators for increasing their use. Tracking devices are viewed as a mechanism to cut costs. For instance, the police may save resources by: utilising these technologies to monitor persistent offenders instead of officers making regular visits to their homes; curfews allow defendants and offenders to be more easily located for further questioning; suspects can be exonerated or identified quickly when tracking and crime data are matched; and missing people can be located more quickly. Viewed from this perspective it is clear why the police have been at the vanguard of deploying tracking technologies in various domains.

Tracking devices do not automatically reduce costs, especially when the costs of deploying and supporting them are considered, but they can increase capacity. For example, police officers who are not required to frequently visit persistent offenders are able to do other duties. Similarly, tracking devices may increase efficiency, allowing the authorities to focus on the cases where the need is greatest and to work more smartly to identify and react to potential incidents.

Reducing populations in institutions is a key purpose of the use of tracking devices – individuals with dementia may be able to stay at home for longer, prisoners and mental health patients are released from prison earlier or not detained at all. The extent to which tracking devices truly replace, rather than supplement, the use of institutions is questionable but there is little doubt that at least some individuals are in the community instead of in institutions because tracking devices exist.

Freedom, autonomy and independence may be increased by the use of tracking devices. Instead of having to lock individuals with dementia in their homes or care homes to prevent them leaving they are able to go out, albeit it with alerts if they go too far. Similarly, GPS devices allow defendants/offenders to move freely within the confines of any curfews or exclusion zones. In the field of criminal justice, RF devices have been identified as 'habit-breaking' by supporting offenders not to go to places and/or associate with individuals linked to offending and 'routine-making', providing assistance to structure individuals' lives (Hucklesby, 2008).

There are several purposes which are only relevant to criminal justice but are important to debates about the ethics and usefulness of tracking devices. Tracking or EM is used and viewed as a punishment, particularly when it involves being confined to an address for a specified length of time. EM is viewed as a mechanism to increase compliance with court orders (Hucklesby, 2009) and also has the potential to support rehabilitation, desistance and resettlement although evidence to support these claims is currently limited.

### **Practical challenges**

A number of practical challenges exist when deploying tracking technologies. These include two issues already mentioned. The first of these is that wearers are able to remove the devices to evade tracking. The key challenge is finding ways to discourage them from doing so by using strategies of persuasion. This is likely to be more easily achieved in some domains than others and different strategies will be effective in different situations. Research is beginning to help us understand why individuals stop using seemingly useful technologies or why they are not adopted in the first place but more research is required (Greenhalgh *et al*, 2017). Secondly, the requirement to regularly charge GPS devices presents particular challenges. Some potential solutions are shared across domains, for instance, portable chargers, nudging strategies such as sending reminders and vibrating devices whilst others are domain dependent, for example, using potential punishment as a deterrent.

Tracking devices are a source of anxiety for wearers and significant others. Real or imagined problems with the equipment are a key concern across domains, including flashing lights on devices and phone calls related to false alerts. But simply wearing the device may induce concerns, particularly if unwanted consequences might follow as a result of allegations of non-compliance. Key to alleviating such concerns is the provision of 24/7 support for wearers and where appropriate, significant others. Support is most often provided via monitoring centres which deal with alerts as

well as queries from wearers and their families. Adequately resourced monitoring centres are a necessary part of the infrastructure for tracking to work effectively and are a significant fixed cost.

Support from monitoring centres may be supplemented in various ways by visits by specialist monitoring staff or other professionals. This additional support may be an important mechanism to increase the likelihood that tracking devices will continue to be worn and conditions complied with, where appropriate, but more research is needed to understand the processes at work. Whilst tracking devices may assist with the management of various populations, they are not a substitute for interactions with people and one very real concern is that personal interactions will be replaced partially, or completely, by technological solutions.

Tracking devices are only as effective as the response which follows an alert. In some cases, the consequences of not responding in a timely manner may be grave. A clear strategy and procedure is required to ensure appropriate responses are forthcoming and are adequately resourced. The requirement for urgent responses is particularly challenging, for example, when a domestic abuse perpetrator breaches an exclusion zone and heads for a previous victim's address or when an individual with dementia goes walking in sub-zero temperatures. These types of incidents often require the police to respond immediately. The potential outcry which is likely to follow an incident in which the police failed to respond quickly enough needs to be considered. Attention also needs to be paid to the potential strain on families who may be responsible for dealing with alerts generated by dementia trackers.

### **What makes tracking legitimate?**

As briefing paper two makes clear, a myriad of ethical challenges are linked to the use tracking devices – not least because informed consent might not be freely given and that wearers might be exploited or harmed as a result of wearing devices (Macnish and Hucklesby, 2019). An important question addressed in this section is what makes their use legitimate.

There is a clear requirement for any use of tracking devices to comply with international human rights conventions. In addition, specific examples of regulations and ethical standards have been produced in several domains (CoE, 2014; ACM, 2018). These are useful reference points providing guidance in terms of broad principles but they lack specificity.

The use of tracking devices in criminal justice, terrorism and immigration is normally, but not always, enabled via the law. The law provides a basic framework for when tracking devices can be used, (usually) how they can be used (to monitor

exclusion zones or curfews), with whom and (sometimes) for how long but it does not regulate their everyday operation. Instead, any regulations tend to exist in policy guidance or in the unpublished commercial contracts with suppliers. There is no legal regulation of tracking devices in social/dementia care where commercial relationships are the norm. Similarly, the 'voluntary' schemes operated under the auspices of the Integrated Offender Management Schemes (IOMs) by the police for offenders are not legally regulated (Hudson and Jones, 2016).

Accountability is via the independent bodies such as the Criminal Justice Inspectorates, although, whether it is viewed as 'core' business is open to question. For instance, the Care Quality Commission could have oversight of the use of tracking devices in social care settings but, to date, it has not done so. Clear challenges are for legal and regulatory structures to be robust and enforceable and to keep abreast, and take account, of technological developments and new domains in which tracking devices are deployed.

Legitimacy is also linked to who decides whether it is appropriate to use tracking devices with individuals. The gold standard would be decision-makers who are independent and viewed as impartial. This may be courts or organisations such as the Parole Board who make some of the decisions about the use of tracking devices in criminal justice. The legitimacy of other decision-makers, including carers, is open to question because they may have a vested interest in the decisions they make. Administrative decision makers may be viewed as less legitimate than judicial decision-makers. For example, prison governors make some decisions about the early release of prisoners and children's services are involved in decisions to track young people. In many social/dementia care settings, decisions might be by carers alone or in consultation with the potential wearers, although the extent to which wearers are able to, and should be, involved in decision-making is hotly debated (McCabe, 2017).

The motivation for the use of tracking devices also has a bearing on whether it is viewed as legitimate. If it is used in the best interests of wearers then it is likely to be seen as more legitimate than the primary motivations being financial or for the convenience of third parties. Of course, there may be differences between the explicit and implicit rationales for deploying tracking devices generally or with specific individuals and what is in the best interests of wearers is not easily determined.

Whether a decision to use tracking devices is viewed as legitimate also depends on: i) whether the wearer has a voice i.e. are they able to give their informed consent and say no; and ii) whether they have a right to appeal decisions and how the appeal would be dealt with. Other relevant issues

are whether tracking is better than the alternatives. If the alternative is detention in an institution (prison or care home) the answer might be yes but not necessarily in all cases.

Whether the use of tracking devices is legitimate is not static and may change over time. Legitimate use is dependant upon what mechanisms are in place to review whether wearing the devices remains necessary and proportionate. The challenge is to decide when the identified risk has reduced sufficiently for devices to be removed. There is always a risk that the wrong decision is made and the wearer's safety or the safety of others is compromised. Therefore, there may be tendency to be cautious about removing devices 'just in case' resulting in the potential for disproportionate use. Another danger is that wearers become dependent on the devices to support behaviour change.

### **Challenges to the use of tracking devices**

One of the greatest challenges to the use of tracking devices is the potential for misuse. Tracking devices may be used as instruments of harassment, oppression and slavery, as cases worldwide testify (Al-Alosi, 2018). The State may also misuse devices, for example by using tracking data in ways not explained to wearers. All tracking devices, even those operated by state agencies, rely on equipment and software from commercial companies and all data are collected and stored initially, if not permanently, on the servers of private sector companies. Whilst data protection legislation and tightly worded contracts may make the malicious use of devices and/or the data collected from them unlikely it remains a possibility. Recent events in the criminal justice system have also highlighted the potential for providers and/or their employees to act unscrupulously or corruptly (NAO, 2013).

A second challenge is to guard against overstating the claims of what tracking devices are able to do and raising unachievable expectations. The reality is often very different to the perception of technologies as a panacea or silver bullet. Tracking devices are not infallible – equipment fails or is not installed correctly and it is not able to prevent unwanted events. Despite this, tracking devices are variously described as preventing individuals with dementia going missing or offenders reoffending. Devices might reduce the likelihood of these things happening and/or make it more likely that someone will know about it but they cannot and do not stop them.

The accuracy of tracking data is another challenge especially as the consequences for non-compliance may be significant in some domains. The general perception is that GPS devices accurately pinpoint the exact location of individuals. The reality is different, particularly in

built up areas where signals may be weak or non-existent (Kemp, 2017). Drift happens i.e. where the location of the individuals is different from tracking data but is only a specific problem in some contexts – whether a suspect for a murder was inside or outside the house or over the road is critical and, whilst scouring terrain within a few 100 metres of a location may be feasible to find a missing person, any larger and this becomes a major effort which requires more resources and is more likely to fail. The data are also collected without context (an alert might be triggered accidentally or for good reason) so an investigation into the circumstances is always required.

A major challenge is handling the data created by tracking devices. Fundamental questions are raised about who owns the data, who should have access to it, where it be stored, when should it be disposed of and what can be done with it (see Hucklesby and Macnish, 2019). Legal requirements provide a framework but it is important to consider these issues in advance of deployment of tracking devices. The hacking of equipment and the misuse of data are an ever present threat and one which has not yet been considered sufficiently.

Ensuring equality of access to tracking technologies is vitally important. Tracking devices normally require individuals to have secure and stable accommodation and access to electricity and not everyone has. In some domains, notably criminal justice, cohabittees are required to consent to devices being installed, and in others, relatives or others known to wearers often need to be willing and able to react to alerts. Not all potential wearers of dementia trackers have the financial resources to pay for them and the level of services provided may be dependent on individuals' ability to pay.

Discrimination on the grounds of sex or race is relevant in some domains. There are significant questions about some criminal justice measures being used more for some sections of society than others (Home Office, 2018; MoJ, 2018). The potential for tracking technologies to be used discriminatorily has not been explored sufficiently (Hucklesby et al, 2016). Robust monitoring is required to ensure equality of access and/or prevent over or under use for some groups. The acceptability and impact of using tracking devices on different sections of the community also needs to be addressed. There are a myriad of differences between wearers and potential wearers within, as well as, across domains which should be accounted for.

We also need to guard against a 'one size fits' all strategy where the same devices are used in multiple domains. It is, of course, cheaper for providers to supply the same equipment but the

purposes and needs of user groups differ. Generally devices should be designed specifically for individual domains and particular groups (Holt and Hucklesby, 2019). Different ways of describing and talking about tracking and the devices are also needed to guard against wearers in 'care' domains feeling as if they are being treated like 'criminals'. It is easy for individuals from one domain to inadvertently use inappropriate language in relation to another.

A key challenge is to consider the length of time that it is acceptable for tracking devices to be worn. In dementia care, the time period may be self-limiting but it is also possible that potential wearers might feel under pressure to wear tracking devices in the early stages of dementia when it is not necessary. In criminal justice, immigration and terrorism-related use the issues are very real. For example, individuals may be awaiting deportation for many years if they cannot be removed to their country of origin, sex offenders in the US are required to wear tracking devices for life and we do not yet know enough about the trajectory of individuals involved in terrorism to know when it may be safe to remove devices. How long is too long and the impact of wearing these devices over long periods of time on wearers and their relatives needs to be thoroughly researched.

Briefing paper two examines some of the ethical challenges which arise with the use of tracking devices in more depth (Macnish and Hucklesby, 2019). These include: privacy; the potential for stigmatisation arising from the wearing of tracking devices; and automation bias and false positives.

### **Private sector involvement and sector integration**

Private sector companies are involved in tracking in all domains. Their involvement varies from supplying and supporting the equipment and storing raw data to providing a full service which may include operating monitoring centres, contacting and supporting wearers and relatives/carers and liaising or working with statutory agencies. The model adopted varies within and across domains and in different countries. The involvement of the private sector raises issues for some about whether organisations run for profit should be involved in the provision of services for the public good. It is clear that their involvement complicates delivery models, data protections and lines of responsibility and intensifies and adds to ethical and legal issues (Hucklesby, 2018). A clear regulatory framework with adequate oversight from independent bodies is required to ensure that providers are held to account, that service levels are acceptable, wearers and their relatives are protected and that they are paid at the appropriate level for the services they provide. Such

regulatory and accountability mechanisms add to the financial costs of schemes.

The growth in the use of tracking devices in many domains is resulting in the greater penetration of security companies into societies. The same companies are often providing tracking equipment for control, care and convenience purposes and/or multiple services. For example, G4S provide tracking devices for criminal justice purposes and also provide more generic services to the police and courts and operate prisons and immigration removal centres. Buddi provide tracking devices in criminal justice and care contexts. This type of vertical or horizontal integration is creating (or bolstering) powerful organisations who hold significant amounts of data on individuals, may influence governments' decision-making and their policies in critical areas of public life as well as decisions effecting individuals' liberty and well-being (Hucklesby, 2018).

### **Concluding comments**

Multi-domain use of tracking technologies heightens as well as highlights the challenges involved now and in the future. Sharing experiences, evidence and insights from across domains will assist with ensuring that tracking technologies are developed, implemented and used responsibly. This is especially important when advances in technologies and techniques such as machine learning create new and potentially worrying possibilities. There is an urgent need to regulate these increasingly ubiquitous and everyday technologies.

### **References**

- Al-Alosi, H. (2018) 'Technology is both a weapon and a shield for those experiencing domestic violence', *Medical Express*, 18 June 2018 at <https://medicalxpress.com/news/2018-06-technology-weapon-shield-experiencing-domestic.html>
- All Party Parliamentary Group (APPG) (2012) *Report from the joint inquiry into children missing from care*, London: House of Commons at [https://www.childrenssociety.org.uk/sites/default/files/tcs/u32/joint\\_appg\\_inquiry\\_-\\_report...pdf](https://www.childrenssociety.org.uk/sites/default/files/tcs/u32/joint_appg_inquiry_-_report...pdf)
- Alzheimer's Society (2018) '10 lifesaving location devices for dementia patients' at: <https://www.alzheimers.net/8-8-14-location-devices-dementia/> [accessed 5/2/2019]
- Association of Computing Machinery (ACM) (2018) *Code of ethics and professional conduct*, at <https://www.acm.org/code-of-ethics>
- Bantry-White, E. and Montgomery, P. (2014) 'Electronic tracking for people with dementia: An exploratory study of the ethical issues experienced by carers in making decisions about usage' *Dementia*, 13(2): 216–232
- Council of Europe (CoE) (2014) *Recommendation CM/Rec 2014/4 of the Committee of Ministers to member states on electronic monitoring*, Strasbourg: Council of Europe
- Daily Telegraph (2013) 'GPS tags for dementia patients' at: <https://www.telegraph.co.uk/news/health/news/10029205/GPS-tags-for-dementia-patients.html> [accessed 5/2/2019]
- Daily Telegraph (2018) 'Fears for child safety as 10,000 reported missing from care', 21 April 2018.
- Diver, L., Jewell, M and Veliz, C. (2017) Tracking people: legal and ethical debates: report.

- Douglas, J et al. (2017) Risk assessment tools in criminal justice and forensic psychiatry: the need for better data', *European Psychiatry*, 42: 134-137.
- Garcia, L.A. (2017) 'How to research EM domestic violence in Spain: challenges and experiences', Tracking people, University of Leeds, 15 June 2017
- Greenhalgh, T. et al (2017) 'Beyond adoption', *Journal of Medical Internet Research*, 19(11): e367.
- Guardian (2016) 'Japan's dementia crisis hits record levels as thousands go missing', 16 June 2016 at: <https://www.theguardian.com/world/2016/jun/16/record-12208-people-with-dementia-reported-missing-in-japan> [accessed 7/2/2019]
- Hearn, D. (2016) *The use of GPS electronic monitoring (GPS:EM) in inpatient forensic mental health settings*, Tracking People, 14 Dec 2016, University of Leeds
- HM Prison and Probation Services (HMPPS) (2018) *Costs per place and costs per prisoner by individual prison*, London: MoJ at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/750185/costs-per-place-costs-per-prisoner-2017-2018-summary.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/750185/costs-per-place-costs-per-prisoner-2017-2018-summary.pdf)
- Holt, R. and Hucklesby, A. (2019) *Designing systems for tracking people*, Tracking People Briefing Paper 3 at <http://trackingpeople.leeds.ac.uk>
- Home Office (2018) *How many people are detained or returned?* at: <https://www.gov.uk/government/publications/immigration-statistics-year-ending-march-2018/how-many-people-are-detained-or-returned> [accessed 7/2/2019]
- Home Office (2018) *Police powers and procedures England and Wales year ending 31 March 2018*, Home Office Statistical Bulletin, Home Office: London at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/751215/police-powers-procedures-mar18-hosb2418.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/751215/police-powers-procedures-mar18-hosb2418.pdf)
- Hucklesby, A. (2008) 'Vehicles of desistance? The impact of electronically monitored curfew orders', *Criminology and Criminal Justice*, 8(1): 51-71
- Hucklesby, A. (2009) 'Understanding offenders' compliance: a case study of electronically monitored curfew orders. *Journal of Law and Society*, 36(2): 248-271
- Hucklesby, A (2017) *Tracking people: looking to the future*, Tracking People, 9th Nov 2017, London
- Hucklesby, A. (2018) 'A complicated business: the operational realities of privatised electronic monitoring of offenders' in A. Hucklesby and S. Lister (eds) *The Private Sector and Criminal Justice*, Basingstoke: Palgrave: 223-259.
- Hucklesby, A., Beyens, K., Boone, M., Dunkel, F., Mclvor, G. and Graham, H. (2016) *Creativity and effectiveness in the use of electronic monitoring: a case study of five European jurisdictions*, at: <http://28uzqb445tcn4c24864ahmel.wpengine.netdna-cdn.com/files/2016/06/EMEU-Creativity-and-effectiveness-in-EM-Long-version.pdf>
- Hucklesby, A. And Macnish, K. (2019) *The ethics of tracking people*, Tracking People Briefing Paper 2 at <http://trackingpeople.leeds.ac.uk>
- Hudson, K. and Jones, T. (2016) 'Satellite tracking of offenders and integrated offender management: a local case study' *The Howard Journal of Crime and Justice*, 55(1-2): 188-206
- Jay, A. (2014) *Independent inquiry into child sexual exploitation in Rotherham 1997 – 2013*, Rotherham: Rotherham Metropolitan Council at: <https://www.rotherham.gov.uk/downloads/file/1407/independent-inquiry-cse-in-rotherham>
- Kemp, A.H. (2017) *Tracking technology*, Tracking People: technological and methodological challenges, 15 June 2017, University of Leeds
- McCabe, L. (2017) *Methodological issues in tracking research*, Tracking People: technological and methodological challenges, 15 June 2017, University of Leeds
- Michael, K., McNamee, A. and Michael, M. (2006) *The emerging ethics of humancentric GPS tracking and monitoring*, Wollongong: University of Wollongong
- Ministry of Justice (2010-2018) *Offender Management Caseload Statistics*, London: MoJ.
- Ministry of Justice (2018) *HMPPS offender equalities annual report 2017/18*, London: MoJ at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/760093/hmpps-offender-equalities-2017-18.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760093/hmpps-offender-equalities-2017-18.pdf)
- Ministry of Justice (2019) *Proven reoffending statistics quarterly bulletin, January to March 2017*, London: MoJ at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/775079/proven\\_reoffending\\_bulletin\\_January\\_to\\_March\\_17.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/775079/proven_reoffending_bulletin_January_to_March_17.pdf)
- National Audit Office (2013) *The Ministry of Justice electronic monitoring contracts*, HC 737, Session 2013-14, London: NAO. Available at: [https://www.nao.org.uk/wp-content/uploads/2013/11/10294-001-MoJ-Electronic-Monitoring\\_final.pdf](https://www.nao.org.uk/wp-content/uploads/2013/11/10294-001-MoJ-Electronic-Monitoring_final.pdf)
- National Crime Agency (2017) *UK Missing Persons Bureau missing persons data report 2015/2016* (updated 2017), at: <http://www.nationalcrimeagency.gov.uk/publications/876-missing-persons-data-report-2015-2016-1/file>
- Public Health England (2017) *Working together to address obesity in adult mental health secure units. A systematic review of the evidence and a summary of the implications for practice*, London: Public Health England at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/591875/obesity\\_in\\_mental\\_health\\_secure\\_units.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/591875/obesity_in_mental_health_secure_units.pdf)
- The Organisation for Economic Co-operation and Development (OECD), (2018) *Renewing priority for dementia: Where do we stand?* at: <http://www.oecd.org/health/health-systems/Renewing-priority-for-dementia-Where-do-we-stand-2018.pdf>
- Walker, C. (2016) 'Tracking suspected terrorists' Tracking People: scoping the landscape and debates across domains, 14 Dec 2016, University of Leeds

\*All reports and presentations from Tracking People events are available from <http://trackingpeople.leeds.ac.uk>

This briefing paper is one of a series produced by the Arts and Humanities Research Council (AHRC) funded 'Tracking People' network. This cross-disciplinary network brings together academics, policy makers and practitioners from diverse domains including criminal justice, immigration, mental health, dementia, terrorism and children's services to examine the use of tracking devices (non-removable wearable devices that enable location monitoring or tracking of wearers by third parties).

More information about the network is available at: <http://trackingpeople.leeds.ac.uk> or contact the Network Chair, Professor Anthea Hucklesby (A.L.Hucklesby@leeds.ac.uk).