

# From Telecare to Holistic Care

Experiences from Liverpool and a SAPHE future

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# Telecare Definition

The use of Information and  
Communication Technology (ICT) to  
support independent living for older,  
frail and disabled people

# Our research

- Intelligent alarms
  - Proactive alarm to immediate situations
  - Personalised to individual behaviours/profiles
- Wellbeing analysis
  - Determination of performance of ADLs
  - Trend analysis of ADLs
  - Use for preventative care strategies
- Holistic care management
  - Fusion of social and health + ambient and worn
  - Continuous contextual analysis for preventative care
- Pervasive living
  - Whole population wellbeing strategies
  - Promotion of healthy living and self management

**Liverpool Pilot**

**DTI Care in the Community**

**DTI SAPHE**

# 1st Generation Telecare

There are now 1.5 million alarm support systems in the UK which use simple technology to provide support to vulnerable people ...



... but systems using new technology could provide much better support.

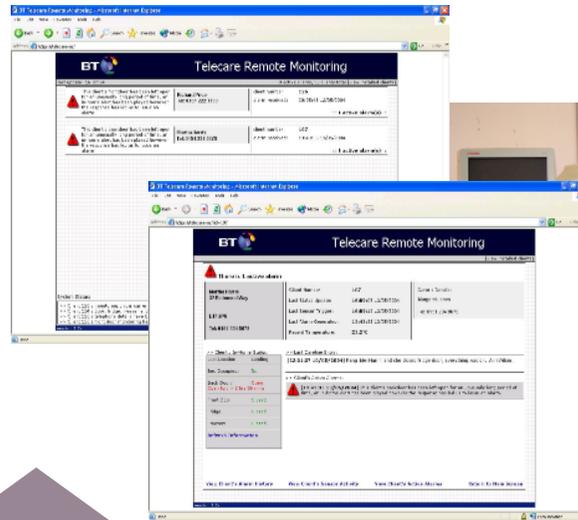


# 2<sup>nd</sup> Generation

## Call Centre



Carer

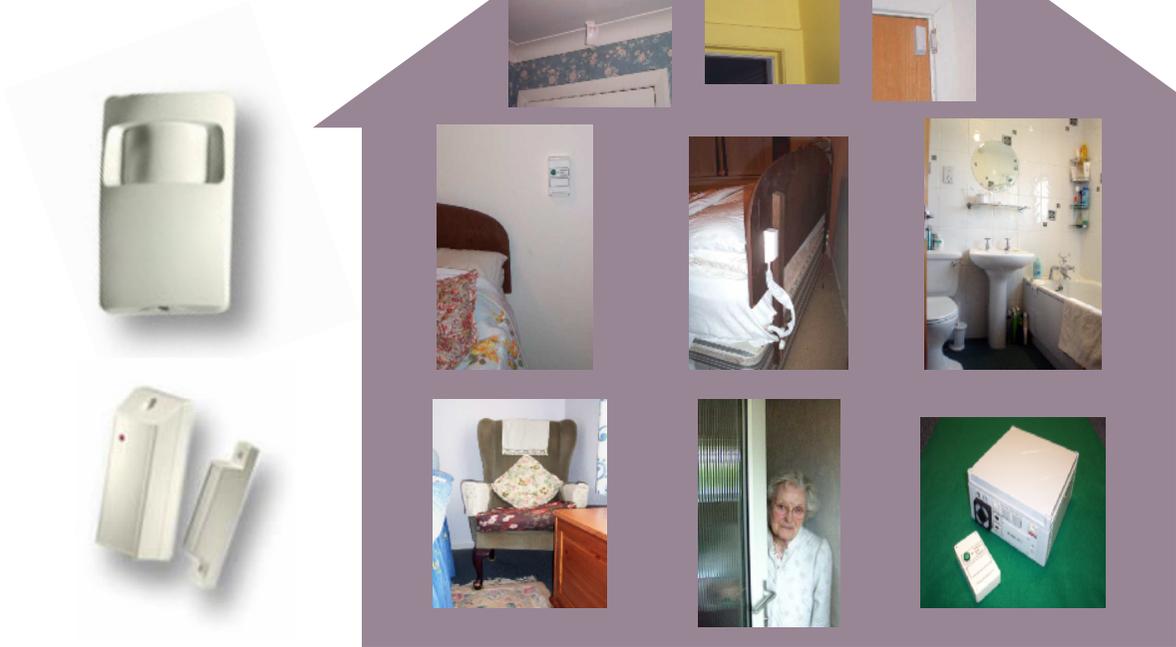


Automated alarm escalation to carer

Automated alerting to client

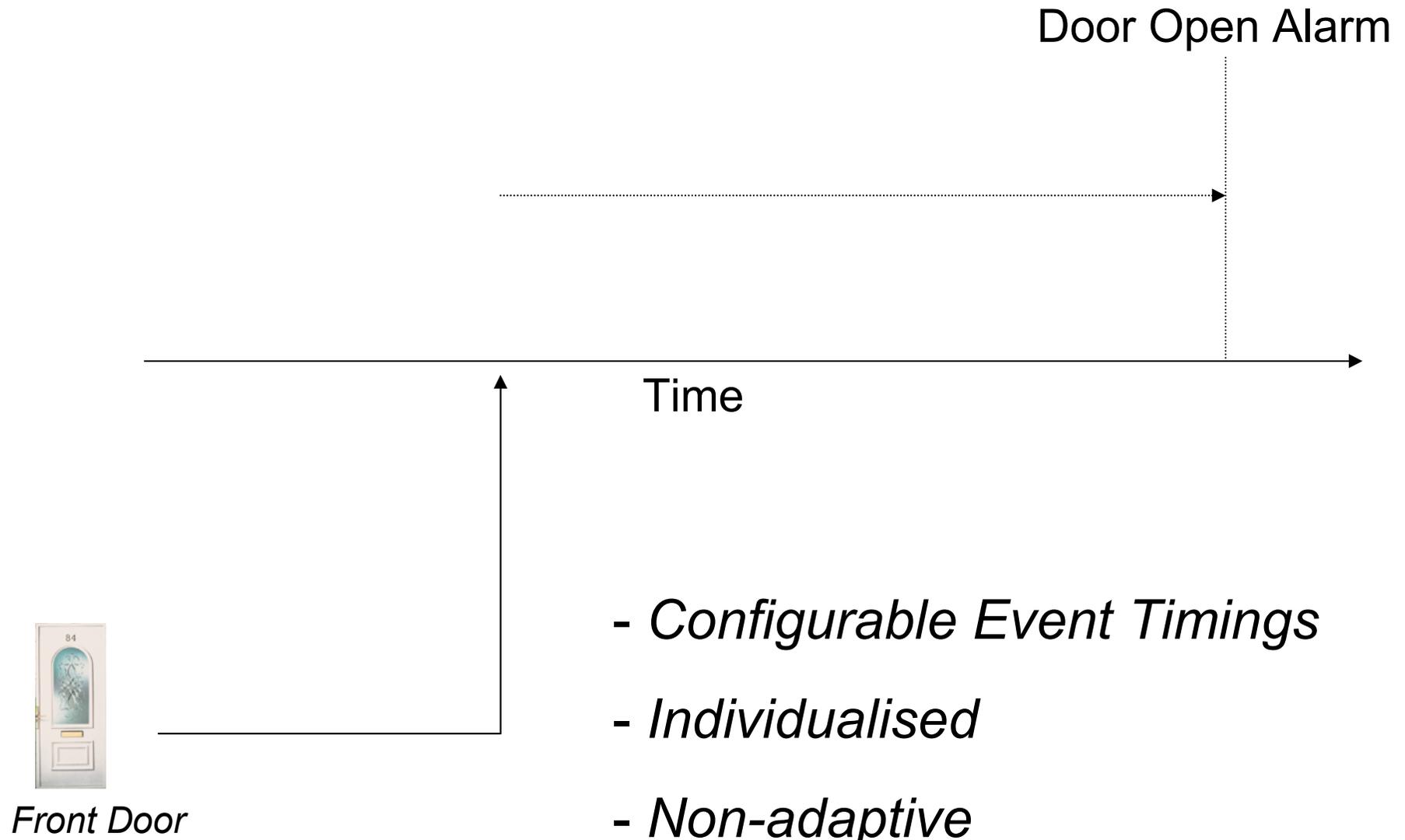
Data capture and intelligent analysis

## Non-invasive home monitoring

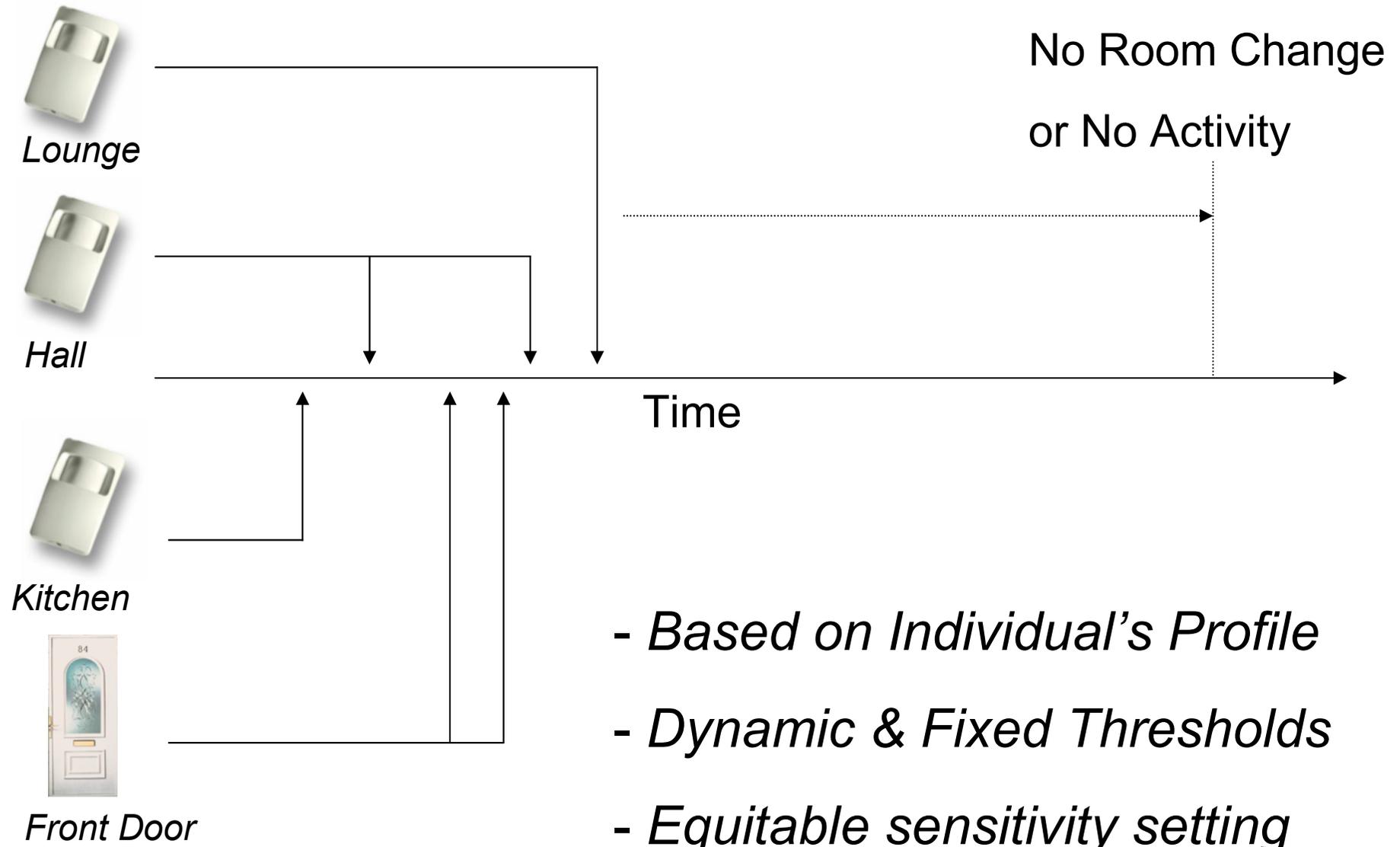




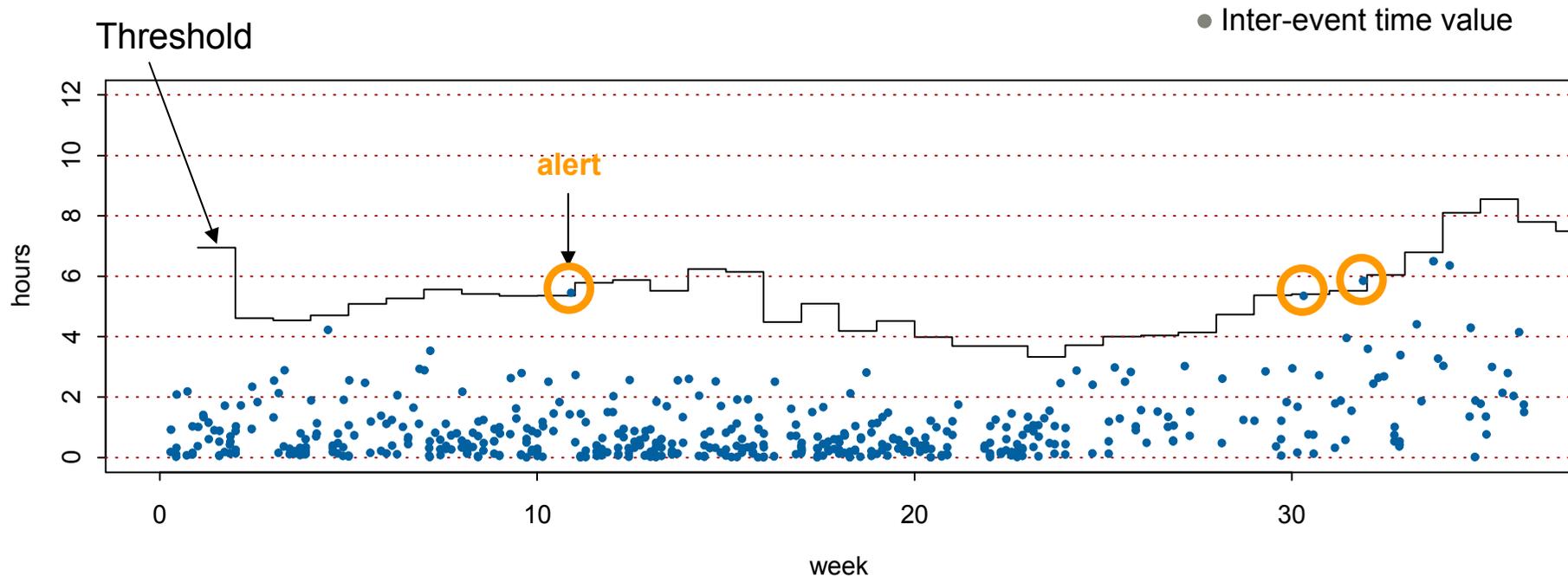
# Event Based Algorithms



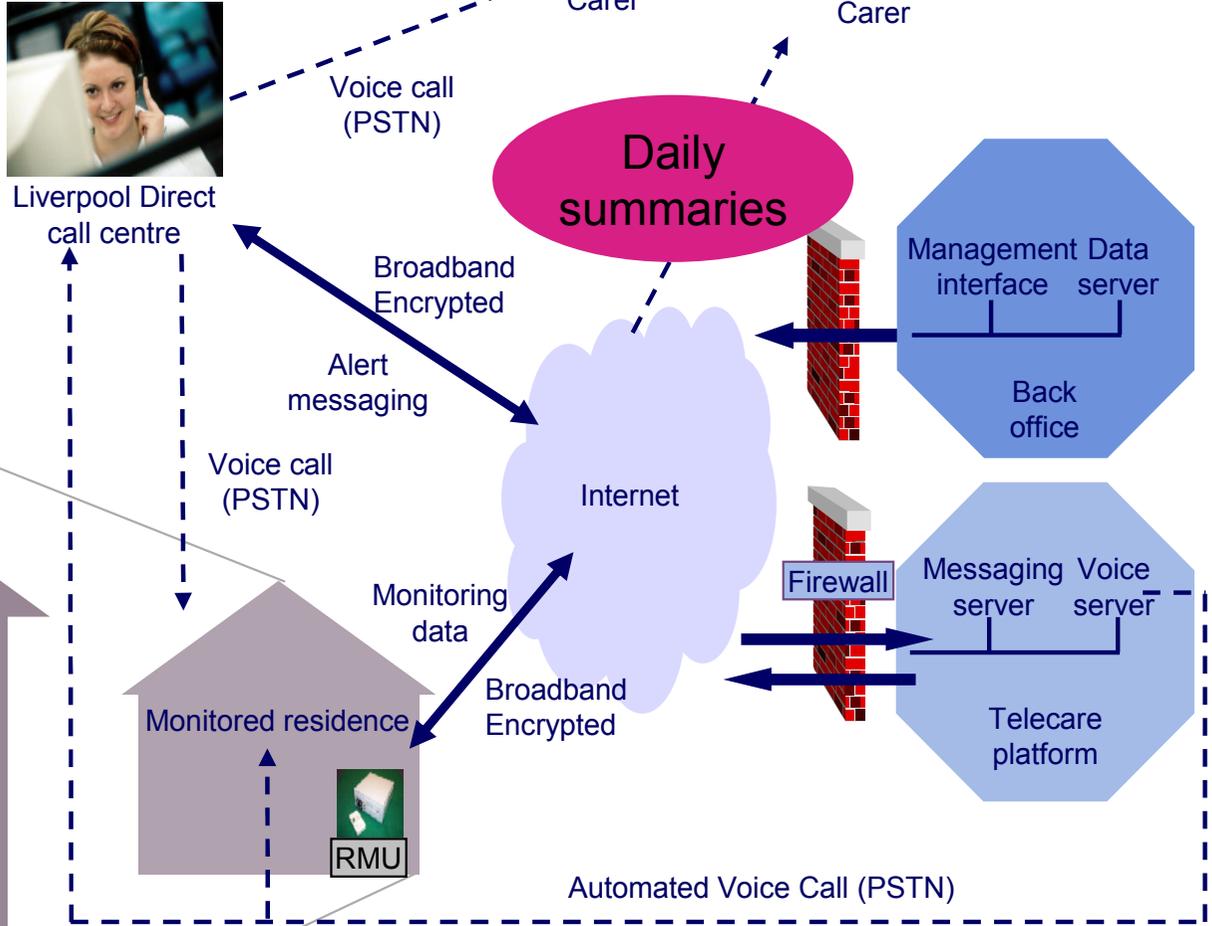
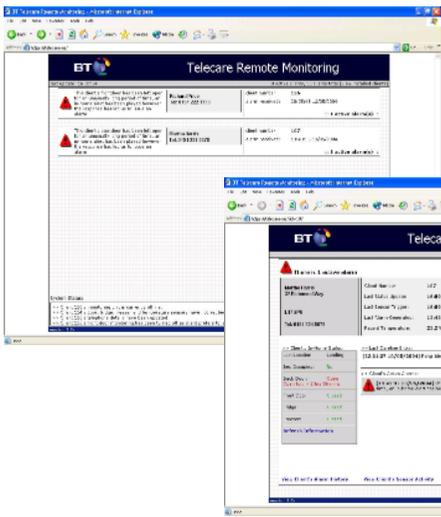
# Behaviour based algorithms



# Adaptive Thresholds



- Example using actual client data
- Bedroom threshold from 0 to 2 am
- Varies between 3.3 and 8.5 hours over 40 week period
- Tracks changing client sleeping pattern
- Longitudinal analysis



# What has been learnt

- Technology acceptable to service users and carers
- Provides reassurance to service users and carers
- Need for personalisation to optimise thresholds
- Need for alternative alerting strategies
- Provides carers with additional 'risk' information
  
- Use of LDL call centre successful
- Need for back-up and out-of-hours carer support
- Need for champion within the care provider
- Need wide engagement across stakeholders
- Potential to provide integration across care agencies



# 3rd Generation Telecare

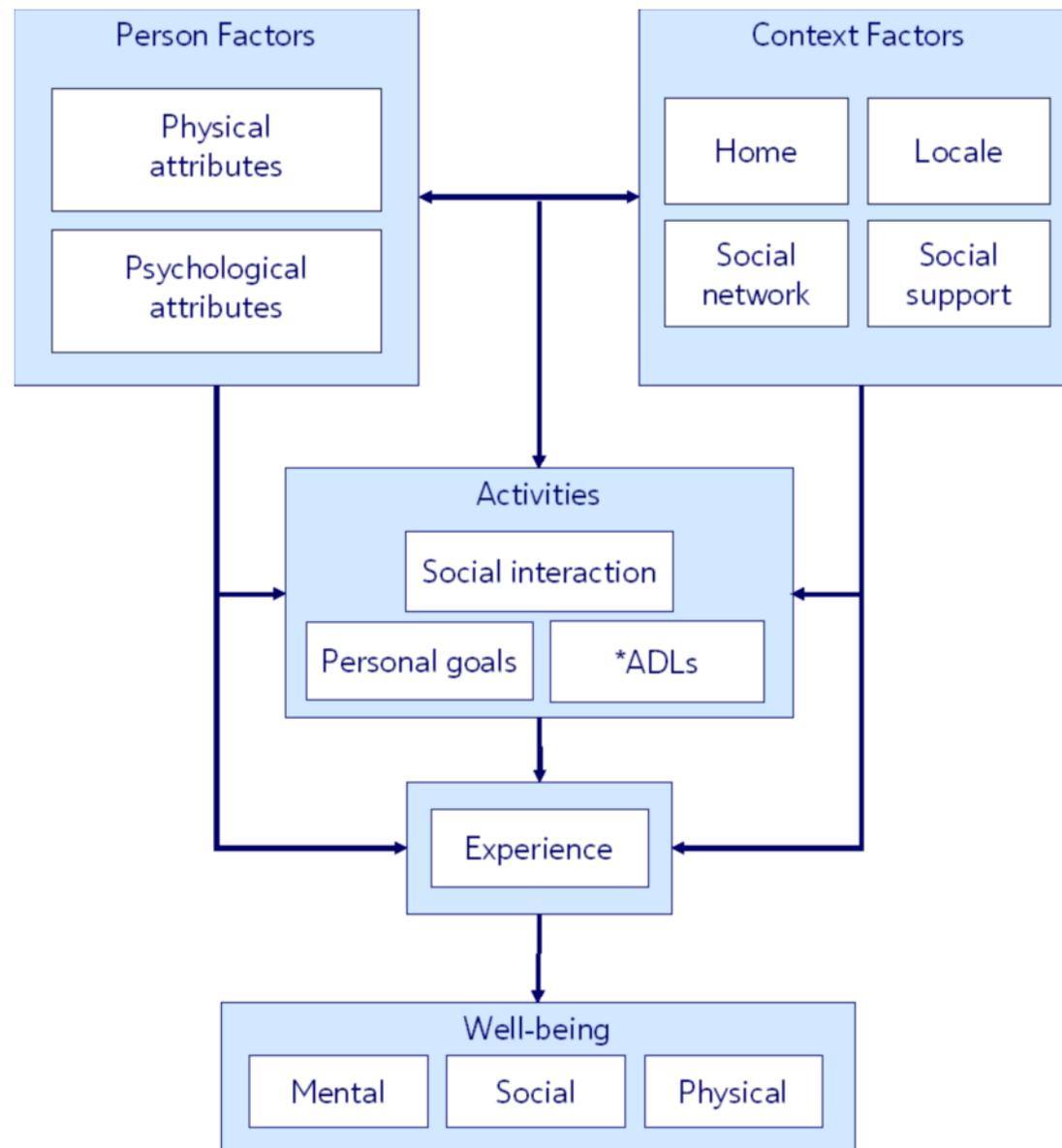
- 3<sup>rd</sup> generation Telecare is a *tool* for providing the carer with activity information enabling them to identify *significant changes* in the general well-being of their client.
- It's aim is to enable carers to *prevent* incidents from occurring in the home.
- Shift from response (*r*-mode) to prevention (*p*-mode)

# Care in the Community Centre Objective

To *design, deploy and maintain* a well-being monitoring system using *ambient* sensors within the homes of two clients, and to assess the ability of the system to identify *significant changes* in the well-being of those clients.

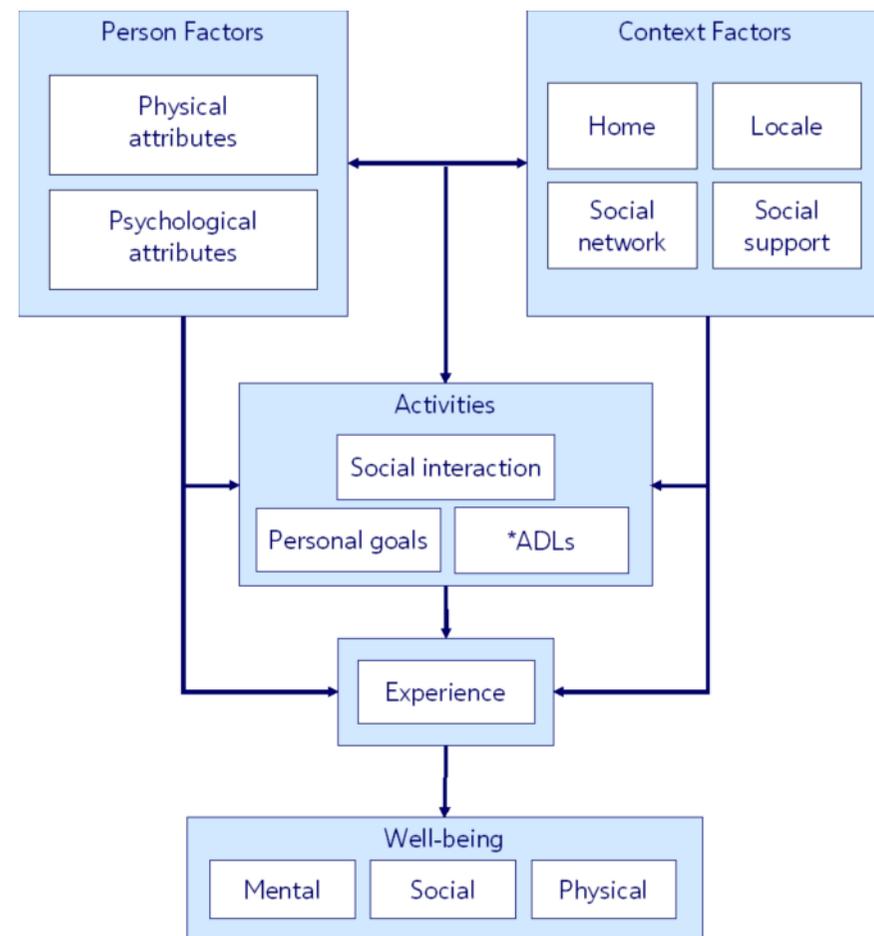
[www.dticareinthecommunity.com](http://www.dticareinthecommunity.com)

# Well-being concept model



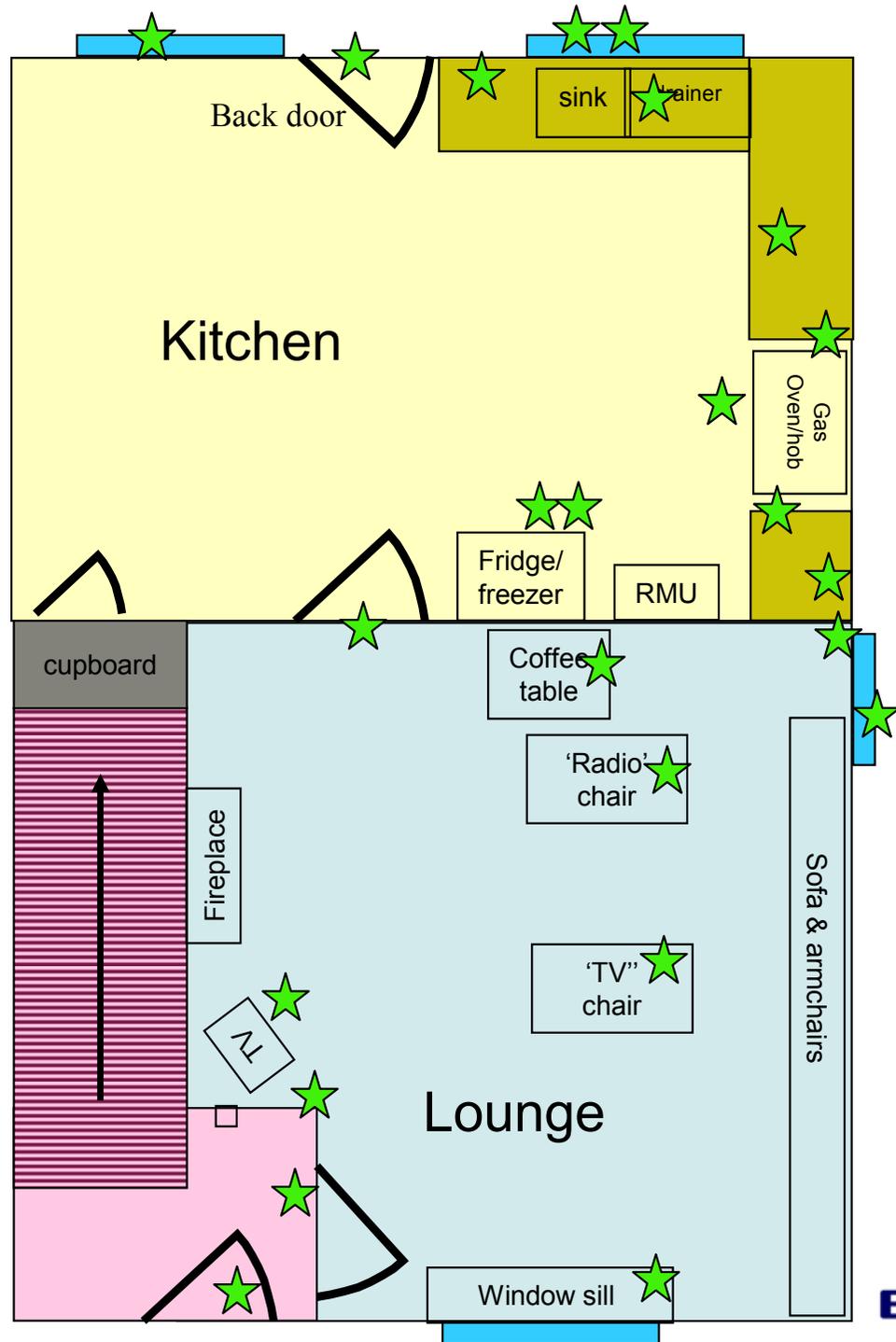
# Activities monitored

Well-being element	Activity type	Activities
Physical	ADL's	Preparing food & eating
		Sleeping
Social	Social Interaction	Leaving & returning home
		Visitors
Mental	Personal goals	Personal appearance
		Leisure activities

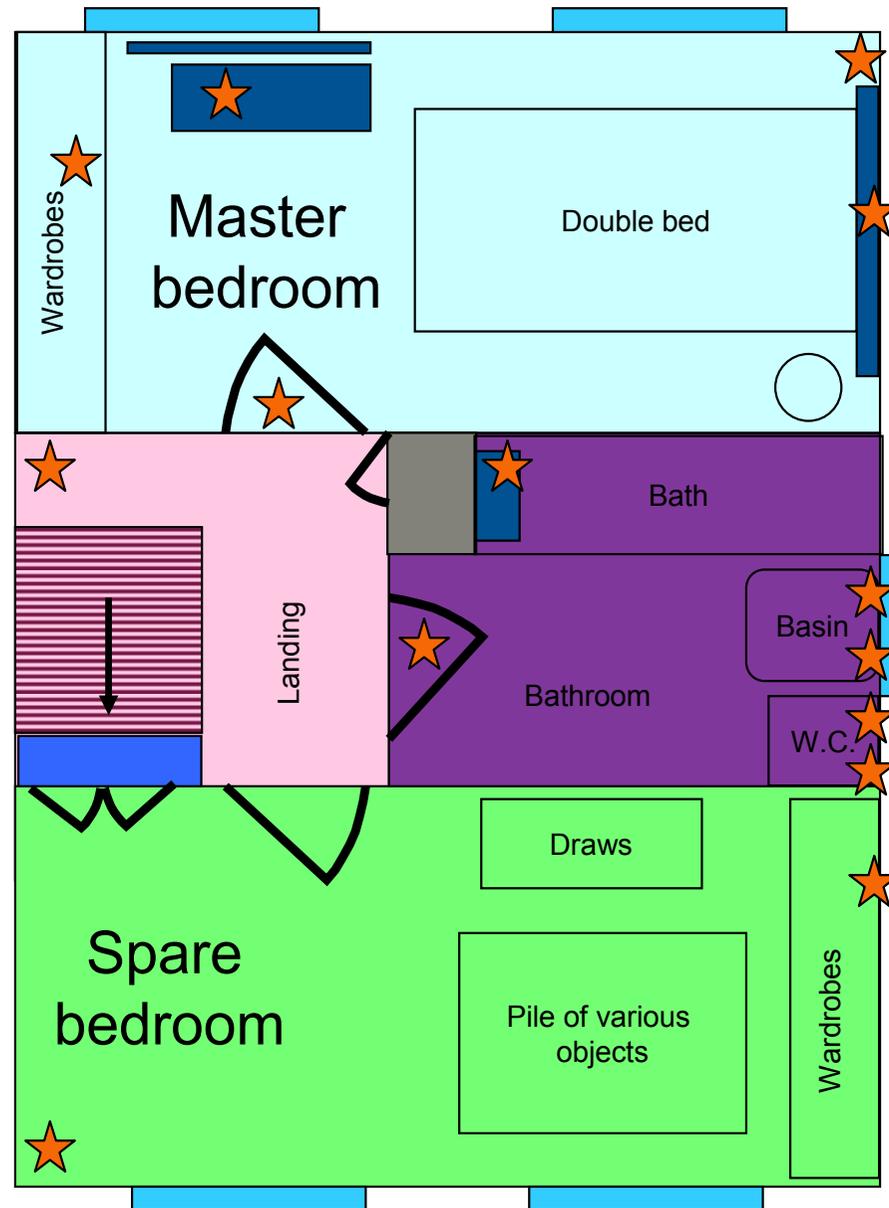


\*Activities of Daily Living

# Sensor locations



# Sensor locations



# Information delivery

## PC web-based

- Sensor data
- Trend analysis
- Pattern learning
- Significant event identification

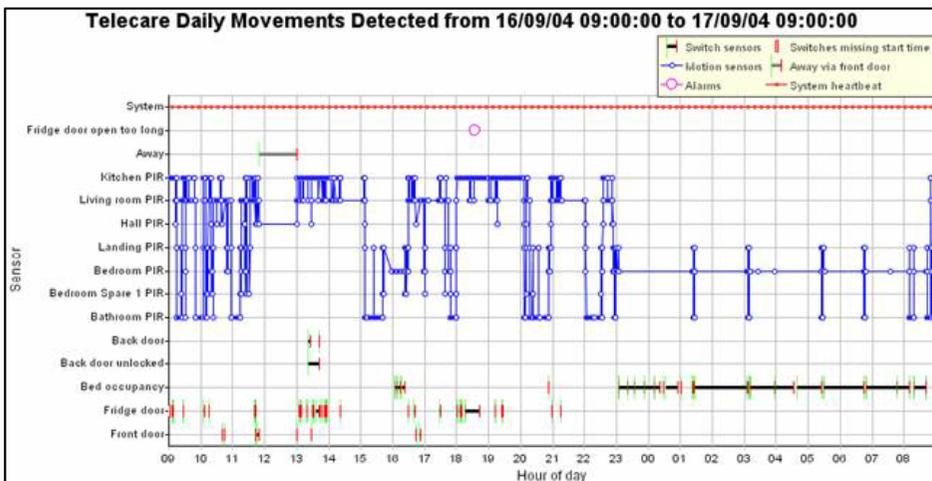


## Email

- Sensor data
- Snapshot

## PDA

- Summary information



# Results summary

- We have *demonstrated* how a telecare system can track significant *changes* in the well-being of a *specific* individual.
- The *usefulness* of well-being monitoring has still to be proven.
- Decision making should still be performed by the carer, not the system software.
- The main technical challenge is developing software powerful enough to detect 'weak signals'.
- Trust, usability and acceptability of the system are important issues and can be complex and difficult, but they are not insurmountable.
- Well-being monitoring systems need to be flexible and easily 'tuned' by the health/care professional.



# SAPHE

SAPHE  
[www.saphe.info](http://www.saphe.info)

*Smart and Aware Pervasive Healthcare Environment*

*Supported by DTI Technology Programme*

Imperial College  
London



PHILIPS

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# Project Overview

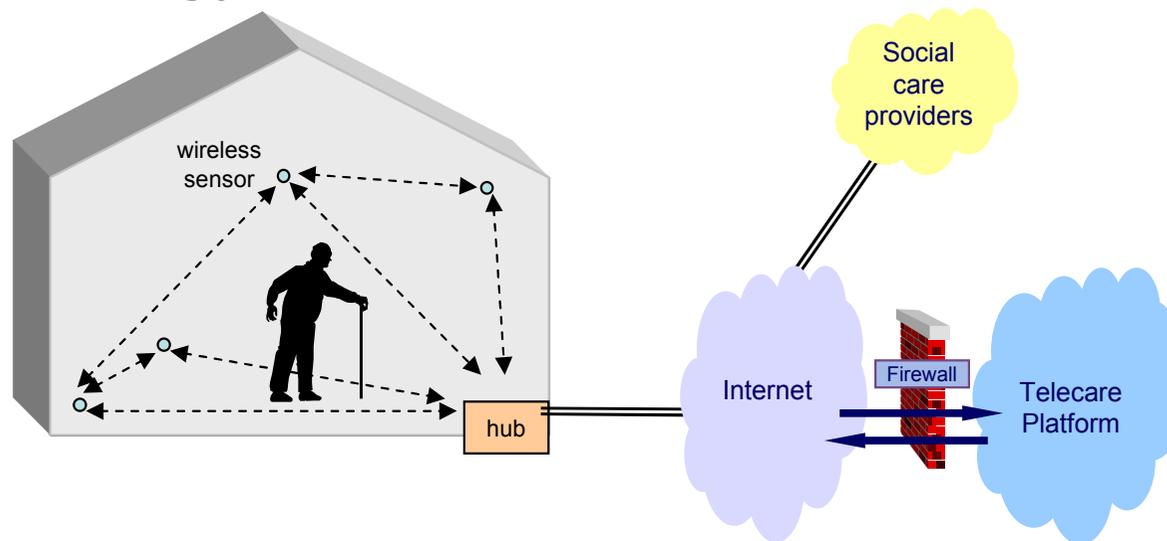
- To develop a novel architecture for unobtrusive pervasive sensing to link physiological/metabolic parameters and lifestyle patterns for improved well-being monitoring and early detection of changes in disease.

By sensing under ***normal physiological conditions*** combined with intelligent trend analysis, SAPHE opens up new opportunities for the UK ICT and healthcare sectors in meeting the challenges of demographic changes associated with the aging population

*DTI Technology Programme*

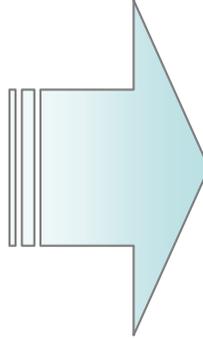
# From Telecare...

- Activity monitoring
- Social care
- Home setting
- Fixed deployment
- Technology led

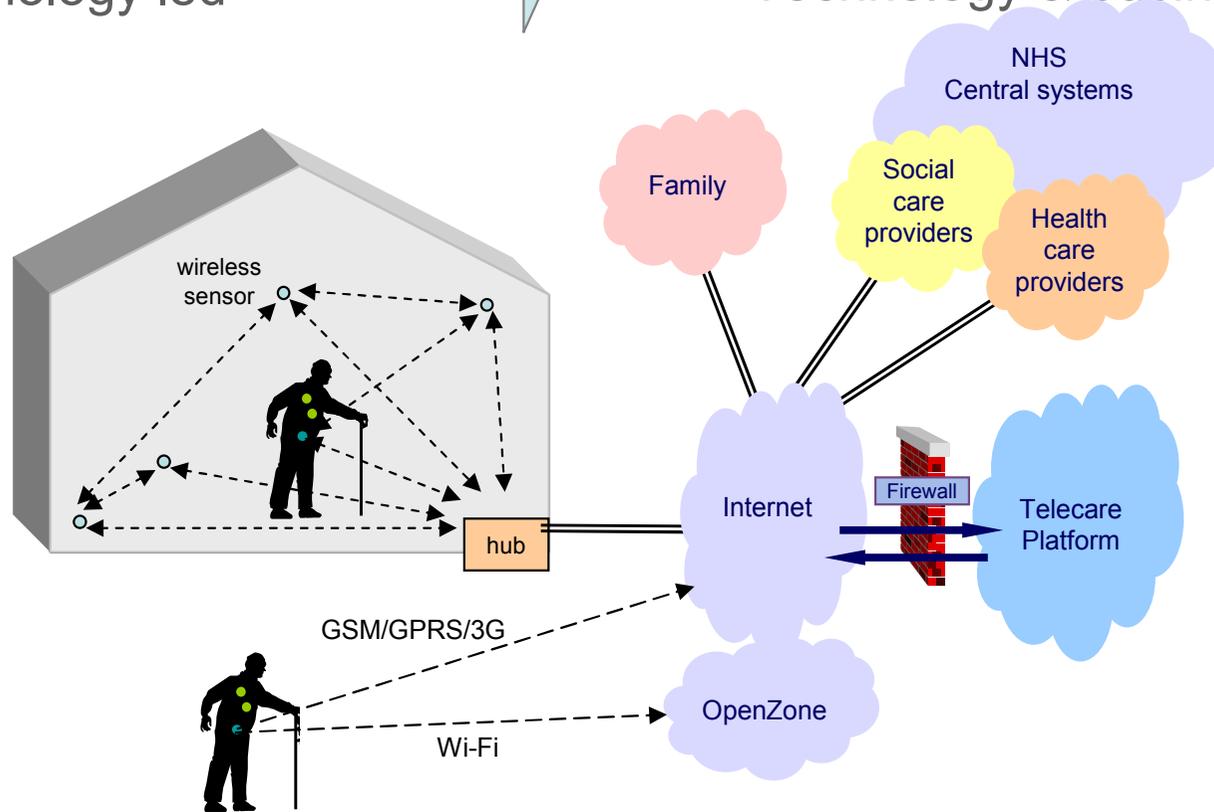


# ...to holistic care

- Activity monitoring
- Social care
- Home setting
- Fixed deployment
- Technology led



- Activity & physiological monitoring
- Social & healthcare
- Home & mobile settings
- Flexible deployment
- Technology & business drivers



# What is SAPHE trying to achieve?

## PCT

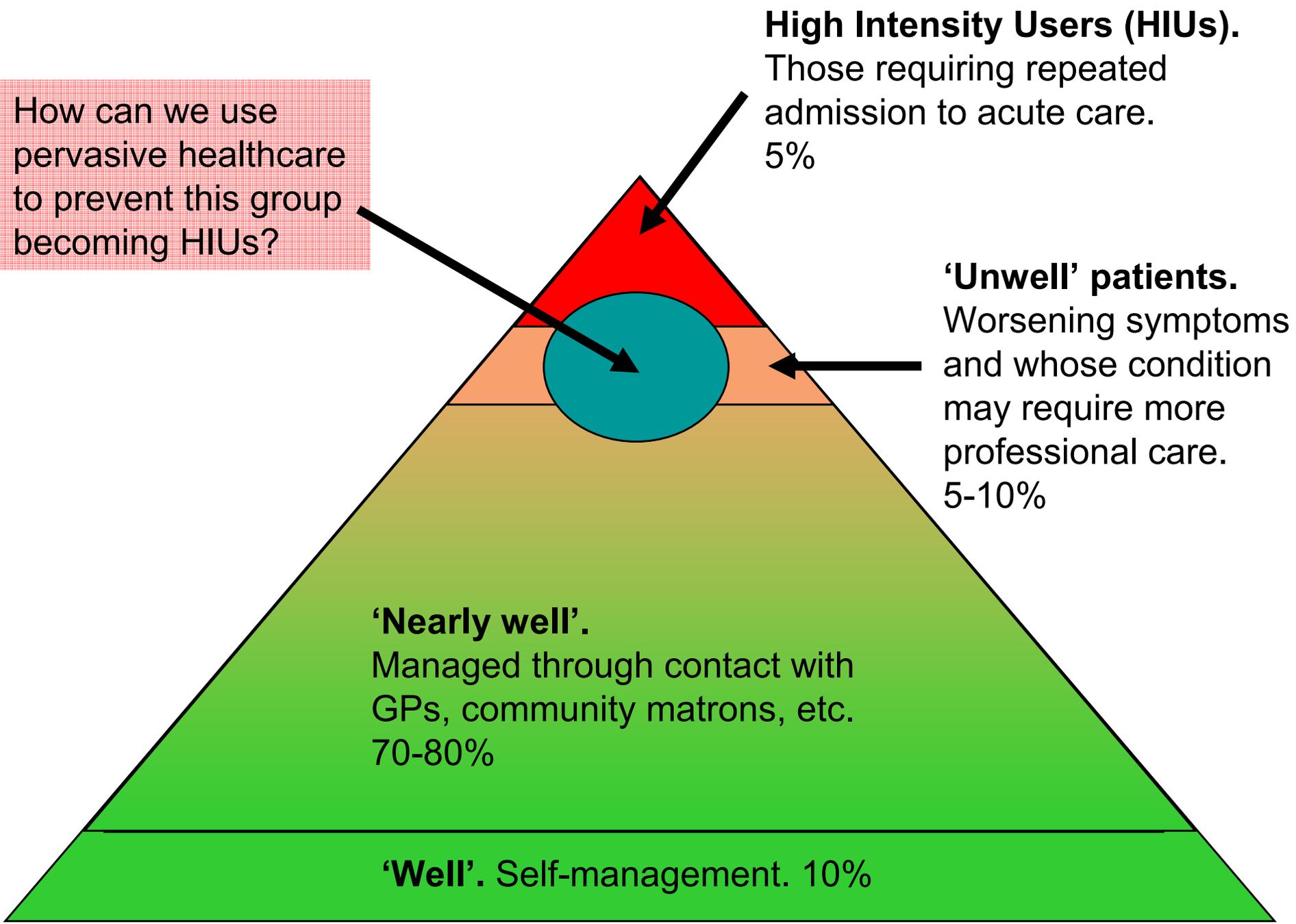
- To increase efficiencies within the PCT
  - *“To be able to do more with what we have.”*
  - Reduce progression up the care pyramid and thereby reduce the number of High Intensity Users.
- Improve care outcomes

## Service Users

- Improve care outcomes and condition management
- Improve self care and independence

*Demonstrated through the creation of an end-to-end system prototype supporting a 20 service user trial during 2008.*

How can we use pervasive healthcare to prevent this group becoming HIUs?



# We will monitor...

## At home

- Activity levels
  - Sleep patterns (quality)
  - Meal indicators
  - In/out
  - Visitors
  - Aspects of gait
  - Other ADL indicators
- 
- Weight
  - BP
  - Peak flow

## Anywhere

- Activity levels
- ECG, HR
- SpO2
- Respiration

*Wearable monitoring*

*Ambient monitoring*

*Point of care devices*

# We will provide...

- Continuous biomedical monitoring
  - Primarily via worn devices
    - point measurement devices
- Continuous activity monitoring
  - Primarily via ambient devices within the home
    - Worn devices, location based, transaction based
- Anywhere
  - Monitoring and access to information
- Contextual understanding
  - New intelligence that adds value to care processes
- Trend analysis / prediction / support / reassurance



Bringing it all together

Thank you – any questions?

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