mHealth in future medical and clinical context, and personal health systems
- *care models and self management*

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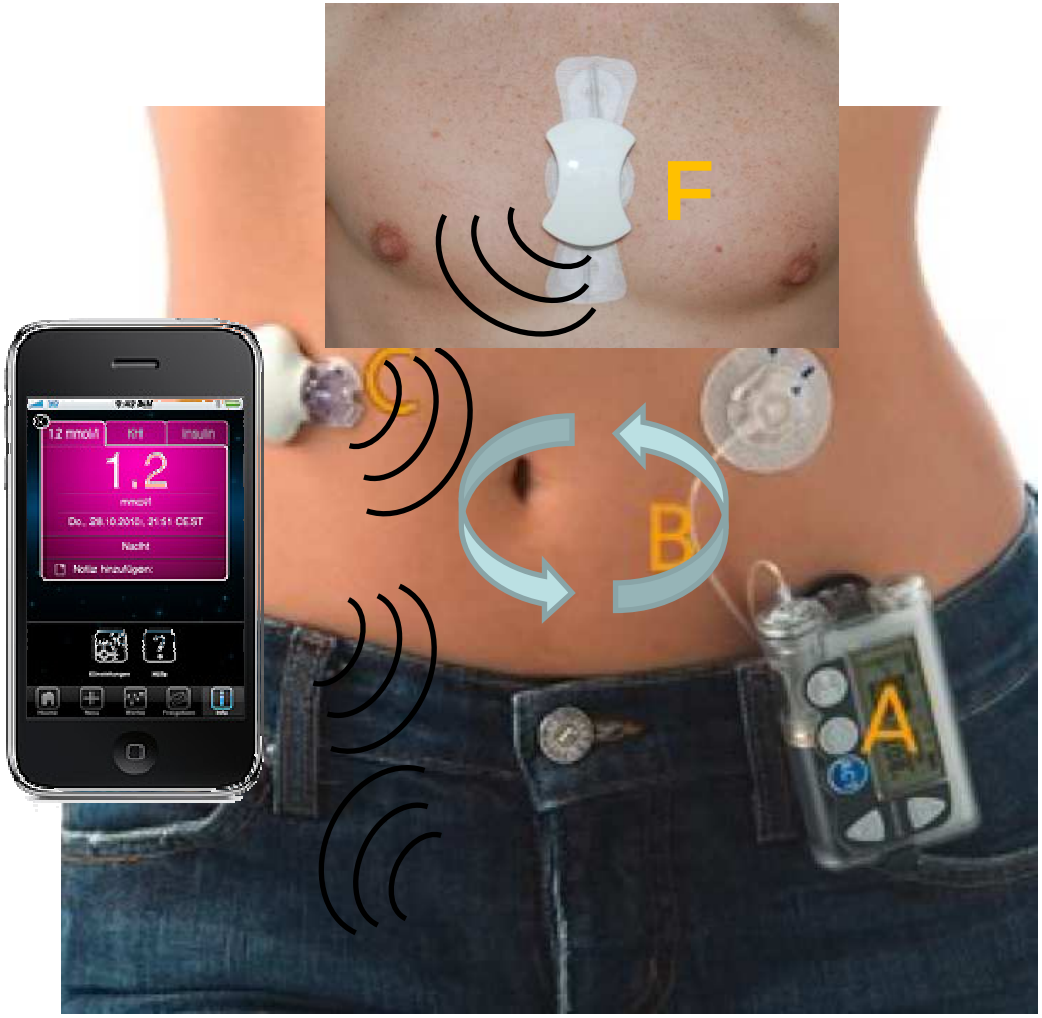
Outline of Presentation

- Examples of patient pathways using mHealth platform
  - Change of workflows promoting self-management in the primary care sector with wearable devices
  - Advise, instructions and risk assessment using mobile devices
  - Health management and wellness using Personal Health Systems
  - mHealth in rural areas and developing countries

- New care models (and pathways) in mHealth
  - Information space
  - Care space

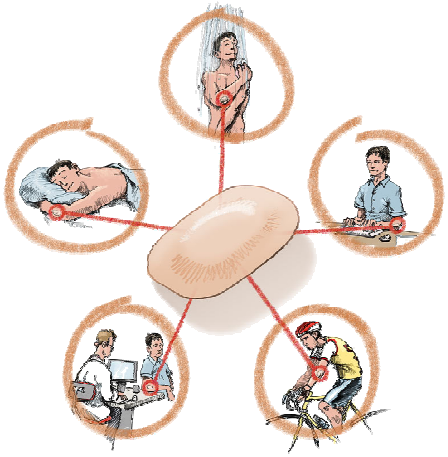
REACTION – Gluceamic Control



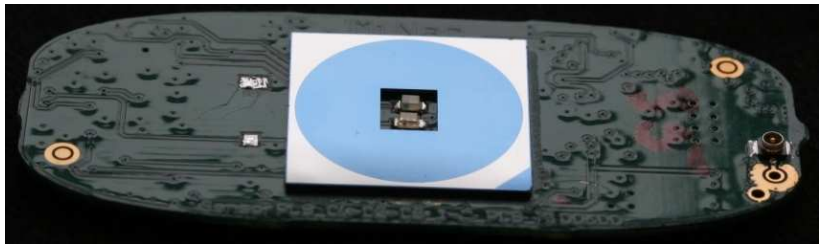
- Healthcare professionals in hospital wards to improve glycaemic control of admitted patients
- Help insulin-dependent type 1 diabetic outpatients to better control their disease with closed-loop feedback
- Encourage strategies in support of pro-active management of type 1 and type 2 diabetes

Insulin pump (A)
Cannula (B)
Wireless Module (C)
Glucose Sensor (D)
E-Patch Module (F)
(Multi Sensor Platform)

Wearable Sensor Design



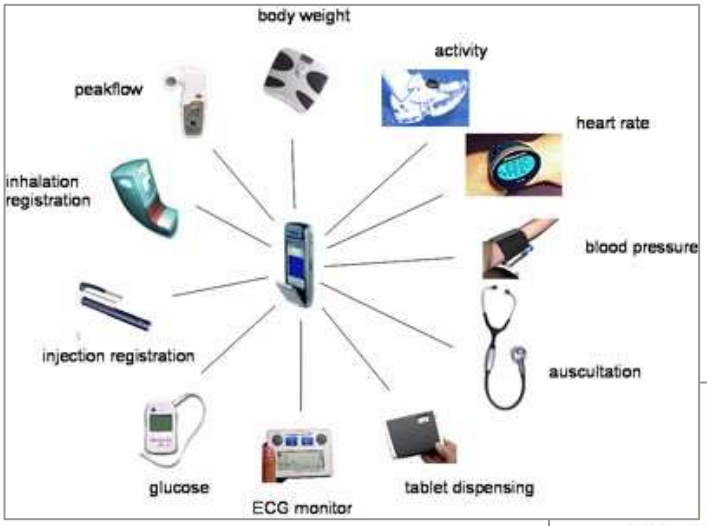
- ePatch technology
- Wearable for one full week
- Integration of different sensors into a single electronic patch!
- Incorporates ASIC and wireless network interface
- Hosting distibuted decision support
- Reusable and disposable versions



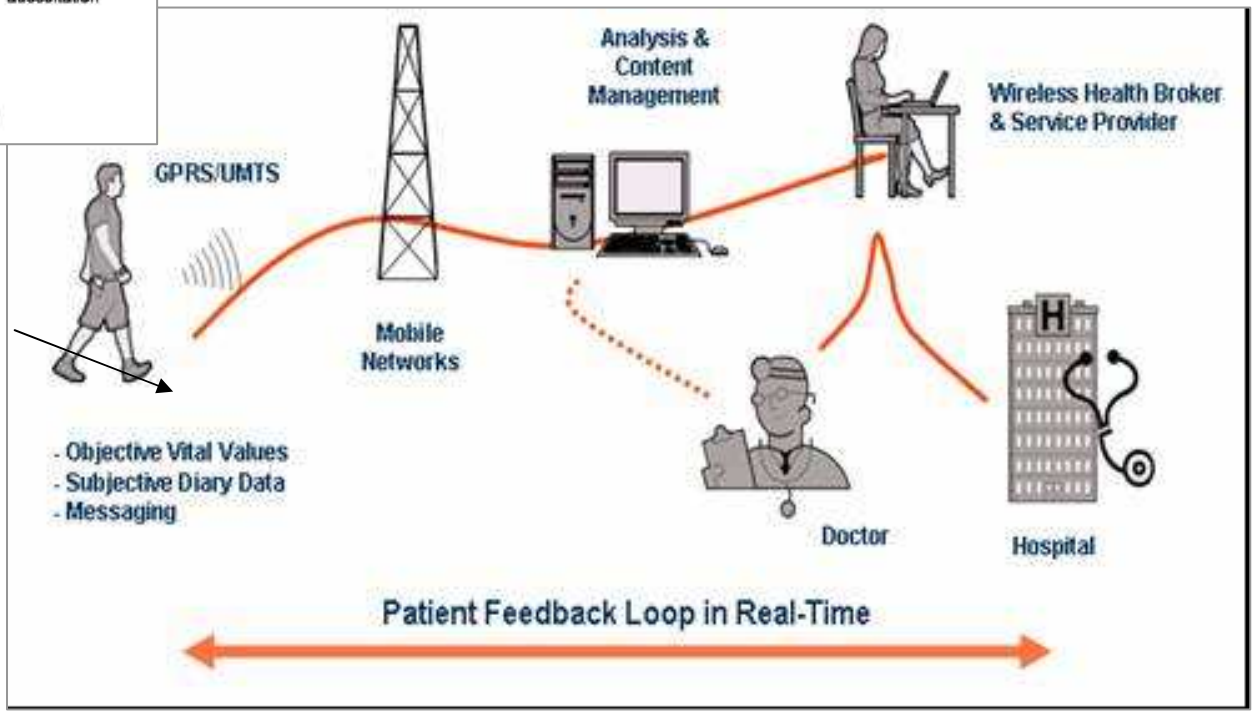
Safe Glycaemic Control (SGC)

- Insulin management errors
  - Insulin not increased when persistent blood glucose greater than 11 mmol/L and better glycaemic control appropriate (NaDIA 2010)
- Insulin sensitivity / Insulin resistance
  - Severity of illness
  - Presence of infections
- Caloric intake
  - Enteral, parenteral nutrition
  - Gastric emptying
  - Diarrhoea
- Concomitant medication
  - Corticosteroids (e.g. cortisole, cortisone)

Ericsson Mobile Health (EMH)

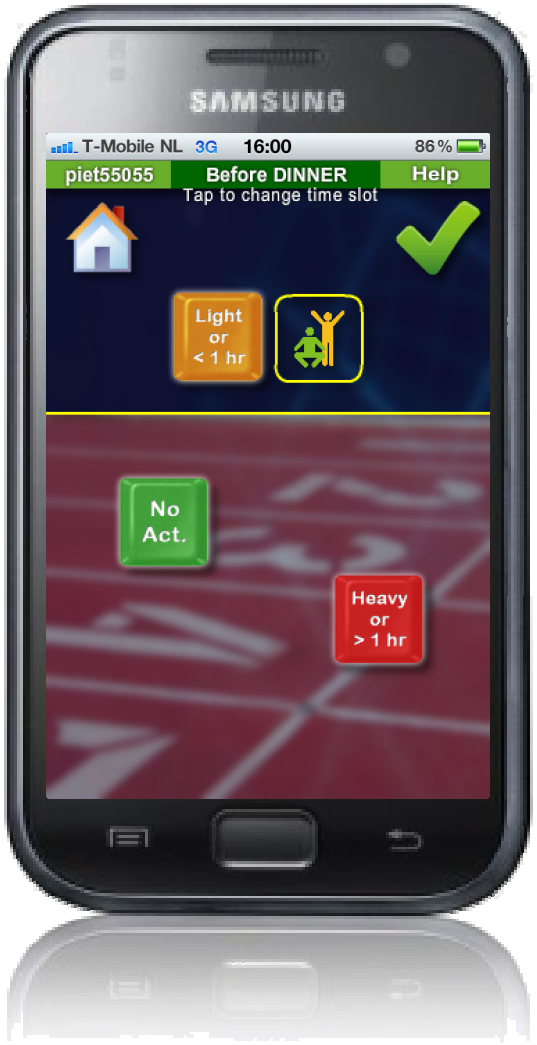


ERICSSON



Source: Ericsson, 2006, IBM, 2006

Activity and Carbon Self-registration

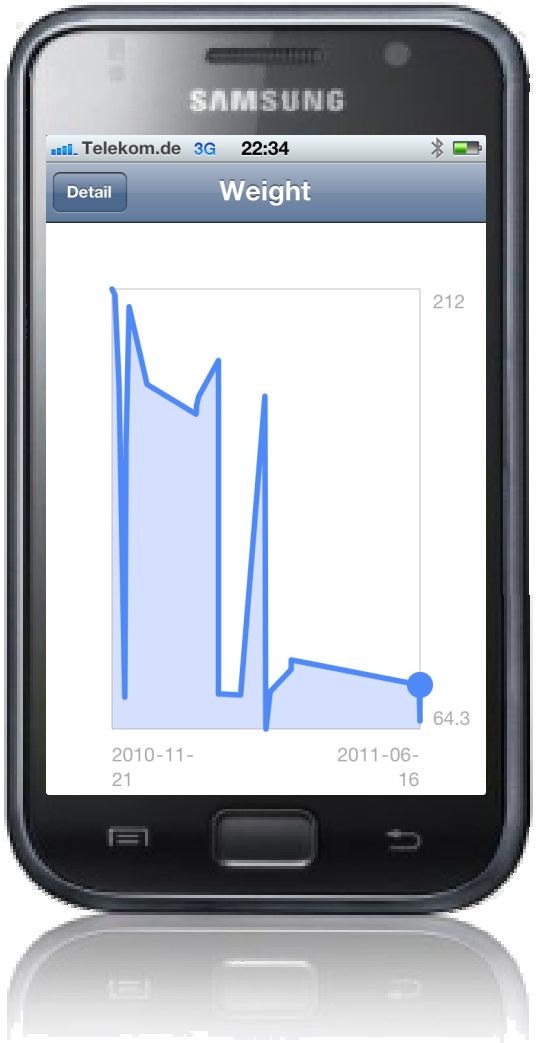


Instructions and Feed-back

Source: Courseware, 2006

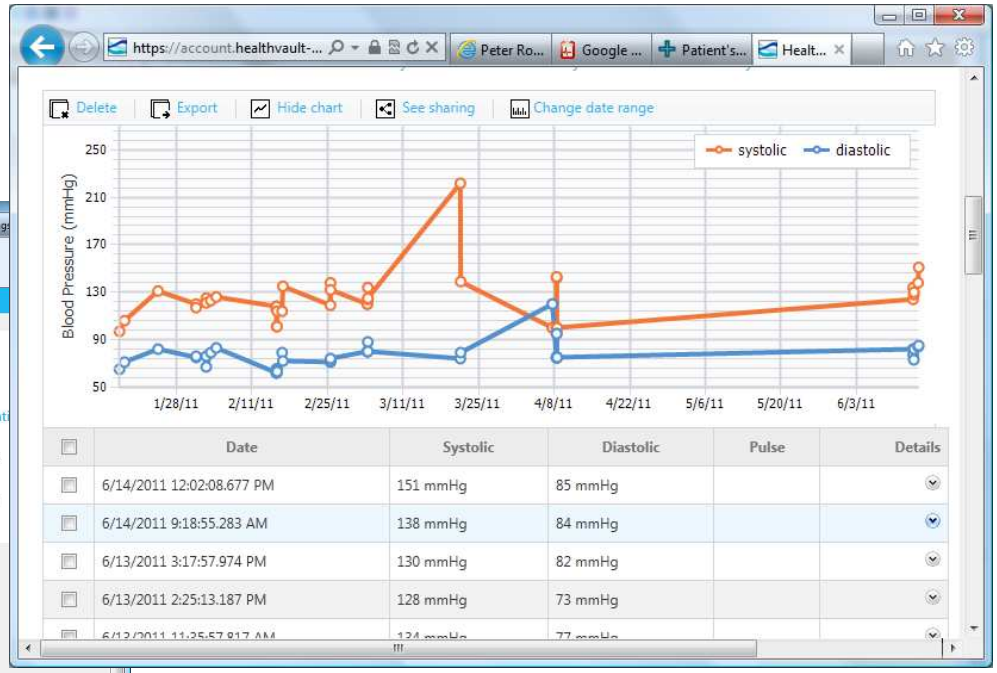
Patient's Access to Personal Data (PHS)

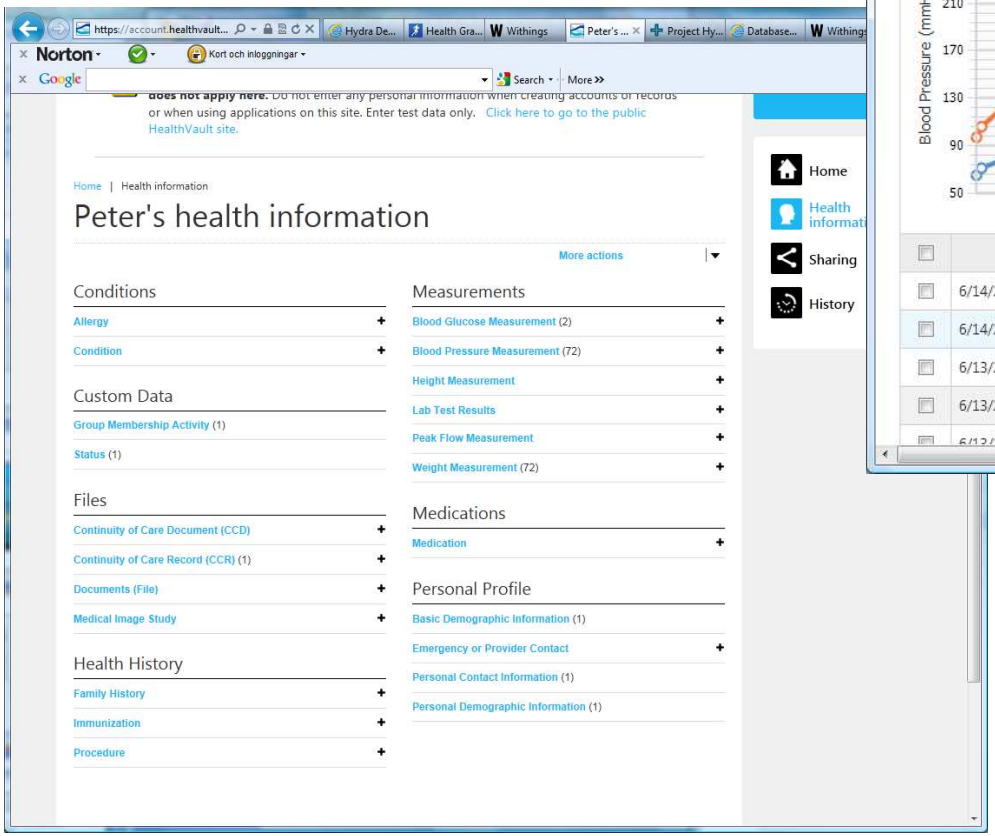
- Supports joint care
- Consolidatates health data across platforms
- Provides access to PHR
- Connects to community platforms
- Can be used with alarm systems and supervision



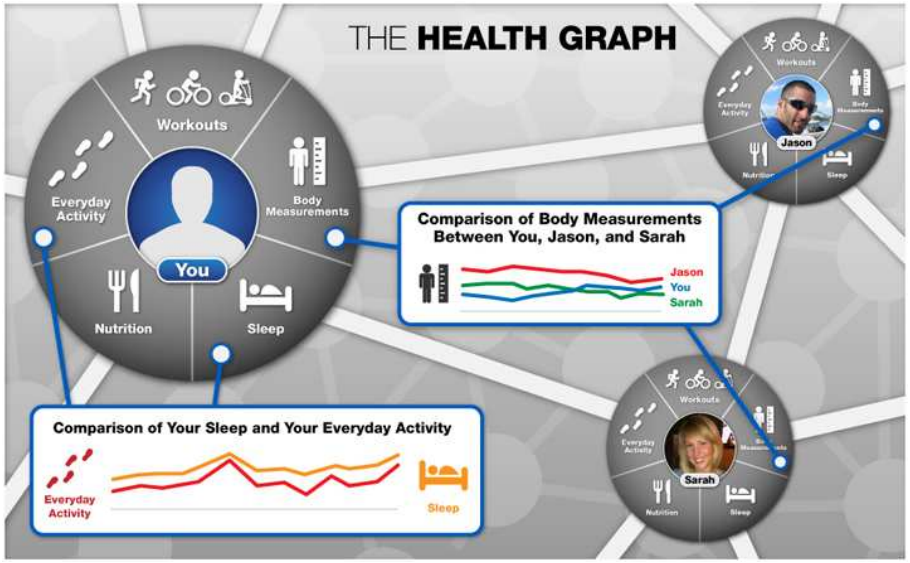
HealthVault

Offers a data store for personal health information and a set of analytical tools





HealthGraph



Offers a data store for exercise data

Extensions for a range of fitness/health devices (like weight scale, heart rate monitors, glucometers...)

UN Compendium of mHealth (1)

- **Handhelds for tracking communicable diseases, India**
  - Health workers use mobile devices to collect, validate, and transmit data to a centralized server. The server will be accessible to resident experts, who can use the real-time data to rapidly identify disease trends and make informed public health decisions. Handhelds for Health will also be able to track non-communicable diseases, such as diabetes, that require continual medical attention and follow-up.
- **Aged Diabetic Assistant (CADA), China**
  - Chinese medical centers are developing a smartphone-based self-management and support system for elderly diabetics in China. The project will use smartphones to send elderly diabetics recommendations and guidelines related to physical activity, glucose and blood pressure monitoring, weight measurement, and diet. Patients will be trained to enter and send data on glucose levels, and doctors will be able to track patient data and graphically display data for patients.

UN Compendium of mHealth (2)

- **Cell-PREVEN, Peru**
  - Cell-PREVEN was created to allow access to real-time data to members of the healthcare ecosystem in remote areas. This interactive voice response system enables health workers in the field to collect and transmit data via basic mobile phones. The data is aggregated in a centralized database and made available to medical professionals, and the system is designed to send SMS or e-mail alerts if certain symptoms are recorded.
- **Map of Medicine for Kijabe Hospital, Kenya**
  - Doctors in rural areas are often forced to treat individual patients with little or no information about resources in neighboring areas. A joint project gives Kenyan health workers at Kijabe Hospital access to the Map of Medicine, a medical information database. The Map of Medicine is a web-based tool that provides comprehensive, up-to-date information on diagnosis and treatment, presented in easy-to-use flowcharts or 'care pathways.' Doctors participating in the pilot study were given PDAs and access to data on HIV/AIDS, TB, malaria, abdominal pain, diarrhea, and typhoid fever.

New care models (and pathways) in mHealth

Information space

Care space

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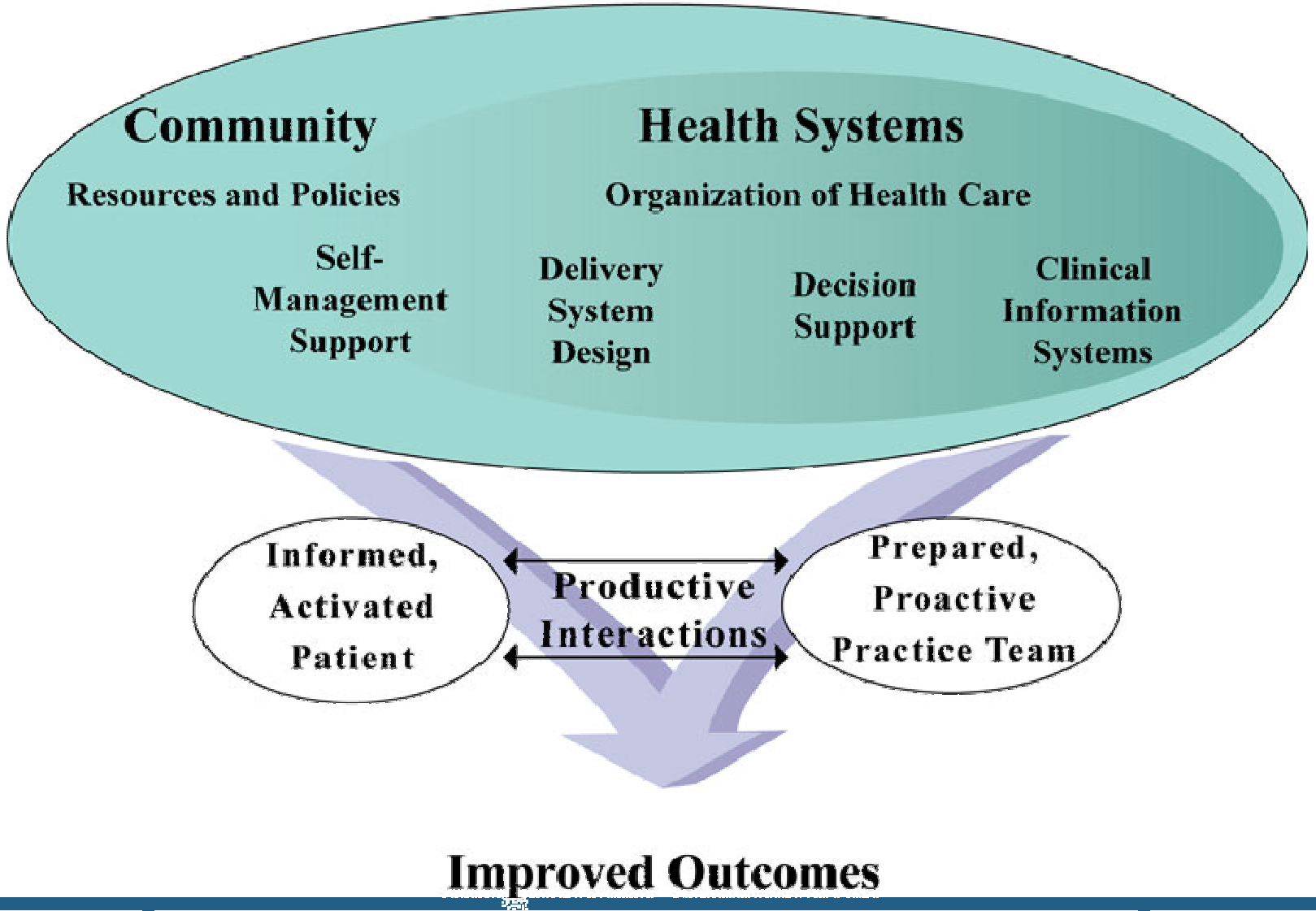
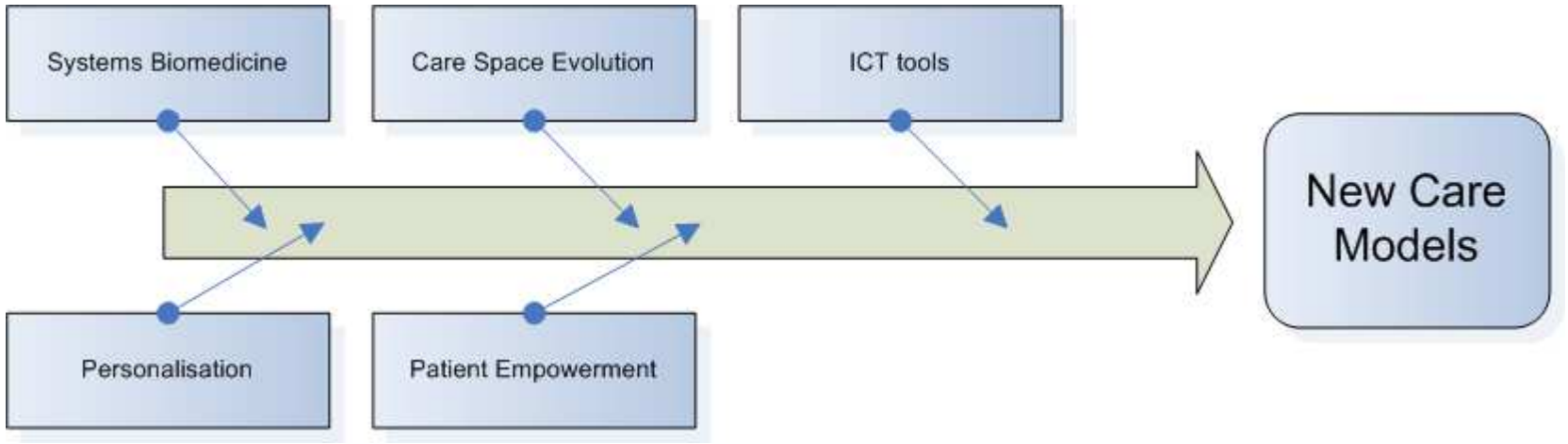
European Commission
Information Society and Media

The Chronic Care Model

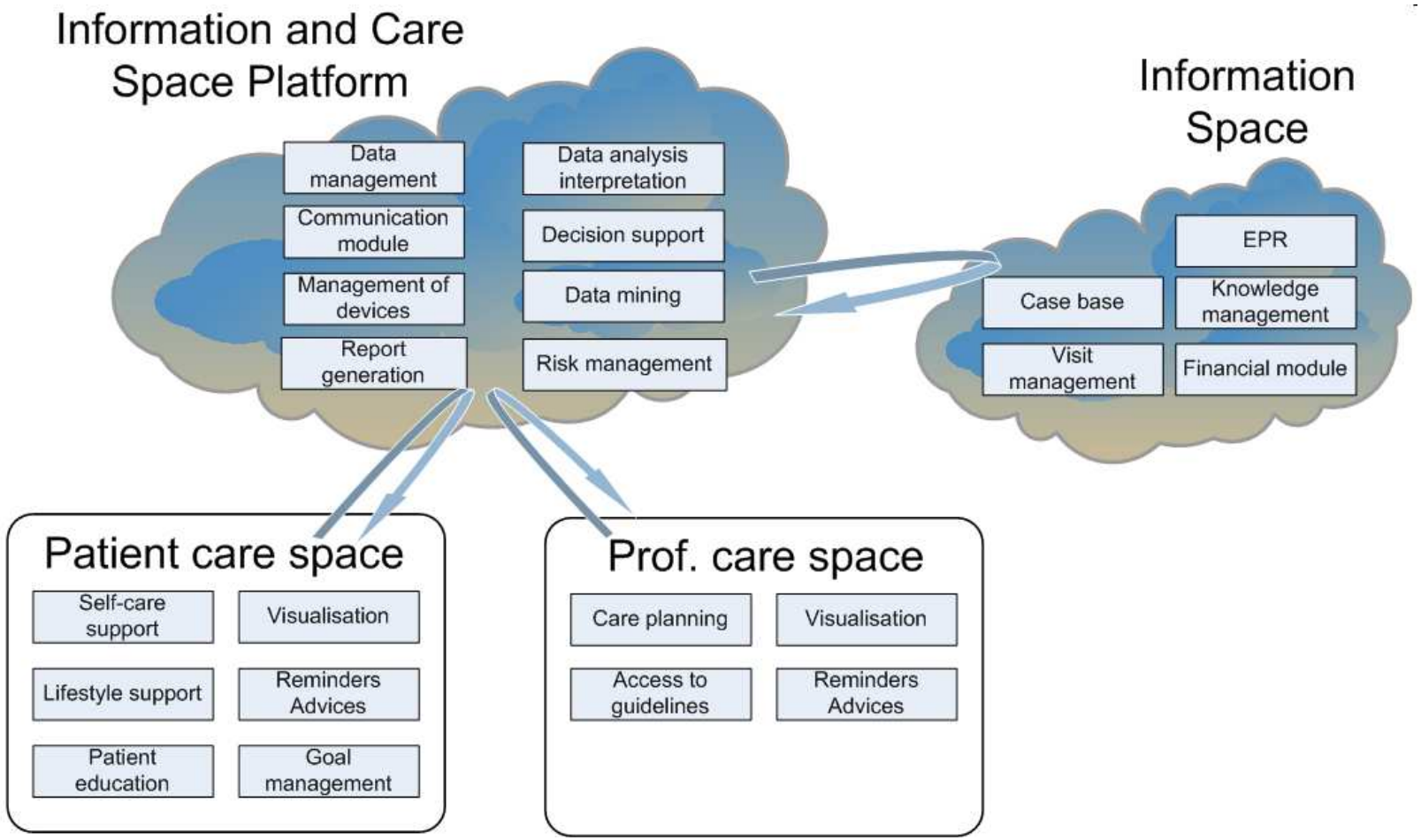


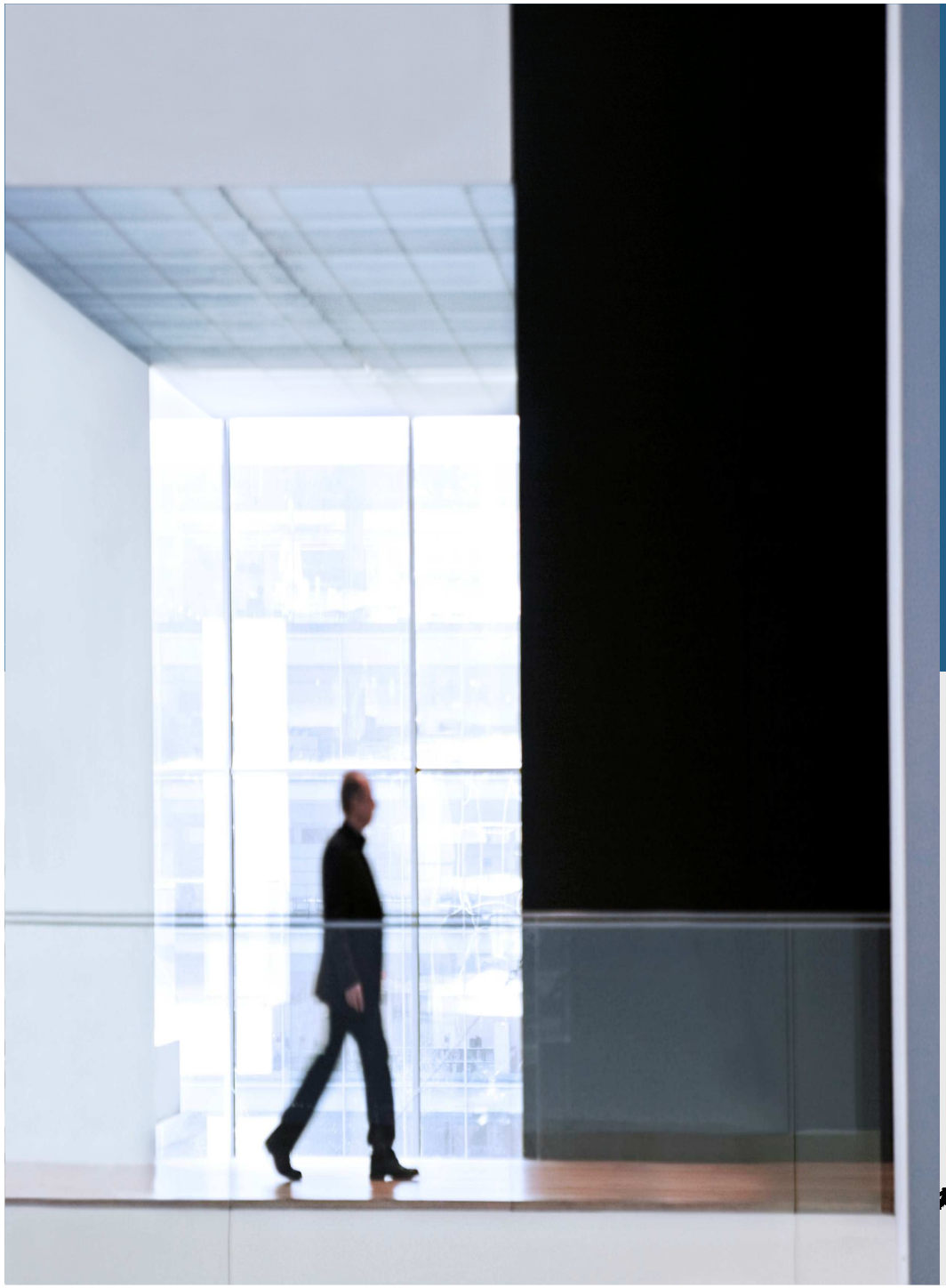
Factors Influencing Care Models

- Systems biomedicine, an important area of the biomedical and clinical R&D
- Care space evolution, integrating many different trends
- The ICT factor, providing information technological support for mHealth
- Personalisation, aiming at the individualisation of the care
- Patient focused organisational re-engineering



Information and Care Spaces





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