



Scientific Aspects of Ageing - developments needed to support independent living

Professor Andrew Monk: Electronic assistive technology

Dr Peter Wright: User-centred engineering for an ageing population

Professor John Robinson: Computer vision

Dr Suresh Manandhar: Natural language processing

Professor Andrew Monk: Electronic assistive technology

Monitoring technology



Assistance with activities of daily living



Advice for people with cognitive problems

Communication



Leisure



Monitoring technology



Wireless pull cord



Personal radio triggers



Fall detector



Bogus caller button



Bed occupancy sensor



CO detector, also gas, flood and smoke available



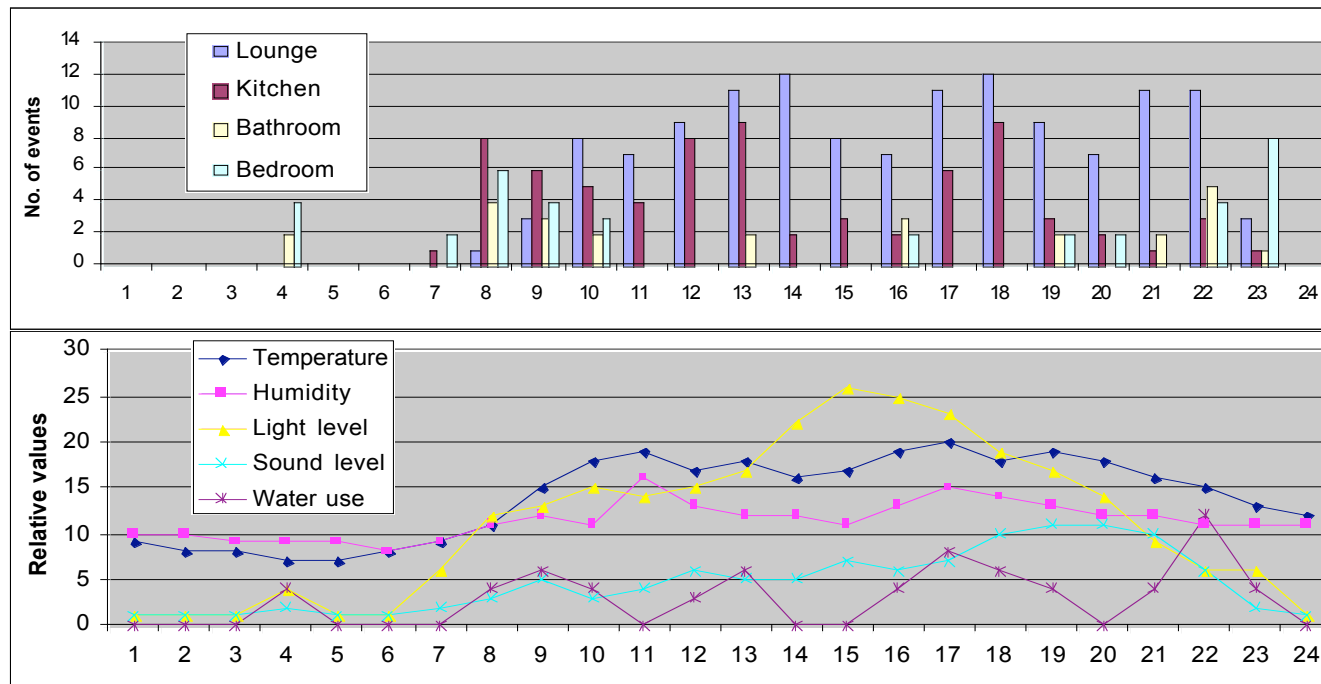
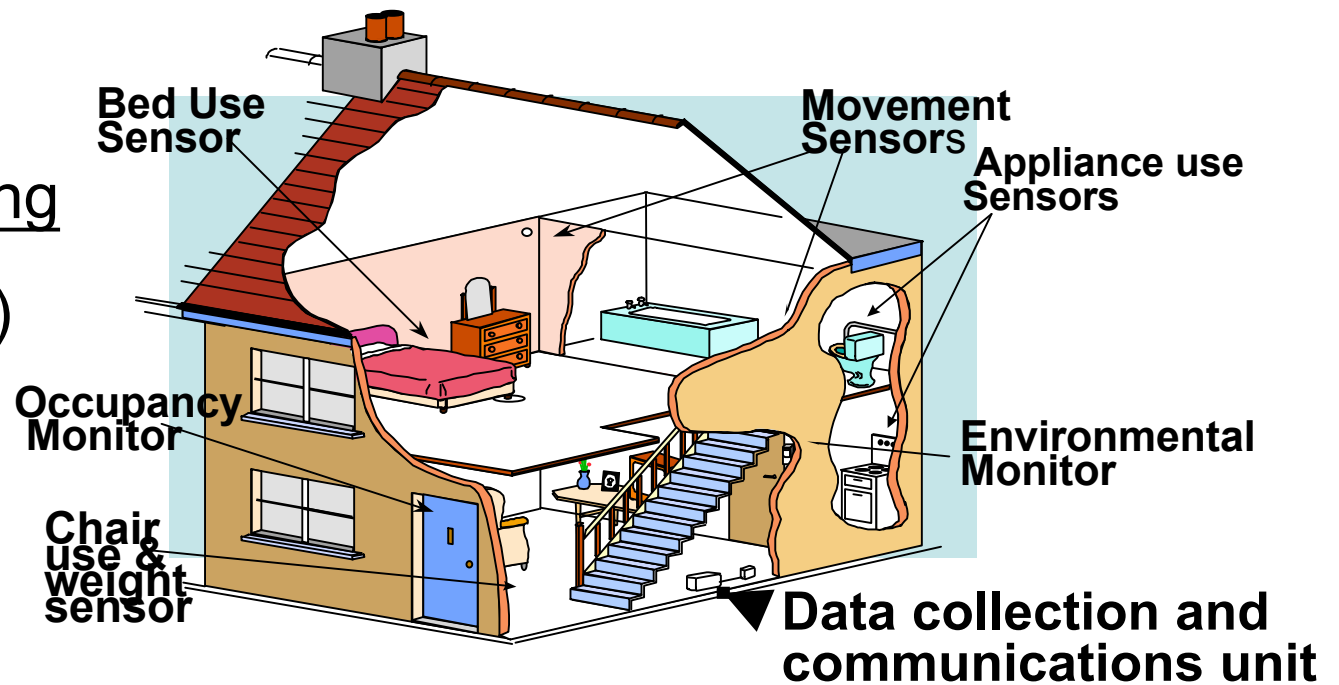
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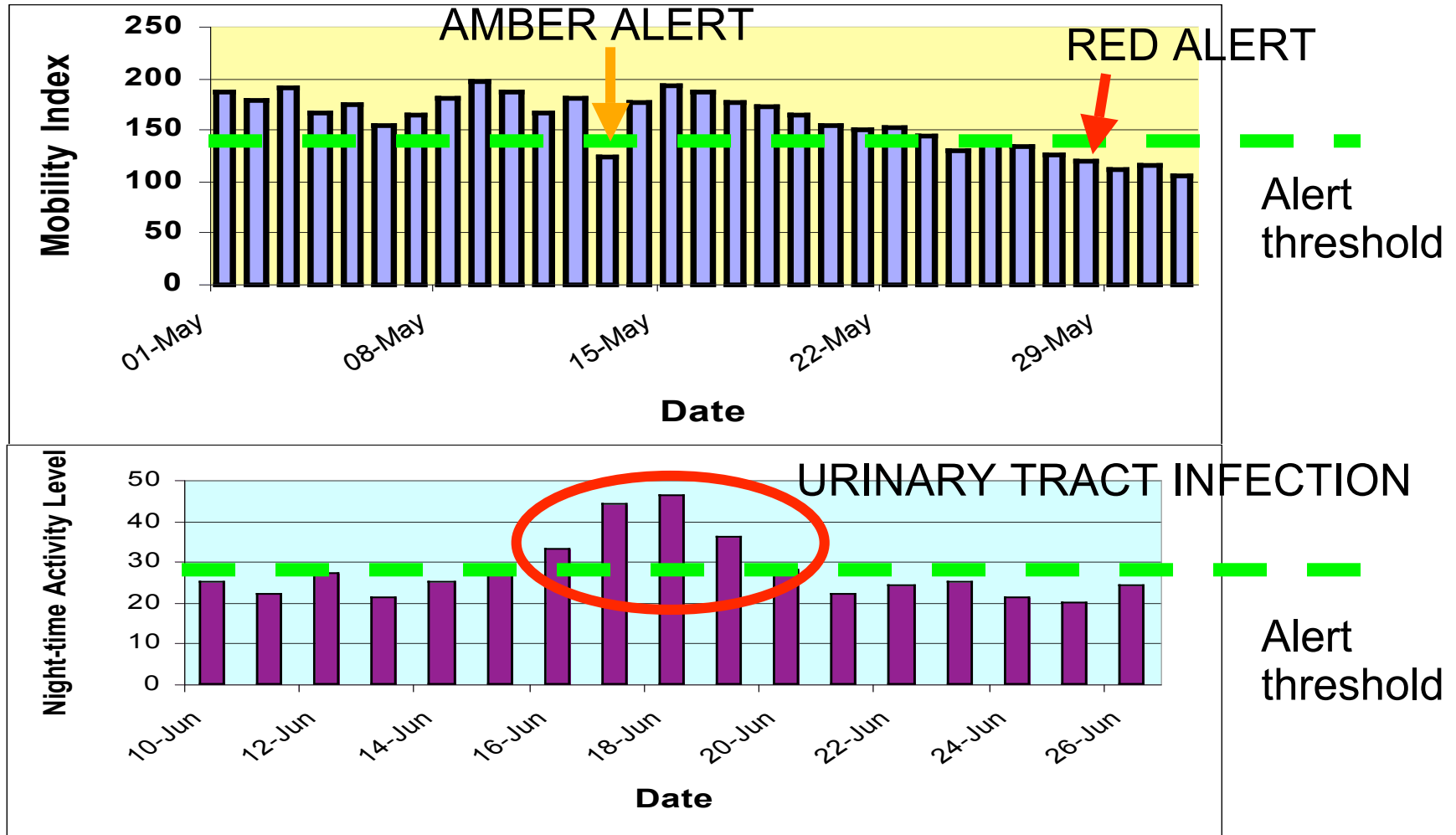
Call centre

Lifestyle monitoring

(Kevin Doughty)



Lifestyle monitoring - trends in wellbeing



Monitoring technology

Scientific advances needed

Human factors and ***social science*** techniques can be applied to make this equipment more attractive to older people earlier in their lives by finding out:

- what else could it do for them?
- how could it be made less stigmatising?

Economics and management theory can be applied to understand what makes some business models for this kind of technology work when others do not.

Monitoring systems will benefit from advances in:

- ***natural language processing***
- ***computer vision***

Assistance with activities of daily living



Door entry systems



Environmental controls



Carl's portable
hoist



Text phone



Reminders

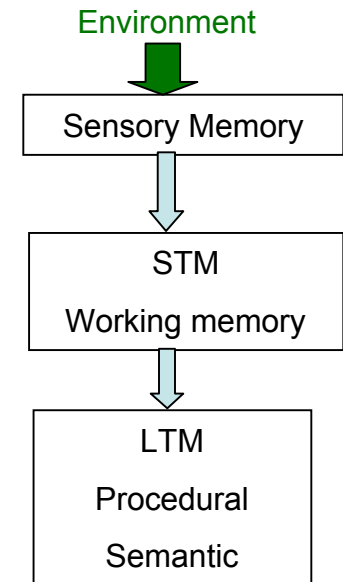
Assistance with activities of daily living

Scientific advances needed

The major problem with this group of technologies is the cost of installation and maintenance, effectors are simply more costly than sensors - ***material sciences?***

Advice for people with cognitive problems

Scientific advances needed



Cognitive psychology can provide precise characterisations of cognitive deficits that can be combined with cognitive models of activities of daily living to inform the design of advice systems.

Advice systems will also benefit from advances in:

- ***natural language processing***
- ***computer vision***

Communication technologies



Scientific advances needed

Theories of technologically mediated human-human communication from **psychology** and **human factors** need to be adapted and applied to devise communication devices that can reduce the loneliness and isolation experienced by many older people.

Leisure technologies



Scientific advances needed

The design of stimulating new entertainment technologies for older people will benefit from advances in our understanding of user experience coming from ***human factors*** research.



Conclusions

There are many opportunities for technology to improve the quality of life of older people living independently in the community.

These opportunities will only be effectively exploited when engineers and designers are given a clear specification of what older people really want technology to do for them.

Professor Andrew Monk: Electronic assistive technology

Monitoring technology



Assistance with activities of daily living



Advice for people with cognitive problems

Communication



Leisure





Dr Peter Wright

User-centred engineering for the responsive home of the future

The responsive home and ambient technologies

Embedded	Networked devices integrated into built environment
Context aware	Recognise individual's context and location, movement and flow
Personalised	Tailored to individuals
Adaptive	Change in response (days- years)
Anticipatory	Predict needs, intent and behaviours
Interaction spaces	Micro-sensor-actuators, smart materials, large interactive surfaces, gesture, speech, handwriting, intelligent image and scene analysis

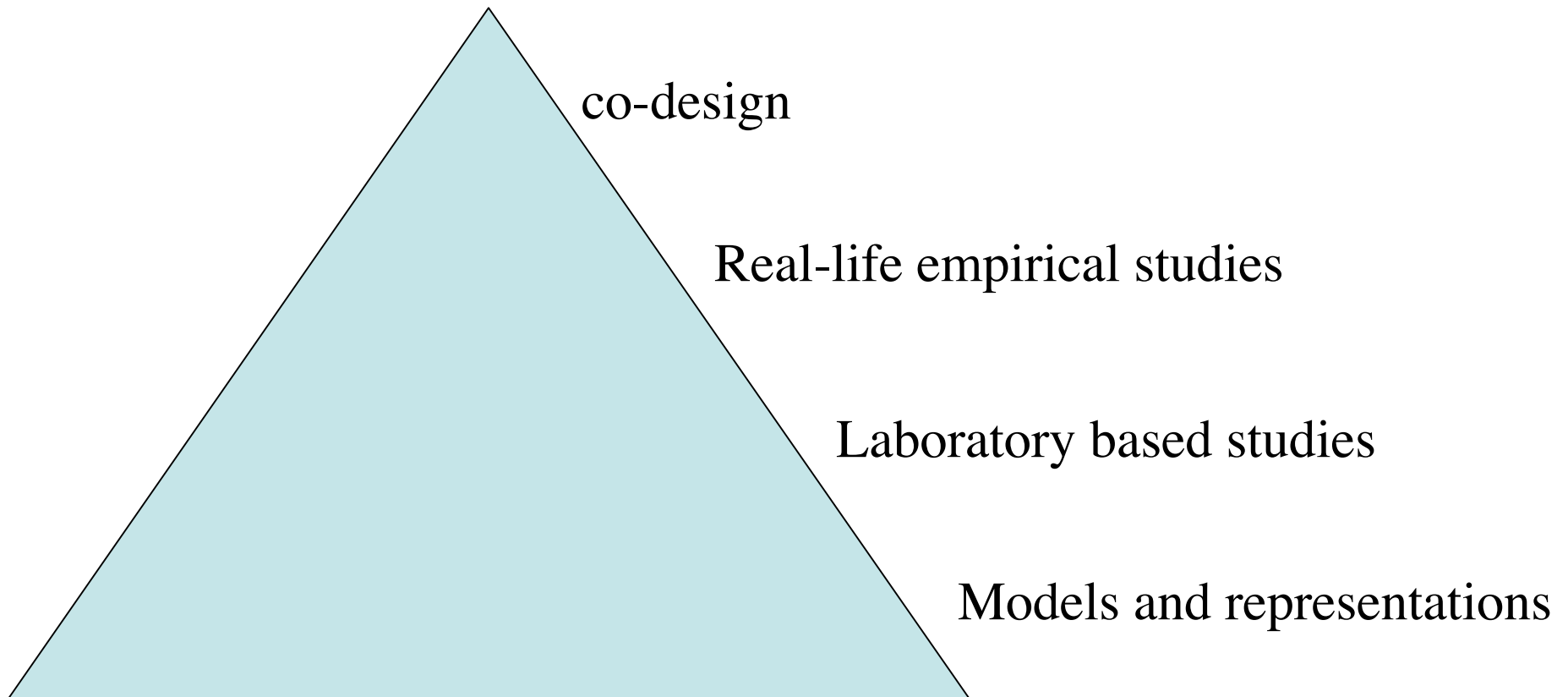
The need for user-centred design

- Designer-led design
 - “creeping featurism”
 - complex from the user’s perspective
 - designers design for themselves
- User-centred design
 - user involvement
 - empirical measurement in context of use

Know your user!

- Needs and capabilities
physical, psychological, social, risks and hazards
- Activities
habits, intents, behaviour patterns, social and cultural dispositions
- Experiences with technology
 - Sense of place, trust, identification, appropriation

Sources of information about users



From usability to user experience

Technojewellery by IDEO



We live with technology we don't just use it:

Users interaction with this domestic and personal technology is as much about self-expression, identity, quality of life

How do we understand these processes in order to design better artefacts?

What does a bed occupancy sensor say about its user?

Why can't a fall detector be a piece of jewellery?



The Apple iPod



Bed occupancy sensor



Fall detector

Ageing research agenda

- Near term
 - Service development, media integration
 - Lifestyle monitoring
 - Social applications of computing
- Long term
 - Ambient technology and the responsive home
 - A new generation of users with new capabilities but same problems
 - Long-term studies of use patterns and change
 - More sophisticated models and measurements
 - Technological research around adaptive and responsive technology
 - Principles of security, access, control, public and private space
 - Involving users in design



Dr Suresh Manandhar: Natural language processing

Embedded Digital Assistants

Allow interaction in plain natural language with everyday devices

Always On/Always Available Technology



The Ubiquitous Digital Assistant (UDA) project is developing such a technology

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▶ close

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- ▶ I'm new to first direct

Applet Measure started Internet

Networked Home Appliances

Access any service from any device in the home

Access services on the internet using plain language
e.g. shopping, doctor's appointment, telecare



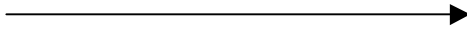
Natural Language Interfaces will reduce dependence on carers in the home and telecare services

Scientific Advances Needed

Natural language processing technology needs to be significantly improved to it bring to devices in the home

Study of human-human dialogues and human-computer dialogues

Interfacing with Monitoring technology



Fall detector



CO detector

Virtual agent interfaces with
emergency services

AI techniques for passive
monitoring of lifestyle and health



Door entry systems



Bed occupancy
sensor

*Advances in Computer Vision will help build cheaper passive
monitoring systems*

Language Driven interfaces to Entertainment systems

Voice driven access to TV schedules

Voice driven recording of programs

Automatic acquisition of user preferences



Aging Population

In 1999 15% of the European population were 80 years of age or older, in 2050, a conservative prediction is that it will be 30%.

So who is going to look after us?



Mitsubishi's
Wakamaru Robot
Companion,
available 2004,
cost £10k.

Virtual Companion

Virtual companions to engage in social chat

Offer helpful advice driven by analysis from passive monitoring systems

Engage in friendly persuasive dialogue to gently induce better daily routine/reminders



Scientific Advances Needed

Better understanding/modeling of role of social chit-chat

Mechanisms for persuasion in dialogue

Better modelling of human gestures and better understanding of other non-verbal communication