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	Platform for self-assessment and efficient management for informal caregivers

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* Milestones names include abbreviations/terms as follows:

- **Draft (D)**: describes planned contents and main structure of the different sections. Document is between 0% - 50% completed.
- **Intermediate (I)**: document is approximately between 50% - 100% completed. It is the previous step before it could be released.
- **Released (R)**: document is 100% completed, reviewed and authorized for release by the partner responsible of the deliverable or the WP leader.

Table of contents

List of figures

List of tables

Executive summary

This document is a high level synopsis of key actions and difficulties experienced during the trials. Specifically, the document covers:

1. An overview of document structure and timelines.
2. Lessons learned in participant recruitment and retention.
3. Lessons learned in installation of system.
4. Lessons learned in data collection and analysis methods.
5. Lessons learned in the maintenance of BREATHE system during trials.
6. Lessons learned uninstalling the BREATHE system.
7. Main conclusions and lessons learned.

While most technology can be made to work in a controlled lab setting, the trials are deployment "*in the wild*" where real people interact with the BREATHE system and give their feedback. In that sense they are difficult but also rewarding as the hard work over the previous months is finally put into practice.

1 About this document

1.1 Structure of this document

This document consists of a high level synopsis of key actions and difficulties experienced during the live trials of BREATHE across all partner sites. The overall aim of the BREATHE study was to develop technology that will help to support informal carers by creating technology that provides monitoring assistance for carers of individuals with a Long Term Condition at home, and personalised support and guidance for carers as part of their caregiving role.

The specific objectives of these trials were to:

- Test and validate the BREATHE system capability and use with the home environment.
- Test and validate the use of the BREATHE system and associated equipment for the carer within the assisted person and informal carer dyad mode.
- Determine the acceptance and impact of the prototype BREATHE system for carers and their AP in order to inform the final product development prior to market dissemination.
- Validate the business model and other hypothesis (i.e. customer segment, Minimum Viable Product, unfair advantage, etc.) related to the exploitation stage and market approach as described in both D5.6 (Final business model and exploitation plans) and D6.3 (Final project report).

Specifically, this document examines the lessons learned in relation to the implementation of the trials, focusing on recruitment, installation, indicators used to monitor the success of the project, and finally the data collection and analysis process.

1.2 Timeline

The BREATHE project has taken place in three main phases:

- **Needs assessment and analysis phase**: In 2013, an extensive needs assessment was carried out to explore the needs of the target group in relation to system design and functionality.
- **Pre-trial phase**: During the summer of 2014, a pre-trial of the system took place. This was the first release of this system.
- **Main trial phase**: The main trials commenced in July 2015 with the second release of the system and it finished on December 2015/January 2016 with the final release. This document explores the lessons learned in relation to this trial stage (i.e. main trial phase).

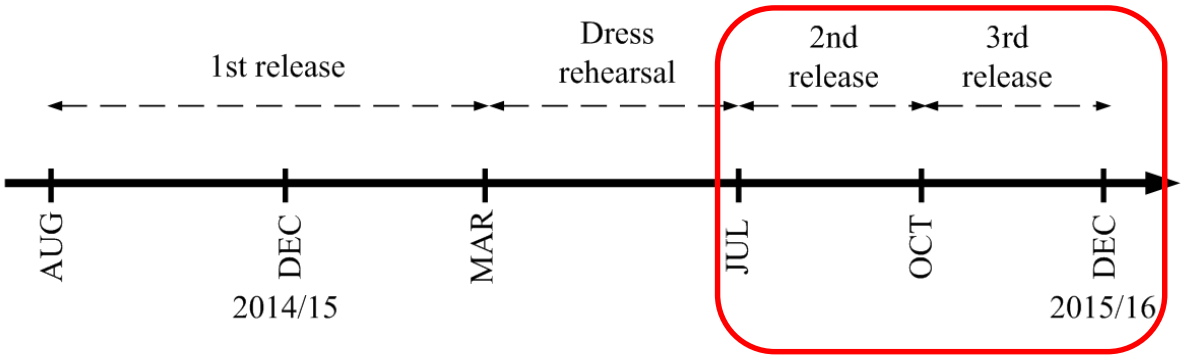

Figure 1 - BREATHE trials timeline

Phase	Release	Period of time
Pre-Trial Phase	First release	August, 2014
Main Trial Phase	Second release	From July to October, 2015
	Final release	From October, 2015 to January, 2016

Table 1 - BREATHE trials timeline

1.3 Trial sites

The trial sites are based in the following locations around Europe:

Site	Contact/Partner
Cumbria & Bath (UK)	Daniel Heery, Cybermoor (CYB)
Valencia (ES)	Juan-Mario Lecumberri, Iniciativa Social Integral (ISI)
Dublin (IRE)	Karen Galligan, Trinity College Dublin (TCD)

Table 2 - BREATHE trials sites locations

1.4 Relationship to other deliverables

This document draws on a number of project deliverables. For that reason, BREATHE Consortium encourages the reader to carefully review each of them in order to get a better understanding of D4.4:

- D4.3 – Trials midterm report, where the most important findings, conclusions and lessons learned after the trials carried out in ES, IE and UK for testing and validating the 2nd release of the BREATHE platform was widely described.
- D6.3 – Final project report, which describes how the Consortium has implemented the BREATHE system compared to the initial list of objectives and action plan as it was elaborated at the beginning of the project as well as the most important conclusions after the trials carried out in ES, IE and UK for testing and validating the final release of the BREATHE platform

For the sake of clarity, content in the above deliverables have been excluded from this document unless a change in the original strategy envisaged from the Consortium was required.

2 Process overview

This chapter describes the specific process followed by the BREATHE Consortium for setting up and carrying out user trials the period of time since November 2014 until January 2016 (with two main software releases in July 2015 and October 2015). The process agreed by the Consortium at plenary management session in November 2014. The agreed timeline and action plan are shown below in Table 3.

Task	2014		2015												2016	
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Definition phase	X	M1														
Starter material	X	X	M2													
Ethics approval		X	X	M3												
Recruitment				X	X	X	M4				X	X	M4			
Dress-rehearsal					X	X	X	X	M5							
Home site visits								X	M6			X	M6			
Installation								X	X	M7		X	M7			
Training									X	M8		X	X	M8		
Guided phase									X	M9		X	X	M9		
Trials (10 weeks)									X	X	X	M10	X	X	X	M12
Data collection and analysis										X	X	M11		X	X	M13

Milestones

M1 – Action plan, roles and timeline.
M2 – Data collection methodology, promotional material, eligible criteria, what is in the box and list of functionalities.
M3 – Ethics approval from TCD Ethics Committee.
M4 – Closed but provisional list of participants per trial site.
M5 – Installation manual (for the installers) and user´s guide.
M6 – Final list of participants per trial site after technical approval.
M7 – Workable instance of BREATHE platform per trial site.
M8 – Dyads properly trained and ready for using the BREATHE platform.
M9 – Continuous encouragement of real dyads for using the BREATHE platform.
M10 – 10 weeks of non-stop trials (i.e. ensure data collection as it was described on M2 and M3): 2nd release.
M11 – Final version (release) of deliverable D4.3 – Trials midterm report.
M12 – 10 weeks of non-stop trials (i.e. ensure data collection as it was described on M2 and M3): final release.
M13 – Final version (release) of both deliverables D4.4 – Lessons learned and D6.3 – Final project report (findings).

Table 3 - Process overview: action plan

2.1 Definition phase

The definition phase started on November 2014 during the plenary meeting of the BREATHE project carried out in Bath (UK). The objectives pursued by this stage were:

1. To set up the basis, objectives, rules and methods.
2. Identification of stage gates and timeline (calendar with milestones and deadlines).
3. Methodology which ensures robust procedures for data collection and data analysis.
4. Identification of the roles to be played by each partner in the Consortium, depending on their skills and expertise.
5. Ethics approval from the TCD (Ireland) Ethics committee which covers the pilot's sites where dyads were recruited in each of the trail sites.

6. List of indicators to be measured over the trials (KPIs, Key Performance Indicators) in order to determine usage and benefit of the IC tool.
7. Detailed and closed list of the equipment to be installed (i.e. acquired) for the trials.
8. Closed list of functionalities to be available for real testing.
9. Material for the trials. Included but not limited to; informed consent, information sheet, installer´s manual, user´s guide, etc.

The outcome of the definition stage was to schedule and agree the project tasks and milestones (i.e. action plan) from November 2014 until January 2016 as shown in table 3.

2.2 Starter material

The objectives pursued during this stage were:

1. Description of the data collection methodology to be followed by gathering data during the real trials carried out in Spain, UK and Ireland.
2. Eligibility criteria-for users (i.e. inclusion and exclusion).
3. Promotional material to be used for the recruitment of real dyads in the trials site.
4. "What's in the box" document, which enumerated and describes all the equipment to be acquired per trial sites.
5. List of functionalities and features which will be available for testing, for both the 2nd and final releases.

The outcomes of the starter material stage are described below:

2.2.1 Data collection methodology and analysis methods

The key principles agreed by the BREATHE Consortium for the trials in Spain, UK and Ireland, are summarised below:

- BREATHE Consortium ensures full data protection, as well as participant confidentiality and privacy of all users involved.
- Data collection will take place in participant's home as part of a 10-week live trial of the BREATHE technology solution.
- This trial consists of an installation of the BREATHE system in the participants home, combined with structured baseline, continuous assessment and end of trial interviews and standardised measure assessments of informal carers and those in receipt of care.
- Following an initial 10-week period, modifications will be made to the system based on user feedback. The system then will be tested for a further 10 weeks.
- Qualitative and quantitative data will be collected through structured and semi-structured questionnaires, standardised assessments, and data mining of usage statistics.
- Each participant will be assigned a study number which will be used for all collected data.
- The BREATHE Consortium follows EU Directive 95/46/EC[1] on both personal and local data protection laws and will ensure that personal data will be treated in line with that legal directive.

[1] https://www.dataprotection.ie/docs/EU-Directive-95-46-EC/89.htm (Accessed on January, 2016)

Research design: The design for this trial was action research. This design involved a live trial of the BREATHE software system in the home of the participating Assisted persons for a period of 10 weeks.

Data collection methods: Qualitative and quantitative data was collected through structured and semi-structured questionnaires, standardised assessments, and data mining of technology usage statistics. Data was collected from the Assisted person and the carer, using multiple methods, before, during and after the live trial at week one, week 5 and week 10.

2.2.2 Eligibility criteria

The inclusion and exclusion criteria for the informal carer, assisted person, dyads as shown in tables 4 and 5, below:

Inclusion criteria	
Informal Carers	**Assisted Person**
• Informal carers, e.g. relative or partner of the person with an LTC (stroke survivors, frail older persons, people with muscle-skeletal disease, or mobility problems). • Aged 18-90. • Have been providing informal care to the assisted person for a period of at least six months. • Ability to communicate clearly in English/Spanish (depending on the trial site). • The IC has skills to use a smart phone and operate in an internet website. • The IC must already have an internet connection at home. • IC must have an Android mobile device where the version of the mobile App will be installed. Minimum requirement is Android 4.XX or higher. • His/her mobile phone should have Mobile Internet (3G).	• People with a LTC for at least six months (stroke survivors, frail older persons, people with muscle-skeletal disease, or mobility problems). • Sufficient dexterity to utilise a touch screen remote control. • Aged 50+. • Ability to communicate clearly in English/Spanish (depending on the trial site). • The AP must acknowledge that the carer for the dyad, is the main carer/person who provides support. • AP must have significant mental capacity to understand what they are consenting to. • Existing broadband service with a spare Ethernet port on the broadband router. • Suitable location for PC equipment with power, ideally out of the way (e.g. under the stairs), and ideally next to the Broadband router. • The AP should be living alone at his/her home (mandatory).

Table 4 - Inclusion criteria for trials

Exclusion criteria	
Informal Carers	**Assisted Person**
• Individuals under 18. • Have significant cognitive impairment or physical illnesses which are likely to impair their ability to participate in the study or their ability to give informed consent. • Not fluent English/Spanish (depending on the trial site).	• Individuals under 18. • Have significant mental or physical illness which is likely to impair their ability to participate in the study or their ability to give informed consent. • Not fluent English/Spanish (depending on the trial site).

Exclusion criteria	
Informal Carers	**Assisted Person**
	• Have a severe communication impairment (e.g. aphasia), which prevents them from clearly communicating with an interviewer. • Older than 90 years old when starting participation in BREATHE.

Table 5 - Exclusion criteria for trials

The ideal scenario focused on seniors living alone with a main informal carer in charge of their care. The carer would live far away from the AP and use the system to give them greater reassurance when they are not able to be with their relative. Some of the issues which arose with recruitment were the presence of pets – should dog owners be excluded as a large dog would be detected by the vision system and create motion data. It was agreed that we would not recruit AP's with large pets.

2.2.3 Validation indicators

The specific objectives of the trials were to:

- Test and validate the BREATHE system capability and use with the home environment (technical point of view).
- Test and validate the use of the BREATHE system within the assisted person and informal carer dyad model (end-user acceptance/point of view).
- Determine the acceptance and impact of the BREATHE system for carers and their loved ones in order to inform the final product development prior to market dissemination (business and exploitation point of view).

Validation indicators for this study were established to address the following high-level questions:

- Does the solution increase Quality of Life (QoL) and reduces stress?
- Does the solution increase the perception of the Assisted Person that there is a higher quality of care?
- Is it really justified the investment in equipment at home?
- Does the AAL system influences the Quality of Care positively?

The validation indicators chosen to measure these criteria consisted of a combination of one to one paper based data collection tools, and data automatically gathered by the BREATHE system. The paper based tools specifically measured goal setting, QoL, stress levels, level of burden, daily activities, and levels of acceptance and use of technology.

Data Collection Tool	Baseline	Mid-point	Exit
Demographics	YES		
Goal Setting: Part 1 Creating Goals	YES		
Goal Setting: Part 2 Reviewing Goals			YES
Goal Setting: Part 3 Experience of Features of system			YES
Quality of Life: Who-QoL	YES		YES
Stress: Perceived Stress Scale	YES		YES
Activities of Daily Living: Barthel Index	YES		
Unified Theory of Acceptance and Use of Technology (UTAUT)	YES	YES	YES
Assessing Cost: Van Westendorp–Price Sensitivity Monitor[2]			YES

Data Collection Tool	Baseline	Mid-point	Exit
Demographics	YES		
Goal Setting: Part 1 Creating Goal	YES		
Goal Setting: Part 2 ReviewingGoals			YES
Goal Setting: Part 3 Experience of Features of systems			YES
Quality of Life: Who-QoL	YES		YES
Stress: Caregiver Stress Assessment	YES		YES
Burden: Zarit	YES		YES
Activities of Daily Living: Barthel Index	YES		
Unified Theory of Acceptance and Use of Technology (UTAUT)	YES	YES	YES
System Usability Scale:			YES
Assessing Cost: Van Westendorp –Price Sensitivity Monitor			YES

Table 6 - Validation indicators: one to one paper based data collection measures

BREATHE Consortium has included a selection of useful indicators which will be automatically collated by the software system (so that no face to face interview will be required) in order to report the usage of the IC tool from the ICs. Specifically:

Name of the indicator	How do we measure it?
Usage of the different features	Number of access/frequency that IC makes to web tool
	Clicks on web menus
	Number of alerts defined by users and forwarded by the system
	Number of accesses from the mobile version of the IC tool
	Number of times the live view features was opened
	Number of times the self-assessment questionnaire is filled
	Number of times (and for how long) the AP switched the gathering system off

Table 7 - Validation indicators: measurement the system usage

[2] http://www.5circles.com/van-westendorp-pricing-the-pice-sensitivity-meter (Accessed on January, 2016)

2.2.4 Promotional material

In order to promote the BREATHE project across the different pilot sites, some dissemination material was produced by the Consortium. All the material was produced in both Spanish and English as official languages of the project. Specifically, a promotional video[3] and a leaflet was released.

2.2.5 What is in the box

The 'what is in the box' document described and enumerated, the equipment to be acquired and installed per partner site. This document was also included in the installer´s manual [private] as a reference document. Table below presents the material (i.e. equipment and manuals) which makes up BREATHE platform:

Platform	System	Sub-system	Component	Aim
AAL home system	Gathering system	Indoor video-based monitoring system and local server	Fisheye wireless camera	Gather activities of the assisted person
			Localhost	Data collection from the camera(s) and submission to GAE infrastructure
			Wireless router	Connect the BREATHE equipment to the existing domestic broadband router
		Array of multi-function sensors and local server	PIR motion sensors	Gather activities of the assisted person (as part of the array of multi-function sensors)
			Power monitoring plug sensors	Gather activities of the assisted person (as part of the array of multi-function sensors)
			Magnetic contact sensors	Gather activities of the assisted person (as part of the array of multi-function sensors)
			Localhost	Data collection from the array of multi-function sensors and submission to GAE infrastructure
			Compatible charger for the localhost	Power supply for the Raspberry Pi Model B+
			Z-Wave adapter for the localhost	Enable the exchange of information between the array of sensors and the localhost (Z-Wave technology)
			Localhost case	Protective case for the localhost
			Micro SD card	Operating system and BREATHE software in charge of the submission of the gathered information to the GAE infrastructure
			USB stick	Local storage of the activities gathered by the array of multi-function sensors
	Interaction device	Interaction device	Android OS touchable tablet PC	Enable the assisted person to manage the gathering system
User´s guides	AP and IC manuals	A set of manuals for both the AP and the IC have been produced in English and Spanish in order to help the participants in the trials to understand the devices, components and features of the BREATHE system.		

Table 8 - What is in the box: BREATHE system components

2.2.6 List of functionalities

The list of functionalities (i.e. use cases) to be tested over the trials carried out during both the 2nd and final releases (i.e. over the main trial stage), are shown below:

[3] Promotional video - https://youtu.be/LCStv9OU7-k (Accessed on January, 2016)

Identifier	Name	Release
UC-W-1	Log in	2nd
UC-W-2	Recover my lost password	2nd
UC-W-3	Configure own account	2nd
UC-W-4	Access to adapted video signals in real-time: live view	2nd
UC-W-14	Visualize information about the level of activity of the AP	2nd
UC-W-15	Configure predefined alerts of the AP	2nd
UC-W-16	Complete self-assessment questionnaires	2nd
UC-W-17	Access to the complete list of filled questionnaires	2nd
UC-W-23	ADMIN: Fill in a form to create a new account for ICs	2nd
UC-W-24	ADMIN: Send credentials to the ICs (username, password)	2nd
UC-W-26	Data visualisation (Heatmap), from the system located in the AP´s house.	2nd
UC-W-27	Sentiment Analysis Tool for the IC.	2nd
UC-W-28	Timeline showing the latest activities carried out by the AP.	2nd
UC-W-29	Statistics and trends about the activities carried out by the AP.	2nd
UC-W-30	Internalization i18n	2nd
UC-W-31	KPIs (Key Performance Indicators) about the usage of the home version of the IC tool from the ICs.	2nd
UC-W-32	Security. Credentials stored in the database which enable the IC to access to the platform are fully protected/coded.	2nd
UC-W-33	Tips, advices and recommendations for the IC depending on his/her current status.	Final
UC-W-34	Possibility to export latest activities carried out by the AP in PDF format.	Final
UC-W-35	ADMIN: create a new account for APs.	Final
UC-W-36	ADMIN: update information about APs.	Final
UC-W-37	ADMIN: update information about ICs.	Final
UC-W-38	ADMIN: create a new account for Admin.	Final
UC-W-39	ADMIN: create a new account for Technological provider.	Final
UC-W-40	ADMIN: add tip, advice and recommendation for ICs.	Final
UC-W-41	TECH PROVIDER: ticketing system view.	Final

Table 9 - List of functionalities: home version of the IC tool

Identifier	Name	Release
UC-M-01	Access to the mobile version of the IC tool.	Final
UC-M-02	Receive real-time notifications.	Final
UC-M-03	Access to daily reports (timeline).	Final
UC-M-04	Set up screen for updating those notifications to send a real-time notification.	Final

Table 10 - List of functionalities: mobile version of the IC tool

ID	Short-name	Release
UC-BE-1	Database ready with all the tables (RAW, activities, etc.) available for storing and managing all the information for running the BREATHE platform.	2nd
UC-BE-2	Algorithms for converting from RAW data (i.e. low-level events from the gathering system) to ACTIVITIES (high-level information).	2nd
UC-BE-3	Isolate the AP´s house from the rest of the system (i.e. stop the gathering and storage of data from the AP´s house and disable the live view functionality) if the AP disables the AAL home system through his/her interaction device.	2nd
UC-BE-4	Create a timer which enables the back-end to wake up the AAL home system once it expires.	2nd
UC-BE-5	Resume the activity of the AAL home system as well as resume the exchange of data between the AAL home system and the IC tool if the AP enables the AAL home system through his/her interaction device.	2nd

UC-BE-6	Automatically resume the activity of the AAL home system once the timer set up by the AP when he/she disables the AAL home system through his/her interaction device expires.	2nd
UC-BE-7	Enable the exchange of information between the GAE cloud infrastructure and the mobile version of the IC tool and the interaction device.	2nd
UC-BE-8	Enable the exchange of information between the GAE cloud infrastructure and the home version of the IC tool.	2nd
UC-BE-9	Enable PUSH notifications from the back-end to the IC tool	2nd
UC-BE-10	Algorithms for estimating the statistics and trends about the current status of the AP.	2nd
UC-BE-11	Heart beat for keeping the technical staff updated about the performance of the system (power outage, system up/down, etc.)	2nd

Table 11 - List of functionalities: Backend of the IC tool

Identifier	Name	Release
AAL home system (video-based recognition system)		
UC-H-1	Initial user configuration (real-home)	Final
UC-H-2	Initial technical configuration (real-home)	Final
UC-H-39	The events which enable notifications are gathered and uploaded to the back-end	Final
UC-H-40	The technician labels the locations associated to the different rooms and events	Final
UC-H-3	Recovery after system failure	Final
UC-H-6	Transmit real-time adapted video signal through secure channel to web	Final
AAL home system (array of sensors)		
UC-H-17	Initial user configuration (real-home)	Final
UC-H-18	Initial technical configuration (real-home)	Final
UC-H-19	Recovery after system failure	Final
UC-H-30	The events which enable notifications are gathered and uploaded to the back-end	Final
UC-H-41	Transmit a regular ACK to indicate that all is working properly (heartbeat)	Final
Interaction device		
UC-H-27	AP turns OFF the AAL home system	Final
UC-H-28	The AAL home system sends an alert to the IC when its turned OFF	Final
UC-H-29	AP turns ON the AAL home system	Final
UC-H-31	The AAL home system sends an alert to the IC when its turned ON	Final
UC-H-32	A message is shown in the interaction device to inform the AP that he/she is being watched in real-time	Final
UC-H-38	A message is shown in the interaction device to notify the AP that the live-view mode facility has stopped	Final

Table 12 - List of functionalities: AAL home system

2.3 Ethics approval

Deliverable D1.3[4] described the ethical principles governing all the research carried out in BREATHE. The BREATHE project had established its own Ethics Board whose main role was to ensure ethical issues were taken into account when dealing with real dyads. This Ethics Board has been managed and coordinated, by ISI's sociologist, Mr. Juan-Mario Lecumberri over the whole project. Additionally, each pilot site was governed by different structures which required approval from their local ethics committees. Although a UK and Spain did not require an ethical approval from an external board, Ireland did require this. Specifically, TCD partner had to prepare and submit a detailed form describing the study aims, objectives, methodologies, etc.

[4] http://www.breathe-project.eu/en/publications (Accessed on January, 2016)

The Faculty of Health Science Research Ethics Committee (REC)[5] was the entity in charge of carrying out the internal review. The final form was committed on January 2015 and the ethics approval for going ahead with the trials arrived one month later.

2.4 Recruitment

2.4.1 Aim

The aim was to recruit a target figure of 10 dyads of Informal carers (IC) and Assisted Persons (APs), across each partner site, to take part in the BREATHE trials, culminating in a total of 30 dyads. Each partner in charge of the recruitment per trial site, was totally free for managing this task according their own resources and local opportunities. However, some material was common and shared among the whole Consortium namely informed consent, letter of invitation, participation/project leaflet and participation information sheet.

2.4.2 Output

The output of this process was a closed list of participating dyads involved in the BREATHE trials carried out from July 2015 - October 2015 (second release) and October 2015 - January 2016 (final release). Specifically:

	Main trial stage **2nd release**	**Final release**
Trials in Spain	5	5
Trials in UK	2	4
Trials in Ireland	0	3
Total	7	12
Scope	15	15
Offset	8	3

Table 13 - Recruitment: list of participating dyads involved in the BREATHE trials

Unfortunately, the numbers achieved were less than the target ones. Only Spain reached the expected figures in both 2nd and final releases. In Ireland unfortunately, the technology received would not function correctly in a sufficient manner for release in end user homes within this timeframe. Between 2nd release and final release Spain and the UK worked with Ireland to resolve these issues. Lessons learned in relation to recruitment and retention of participants are discussed below.

2.5 Dress-rehearsal

The Grisedale building in Alston[6] is a demonstration apartment, to show the benefits of independent living. As it is a semi-real environment (no one actually lives in the apartment) with relatively flexible access for engineers and staff, it was ideal location to test the equipment. The dress rehearsal in Alston focused on the integration of all the components of the system in

[5] http://www.healthsciences.tcd.ie/research/ethics.php (Accessed on January, 2016)

[6] http://www.housingcare.org/housing-care/facility-info-3210-grisedale-croft-alston-england.aspx (Accessed on January, 2016)

a single installation. This identified different bugs with the system and enabled the technical team to resolve most of them before the systems were deployed in a real environment.

2.6 Home site visits

The first visit initially involved surveys and analysing what equipment would be deployed in each room. This was followed by an installation visit where engineers would install the equipment e.g. drilling holes in walls, and configuring the servers, cameras etc. At the same time, another member of the team would carry out interviews with the IC and AP. The result of this process was a closed list of dyads per trial site where the BREATHE system was finally installed/deployed. Thanks to this information, BREATHE Consortium was able to schedule the installations and manage their own resources properly without bothering the dyads. In the UK, most installations combined the survey and installation into a single visit.

2.7 Installation

Following the dress-rehearsal stage, the BREATHE Consortium released a document to guide the technical staff in charge of installing/deploying BREATHE platform in a real environment without harming end-users. Specifically, the installation phase was fulfilled through the different approaches:

- **Step 1 as initial step**. The aim of this step was to create both profiles for the informal carer and the assisted person properly in our GAE cloud infrastructure. In no way whatsoever any personal information was asked neither stored in our databases. As it has been written before, every reference to a real end-user was fully anonymised so that no real names were used but alias or IDs.
- **Step 2 or pre-installation stage**. This was the first technical step in setting up the equipment and was carried out in the office/lab before going to the assisted person´s house for carrying out the physical installation. The output of this step was an instance of the whole AAL home system ready to be deployed in a real environment.
- **Step 3 or installation stage**. This was the last technical step before completing a BREATHE instance running for a specific dyad in a trial site. This phase had to be carried out in the AP´s house once the pre-installation stage was completed.

The output of this stage was an instance of the whole BREATHE platform running, remote access was enabled from the premises of the technical staff, so that the system could be updated without bothering the end-users.

2.8 Training and guided phase

During the training and guided phase, ICs and APs were trained in how to use the system. This covered the basic information about the home version of the IC tool and the use of the interaction device which enables the AP to switch ON/OFF the whole gathering system. In the following days, time was spent by the people in charge of trials supporting ICs to help them use the system and sort out any problems that arose. When the system was live and data was being generated, the concept became easier for most respondents to understand and it also generated more queries about the interface. The helpdesk in each pilot provided support in this process

until the ICs were confident enough to manage the tool. The outcome of the training was a group of ICs who are independent enough to manage the platform by themselves. While BREATHE staff are available to provide support, reply to specific questions and correct problems.

2.9 Trials

Once the trials were properly set up and installed, it was agreed to maintain each user for 10 weeks in non-stop mode (i.e. 70 days continuously running). The aim was to determine which were the most useful services/features available in the platform, from the point of view of both the informal carer and the assisted person.

2.10 Data collection and analysis

Qualitative and quantitative data was collected through structured and semi-structured questionnaires, standardised assessments, and data mining of technology usage statistics. Data was collected from the assisted person and the carer, directly via in one to one, face to face interviews at the beginning, middle and end of the trials. Documents and questionnaires were available in both English and Spanish languages so a translation process was required.

Following each interview, data was entered into a securely stored excel data capture template. This template facilitated both a central location to record the raw data, and mathematical functions which allowed for summation of results according to scoring cut-offs and rules of each measure used. While this template facilitated the calculation of raw scores into aggregate and cut off scores when possible, an additional final summation of findings was required by each site for inclusion in the final project report (i.e. deliverable D6.3). The data collection produced in Spain has been translated into English and sent to both the coordinator of the project in Spain and the responsible of the data analysis in Ireland.

3 Conclusions and lessons learned

This document has brought together the different elements of the BREATHE trials. The complexity of combining innovative technical systems with trials in real user's homes has made this work a challenge, but they yielded valuable data. Specifically, the key topics discovered by the Consortium as consequence of running the trials at this stage are explained below.

3.1 Key learnings recruitment

2nd release (from July to October, 2015)
• Trials in Spain: 5 dyads. • Trials in UK: 2 dyads. • Trials in Ireland: 0 dyads. • Total: 7 dyads. • Target: 15 dyads (5 dyads per trial site). • Offset: 8 dyads.
Final release (from October, 2015 to January, 2016)
• Trials in Spain: 5 dyads. • Trials in UK: 4 dyads. • Trials in Ireland: 3 dyads. • Total: 12 dyads. • Target: 15 dyads (5 dyads per trial site). • Offset: 3 dyads.
Main Trial Phase (from July, 2015 to January, 2016)
• Total: 19 dyads. • Target: 30 dyads • Offset: 11 dyads.

Table 14 - Total number of dyads involved in trials

3.1.1 Gaining initial access to potential dyads

3.1.1.1 Spain

Participants in the home trials carried out in ES were reached and enrolled from ISI. ISI is a Spanish private company located in Valencia (Spain) which provides home help/care services for seniors who remain at home through a staff of formal carers. Real dyads recruited for the trials were directly contacted using the personal relationships that formal carers (professional staff) have already developed in their daily activities with families.

In ES, the recruitment and the involvement of the real dyads in the trials worked very well since the target of 5 dyads per trial site/stage was reached in both the second and final releases (it was more than challenging to find our APs who were living alone as required according to the inclusion criteria). The key facts which contributed to such a good outcome/experience were: (1) the partner in charge of the recruitment and the management of the trial sites was involved

in the project (taking part of the Consortium) since the beginning of BREATHE and (2) good collaboration between both the technological partner and the one in charge of the end-users.

3.1.1.2 UK

- A concerted attempt to recruit participants involved promoting BREATHE in the local media, on local radio, through meetings with care professionals and through church groups.
- Two sets of APs/ICs who took part in the pre-trials decided they did not want to take part in the working pilot – one because they thought it was too much 'hassle' and disruption to go through for such a short time and the other because they had decided that it was too intrusive.
- Two ICs who had expressed an interest came back and said after consulting with the professional carers who also visited their Parent, they had been unhappy with the idea of being 'monitored like big brother' so backed out. This was despite reassuring them that the system could be switched off for the period they were visiting the AP.
- Two potential participants decided they did not want anything drilling into their walls or cables running down walls/ceilings. They were reassured that everything would be made good afterwards, but wouldn't re-consider.
- Two people who were interested initially, but were basically put off by the 'technology' and decided it was too much for them.
- There were four sets of people who had a change of circumstances shortly after expressing an interest in taking part in the working trial (health taken a turn for the worse and been hospitalised, one was moved to residential care, one diagnosed with early onset of dementia, circumstances of IC changed).
- The recruitment process was far more challenging than initially anticipated, partly because of the exclusion criteria (e.g. people with cognitive impairments were a real concern for ICs, but they could not be included in the trials).

3.1.1.3 Ireland

Due to ethical procedures, gaining access to the initial dyads required the use of a neutral gatekeeper who could provide information about the trial to possible participants based on inclusion criteria, and whose neutrality would alleviate any pressure that the possible participants might feel about having to agree to take part. The neutral gatekeeper chosen in Ireland was a National body of Carers. This group provided both the required neutrality as this group was not involved in the study in the BREATHE project, and also had access to a pool of potential suitable candidates. The same association had also acted as Gatekeepers for Phase 1 (Needs Assessment 2013) and Phase 2 (Pre-Trial 2014).

This group facilitated recruitment of carers and those with Long term conditions by:

- Selecting possible suitable candidates based on a list of inclusion/exclusion criteria provided to the association from the research team at TCD.

- Approaching potential participants and providing them with the study details (an introductory letter and a participant information leaflet). This leaflet clearly articulated that a live trial of the BREATHE system would be required to take place in the persons home.
- Potential participants were asked to confirm permission to the Carers Association to allow a member of the research team from TCD to contact them to discuss the study in more detail should they wish to proceed
- Interested participants were contacted by Trinity Research team to address any outstanding queries
- Following this step, if participants still remained interested, with their permission, their contact details were provided to the Technical Team in Tunstall Emergency Response (TER) to facilitate an assessment of the house for suitability of system and to address any further issues that arose.

In Ireland the process of having a central gatekeeper to access potential dyads, worked very well. A total of 14 *potential* dyads were provided to the research team in TCD from the association. However, in the early stages of the recruitment process, it remained unclear as to whether the AP and IC could live together, which did cause some delays with defining potential clients.

3.1.2 Initial participation of dyads

3.1.2.1 Spain

In ES, 10 real dyads were involved in the trials carried out from July 2015 until January 2016. A few days after the installation stage, we had to remove the system from one AP´s house since the senior decided to give up the trials for personal reasons. In consequence:

- 4 installations have run over the 10 weeks initially scheduled for the second release: 3 of these were located in a small/medium municipality of Valencia called Puzol with 19,018 inhabitants where a high impact was expected. The remainder installation was deployed in the city of Valencia.
- 5 installations have run over the 10 weeks initially scheduled for the final release: 3 were deployed in the municipality of Puzol, 1 in the city of Valencia and the last one was running in the town of Meliana (municipality in Valencia with 10,612 inhabitants).

3.1.2.2 UK

Six dyads who signed the consent forms in the UK had equipment installed in their properties:

- In one case the participant needed broadband installation which was delayed and so having installed the system, the IC was unable to use it.
- The first install was completed in early September and ran until early January.
- Due to the inherent nature of technology trials, dyads were recruited who did not have a major need for the project (they had good support networks and were already relatively independent). They would not be adversely affected if the technology failed.
- This approach was justified by some of the challenges faced by the technical team as/;

  - Wireless sensors would stop working (needing new batteries in the case of door sensors) or a reboot for the wireless cameras.
  - The video software needed to be fixed twice as it was not picking up movement for the heatmaps.

- APs consented to take part in the project as a "favour" to the IC, rather than recognizing they would receive any particular benefit.
- One dyad participated knowing that their circumstances were likely to change during the course of a trial, the AP would undergo a knee operation and so there was a real need during the recuperation for a month. Afterwards, the IC was less concerned and used BREATHE less.

3.1.2.3 Ireland

Having received a list of potential dyads that met with initial eligibility criteria, the next stage was to establish with further investigation, which of these dyads wished to proceed to installation, and finally, of those that did express an interest in proceeding, which of these were eligible following the final assessment of the house and suitability of technology to client needs by the technicians. A total of 14 *potential* dyads were provided to the research team in TCD from the association.

Of the 14 names initially provided, 6 dyads expressed interest in taking part in the trials. Unfortunately however, only 3 were deemed suitable to participate, following a house visit from the technical team. The purpose of the house visit from the technical team was to assess suitability of the house for the installation and to explore further, if dyads were suitable. The reasons provided for ineligibility of 3 of the 5 interested dyads, by the technical team were:

- **Technology not suitable for client needs:** The AP and IC live in the same house. IC wanted to use BREATHE to primarily see into a different room in the house. When technical team in Ireland checked with project coordinators in Spain, advised that BREATHE is not designed to work like that. Live-view is designed to work from *outside* of the AP house. It was felt that given current high level of stress that IC was under, that BREATHE would not alleviate it in any way. IC was very rarely out of the house and the AP was never left alone. AP was not very mobile and carried out very few of the ADLs that BREATHE records.

- **Fall detection/cabling/instability of technology:** The final dyads were not suitable following the house visit by technicians, as when carer saw how the system would look if installed, she was concerned that AP would not be happy with amount of equipment and cables. Secondly, the Carers main concern was that the AP might fall in the back yard while feeding the cat so thus the system would not be the most suitable product for the carer. Finally however, the technical team in Ireland had concerns about the ongoing instability of the system and in combination with the issues raised by the carer and the AP, a decision not to proceed with this dyad was made.

- **Location/instability of technology:** Having installed the BREATHE system locally initially with a successful dyad, the technical team were required to repeatedly revisit the home of the AP regularly for ongoing configuration and maintenance. This degree of

ongoing maintenance was not pre-empted, as the expectation was that once the system was installed, it would require a low level of ongoing maintenance. However, given the high degree of ongoing maintenance required, the team were reluctant on both ethical and feasibility grounds, to install the equipment in a distant location, when they were not confident it was reliable and would have to travel back to the property on numerous occasions to fix it. This would not be feasible or ethical.

For the remaining 8 dyads, they were unable to take part for the following reasons:

- **3 agreed to participate but AP situation changed:** 3 did wish to take part, but due to a change of circumstance of the AP, they were no longer able to continue (2 placed in care, 1 had family move in due to heart attack).

- 1 **family of carer did not want monitoring system in house:** 1 carer was interested but family did not want a monitoring system in the house.

- **1 formal carers objected to system:** 1 informal carer said that while they were interested, they could not take part due to objections on behalf of formal carers working in the house who felt the system would be intrusive. It was explained that the system was not recording but was live view and only activated by the informal carer, and could be switched off by the assisted person. However, the carers also felt that they should have been made aware of this technology by their own organisation and on these grounds, the informal carer was not willing to take part.

- **1 Not eligible-dementia:** 1 was not eligible as assisted person had dementia and would not be able to consent.

- **2 did not return calls:** 2 of the carer dyads did not return calls. Researchers rang the carer 3 times, over a period of 10 days, but received no response.

3.2 Key learnings sustaining participation of dyads

Throughout the trials, it was noted that initial engagement of dyads to agree to the install, did not ensure that the participants would remain engaged with the process until the end of the trial. Thankfully however, it was only a very small number of dyads that asked to be removed from the process once the trials had commenced. The section below explores the reasons this occurred on those rare occasions.

3.2.1 Spain

As it was mentioned before, one AP decided to give up the trials some days before the BREATHE technology was deployed at home. The reason the AP argued was that the big PC (i.e. the localhost of the indoor video-based monitoring system) was so scary for her. Some APs were uncomfortable with it because they perceived fire risk from leaving it on at night. The last Informal Caregiver from the last pilot site refused to answer to our final questionnaires due to a lack of time (the IC was moving from one place to another).

3.2.2 UK

None of the systems were removed during the trials. However, the use of the system tended to decrease for some of the dyads as they became frustrated with some of the bugs in the system. All of the APs were happy that the system was unobtrusive and did not feel it necessary to switch off the system. One accidentally switched off the kettle sensor, so the kettle would not work and so they plugged the kettle into a different socket and bypassed the sensor.

Some of the minor bugs included:

- Location of the camera was blocked the view of a room when a door was left open.
- Sensors not showing all doors opening / closing, kettle boiling.
- Having to login to use live view.

This undermined some of the confidence in the system and reduced the satisfaction of the IC in the system. Some external factors also played a part – Christmas lights in one AP's house degraded the BREATHE Wi-Fi network and dropped the number of successful packets delivered. The use of notebook PCs helped the system remain unobtrusive. Using command strips lead to less disruption during installation and removal of the equipment.

3.2.3 Ireland

As noted before, unfortunately in Ireland, only 3 dyads were suitable to progress to the installation phase of the trial. To date, all of these dyads have remained successfully engaged in the process. However, factors that may have impacted on sustained engagement e.g. unstable technology, were mitigated by only choosing dyad installations within a close geographical location to allow for ongoing maintenance and monitoring by the technical team.

3.3 Key learnings installation

3.3.1 Connectivity and start-up

- The type of router in the AP home was key to whether the home was suitable or not. The technical team needed to know more about the requirements of home router before we could progress with recruitment process at a particular home.
- As part of the installation process, the installer has to access to the broadband router available in the AP´s house with administrator privileges. In order to save time, it is strongly recommended to find out the aforementioned credentials (username and password) before visiting the assisted person.
- In the UK, an early participant could not access fixed wireless broadband and some trees needed to be cut back so his property had line of sight to a nearby mast.
- In Spain, the big telecommunication companies demand at least one year of continuance clause before the provision of Internet services at home. The ES staff found one SME company[7] operating in the area of Valencia which worked very well:

[7] http://www.redblanca.net (Accessed on January, 2016)

  - Pros: cheap prize (monthly fee and free installation), without continuance clause and broadband router open with 4 spare ports (EUR18/month per 512 kB upload).
  - Cons: the aforementioned company does not have full coverage in the area of Valencia (i.e. a check has to be carried out with the installer of the company prior hiring the service). The service is based on the WiMax technology which requires direct line of sight from the AP´s house (i.e. a mast has to be installed in the roof of the house).

- In Spain, only one assisted person involved in the trials has Internet connection at home.
- In Spain, in those places located in the downtown (small flats surrounded by big buildings) the installation of the broadband service was difficult and more expensive that the other ones (because of the Internet provider chosen by the ES staff requires direct line of sight).
- As part of the installation process, the installer has to access to the broadband router available in the AP´s house with administrator privileges. In order to save time, it is strongly recommended to find out the aforementioned credentials (username and password) before visiting the assisted person.
- An installation sheet template has been created and circulated among the partners in charge of carrying out the installations in order to keep the credentials for accessing to the equipment deployed in the AP´s houses in a safety way.
- In order to reach the indoor camera located in the APs house through the live view facility available in the IC tool, the BREATHE system has to automatically manage the changes in the public IP set up by the broadband provider (this is not static and it depends on the company and the country). Some DDNS (Dynamic DNS or DynDNS) third-party tools were intensively tested during the trials unsuccessfully. Finally, TSB Company implemented an algorithm which keeps BREATHE platform updated about the public IP of the AP.
- On September 2015 BREATHE Consortium was notified from Google Company that the authentication mechanism for accessing to the GAE cloud infrastructure will change in short (Google has decided to replace ClientLogin for OAuth 2.0). TSB Company, as partner in charge of the implementation of the back-end solution, upgraded the source code which will ensure the access to the GAE cloud infrastructure through OAuth 2.0 mechanism. This update was released at the end of the trials in charge of testing the 2nd release.

3.4 Key learnings on BREATHE technology

3.4.1 AAL home system

3.4.1.1 Indoor video-based monitoring system

- A heartbeat mechanism which keeps informed the BREATHE staff in charge of trials about the status of the indoor video-based monitoring system is required.
- The indoor video-based monitoring system took more time to troubleshoot in a real environment.

- The indoor video-based monitoring system has to manage the loss of connectivity from the indoor camera (i.e. wireless connections between devices subject to interference which reduces reliability).
- A solution which will enable the BREATHE staff to remotely switch on/resume the activity of the localhost of the indoor video-based monitoring system is required.
- As the system is used more and processes more data, it should be able to "learn" and improve its accuracy. This would enhance the attractiveness of the system for ICs.

3.4.1.2 Array of multi-function sensors

- Very new batteries should be put into the magnetic door sensors (used on the exit door and on the fridge door).
- We recommend that any batteries that fall below 3.0V each are replaced with new ones. There was a small drop below this (i.e. 2.90 Volts!) which meant that the batteries were not working as well as we might need. Ideally, measure the voltage of any batteries that are causing problems and replace them.
- Additionally, when testing the sensors, make sure that the open/close tests are not carried out too rapidly; the batteries may need a couple of seconds to recover after each event, which is fine in the field when being used by our older people, but may cause rapid test events not to be detected by the system. This is most inconvenient if a single open or close event is missed so that a pair of events is not reliably detected. [We have verified this by checking the sensors using a power supply – the issue only occurs when using batteries.]
- Also, when testing it is important not to hold the sensor so that the aerial is obscured. The aerial runs along the top edge of the sensor.
- We recommend high quality Energiser batteries, since they are the ones we tested with. In the UK these are available via Farnell etc., rather than high street shops.
- Conservative set-up in the lab (i.e. putting the sensors quite a long way from the localhost when including) would be a sensible tactic to minimise issues with range in the home.
- The power monitors do not need batteries and will relay Z-wave signals from other sensors, so are best installed first.
- With 2 separate dyads part of the Raspberry Pi became corrupted and had to be reset.

3.4.2 GAE cloud infrastructure

- Once the trial started, BREATHE Consortium had to register/set up the GAE cloud infrastructure as a paid account (billing enabled, not free trial). Otherwise, we got an over quota problem related with the number of accesses to the databases (i.e. commit/fetch data).
- The Database on the GAE cloud infrastructure does not allow joins operations since that database is not a relational, but is schema-less. Trying to retrieve a huge amount of data for estimating the statistics and trends caused a problem related with the memory cache. This

problem was solved by implementing a new algorithm based on the sharing counters mechanism[8] which is an important technique for building huge and scalable applications.

3.4.3 Informal carer tool

- Cloud based systems makes easier the start-up and update (i.e. bugs fixing, deployment of new functionalities, etc.) of software platforms like the informal carer tool.
- Big deploys with a high number of features is not a good idea because they distract end-users and makes the training difficult.

3.4.4 Insights

- The heartbeat facility is very useful – it shows when the system is down by polling equipment in the home (and automatically informs the administrator of the pilot site so the person in charge of the trial is alerted to the failure of the system even before the end-user).
- Remote access for the technical team is essential, as it allows them to resume the activity of the system, to avoid bothering the end-users.
- Once the BREATHE system is installed/deployed in the AP´s house, assisted people do not notice it (i.e. the system is blended into their home environment well).
- Informal carers trust on the information which is shown in the IC tool.
- For most of the APs, many wires and a big PC installed in the home was perceived as disruptive.
- The big PC (i.e. localhost of the indoor video-based monitoring system) is scary. Some APs were uncomfortable with it because they perceived fire risk from leaving it on at night. Something like a raspberry pi would be better.
    - In the UK, small notebooks were used and this did not generate negative feedback.
- One system had to be removed/uninstalled in the trials carried out in Spain because the AP decided to give up the trials for personal reasons. At the beginning, the AP was so concerned because she/he thought that the IC would be upset about removal.
- Seniors can forget the role played by the technology installed at home and switch it off to save electricity.
- Interviewed informal carers are happy with the BREATHE system. In some cases, this is the first time they have the opportunity to really know what is happening in the AP´s house.
    - In ES, two informal carers asked the BREATHE staff to do not discontinue the service (they wanted to be involved/using the technology beyond the trial stage).
- Health of APs and their care requirements are not static – as health improves after an accident or operation, the need for an IC to access the IC tool diminishes.
- There is a lot of equipment in the box and for the trials we were trying to install 2 cameras and 6 sensors in each house which is too much for smaller spaces. If the video server and

[8] https://cloud.google.com/appengine/articles/sharding_counters (Accessed on October, 2015)

Z-wave sensor applications could be integrated into one server, it would reduce the amount of equipment at the AP home.

- The behaviour of how the telecommunication companies manage the assignment of the public IPs is slightly different per country. One technical person per pilot site with network skills is really required. Otherwise the set-up of the live view facility is not straightforward. In the UK most users have dynamic external IP addresses so in one case it was necessary to ring the AP and ask them to check their new IP address. This was resolved when CYB and TSB developed a tool which monitored changes and sent them to the technical support team.
- KPIs with the real usage of the tool from the informal carers are mandatory in order to really discover which are the top functionalities (i.e. where they spend the highest time per session) of the platform.

3.5 Key learnings from data collection process

3.5.1 Spain

- All the questionnaires were completed at the beginning, mid-point and end of the final research as expected.
- Only one question was missed out because the participants rejected to answer it (the one which related to very personal information of respondents).
- We have paid attention about the goals they expressed in the beginning of the research and specifically asked about them in the mid-point and at the end of the pilot stage.
- Some of the usability questions were really similar, (i.e. do you intend to use the system? do you plan to use the system? etc.).
- All the interviews were carried out face-to-face rather than remotely (i.e. by telephone). We preferred to keep a close relation with the participants from the beginning until the end of the testing phase.
- According to the answer we got from the dyads involved in the trials, both the AP and the IC really appreciated the manuals and the personal involvement (i.e. dedication) of the ES staff in charge of the Spanish trials (i.e. the technicians and researchers). The feedback we got from them highlighted how they enjoyed taking part in the trials.
- In a few number of occasions, both the AP and the IC were in the same room answering the questionnaires. The research team perceived some distortion in the answers because the presence of the other.
- In Spain, the UTAUT questionnaire was repetitive and tedious due to the lack of technologies (i.e. out of their reach) for the range of age of the interviewed people.

3.5.2 UK

All the questionnaires were completed at the beginning, mid-point and end:

- Some questions were missed out (those which related to very personal information of respondents).

- The goal setting question required prompting and most of the ICs and APs answered along similar lines.
- While the questionnaires tackled different areas of interest, there was some overlap. Some of the usability questions were very similar and the differences were small (e.g. do you intend to use the system? do you plan to use the system?). This required explanation to end users.
- Both members of the dyad were present during the interviews for the install and removal of equipment. They could potentially hear how the other person was responding and this could have impacted their answers e.g. they may have been more frank if they had been interviewed in a different location. Practically, both needed to be available for the install and arranging another visit would have been inconvenient.

3.5.3 Ireland

The data collection process has been limited due to both the low number of dyads participating (3 dyads only), and the availability of these dyads to take part in the interviews in a timely manner. To date in Ireland, all 3 baseline interviews have been carried out, with the dyads. Overall the interviews worked well. The questions were understood the interviews were not too time-consuming. However, one of the interviews with the assisted person was conducted in the presence of her spouse. Some of the questions were of a personal nature and it would have been better to interview the person on her own. However, it would have been difficult to ask her spouse to leave and so on balance it was felt better to continue the interview. One lesson learned is to inform the interviewee well in advance that they should be interviewed alone.

3.6 Key learnings from management trials

- One of the biggest challenges of BREATHE has been managing the development of a system across different technical partners in different countries and then deploying across trial sites in 3 different EU countries.
- Different level of expectations between the BREATHE technical and non-technical staff. It is paramount to bear in mind that the outcome of a research project is not a final product but a mature prototype.
- Every trial site needs a technical responsible with expertise enough for fixing problems (with the support/help of the rest of the technical staff) if something unexpected arises during the project.
- The trial really starts once the technological system is deployed in the AP´s house. It is paramount to ensure that the system is always alive (24 hours per day) the whole period of time the trial is running. Daily checks have to be carried out per trial site. Otherwise, the confidence and satisfaction of the IC in the system will be undermined and reduced.

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