

SAPHE

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1 Introduction

1.1 Document Status

This document, based on contents within the internal SAPHE Deliverable D03: Service Usage Scenarios, has been approved by SAPHE project management for public release.

1.2 Document Overview

This document accompanies the public scenarios document (*D03a_pub*) and outlines the prior analysis of events taken from existing scenarios used in the development of SAPHE scenarios. The methodology adopted during the Scenario Usage Scenarios work package is outlined in the further accompanying public document (*D03c_pub*).

2 Analysis of existing scenarios

This section presents the analysis of existing scenarios following the methodology described in section 3.

The consolidated events taken from the analysis of existing scenarios cover the following areas:

- Activities
 - Activity Level
 - Leaving and returning home
 - Sleep
 - Toilet
 - Meals
- Falls
- Clinical
 - COPD
 - Weight and Blood Pressure
 - Temperature
- Medication
- Reassurance and Information
 - Information and reassurance to service user
 - Alarm and reassurance to service user
 - Reassurance and information to informal carer
 - Information to professional carer
- Other
 - Well-being
 - De-installation
 - Earlier discharge
 - Reminders

These events were spread across the analysed scenarios as shown in the following table.

Scenario	Activities	Medication	Clinical	Reassure/ Information	Falls
1	Sleep, meals	✓	BP, weight	✓ (carer)	
2	Sleep, toilet				✓
3	Level				✓
4			Temp		
5	Sleep, toilet				✓
6			COPD	✓ (SU)	
7	L/R home, all			✓ (carer)	
8	All			✓ (carer)	
9	Well-being, meals		Health status	✓ (carer, SU)	
10	L/R home				
11	Well-being		Health status	✓ (SU)	

2.1 Event analysis tables

The analysis of each of these events is given in the following tables.

Activities (activity level)	
USE – To detect changes in behaviour (event 3.1)	
Role for existing Telecare	Gross activity level (e.g. Wristcare)
Improvement in outcome	Detection of problems allows treatment intervention to be given early
Involvement of stakeholders	Carers monitoring activity level
Limitations	Typically existing systems do not automatically flag abnormal events; requires device to be worn.
Role for SAPHE	Identify abnormalities in activity data at the earliest possible stage; to provide supporting

	physiological measurements which may help with diagnosis.
Sensors	Both environmental and wearable sensors can provide indications of gross activity level.
Collection (input) of information from user	
Data analysis	Abnormal pattern detection in robust evidence based manner
Provision (output) of information to stakeholders	Important that changes are proactively flagged to appropriate carer
Improvement in outcome	Quicker identification of problems resulting in less advanced medical conditions, leading to quicker recovery time and fewer secondary related problems (e.g. falls)
Involvement of stakeholders	Carers notified of change in behaviour
Limitations	Still identification of problem only and may take some time for problems to be evident from activity data.
Comment (assumptions, issues etc.)	

Activities (Leaving/returning home)	
USE – Detect wandering (Event 7.1)	
Role for existing Telecare	<p>Pendant alarms may be issued for SU to raise alarms when they need assistance but these would do nothing to help prevent wandering particularly if the SU is not aware that they are wandering.</p> <p>Some systems include simple door switch sensors to identify when door is used.</p>
Improvement in outcome	Persistent wandering may be a reason to move the SU from their own home so it is important to understand how often this occurs; identifying wandering events allows

	the search to be initiated before the SU has wandered too far; carers may also spend time watching over SU in case they wander.
Involvement of stakeholders	Appropriate carers involved in looking at pattern of wandering and also search. Without Telecare carers may also spend time 'watching over' SU.
Limitations	
Role for SAPHE	Similar to above richer data set should allow leaving home to be more accurately detected; it may be possible to track a wandering SU outside of their home; data from prior to wandering may help to identify triggers; may be possible to issue reminders to go back to bed if SU gets up in night e.g. to watch TV, not to go out, etc
Sensors	Identifying when the SU leaves the home is likely to be done by environmental sensors (e.g. 'blob', PIR, door contact). Wearable sensors may track the SU outside of their home.
Collection (input) of information from user	
Data analysis	Simple collating of door events; location and blob tracking; ADL inference; trending
Provision (output) of information to stakeholders	Informal or professional carers
Improvement in outcome	Fuller picture of ability to live independently in own home; reassurance for carers that they do not have to watch over SU
Involvement of stakeholders	Reduced carer involvement watching over SU; carers look for triggers in data; carers look at trends in data.
Limitations	Flagging wandering but not preventing it, in

	theory a system could lock the doors in the house at night but this would raise ethical and safety questions. The system can't explain to her that she is wandering or force her to stay inside, but it can alert her and her carers to the fact
Comment (assumptions, issues etc.)	A full SAPHE system may less appropriate if only looking when looking for limited specific information or if the system only needs to be in place for a short period of time to gather sufficient information.

Activities (sleep)	
USE – identify related problem (Event 1.1)	
Role for existing Telecare	Failure to get out of bed alarm using simple bed sensor
Improvement in outcome	SU can only spend a finite period of time in bed before an alarm is raised.
Involvement of stakeholders	Carer response to failure to get out of bed; possibly via CCC first
Limitations	Need to preset alarm thresholds; trends in sleeping patterns not recorded.
Role for SAPHE	Identification of abnormal period of time in bed.
Sensors	Likely: Environmental, e.g. bed occupancy, PIR, 'blob'. Possible: Body, e.g. accelerometer
Collection (input) of information from user	No user input for environmental. Potential to solicit feedback on quality of sleep via questionnaire, e.g. "how did you sleep?"
Data analysis	Learn typical wake up time; look for trends in

	sleep patterns which may be indicative of emerging problems
Provision (output) of information to stakeholders	Alert of failure to wake up; Alert of changing trends in sleep patterns e.g. wake up times
Improvement in outcome	Additional flexibility makes the solution less intrusive for SU; potential for sleep patterns to stimulate further investigation as they may be indicative of emerging medial conditions
Involvement of stakeholders	
Limitations	May still raise alerts when SU has genuine reason for remaining in bed – as with all alerts SU should be able to disable them
Comment (assumptions, issues etc.)	Monitoring sleep could have wider implications for well-being.

Activities (sleep, toilet)	
USE – detect UTI (Event 2.1)	
Role for existing Telecare	Abnormal bathroom activity levels may be detected by some systems (e.g. Living Independently, Just Checking); they may also detect disturbed sleep – both symptoms of UTI
Improvement in outcome	Changed activity pattern used to detect problem early leading quicker intervention, earlier diagnosis, reduced complications and shortened recover time.
Involvement of stakeholders	Carers may be required to interpret data unless notification is automatic. Likely that the alarm will only be raised if CCC or carers notice that there is a change in behaviour.
Limitations	
Role for SAPHE	UTI may be detected by symptomatic

	changes in activities e.g. disturbed sleep, increase toilet usage; perhaps physiological changes would also be detected.
Sensors	Environmental – PIR, 'blob', bed occupancy Wearable – possibly to detect physiological changes
Collection (input) of information from user	Understanding of typical patterns could initially be based on SU input, with the system revising them as it learns her behaviour. Potential feedback from service user on quality of sleep, disturbances etc.
Data analysis	Flag abnormality in activities (sleep, bathroom usage, other). This requires system to learn typical patterns.
Provision (output) of information to stakeholders	Notification of change in activities to carers. Clinicians may also be informed of problem and will be involved in diagnosis.
Improvement in outcome	UTI problem diagnosed early to prevent condition worsening or other detrimental events such as falls. SAPHE improves outcome by automatically flagging that a cause for concern exists possibly allowing for earlier detection.
Involvement of stakeholders	Clinician (e.g. GP)/carers made aware of potential problems before they become serious
Limitations	SAPHE can only highlight a problem exists which may have multiple possible diagnosis
Comment (assumptions, issues etc.)	Limitation mentioned above could have wider implications – the system may effectively flag that there is a problem but ideally data would be available diagnosis.

Event 1.3 – Activities (meals)	
USE – confirm SU is eating ok	
Role for existing Telecare	Some existing systems suggest simple meal detection (e.g. Living Independently) or data which carers could interpret to indicate kitchen usage
Improvement in outcome	Possible to detect eating problems early
Involvement of stakeholders	Carers able to check SU is using kitchen, possibly to prepare meals
Limitations	Unsure how reliable meal detection is – possibly based on simplistic indicator of duration of time in kitchen.
Role for SAPHE	Increased reliability in meal detection
Sensors	Environmental – possibilities including IR, vibration, PIR, 'blob', appliance Wearable?/ 3 rd Party scales
Collection (input) of information from user	Self-reporting a possibility
Data analysis	Fuse kitchen sensor data; trending for meals – missing single meal may not be a problem; look for trend in weight.
Provision (output) of information to stakeholders	All carers may be interested in meal data
Improvement in outcome	Increased reliability in detection and intelligent analysis to help identify persistent problem rather than single missed events
Involvement of stakeholders	Carers notified of cause for concern and need for further investigation.
Limitations	Reliability of meal detection could still be an issue – how do we know the SU is not making food and deciding not to eat it. Use of weight should help to overcome this

	limitation.
Comment (assumptions, issues etc.)	<p>Validation of meal detection could be an issue.</p> <p>Could extend to take account of balance between food, weight and activity (energy expenditure).</p>

Falls	
USE – detect falls (Event 5.1)	
Role for existing Telecare	<ul style="list-style-type: none"> i) Self raised alarms using pendent ii) Wearable fall detector alarm iii) Existing simple lack of activity raised fall alarm using PIR iv) Failure to return to bed alarm using bed sensor
Improvement in outcome	<ul style="list-style-type: none"> i) Help can be summoned following a fall ii) Automatically detects falls in real-time iii) Falls not detected but SU should not end up being stuck on the floor for days. (Unless they continue to trigger motion sensor.) iv) SU falls at night should be detected
Involvement of stakeholders	Falls are likely to be considered a priority event and alarms raised as soon as possible, typically to CCC with carer to respond.
Limitations	<ul style="list-style-type: none"> i) SU needs to be wearing pendant. They may not wear it especially if they are not susceptible to falls. ii) SU needs to be wearing fall detector which is unlikely unless they are susceptible to falls. iii) Lack of activity thresholds likely to be

	<p>high.</p> <p>iv) Falls only detected at night and only after a period of time. False alarms may also be generated by taking longer than usual in bathroom or going to watch TV, get a drink, etc.</p> <p>Detecting the fall does not give indication of any underlying cause, e.g. UTI. Used alone it also requires the fall to indicate a problem.</p>
Role for SAPHE	<p>To provide fall detection support for any where in the home, at any time, in a more flexible manner. Possible also intelligence can be used to indicate changing mobility (e.g. monitor gait, changing timescales for moving around her home etc) and need for assistive device.</p> <p>Underlying problems may be identified by other routes (e.g. physiological data) allowing for fall avoidance.</p> <p>Data for period leading up to fall event may be of use in understanding why it occurred.</p>
Sensors	<p>Environmental – ‘blob’, PIR, bed occupancy</p> <p>Wearable – accelerometer based fall detection; physiological for identifying potential problems before a fall occurs.</p>
Collection (input) of information from user	<p>Need to understand her typical patterns, this could be initially based on her comments, with the system revising them as it learns her behaviour</p>
Data analysis	<p>Fall motions from accelerometer; ‘blob’ analysis; possibly detection of abnormal lack of activity; gait analysis; in home movement</p>

	patterns
Provision (output) of information to stakeholders	Priority fall alerts likely to go to CCC to ensure timely response. More subtle indicators (e.g. increasing fall likelihood, evidence of repeated falls) may go to carers; clinicians may have interest in data prior to fall to help with cause identification
Improvement in outcome	Quicker response to falls (leading to fewer additional problems); detection independent of location or time of day; may be able to prevent the fall from happening in the first place;
Involvement of stakeholders	Carer made aware of changing behaviour prior to fall; responding to fall alarms; possibly user to attach wearable sensor
Limitations	Many factors could contribute to a fall so it would be unlikely that system could prevent them all
Comment (assumptions, issues etc.)	

Clinical (CPD)	
USE – condition management (Event 6.1)	
Role for existing Telecare	Existing CDM platform could be used for monitoring condition
Improvement in outcome	Prevents condition becoming unmanaged
Involvement of stakeholders	SU required to take readings, carers required to respond/investigate if thresholds are exceeded
Limitations	Simple periodic measurements taken with little contextual information
Role for SAPHE	Richer picture through the provision of continuous long duration physiological data

	combined with contextual information
Sensors	All, including 3 rd party COPD specific devices
Collection (input) of information from user	All
Data analysis	Long-term trending; abnormal feature extraction
Provision (output) of information to stakeholders	Clinical information likely to be of most value to professional carers e.g. GP, community matron
Improvement in outcome	Better understanding of condition and condition triggers
Involvement of stakeholders	Main stakeholder involvement likely to be professional with clinical knowledge e.g. GP, community matron
Limitations	May take significant time for professional carer to understand the information made available to them
Comment (assumptions, issues etc.)	Danger of providing too much/irrelevant information; need to ensure alignment between information provided and information seen as useful by care professional

Clinical (weight, BP)	
USE – general health indicators (Event 1.2)	
Role for existing Telecare	Most CDM systems include weight and BP monitoring
Improvement in outcome	Failure to maintain within bounds could be indicative of a number of emerging conditions
Involvement of stakeholders	SU required to take own readings (scales, BP cuff); CCC operator/carer notified if out of bounds, possible referral on for further investigation

Limitations	Alert only raised when fixed threshold reached
Role for SAPHE	Trend analysis; holistic picture through presentation of weight data with other physiological metrics and activity information
Sensors	3 rd party scales/BP cuff; wearables; environmental
Collection (input) of information from user	
Data analysis	Long-term trend analysis; fusion of weight with meal and activity data; fusion of BP with activity data
Provision (output) of information to stakeholders	Data may be useful to clinician. Motivational feedback and/or information to service users.
Improvement in outcome	Decline picked up optimally – potentially prior to fixed thresholds being reached; may be able to provide context data; holistic view may facilitate understanding of underlying cause.
Involvement of stakeholders	SU, GP
Limitations	SU still required to self test
Comment (assumptions, issues etc.)	Weight (and possibly BP) likely to be fundamental clinical metric of value across a number of different conditions. Unsure if any practical wearable BP devices exist, so may need to rely on periodic readings. A wearable BP device is a current area of research e.g. Chinese university of Hong Kong's BSN paper or MIT's Photo-Plethysmograph approach.

Clinical (temperature)

USE – detect hypothermia (Event 4.1)	
Role for existing Telecare	System's can detect room temperature. Unclear if commercial systems monitor body temperature but it has been suggested leg/foot temperature could be monitored in bed and wearables do often include body temperature even if not part of telecare systems.
Improvement in outcome	Low temperature alarms can be raised which lets carers know SU needs assistance with heating.
Involvement of stakeholders	
Limitations	Systems which use measurement of room temp not body temperature lack accuracy as SU could be wearing warm clothing; system is reactive rather than proactive; there may be some underlying cause (e.g. loneliness) for the hypothermia which should be looked in to.
Role for SAPHE	Provide continual body temperature monitoring through wearable sensors. Could adjust heating levels to help compensate but beyond scope of SAPHE; may be possible to identify reduction in well-being prior to neglecting to keep self warm (e.g. reduced well-being); devices which stimulate social interaction could be used to help with loneliness but beyond scope of SAPHE
Sensors	Wearable temperature sensor; environmental sensors for activity inference
Collection (input) of information from user	
Data analysis	Monitor his body temperature and room temperature in real-time, if it goes below prescribed levels raise alert to SU/carers

Provision (output) of information to stakeholders	SU and carers may be able to make use of temperature charts; considering SU activities may indicate other underlying causes
Improvement in outcome	Body specific temperate monitored lowering chance of hypothermia; more holistic picture provided to indicate if hypothermia is the only problem.
Involvement of stakeholders	
Limitations	Danger of still addressing specific symptoms such as low temperature rather than identifying underlying conditions such as loneliness.
Comment (assumptions, issues etc.)	

Medication	
USE – medication compliance and optimisation (Event 1.4)	
Role for existing Telecare	Medication compliance pill boxes; existing reminder systems – e.g. Motiva, SMS; CDM platforms may include self-reporting of medication usage when SU has a degree of control over dosage/frequency of use.
Improvement in outcome	Reduced chance of SU forgetting to take medication; notification if medication not taken.
Involvement of stakeholders	SU uses a instrumented pill box; SU receives reminders; carer notified if medication missed; for some conditions, such as asthma, self-reporting of medication usage may be used to assist with understanding how well the condition is managed
Limitations	Instrumented pill boxes do not allow us to know that medication has been taken by SU only that it has been removed from pill box; self-reporting has reliability issues;

	instrumented pill boxes may be deemed unsuitable.
Role for SAPHE	Maybe able to link medication changes to changing ADLs/vital signs.
Sensors	All for symptoms; 3 rd Party pill box; wearables for vital signs
Collection (input) of information from user	Medication usage could be self-reported
Data analysis	Need to keep records of medication changes
Provision (output) of information to stakeholders	Carers may have interest in medication usage; could form part of condition management reviews; SU/carers alerted if medication missed; reminders to SU
Improvement in outcome	Effects of medication changes may be investigated
Involvement of stakeholders	Possibly some self-reporting; carers may be required to look at data; reminders to SU
Limitations	Self-reporting has reliability issues; instrumented pill boxes may be deemed unsuitable.
Comment (assumptions, issues etc.)	Medication compliance emerged from requirements capture as a key issue

Information/reassurance (SU)	
USE – assist SU with understanding own condition/symptoms (Event 9.2)	
Role for existing Telecare	Can be difficult for SU to recall own symptoms accurately (e.g. for meetings with clinicians) – electronic diaries/ simple rating systems may help; CDM platforms can provide user with charts showing that they are managing their condition;
Improvement in outcome	

Involvement of stakeholders	Input of the data
Limitations	Systems may require a high level of interaction from the SU this may be considered positive as it involves the SU in own health but they may not wish to be recording information or may repeatedly forget to do so.
Role for SAPHE	Provide automated and intelligent linkage between this user contributed data and the sensor data
Sensors	All
Collection (input) of information from user	SU could be able to add their own comments, indicators of her self-perceived health status (e.g. simple touch options like smiley faces chosen by SU at certain / random times of the day)
Data analysis	Outside scope of SAPHE but a telecare system could provide some key vocabulary for SU to select from, the system could then cross reference and take these into account to provide user contributed annotations for the sensor data collected; data analysis required to present raw data in a form suitable for SU; trend analysis where suitable
Provision (output) of information to stakeholders	Web delivery; STB
Improvement in outcome	Information provision allows SU have more involvement with their health management leading to a better understanding of their health; deeper understanding also allows for better informed discussions with clinicians; reassurance provided by alert monitoring may contribute to improved feeling of well-being

Involvement of stakeholders	There needs to be a quick, reliable and very simple method for data capture from SU and data provision to SU; carers may also get value from having access to information particularly simple summaries to enable them to make use of the data in the short duration consultations.
Limitations	Self-reported information is most useful if compliance is high this means that the capture process should be simple and quick; it also places requirements for a suitable input and viewing terminal (e.g. TV with a keyboard)
Comment (assumptions, issues etc.)	

Alarm/Reassurance (SU)	
USE – increase SU confidence in ability to live independently (Event 6.2)	
Role for existing Telecare	<ul style="list-style-type: none"> i) Basic pendant alarm raising provides a level of reassurance that whatever the problem the SU will be able to summon help ii) Further reassurance can be provided by use of other devices designed to detect specific problems (e.g. falls, gas leak) iii) Existing systems (e.g. CDM) typically raise call centre alarms if fixed thresholds are breached.
Improvement in outcome	<ul style="list-style-type: none"> i) Reassurance that SU can raise an alarm from anywhere (e.g. when in garden) ii) Reassurance that specific problems will be detected. iii) Safety net provided
Involvement of stakeholders	i) SU has to manually raise the alerts and requires a response mechanism to be in place.

Limitations	<p>i) Pendants may not work when outside of house. The pendant alarm response time may be unacceptable (e.g. for breathing difficulties)</p> <p>ii) Looking for specific causes for concern does not provide any longitudinal information regarding SU health status.</p> <p>iii) Simplistic; provides little evidence of underlying problems.</p>
Role for SAPHE	Sophisticated trend analysis and abnormal event identification; continuous monitoring to allow abnormal symptoms to be detected any time and any place; monitor SU vital signs (e.g. breathing and SPO2) at any time and any where around home; better condition management to keeping symptoms under control and avoid emergency situations (e.g. exasperations)
Sensors	Discreet wearable sensors for specific vital signs; all sensors for improved condition management.
Collection (input) of information from user	
Data analysis	Real-time alarm monitoring; vital signs will require some processing (e.g. standard algorithms for SpO2 analysis & breathing rates); longitudinal data mining for detecting anomalies or gradual degradation in health.
Provision (output) of information to stakeholders	Information provision to SU and carers to aid condition management; carers to respond to alarms.
Improvement in outcome	SAPHE can provide continuous monitoring including when outside of the home; the reassurance provided by SAPHE should facilitate an increased sense of well-being &

	quality of life; better management of conditions (e.g. through providing information to allow refinement of medication regimes); reassurance that problems will be identified if they exist.
Involvement of stakeholders	Professional carers use data to check SU is managing conditions; carers may also need to possess ability to investigate further; may be possible to use information to help optimise medication regime; SU made aware of when health should prohibit certain activities e.g. when health is not up to gardening etc.
Limitations	Monitoring is continuous but still may take time for help to arrive; requires SU to want to, and be able to understand the provided data and what it means; professional carers need to have the resources and desire to work with the data collected by SAPHE; SAPHE style lifestyle monitoring is always likely to require a facility to self-raise alarms (e.g. pendants); system cannot supply immediate help and physical aids (e.g. an oxygen supply for someone with breathing difficulties) might be only way to provide real reassurance; potential increase burden on professional carers.
Comment (assumptions, issues etc.)	SAPHE system should be used in addition to the other appropriate reassurance providing devices e.g. pendant, oxygen supply, etc; any alert/alarm mechanism should be robust and transparent in its functionality.

Reassurance (Informal Carer)	
USE – reassure concerned informal carer (Event 1.7)	
Role for existing Telecare	Web-based interfaces (e.g. Living

	Independently, Just Checking) and SMS approaches exist for providing informal carers that the SU is ok
Improvement in outcome	Reassurance to relative without need for an intrusive level of contact.
Involvement of stakeholders	For web-based interfaces informal carers are required to log on.
Limitations	Limited information available from existing systems.
Role for SAPHE	SAPHE should provide further reassurance through the provision of more detailed information
Sensors	All
Collection (input) of information from user	All
Data analysis	Information should be presented in a form suitable for the specific informal carer
Provision (output) of information to stakeholders	Via (customisable) informal carer interface
Improvement in outcome	Further reassurance provided including vital signs
Involvement of stakeholders	
Limitations	Could introduce information overload
Comment (assumptions, issues etc.)	Getting the interface right is important to ensure information provided meets the needs of the informal carer

Information (Professional Carer)	
USE – determining care needs (Event 8.1)	
Role for existing Telecare	Existing systems can provide professional carers (e.g. social workers) with simple information which allows them to judge

	whether an individual SU is able to cope with living at home independently.
Improvement in outcome	Decisions of whether a particular SU can live at home have objective evidence to support them; evidence that SU is able to remain in own home
Involvement of stakeholders	Professional carers use information to make changes to care arrangements
Limitations	Existing systems typically possess limited intelligence mainly reporting sensor events rather than learnt patterns, activities and long-term information and trends; lack of integration with existing systems; limited information available from existing systems
Role for SAPHE	<p>i) Intelligent interpretation of sensor data, detection of patterns and anomalies, measure of ADL capabilities</p> <p>ii) Enable OLAP (online analytical processing) to allow stakeholders to see the long-term observation measured data in relation to different time break downs, e.g. by weeks, months.</p> <p>iii) Integrate with the existing care service systems; e.g. to provide a simple good / bad day indicator via mobile phone to assist homecare helps</p>
Sensors	Environmental – all; wearable – all
Collection (input) of information from user	Supplementary user supplied information could be of use
Data analysis	Data mining; rules; autonomous agents
Provision (output) of information to stakeholders	Visual summaries of past health status; report of trends; report degradation in SU's health and capability to live independently

Improvement in outcome	Most appropriate level of care provided; Intelligent analysis performed by the system reduces the effort required by carers to understand and interpret data; carers are better able to tailor care packages to individual SUs – possible even down to the level where home help will know prior to their visit what a SU's recent health status was allowing them to prepare more appropriate meals or improved the use of time between home help and SUs.
Involvement of stakeholders	Summary reports should reduce requirement for carers to process reported data; should allow carers to browse simple summaries, with further details available by drilling-down into the data; need to assess how detected ADLs relate to care package
Limitations	Accuracy of interpretation and algorithms; carers required to interact with interfaces which some may not wish to or be able to do.
Comment (assumptions, issues etc.)	OLAP requires Microsoft SQL Server and ProClarity Server; details above relate to using Telecare for making optimal decisions to all changes in care packages including when to move to residential care; accuracy of ADL inference.

Event 11.1 – Other (well-being)	
Role for existing Telecare	
Improvement in outcome	
Involvement of stakeholders	
Limitations	Existing telecare is unable to provide long-term trend analysis, visualisation and reporting

Role for SAPHE	Provide long-term trend analysis of Jane's health and general wellbeing; report this data using simple summaries, with the potential for explore / question or more specific details. This will largely be used by Jane and her family, but also by her GP in consultations. Could provide video conference / Skype services to allow Jane's family to have video & audio interactions with her.
Sensors	Environment & worn
Collection (input) of information from user	
Data analysis	data mining & trend analysis / longitudinal data visualisation e.g. OLAP
Provision (output) of information to stakeholders	web delivery of longitudinal data; integration with GP systems; mobile phone alerts of bad days
Improvement in outcome	Jane and her family have a greater understanding of her health patterns;
Involvement of stakeholders	Everyone is able to, and should check the long-term data reports so that they can all understand Jane's health problems better
Limitations	It would take time for the system to be able to detect possible triggers of bad days; once the system can detect patterns and thus anomalies the system would be able to generate alerts automatically taking off some of the load from Jane and her family, but there would always be a need for manual exploration of the data; thus the system / report views would need to be simple to use and adapt.
Comment (assumptions, issues etc.)	

Event 7.3 – Other (de-installation)	
Role for existing Telecare	Easily moved to next SU
Improvement in outcome	Efficient use of resource
Involvement of stakeholders	
Limitations	Limited amount of information available from easy to remove systems – but this may be sufficient for some purposes.
Role for SAPHE	Modular deployment; wearable sensors deployment only
Sensors	
Collection (input) of information from user	
Data analysis	
Provision (output) of information to stakeholders	
Improvement in outcome	
Involvement of stakeholders	
Limitations	
Comment (assumptions, issues etc.)	SAPHE system designed to be appropriate for long-term trend analysis rather than short term deployments.

Event 2.3 – Other (earlier discharge)	
Role for existing Telecare	If existing telecare provides sufficient support it may be possible to reduce time in care home.
Improvement in outcome	May be SU preference to return home quicker
Involvement of stakeholders	Multiple stakeholder involvement to ensure monitoring service is in place.

Limitations	Safety net telecare provided may not be sufficient to reduce time in care
Role for SAPHE	May be possible to avoid care home through greater use of remote monitoring.
Sensors	All
Collection (input) of information from user	All
Data analysis	All
Provision (output) of information to stakeholders	All
Improvement in outcome	Preferential for SU and lower cost
Involvement of stakeholders	Multiple stakeholder involvement to ensure monitoring service is in place.
Limitations	Care home may still be required
Comment (assumptions, issues etc.)	

Event 1.5 – Other (reminders)	
Role for existing telecare	Part of medication
Improvement in outcome	
Involvement of stakeholders	
Limitations	
Role for SAPHE	
Sensors	
Collection (input) of information from user	
Data analysis	
Provision (output) of information to stakeholders	
Improvement in outcome	

Involvement of stakeholders	
Limitations	
Comment (assumptions, issues etc.)	

3 Document History

Issue	Date	Prime author(s)	Comments
1.0	02/01/2007	Nigel Barnes	Internal Deliverable D03.
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End of Document