



Protecting Vulnerable Persons and Reducing Demand of Police Time and Resources using Assistive Technology

Evaluation Report

May 2017

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This project was funded by Police Innovation Fund 2016/2017. This evaluation report was submitted to the West Yorkshire and Hertfordshire Police Forces.

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1. Context and Aims

1.1. Background

Out of doors mobility is an important part of living well with dementia (Bantry White & Montgomery, 2015; Oswald et al., 2010). However, one clinical consequence of living with dementia is an inability to recognise familiar places or find a familiar location (Rowe & Bennett, 2003). Therefore, people living with dementia are at risk of becoming lost even in familiar environments (Rowe & Bennett, 2003). Thus, they are more likely to go missing than people of similar age who do not live with dementia. A 'missing person' is "anyone whose whereabouts cannot be established will be considered as missing until located, and their well-being or otherwise confirmed" (College of Policing, 2016).

Despite their elevated risk, the majority of people with dementia who go missing are found safe and well. However, when people with dementia go missing they are exposed to particular risks, such as dehydration, injuries such as bruising and abrasions, orthopaedic and soft tissue injuries, hypothermia, hyperthermia and death (Ali et al., 2015; Aud, 2004; Rowe et al., 2004). Thus, it is most important that an intensive search gets quickly underway, before people with dementia succumb to death by exposure.

1.2. Use of Assistive Technologies

A solution to this issue is the somewhat 'controversial' use of assistive technologies, commonly using GPS tracking devices. It is a solution that intends to promote safe and independent walking. The user carries an electronic device, allowing a formal or informal carer to track him/her remotely should they go missing (Schaathun et al., 2014). Academic research in this area focuses on the following issues:

1. Ethical concerns have been the focus of discussion in recent years. The use of assistive technologies raises a real sensitivity to civil liberties, stigma and dignity. The right to private life, for example, may be infringed if the person's carer is continuously checking the person's whereabouts. Concerns regarding the person living with dementia's consent to be monitored have also been at the core of this discussion. Mental capacity¹ is presumed unless proven otherwise. When considering the use of assistive technology, every effort should be made to facilitate informed decision as to the person's ability to consent. Cases where a person with dementia fully understands the implications of using the device are not problematic. Yet, in moderate-severe cases of dementia, where a person may be more likely to get lost or confused while outdoors, the element of consent may be more of an issue (Bartlett, 2015; Bantry White & Montgomery, 2014; Ladau & Werner, 2012).

2. Practical issues relating to the use of the devices- the advantage of assistive technology is that it helps people living with dementia maintain indoor and outdoor autonomy. It enhances their freedom by reducing carer's concerns for their safety. By including people

¹ Under section 30-35 of the Mental Capacity Act (2005)- Where a person is deemed not to have capacity to make a particular decision, it is unlawful for them to take part in intrusive research. (www.legislation.gov.uk/ukpga/2005/9/pdfs/ukpga_20050009_en.pdf)

living with dementia in the discussion about its potential use it also helps maintain person-centred care and mitigate the risks associated with getting lost (Bartlett, 2015; Gibson et al., 2015; Williams & Ware, 2014). Milne et al. (2014) also examined the impact of the use of this technology on demand on social services caregivers and concluded GPS devices reduced search times. This was supported by Bullat et al. (2016) who found that GPS devices were reliable and accurate in locating the position of a missing person living with dementia and was highly efficient in terms of time to discover the location of the missing person.

However, difficulties in the use of assistive technologies have been identified in four domains by Nygard & Starkhammar (2015). These difficulties include conditions that interfere with the use of the technology, deficiencies in knowledge and in the communication between users and their technology, and limitations in the use of instructions. The authors found that these difficulties appeared in complex combinations (pg. 148).

3. Attitude of professionals, family members and patients towards this technology has also been examined. While there are participants who reject the use of these technologies out of respect to the privacy of those living with dementia, most research findings indicate that patients, family members and professionals are overall supportive of its use. Landau et al., (2009, 2010) explain that at times carers may feel obliged to use it in order to keep people safe. It was also found that older people who were cognitively intact favoured the loss of privacy in favour of greater autonomy. These and other studies highlight the importance of giving the person with dementia a voice in the decision whether or not to use assistive technology and that the discussion is and should remain an inner family issue (Bartlett, 2015; Landau et al., 2009).

As seen from the discussion above, the application of technology to facilitate independent living for people with dementia is not new, its use by police forces across the UK is growing, with a particular interest in reducing missing person episodes as well as the time it takes to recover the missing person and bring them back to safety.

1.3. Aims of Evaluation

This evaluation report examines a pilot project, which was funded by Police Innovation Fund 2016/2017. The project aimed to use assistive technology to improve safeguarding provision in the management and reduction of repeat vulnerability 'missing persons' incidents. The project took place in West Yorkshire and Hertfordshire Police Forces during 2016-2017.

1.3.1. The aim of the evaluation report is to

- ✓ Assess whether the objectives of the projects were met.
- ✓ Highlight challenges experienced by the police forces running this project.
- ✓ Identify good practices and recommendations which may be implemented in the future.

1.3.2. Objectives of the Project:

- ✓ Reduce the number of High/Medium risk repeat missing persons.
- ✓ Reduce the time taken to recover a missing person.

1.3.3. The Principle Hypotheses of the Project:

- ✓ The use of Assistive Technology will reduce the overall amount of Missing Persons aged 65 years and over.
- ✓ The use of Assistive Technology will show reductions in numbers of Repeat Missing Persons aged 65 years and over.
- ✓ The use of Assistive Technology will show reductions in numbers of High/Medium Risk Missing Persons aged 65 years and over.

2. Methodology of the Evaluation of Project

This evaluation report is based on material collected and provided by West Yorkshire and Hertfordshire police forces. Each police force created their own set of data which was sent electronically to the researchers in an anonymised word and excel file. The material included information about how the project was set up, details about the inclusion and exclusion process of participants, the participants that took part in the project, any missing person incidents prior and during the project, and feedback received from the families of the participants about their experience during the project.

This was followed up by several phone conversations and email exchanges with designated officers in each police force and enabled clarification on particular issues that required further details. The authors of this report did not have any contact with the participants or their families and all the data provided followed data protection and ethical guidelines as set by West Yorkshire and Hertfordshire police forces and University of Portsmouth.

3. The ‘Protecting Vulnerable Persons and Reducing Demand of Police Time and Resources Using Assistive Technology Project’

3.1. The ‘Buddi’ System

In 2016 funding was received from the ‘Police innovation fund’ to purchase on loan a number of ‘assistive technology’ units. These units have been purchased from Buddi Ltd (<https://www.buddi.co.uk/>). The unit consists of a clip that can be attached to a lanyard or attached to a key ring. A SIM card in the clip will register the clips location. A wristband works in conjunction with the clip and the two communicate with each other and if out of range an alert is triggered. The docking station (charging unit) is static at the user’s home address. Buddi operate a 24/7 monitoring service, Alarm Receiving Centre (ARC).

Geo-fencing is a feature in a software program that uses the global positioning system (GPS) or radio frequency identification (RFID) to define geographical boundaries. Buddi location

clips use this system to create safe and unsafe zones which are specified by the user/family. The zones created can be tailored to suite the user's lifestyle. Different zones, safe and unsafe can be activated for different days of the weeks and also hours in the day.

3.2. Identifying Potential Users

3.2.1. Inclusion Criteria in the Project

Hertfordshire

Potential users have been sourced through 'Compact', Hertfordshire police's missing person's database. Initially, search parameters were set to identify those reported missing on at least 2 occasions between April 2016 and October 2016. This search identified 21 repeat missing persons. All 21 were contacted and only 3 were suitable for the pilot study. The search was later widened to identify those reported missing on at least one occasion. In total (including above 21) 78 were contacted.

Inclusion criteria in the project comprised of individuals who were:

- ✓ over 65 years old
- ✓ living with dementia
- ✓ have been reported missing to police on at least one occasion
- ✓ user does not wear a pacemaker
- ✓ consent to participate in the study has been given by the user and family
- ✓ the user has 3 nominated contacts in the event an alert is received by the Alarm receiving centre (ARC)
- ✓ Nominated contacts have access to the internet
- ✓ Someone will ensure that the unit is kept charged
- ✓ Someone will ensure the GPS clip is worn/with the user.

West Yorkshire

The Police Performance Review team performed a search on 'NICHE', the police's missing persons database. Initially, the aim of West Yorkshire was to allocate Buddi to adults who may have other vulnerabilities besides dementia. They provided a list of individuals living with dementia who went missing between the dates, March to September 2016 and April to October 2016. 43 individuals were identified as reported missing 116 times for the first period and 48 individuals were reported missing 125 times for the second period. Some of the data was duplicated due to the period overlaps.

The inclusion criteria in the project mirrored that of Hertfordshire. In order to further extend the potential of the project and better safeguard other vulnerable groups West Yorkshire police engaged with partners within the areas of mental ill health, hospitals, memory clinics, Dementia / Alzheimer's Societies, CSE support groups and street worker

support groups. These details were then compared to the live system to determine suitability of the individual to be part of the project. This involved assessing the circumstances of the missing report including their reason for absence, the period of absence, method of travel and location found. District safeguarding hubs and missing person coordinators were engaged to assist in identifying further suitable individuals considering not only reported missing incidents but also concern reports which lead to officer deployments. Further consideration was given to individuals already subject to the Herbert Protocol. 69 individuals were identified as a result of this process, spread across the 5 West Yorkshire Districts.

Once a person was identified as a possible participant, their immediate family were contacted by the police forces. Contact with the family was made by telephone, face to face and via the Dementia or Missing Persons specialist officers. Follow up communication with a letter to confirm the trial was sent once initial set up was confirmed to thank the family for being involved in the trial and provide them with contact details should they need any further assistance at any time.

3.2.2. Exclusion Factors from Original Samples

There were several reasons why 73 people in Hertfordshire and 66 in West Yorkshire who could have been included in this project did not take part (see table 1):

Table 1: Reasons for NOT taking part in the project

Reasons for NOT taking part in the project	Hertfordshire N=73	West Yorkshire N=66
Person living with dementia lacks capacity to consent ²	26	n/a
Family declined or did not respond	18	12
Person had other care arrangements (e.g. live in carer, care home, secure home, etc.)	7	21
The person had no family contacts	5	3
Person was not diagnosed with dementia	4	3
There was no internet	3	1
Person already has a GPS device	3	10
Person does not speak English	1	0
The person is now deceased	1	1
The person now has a pacemaker	1	n/a
Other	4	15

Both police forces made sure participants had the capacity to consent. Following legislative boundaries the forces excluded possible participants if there was any indication they lacked capacity to consent to take part in the project. The decision about capacity of prospective

participants was made by Hertfordshire Police force while reading previous missing person reports of individuals that were identified as fitting the inclusion criteria. If information in these reports indicated possible lack of capacity, such as stated above, or any comments or concerns by relatives about their loved ones, those individuals were not approached. Furthermore, in the first phone conversation with the families, if they indicated their relatives did not have capacity, they would be excluded from the project.

The issue of consent was similarly evaluated by West Yorkshire Police force once they were aware of families who wished to find out more information about the project. An in-depth assessment of the individuals that were highlighted as having one or more missing occurrence was carried out. This was concluded by the history held and circumstances identified through research and conversations alongside the support of Dementia police specialist and Missing persons teams to identify suitability of the individual and the support in place in terms of family. Once this was identified contact was then made with the family to introduce them to the project and provide suitable information that would then assist them in their decision on whether to take up the offer to pilot the Buddi service. Those unable to consent were not approached or offered to take part in the project.

Of the relatives who were invited to take part in the project, a few relatives explained their decision to decline the invitation saying:

- (a) they did not feel a Buddi would benefit them
- (b) they felt that they were capable of looking after the person with dementia

West Yorkshire also highlighted that Telecare operate a medical referral process meaning the issue of consent had already been addressed through a medical assessment. Telecare provide the technology free of charge and the family pay the monthly monitoring fee to the Buddi Company. The opportunity to work in conjunction with Telecare was explored however due to the time scales of the project this was not possible.

West Yorkshire identified 7 possible participants. However, if the wearer could not consent they could not be part of the project. Of the remaining 3 participants, one family returned Buddi in January and another family in February, this only 1 participant wore the device until the end of the project.

Following the reasons stated above, Buddi was used by 5 participants (participants 1-5) in Hertfordshire and by 3 participants in West Yorkshire (participants 6-8).

3.3. Assistance to Families Involved in Project

3.3.1. Setting Buddi up

Hertfordshire

Once possible participants were identified, the designated officer approached the family by phone to discuss the project and sent out information by email. A week later she called the families back and if they were still interested she made an appointment to come and visit them in their family home. The officer showed the family how the Buddi system works and set it up for them. This included creating the zones, make sure the batteries were charged and populate the Buddi system for the user. Once she visited their home and they consented in writing, the system was live for the user to use.

West Yorkshire

Relatives of potential participants were visited at a location agreed by them which was in the family home environment. Buddi provided an upskills meeting for all staff i.e Missing persons and Dementia Specialists and other staff or officers involved in the project. This enabled them to take a trial kit to demonstrate its functionalities and set it up with the user and/or wearer. If they chose to set it up themselves the unit also came with full set up instructions within the box. Relatives of the participants were also provided with the details of the Buddi 24/7 helpdesk number that enabled instant support for any ongoing set up issues they may have had.

The system was set up that if the nominated 3 contacts of family members should not be contactable the Police force was to be the alternate contacted. In West Yorkshire, if there was an incident or an emergency requiring the police to act due to a missing episode which could not be managed by the family alone due to the involved risk, then they would call the police control room as normal to report a missing person. In Hertfordshire, this type of call would still be made directly to the designated officer who the family had already met.

3.2.2. Ongoing Support During Project

Ongoing support was offered to the families throughout the duration of the project. Hertfordshire Police force employed a designated officer for this project who would enter each Buddi account daily and view the use of the system, for the first couple of weeks of the project. The officer was considered to be a super-user. The officer did NOT access the whereabouts of the participants. She only examined information about zone breaches and panic button alarms. Families who took part in the project were given the officer's direct office number and she called them a few times to discuss how they were experiencing Buddi. The officer also visited them at their home between one to four times during the project. If the family asked the officer a question she could not answer she would contact Buddi Customer Care and return a call to the family. Ongoing support was also made available to the families by West Yorkshire Police force. Families were provided with contact details of Dementia specialist district officers who were also proactive and called the

families to offer support. Families were also provided with the 24/7 helpdesk Buddi Customer Care who they could call at any time.

3.3.3. Exit Strategy

Hertfordshire

Although the project has concluded, Hertfordshire Constabulary has extended the use of Buddi to the families for a further 3 months. Relatives were contacted either by phone or email to discuss this option.

West Yorkshire

Families were sent a letter outlining the exit plan once the project ended. This process was in place to ensure that the families and individuals were supported throughout the full process. The letter confirmed the end date of the pilot and signposted to relevant services should the families wish to continue a similar assistive technology service. Written communications with the families made sure they had the information to make their own decision for themselves and their families based on their experience of the pilot, needs and wants going forward following the end of the project. They also had the option to complete a Herbert Protocol should they wish. This was offered at the beginning if it was identified that one was not already in place. Further guidance and support was offered when explaining the benefits of having this in place).

3.4. Results of Project

3.4.1. Demographic Background of Participants

6 of the 8 participants in this sample lived with a relative, who was most likely to be their spouse (see table 2). Participants 6 and 7 lived on their own and their sons were their designated carers. The average age of participants in this sample was 76 and 5 were male and 3 were females. The project was originally aimed at people who were considered missing repeatedly, i.e. 3 or more times. However, due to the reasons mentioned above and in order to enable the project to progress the number of missing episodes was lowered to a minimum of 1. Participants in Herefordshire used Buddie for an average of 93 days ranging between 78 to 110 days. The participants in West Yorkshire used Buddi for an average of 50 days, ranging between 22 to 78 days.

Table 2: Demographic Background of Participants

	Age	Gender	Living with relative	Been reported missing to police <u>prior</u> to project	Buddi issued (date of start and finish)	Number of days used Buddi
Participant 1	77	Male	Wife	4	10.11.16-28.2.17	110 days
Participant 2	78	Male	Son	2	21.11.16-28.2.17	99 days
Participant 3	78	Female	Husband	2	25.11.16-28.2.17	95 days
Participant 4	74	Male	Wife	1	12.12.16-28.2.17	78 days
Participant 5	76	Male	Wife	1	6.12.16-28.2.17	84 days
Participant 6	81	Female	Son (did not live with his mum)	1	13.12.16-28.2.17	78
Participant 7	73	Female	Son (did not live with his mum)	1	20.12.16-8.2.17	51
Participant 8	69	Male	Wife	2	19.12.16-9.1.17	22

3.4.2. Missing Incidents Prior to and During the Project

The 8 participants included in this sample were reported missing 14 times to the police before the beginning of the project, ranging between 1 to 4 times (see tables 2 and 3). Only one person (participant 1), was reported missing during the project, as well as prior to it commencing (see details of case example of Henry below). Therefore, this section will summarise the missing incidents history of the 8 participants taking part in this project (see table 3) and discuss the missing episode of Henry (a pseudo name), its impact on police resources and an assessment of the cost of the investigations.

3 of the 8 participants in this project had missing incidents that were NOT reported to the police as well as the ones that were reported. For example, participant 5 has been reported missing to police only once but has wandered on four occasions whilst out with this wife. She has not reported these incidents to the Police as he was located quickly. Furthermore, participant 7 was discovered after a member of the public who lives 0.2 miles away from her home found her walking, confused and lost. They reported that to the police in order to help return her home safely.

As table 3 shows the missing episodes that were reported to the police, included cases where the person with dementia was classified as high risk. Fortunately, none of the participants in this sample was harmed while missing. The missing incidents lasted, on average, over 3 hours ranging between 5 minutes and over 13 hours. Participants in this sample varied substantially in the distance they travelled during a missing incident ranging between a few yards away from their home up to nearly 20 miles away. Search activity, where relevant, was carried out by family and the police and most of the participants were found by the police (7), members of the public (4), or returned by their own accord (3).

Table 3: Missing Incidents of Participants Prior to Project

Participant number	Number of missing incident	Month of report	Risk Assessment	Length of time Missing	Length of time missing (minutes)	Time reported missing to police	Last seen by family	Method of travel	Came to harm (Yes/No)	Searched for by	Distance travelled	Found by
1	1	Jun-16	High	9h 22min	562	18:14	07:30	Bus and walking	No	Family and Police	20 miles	Police
	2	Jul-16	High	7h 21min	441	18:23	12:00	Unknown	No	Family and Police	Unknown	Returned home by own accord
	3	Oct-16	High	2h 27min	147	20:25	15:30	Bus and walking	No	Family and Police	15 miles	Returned home by own accord
	4	Oct-16	High	33min	33	14:57	Unknown	Walking	No	No one	9 miles	Member of the public
2	1	Aug-15	Medium to High	3h 57min	237	13:01	09:15	Bus	No	No one	6 miles	Returned home by own accord
	2	Apr-16	High	1h 2min	62	13:21	08:00	Bus	No	Police	6 miles	Police
3	1	Apr-16	High	48min	48	12:00	Unknown	Walking	No	Family	0.9 miles	Police
	2	Aug-16	Medium	5min	5	22:30	Unknown	Walking	No	No one	50 yards	Member of public
4	1	Nov-16	High	46min	46	15:18	10:45	Walking	No	Family and Police	1 mile	Police
5	1	May-16	Medium to High	13h 10min	790	12:48	11:46	Train	No	Family and Police	19.7 miles	Member of public
6	1	Dec – 15	High	37 min	37	15:48	15:38	Walking	No	Police	2 miles	Member of public

7	1	May – 15	High	7hrs 38min	458	04.33	19.45	Walking	No	Family & Police	1 mile	Police
8	1	June – 16	High	4h 10min	250	14.48	11:15	Walking	No	Family & Police	11.3 miles	Police
	2	July-16	High	1h 35min	95	09.46	09.30	Walking	No	Family & Police	2.3 miles	Police

Case Example- Henry Going Missing Without Buddi

The following account describes the first missing episode of participant 1 who will be referred to here as Henry. The case example explores how Henry ended up missing, the search activities that followed, actions taken by the police and an estimate of the costs to Hertfordshire Police force, as a result. The details of the case and the cost estimate were put together by the Hertfordshire Police force.

On the day he went missing, Henry was due to travel abroad for a family holiday. He was last seen by his family at approximately 07:30 hours when he left the house to go to the shops.

When he didn't return home the family started to search for him. His family consists of his wife, a daughter and two sons. The family had been searching for their father for most of the day before reporting him missing to the Police. He was reported missing to the Police at 18:14 hours. Henry, eventually, was located at 0400 hours after being reported missing for 9 hours and 22 minutes.

The following actions were completed by police prior to Henry's return. It should be noted that most of these enquiries were completed out of hours where on-call staff have been utilised (the cost to the Constabulary far greater).

- ✓ A full search of Henry's home address completed by officers and again by search trained officers
- ✓ Enquiries made with 3 local hospitals (checked twice during missing period)
- ✓ Previous home address identified and a different Police Force was tasked to conduct address check
- ✓ Enquiries made with bank regarding usage of Henry's bank card. A financial investigator is required to make these enquires.
- ✓ Image of Henry were circulated by uniformed officers throughout 2 areas.
- ✓ British Transport Police notified
- ✓ CCTV of shops Henry frequents viewed by officers.
- ✓ CCTV of Henry's town centre obtained and viewed
- ✓ On-call Corporate Communications contacted to compile media release.
- ✓ PolSa (Police search adviser) deployed with search trained staff and street search/wooded area search with dog unit in attendance
- ✓ Local Mosque visited and photograph circulated
- ✓ 2 local restaurants Henry visits checked
- ✓ House 2 house enquiries made
- ✓ Police helicopter deployed and active for 4 hours

Approximately 25 uniformed officers were involved, 2 Inspectors, CID staff (approx. 4), 1 dog handler, 1 out of hour's financial investigator, 1 out of hours press officer and helicopter crew. Undoubtedly other staff would have been involved that have not been named on the Police log i.e. PCSO's. In addition, many of the above staff would have been required to work past their duty time and for the majority this would have been 12.00a.m.

Hertfordshire police force estimate (see appendix 1) that the cost of this investigation totalled £10,730.83.

Hertfordshire and West Yorkshire Police forces kept slightly different logs of the use of Buddi and alerts activated. Table 4 summarised the use of the Buddie system by the participants from Hertfordshire Police force.

Table 4: Use of Buddi by participants from Hertfordshire

	Number of Zones	Zone Breaches	Panic Button
Participant 1	1	4	15
Participant 2	2	61	1
Participant 3	1	0	1
Participant 4	1	0	0
Participant 5	0	0	0

It is important to note that the family of participant 2 set up initially very small zones which led to a high number of alerts. This was not an error. It was a result of the set up process that followed the family wishes. It is important to highlight that this does not mean participant 2 went missing 61 times but only that he travelled past the zones as they were originally set up. This was later amended and included wider areas.

The wife of participant 5 did not set up any zones as her husband does not go out on his own. In the case that he may go without her knowledge she chose to activate the 'locate now' option.

All the panic button alerts were in error.

West Yorkshire's 3 participants generated, overall, 80 alerts between them (see table 5). These are explained below by the type of alert.

Table 5: Use of Buddi by participants from West Yorkshire

	Safe Zone Alerts	Out of Range/No Signal Alerts	Low Battery Alerts	Fall Alert	Total
Participant 6	29	10	6	1	46
Participant 7	0	11	8	0	21
Participant 8	0	10	3	0	13

The 29 Safe Zone alerts did not require any action and the participant was safe and well. There was no notification from Buddi to say any of the alerts were correct at that time. Reasonable checks were made by Buddi to ascertain if assistance was required by contacting the key members at that time. The Fall Alert was triggered by a wearer who was wearing the wrist bracelet and started banging on the window. This in turn triggered the Alert. Again checks were made by Buddi to assess the need for assistance.

Case Example- Henry Going Missing While Using Buddi

Henry does not usually leave the house apart from Fridays when he visits his place of worship. He uses the bus network to get there and back. It is on these days that he often gets confused and gets on the wrong bus. This was the first Buddi issued by Hertfordshire.

A zone can either be designated safe or unsafe. In this case the family had 4 zones created which were identical but different designations for different times and days of the week. The first active zone created was to cover Friday's when the wearer visits his place of worship. The area on the left between the times of 0800 and 1600 was designated as a safe zone.

As the family wished to know if he had returned home by 1600 hours they requested that the same zone (excluding the home address "dock") be designated as an unsafe zone between the hours of 1600 and 2300. It was thought that by changing the zone to unsafe that the family would have been notified by an alert if he was still in the now unsafe zone and had not returned home.

The Buddi system will only recognise the wearer/clip entering or exiting a zone. In this instance the wearer/clip was in a safe zone up until 1600 hours. After this time the zone changed to unsafe and as the clip was in the zone already the only recognition would be when the clip exited the zone. So this area, now registered as an unsafe zone effectively made the rest of the U.K a safe zone.

This proved problematic on a day in December 2016 when Henry took a wrong bus, travelled through the "unsafe" zone (no alert activated as a result) and ended up in a completely different area. His daughter was notified in the morning that there was a breach in the zone and she monitored his movements. She used a 'locate now' facility but it failed to locate Henry as the facility is only available to access every 10 minutes. Thus, it is not effective in locating a person who is actively mobile. After 2 hours of searching for Henry by herself, she returns home and called the police at 17:45 to help locate him. At 18:15 hours Hertfordshire Constabulary pass the search to another Police Force where the Buddi clip places him. One unit is assigned to locating the wearer. At 19:23 hours Henry was found.

Hertforshire Police estimate that the cost of this investigation, which lasted 2 hours and 38 minutes, at £169.27.

3.4.3. Feedback from Family

4 relatives from Hertfordshire and 3 from West Yorkshire provided feedback about their experience of using Buddi and being involved in this project.

- ✓ Buddi has given them peace of mind and that they do not worry anymore and can check the person's whereabouts occasionally. It is also reassuring to them knowing that their loved one would be located should they breach the safe zone.
- ✓ Carrying the Buddi has given the person living with dementia confidence when they goes out.
- ✓ One relative stated she will continue to use Buddi once project was completed as she found it so helpful.
- ✓ It reassured the family that the Police care

On the other hand,

- ✓ A participant did not seem comfortable wearing the device.
- ✓ Five of the eight families explained they did not like the system due to false alarms. They felt that calls or texts were intrusive and that the frequency of alerts from Buddi may cloud their judgement as to when their loved one is actually 'missing' and may be unsafe. It also led to mistrust in the Buddi system.
 - Three relatives explained they did not like to use the zones as any breaches results in a phone call.
 - A relative received alerts his mother had fallen when she was hitting the window. That was a typical action of hers and led to false alarms.
 - A relative stated the Buddi system would create alarms even when it was not in use and received multiple text notifications each day.
- ✓ A relative stated they were not happy with Buddi as a specific assistive technology system. This was in terms of its weight, visibility, battery life, etc.
- ✓ Three relatives were unsure whether they will continue to use Buddi after the project has been completed, purely due to financial constraints.

4. Evaluation of Project

The following section is a summary of good practices and key challenges faced by Hertfordshire and West Yorkshire Police forces and recommendations for future use of similar devices. Hertfordshire and West Yorkshire Police forces worked on this project independently of each other. This generated some differences in their practices as detailed above. However, overall their use of the Buddi system was fairly similar and for the purpose of the evaluation and lessons that can be learned for the future the discussion below will explore the project overall, and not by each Police force.

4.1. Good Practices

4.1.1. Identifying Participants

Hertfordshire and West Yorkshire Police forces were very aware of the ethical concerns regarding the consent to take part in this project. Both police forces spent much thought and time determining whether potential participants had the capacity to consent and if there was any doubt in the mind of the officers involved in the project, the families were excluded. The steps taken to assess capacity were also appropriate and tried to determine, from written documentation, whether this was an issue. Officers also discussed this with families of potential participants, in order to be as sure as possible this was in fact not the case.

Hertfordshire and West Yorkshire Police forces involved the families in the discussion about using the Buddi system and the fact that only people with capacity to consent took part maintained person-centred care. Furthermore, keeping the decision to take part an inner family process was at the core of the process of recruiting participants. As the literature suggests, this is most important in terms of ethical use of assistive technologies as well as encouraging users to engage with the system and make best use of it.

Hertfordshire and West Yorkshire Police forces expanded their original search criteria as they struggled to find potential participants. There is a strong argument to provide assistive technology to people who go missing repeatedly as they may be more exposed to risk of harm. However, including people who have been reported missing at least once is also good practice. It can lead to more people with capacity to consent taking part in such projects, and also act as a preventative measure and help safeguard people from going missing repeatedly.

A collaborative approach with partner agencies in order to reach a wider sample is also good practice and develops communication between the police and local community in a positive manner.

4.1.2. Running the Project

Once participants were identified, contact with the families was important and possibly the key to the continued use of the Buddi system for the duration of the project. Hertfordshire and West Yorkshire Police forces made direct contact with the families from the outset and explained in person and in writing the aim of the project.

Hertfordshire Police designated officer and West Yorkshire Police Specialist district officers visited the families also set up the device and explained to them how it worked. The technical support to set up the devices and set up correct zones seems to be very important as it helps the families and officers understand their specific needs and possible errors that may occur. For example, if the zones were too small and may lead to many alarms.

Once the devices were set up there was constant support offered to the families. Hertfordshire and West Yorkshire Police forces differed slightly in their practices. It seems that a specific person of contact who manages the project and oversees its progress, who

proactively called the families and/or visited them several times throughout the project, was good practice that assisted in longer engagement with the Buddi system.

4.1.3. Missing Persons Incidents

The aim of this project was to reduce the number of High/Medium risk repeat missing persons and the time taken to recover a missing person. Due to the small number of participants and the relatively short time frame this project run, it is not possible to definitively conclude how successful this project has been in achieving these aims. However, there are several indicators of good practices and a case example that suggests a similar project has the potential of meeting these aims in the future.

The case example of Henry exhibits that going missing while using Buddi has the potential of reducing substantially the length of time a person living with dementia is missing. It was evident very quickly that Henry was travelling away from where he was supposed to be, and his daughter was able to monitor his movements.

The use of Buddi in the case of Henry also proved to substantially save police resources in terms of number of staff required as well as the length of time they needed to be involved, compared with his missing episode prior to using Buddi.

From feedback provided by the families involved in the project, it is evident that the use of Buddi reassured them and offered people living with dementia more independence, freedom of movement and confidence in themselves.

It will also be fair to say that this project also advanced Hertfordshire and West Yorkshire Police forces visibility in the community and developed their engagement with external partners, which furthered the forces reputation as supporting and safeguarding vulnerable people within their areas.

4.2. Challenges

4.2.1. Identifying Participants

The main challenge for Hertfordshire and West Yorkshire Police forces was identifying and recruiting participants given the very strict inclusion criteria of ability to consent. While the small number of participants meant the forces had capacity to support the families and be involved in the project, it has also prevented the project from reaching its full potential.

This was exacerbated by the relatively late start of the project given it was scheduled to last for a year. The actual process of identifying potential participants did not commence until 5 or 6 months into the year, which also meant each participant and their families had less time to use the device, than was originally anticipated. The authors of this report are not aware of the reasons for this delay, thus are not able to comment on ways to improve timings in future projects.

The original funding application intended to target a larger group of vulnerable people who may be able to benefit from the Buddi system. Over the course of the first half of the year,

both police forces decided to focus their efforts on people living with dementia. Again, the reasons for that were not discussed with the researchers. It would have been possibly more helpful to the forces to be clearer from the outset on their target audience for the project and focus their efforts on recruiting potential participants accordingly.

4.2.2. Running of the Project

The main areas of challenges Hertfordshire and West Yorkshire Police forces faced running the project were false alarms and setting the zones to capture people's daily routines accurately. This is to be expected in a pilot project such as this, and Hertfordshire and West Yorkshire Police forces invested staff time and effort in assisting the families resolve technical difficulties they faced.

West Yorkshire Police also faced early returns of the devices, for different reasons, as stated in family feedback. These include errors in alarms that led to family dissatisfaction as well as disliking the system itself. It may be that more can be done in terms of personal contact and technical support to the families, in order to assist them in working through these early issues, resolving them and reassuring the families to try and use the Buddi system for longer time periods. The personal contact, made by Hertfordshire's project manager who worked solely on this project, may have accomplished that, as they did not experience early returns. However, the sample for each force is very small and this is only a supposition rather than a definitive conclusion.

4.2.3. Missing Persons Incidents

The main challenge dealing with a missing person who is wearing the Buddi system is the time delay in locating them. When a person is 'on the move', there needs to be a way to locate their whereabouts immediately or in less than 10 minutes intervals. This time delay prevented Henry's daughter from locating him herself, led to involvement of police officers and potentially put him at risk of harm. Had Henry been near water or traffic 10 minutes delay could be potentially life threatening.

Due to the short periods of use of the Buddi system during this project only one person went missing. This prevents the authors of this report from reaching any definitive conclusions.

4.3 Conclusions and Recommendations

The aim of this project was to reduce the number of High/Medium risk repeat missing persons and the time taken to recover a missing person. Due to the small number of participants and the relatively short time frame this project run, it is not possible to definitively conclude how successful this project has been in achieving these aims. However, the evaluation of the project can state that there are sufficient indicators of benefits in this project to act as proof of concept and encourage the development of future projects of a similar nature.

The evaluation process also identified similarities in good practices and challenges that have been previously discussed in academic research. It is therefore important for any future project of this kind to consider ethical, practical and attitudinal issues regarding the use of assistive technologies by people living with dementia.

Based on the discussion above, this report makes the following recommendations:

1. Forces to work in partnership with primary and secondary care providers to identify people early in their diagnosis, or at the point of receiving acute treatment who could potentially benefit from the technology longer in their healthy life expectancy.
2. Create guidelines for key stakeholders across health, social care, private care and policing sectors to jointly assess the scale of demand within the local demographic, e.g. age, healthy life expectancies, social isolation e.t.c
3. Through a joint needs assessment, to devise a clear and consistent protocol for identifying, triaging, distributing, monitoring and evaluating people and families who are at greatest risk and therefore need for technologies.
4. Training for forces implementing the system in the Mental Capacity Act and processes for determining capacity to consent by an individual or their families.
5. Have guidelines for forces implementing the assistive technology systems to facilitate conversations with families about both the ethical risks and benefits so that families can come to a decision that is right for them and their loved one.
6. Develop a communication model to deliver timely information to families from the outset of their expression of interest, through to its set up, implementation and ongoing support.
7. A Single Point of Access is recommended to ensure that families, health care professionals, social services, private care and police can collaborate in a timely and effective way when alerts are received via technologies. Also to support families on the technological aspects of the project and thus reduce demand on policing time to assist with this.
8. Devise a simple cost-benefit calculation template to enable forces and wider systems to define the potential savings in cost, time and other resources through an investment and roll-out of assistive technology systems.
9. Ensure that forces who do adopt the technologies collect baseline data about the incidences of missing, cost and resourcing of investigations, as well as wider cost implications through associated health and social care.
10. Define the outcomes and impact data required by all forces implementing the technologies to collect from the outset of implementing the project. This will enable a more robust data set and sample of the size required to demonstrate the impact of assistive technologies at the scale required for empirical evidence.

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Appendix 1: Estimated costs of case example- Henry

Example 1				hrs	mins		
Wearer 1	(Incident 1)	without Buddi	per hour	9	22	Revised charging total	Total cost
	25 PC's	Employable Cost	32.14	289.26	11.78	301.04	7526.12
	2 Inspectors	Employable Cost	49.7	447.3	18.22	465.52	931.05
	4 DC's	Employable Cost	32.14	289.26	11.78	301.04	1204.18
	1 PC Dog Handler	Employable Cost	32.14	289.26	11.78	301.04	301.04
out of hours	1 A4 Investigator	Direct cost	37.2	334.8	13.64	348.44	348.44
out of hours	1 A5 Press Officer	Direct cost	44.84	403.56	16.44	420.00	420.00
	Total						10730.83
Example 2				hrs	mins		
Wearer 1	1 unit	with Buddi	per hour	2	38	Revised charging total	Total cost
	2 PC's	Employable Cost	32.14	64.28	20.36	84.64	169.27
	Total						169.27
ASSUMPTIONS							
For Met Officers - Mutual Aid rates are used							
Costs of Herts officers are standard Employable costs							
For staff when it states 'out of hours' this is Total Direct costs (and this will contain an overtime element)							
For staff when it doesn't state 'out of hours' this is Employable costs (which does not contain an overtime element)							