What are patient-driven approaches / self-management?
Here are the opportunities:

- Technologies that allow patients / citizens to manage their condition using technology.
- Use of smartphones / tablets / mobile devices / watches / sensors (generic & specific)
- Support lifestyle changes and medical information.
- Communication with health personnel.
- Access to health records / archive.
- Decision support when incidents occur.
- Detection of deterioration – alerts if necessary.
- Interactive knowledge base & psychologic support.
Which advantages do patient-driven approaches / self-management have?

- Patient/citizen has «helper» in her/his pocket
  - Always available
- Reduce number of visits to hospital/health care unit
  - Cost reduction in health care service
  - Health personnel can concentrate on the «real» cases
- More complete documentation: health diary
  - Reminders can help patient to organise
- Can facilitate communication to health personnel
  - Health personnel can take informed decisions
- Better informed patients ...

Example how patient-health personnel collaboration can look like from a technical perspective

Example is taken from the MOSKUS project, supported by The Research Council of Norway, funding number 227251.
What are the challenges of patient-driven approaches?

- Can patients trust the technology?
- Are there cases when self-management does not work?
  - Can death rate increase when using self-management?
  - What if patients are cheating?
- Obstacles for patient – health personnel communication?
- Security and privacy? Can data be used by others?
- Data processing and cloud computing?
- Do patient-driven approaches compete with health personnel?
- Who shall bear the costs for self-management?

Brendan O’Flynn, University College Cork, Ireland:
bridging the gap between clinicians / healthcare experts and ICT technologists: how to learn a common language to create solutions

Aoki Kyota, Utsunomiya, Japan
The IoT can promote activities to increase the QoL of the ageing population

Jaap Ham, Eindhoven Univ. of Technology, NL
The importance of situational influences in ambient assistive technology

Hassan Khachfe, Lebanese International University
Ensuring the Quality of Home-Based Healthcare using Mobile Technology

Gregory O’Hare, University College Dublin, Ireland
How to collect and fuse quality sensed data that can inform the learning algorithm; ... that can reflect the changing needs of the patient; ... that can deliver system personalisation?
The panel discussion went into a variety of issues (1).

- Specialists talk different «languages» and use different research methodologies. Maybe the suggested ABC ecosystem needs an extension by other professions ... and also the patient ...
- The use of the IoT vs. traditional healthcare; having a dog as a pet vs. a robot, ...
- Pokémon Go as a self-management system?
- The importance of preventing to be a patient ...
- Studying the effectiveness is important ...
- The psychology of therapy – being in a hospital vs. home healthcare

The panel discussion went into a variety of issues (2).

- Errors in the healthcare chain can happen – nurses, doctors, ... can make errors; devices can fail;
- When choosing a dog as a pet or a robot as a pet: consider that a robot can gather data while a dog cannot.
- Data is the key! Data can give valuable insights!
- Moral dilemmas can occur: ambient technology, the technology that enables independent living, can be used to decide when a person no longer can live independently ...
- ...

NR
ICT Enabling Smart Therapeutic Solutions

It’s a matter of ABC........

Brendan O’Flynn

Tyndall National Institute
University College Cork
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Vision

To be the premier Information and Communications Technology research institute worldwide in generating economic impact through excellence in research
Differentiation: from atoms to systems

We are globally leading in our core research areas:

**Atoms**
- Theory & Modelling
- Nano materials and device processing

**Devices**
- Semiconductor wafer fabrication

**Circuits**
- Mixed signal and analog circuit design

**Systems**
- Smart sensors and systems
- Optical communication systems
- Microelectronic and photonic integration
Integrated ICT enabling sectoral growth

Integrated ICT delivers smart systems to enable sectoral growth

Healthcare: longer, healthy lives

Communications: efficient, reliable

Energy: protected, safe, secure

Agri, Food, Environment: sustainable, secure
ABC Ecosystem for Medtech & Pharma

Collaboration with global medtech & pharma companies, leading clinicians and leading scientists.
We **Collaborate** with global medtech & pharma companies, leading clinicians and scientists.

**ABC Ecosystem**

Novel Healthcare Solutions

Combining Clinical Need & Commercial Opportunity
Industrial Researchers-in-Residence

- Boston Scientific
- Lake Region Medical
- J&J ACOE
- Intel Corporation
- Analog Devices
- Applied Materials
- Endeco
- Infiniled
- X-CelePrint
- UTRC – incubated at Tyndall
Vision

- Smart Medtech Devices will enable Personalised Precision Medicine.
- Convergence in Medtech, Pharma and ICT manufacture and innovation.
  - Challenges and opportunities related to the transition to Smart Delivery Systems.
- Precision therapies
  - Closed loop systems with delivery and monitoring - dose is adjusted to achieve the desired effect based on real-time monitoring of the patient
  - Big data - data collection at the device, patient and population levels will empower big data analytics for managing the supply chain, quantifying the effectiveness of the devices / therapeutics, and enabling population level analytics.
- Service rather than product based business models will be the future basis for reimbursement.
- All enabled by A, B, C (Academics, Business, Clinicians)
Ireland’s National Institute for ICT Research Development and Innovation
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Marie-Curie - Edge Co Fund

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3 THEMES:
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- Future Networks & Communications

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www.edge-research.eu
First call closes 1st Dec 2016
THE IMPORTANCE OF SITUATIONAL INFLUENCES IN AMBIENT ASSISTIVE TECHNOLOGY

JAAP HAM

AMBIENT 2016
Jaap Ham

j.r.c.ham@tue.nl

Research Group: Human Technology Interaction
Eindhoven University of Technology

Research topics:

-- eCoaching (www.echw.science)
-- Acceptance and trust in technology
-- Persuasive technology → Health behavior
  -- Persuasive robots → Sustainability
-- Persuasive lighting
eCoaching for Health and Wellbeing 2016

[Website Link]

Amsterdam, January 26-27, 2016.
Deadline for papers: November 1.
Patient-driven approaches

Patient-driven approaches in self-managing ambient assisted systems can lead to:
- increased user agency,
- user control allocation, and
- lower reactance and to
- stronger persuasion and
- improved behavior change.
Current societal problems

Environment

Health

Safety
Effectiveness = Technology \times Behavior

Environment  Health  Safety
Ambient influences: crucial driver of human behavior

Behavior = F (Person, Situation) \hspace{1cm} \text{(Lewin, 1932)}

The importance of situational influences in ambient assistive technology.
THE IMPORTANCE OF SITUATIONAL INFLUENCES IN AMBIENT ASSISTIVE TECHNOLOGY

JAAP HAM

AMBIENT 2016
Ensuring the Quality of Home-Based Healthcare using Mobile Technology

Dr. Hassan M. Khachfe
Prof. of Biomedical Sciences & Biomedical Engineering
Director, Center for Quality Assurance and Scientific Research
Lebanese International University, Beirut, Lebanon
Home-Based healthcare: History and Development

It is health care or supportive care provided in the patient's home by healthcare professionals (often referred to as home health care or informal care).

- Development of the hospital as a place for treatment was at first gathered.
- Augmented risk of infection and health expenses due to the elongated period of stay at the hospital.
- Re-establishing of in-home care services as it could help solving some issues.
- Doctors used to treat patients at home
Current Situation

- Approximately 10 million individuals currently receive care from some 20,000 providers because of acute illness, long-term health conditions, permanent disability, or terminal illness.
- In 2014, annual expenditures for home health care were approx. $18 billion.

[Diagram: Distribution of Medicare Benefit Payments, 2014]

Current Situation: Services provided

- Professional nursing care, physical, occupational, respiratory, and speech therapies.
- Social work and nutritional care and laboratory, dental, optical, pharmacy, podiatry, x-ray, and medical equipment and supply services.
- Services for the treatment of medical conditions usually are prescribed by an individual's physician.
- Supportive services, however, do not require a physician's orders.

- Home care services can be provided by the following: professionals, paraprofessionals, and volunteers.
Current Situation: Challenges

- Work conditions
- Interaction with the patient or case severity
- Device error
- Lack of control
- Human mistakes
- Lack of Experience
- Negligence

Errors
Effect of Lack of Experience on Total Error

<table>
<thead>
<tr>
<th>Total Error</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Without control</strong></td>
<td>17%</td>
<td>24%</td>
<td>33%</td>
<td>42%</td>
<td>52%</td>
</tr>
<tr>
<td><strong>With control</strong></td>
<td>13%</td>
<td>16%</td>
<td>19%</td>
<td>23%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Total error in both cases with and without control.
Current Situation: Treatment process

Staff and Service

- Staff working conditions
- Staff Experience
- Patient Living conditions
- Patient Responsiveness
- Support
- Control and Follow up
- Devices and tools
The proposed Model
Home-based care system sample diagram.
The proposed Model: Mobile applications in healthcare

→ Enables Real-time access to healthcare information.

→ Healthcare providers and partners to have anytime-anywhere access to information while ensuring patient confidentiality.

→ The doctors can manage appointments at their finger tips and make instant decisions. They can view the patient scheduling and alter appointments as necessary. This gives them an over view of the work load. They can also trigger new prescriptions and prescription refills.

→ Mobilization of critical healthcare applications, forms & reports irrespective of the technology and data location.
The proposed Model: Sample (work flow of a new patient)

- **New Patient ID**
- **Already Served?**
  - **Yes** → **Old Patient Procedure**
  - **NO** → **Central Control Office**
    - Requesting detailed description of the case from the treating Doctor and the procedures to be executed
- **IT**: Development of the dedicated mobile application and settling necessary alarms and indicators
- **Introduce and Train staff to the case**
Simulations and conclusions

- Real time monitoring ensured
- Error decreased sharply.
- More patient satisfaction.
Involvement of the Patient

Communication scheme between the various key players.
Equipment maintenance tracking system

Inexperienced staff enters tag # of medical device to check maintenance history

Control Room at Hospital

Secured Link

Experienced Staff monitors medical device information.

Medical Device

XXX-XXX-XXX
Thank You for your attention
IoT promotes activities.

To inactive elderly people
Population

- In JAPAN, many elderly peoples keep in an inactive state.
- Some peoples really have problems about their motor functions.
- Many peoples destroy their motor functions from their inactiveness.
Population

• We human is not strong enough to prevent bad customs.
• In JAPAN, already 30% of population is aged over 65 years old.
• For me, a beautiful young female trainer is best.
• However, there is not enough man-power in JAPAN.
Robot

• Soon, in 20 years, we can have a robot that helps us in day by day life.

• However, now we need their replacements.

• No single sensor can not have enough power to understand a human activity.

• Now, IoT: the cloud of sensors can understand a human activity.
IoT helps us to keep good customs.

• Good customs make us much more healthy.
• Good customs delay our aging process.
• Good customs increase our QOL.
Conclusion

- Patient-driven?
- Pre-patient-driven?

- We need a magic to make a human to learn good custom.
- The magic may be implemented with the help of IoT.
  - Understanding of a human activities.