MEDICAK INFORMATICS, TELEMEDICINE, e-HEALTH IMIT Geneva

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Today Medicine challenges

- Increase of elderly people
  - Cronical diseases
  - Cardiovascular diseases
  - Cancer
  - Neuropathologies
- Infectious diseases
- Genetic causes of diseases
- Diseases prevention (epidemiology)
- Rehabilitation
- Home care monitoring and surveliance
- Citizens/patients ask more medical information

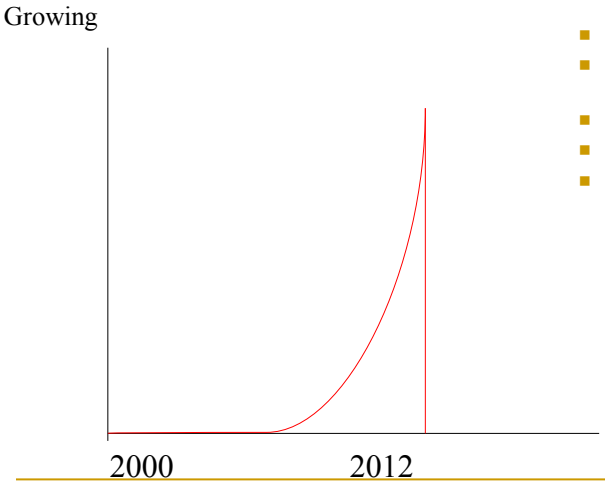
Needs of health Care and biomedical research

- Knowledge, information and data sharing and accessing for better management, control and maintaining high standards of Treatment and Care process;
- Population ageing with chronic diseases and necessity of continuously treatments, care and rehabilitation;
- Globalization of health, as market and request of more qualified health services.

Change of Paradigm

- Cost containment
- Changing demographies
- Peripheralization of Health care delivery
- Changing disease patterns
- Impact of ICT in supporting clinical decisions
- More informed and expectant patients
- Well-being factor (wellness paradigm)
- Moving information and knowledge
- Creation of health network

ICT in Health Care



- Globalisation
- Health care economics
- Patient process
- Medical profession
- New technologies (mobile videophone, mobile networks)

Information data and documents in Hospital/Health Organization

- More than 50% of activities in health care is data management

Information:

- on patient
- on structures

Medical Informatics

- Methods and systems for electronic:
  - Acquiring
  - Exchanging
  - Processing
  - Management of
    - MEDICAL DATA present in :

      RECORDS, DATABASE AND INFORMATION SYSTEMS OF HEALTH CARE STRUCTURES (HOSPITAL OUTPATIENTS CLINICS, GP's……)

Medical record (BLOIS 1984)

Set of patient information useful to diagnosis and care at different level:

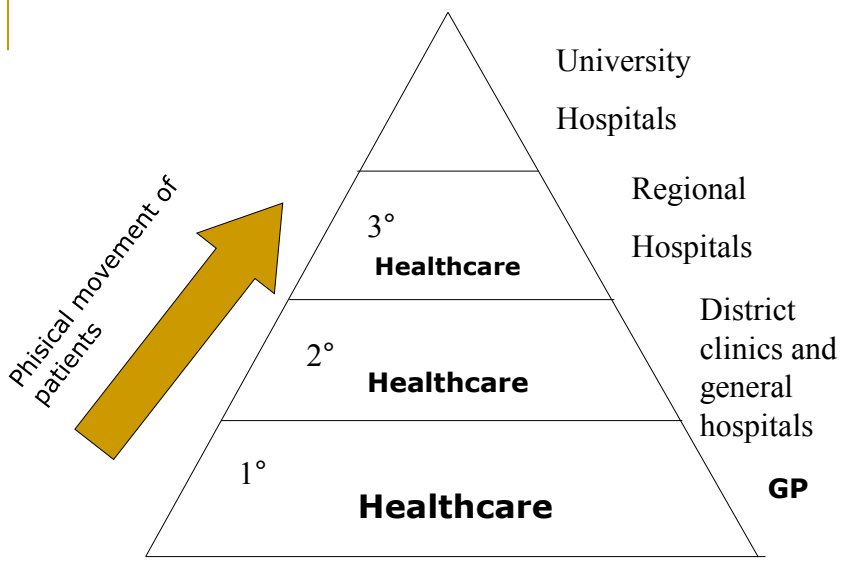
- outpatient clinic
- hospital
- emergency
- GPs
- ……..

Clinical database

Set of medical records of different patients, useful for clinical research and epidemiological studies.

Health/Hospital Information Systems

- ADT
- Wards
- Outpatient clinic
- Diagnostics/therapeutical divisions;
- Emergency care
- GPs
- Public Health Services
- Epidemiology Networks
- ……



Focus

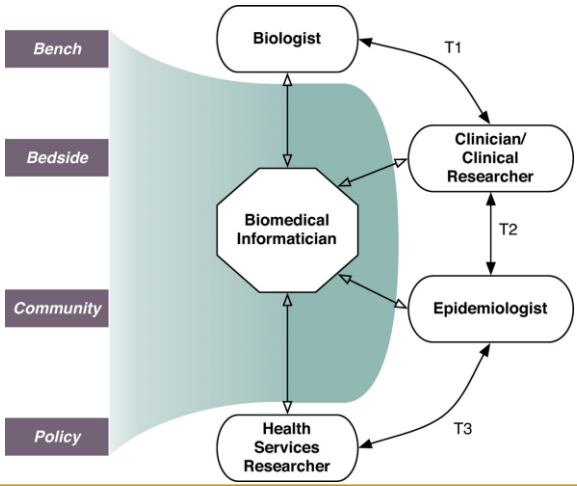
- Medical record
  - Electronic patient record
  - Patient data card
  - …….
  - Record linkage
  - Integration of health database
  - Epidemiology
  - Evaluation of care and structures quality
  - Clinical research
  - Networking
  - Telemedicine (teleconsulting/telediagnosis)
  - Teleassistance/telemonitoring
  - Internet in health care
  - Medical www

INTEGRATION OF DIFFERENT BIO-MEDICAL DATA

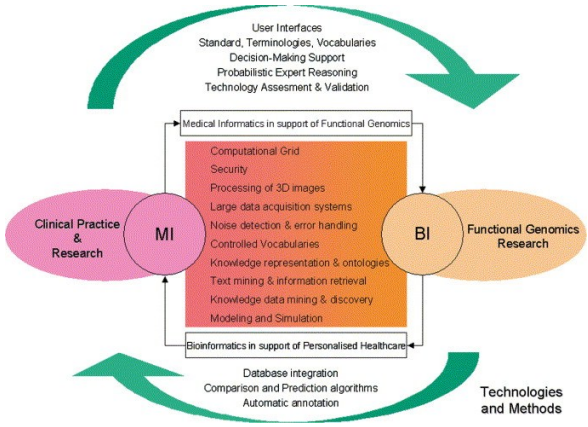
At various levels for 'personalized' health care

- Molecule
- Cell
- Tissue
- Individual person (Clinical practice)
- Population (Epidemiology, Public Health)

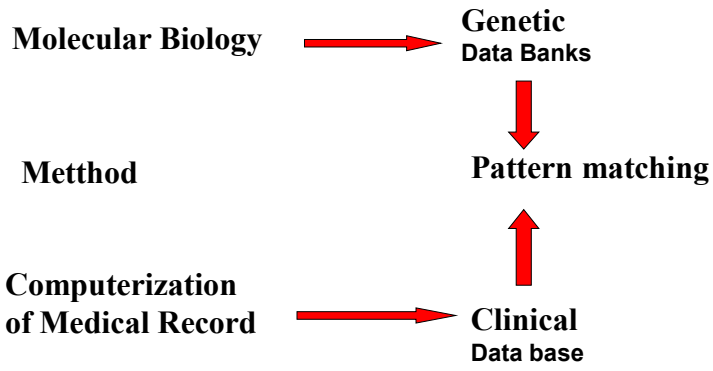
Interaction



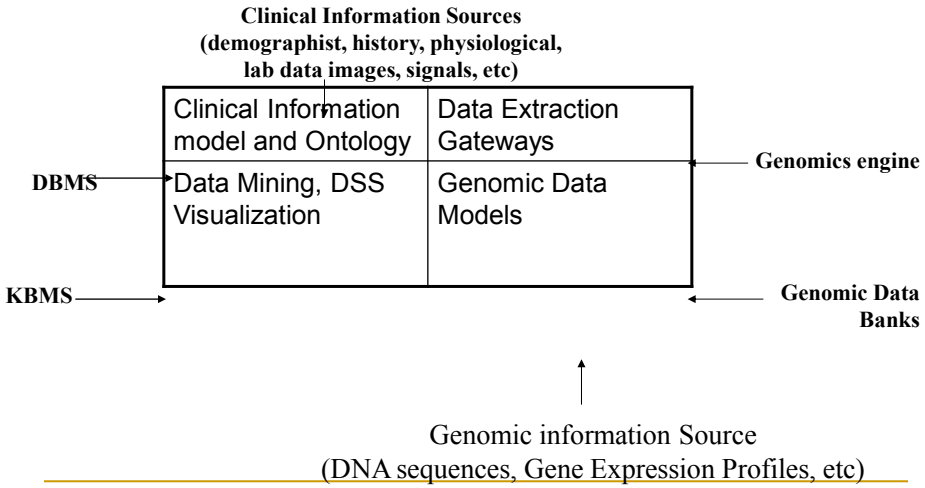
Synergy between Medical Informatics -MI & BioInformatics - BI

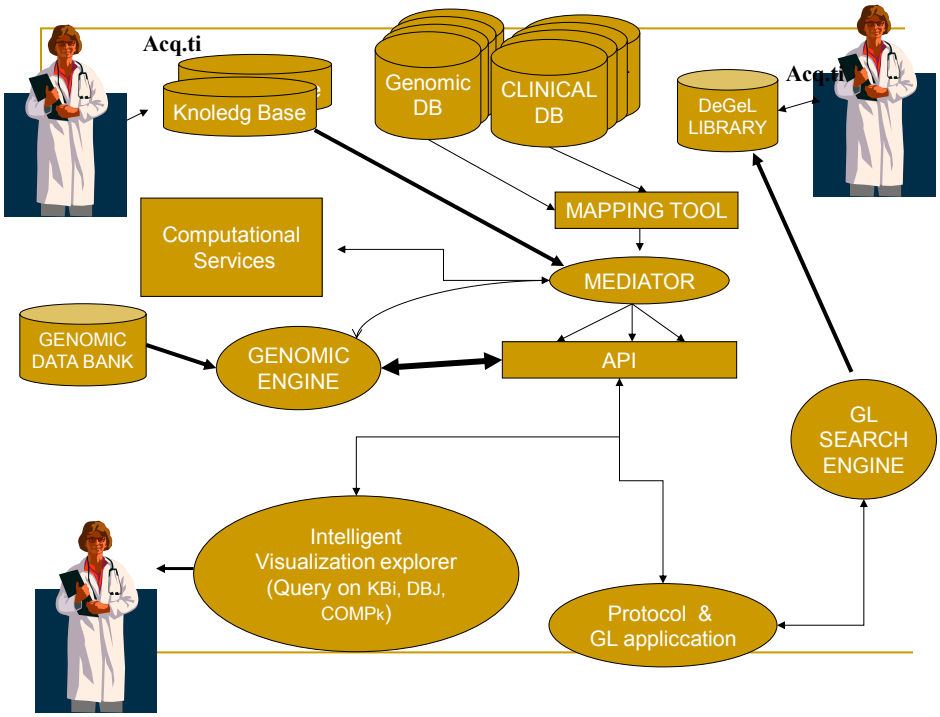


BioMedical Record Linkage: Synergy between MI and BI



Integration/Interaction of Clinical-Genomics Data



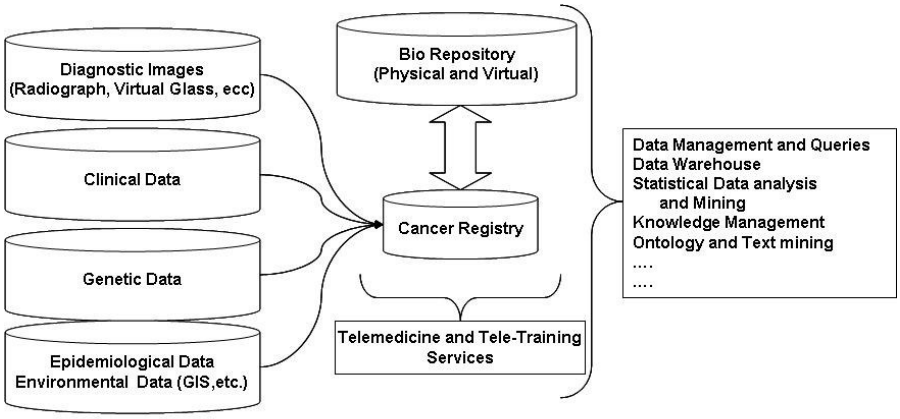


Common Language and Communication

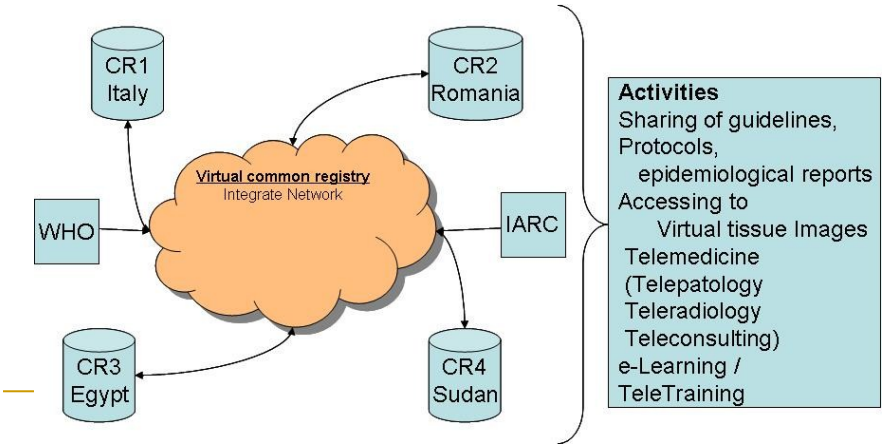
- Same coding and classification systems
  - ICD9CM/ICD10 (for diagnosis)
  - SNOMED CT (Clinical Terms)
  - ACR-NEMA (for Radiological Referals)
  - Tesauri of Terms
  - Ontology
  - …….
- Using ICT Standards
  - DICOM
  - HL7/CDA
  - XML
  - Protegè
  - Etc.

Another Project for

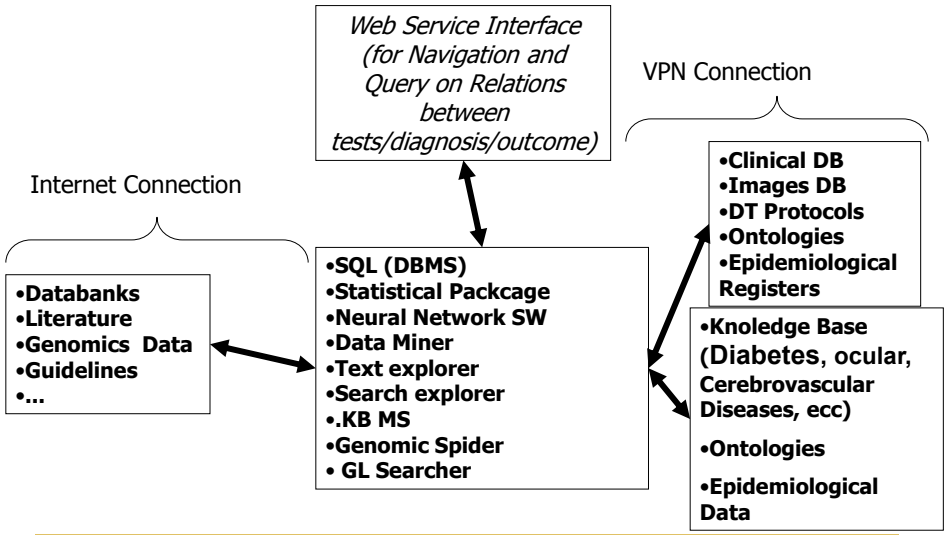
Translational Approach in Cancer Epidemiology, Research and Treatment

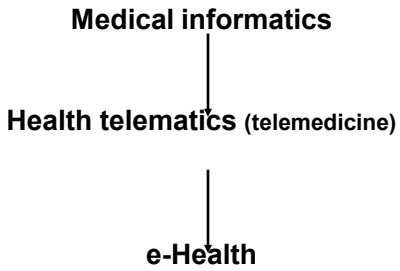


And the Network for Cancer registries in some Countries



Towards a BIG DATA Integration in DIABETES

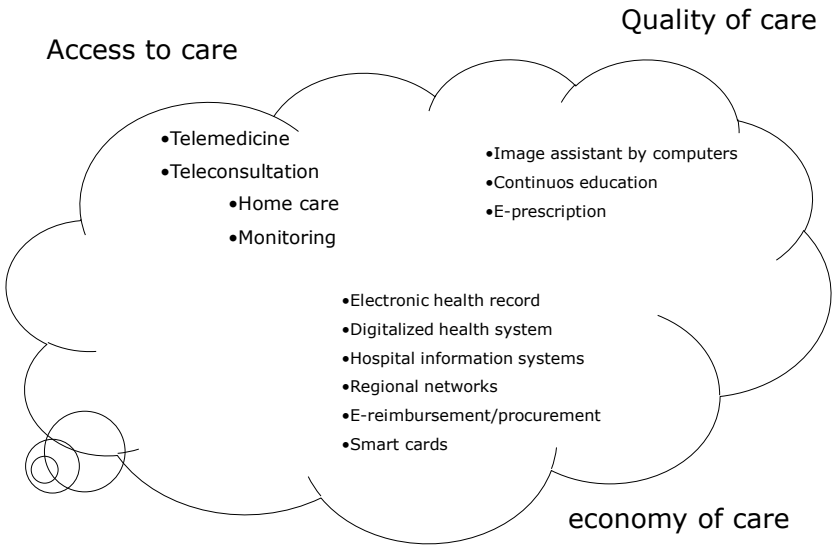




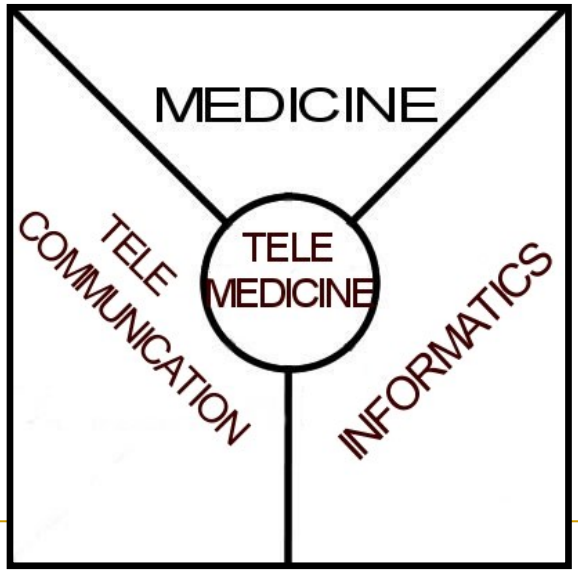
e-health includes:

- medical information systems,
- public health surveillance,
- e-learning for health professionals,
- telehomecare
- telemedicine

e-Health



Technology CONVERGENCE



DEFINITION OF TELEMEDICINE

The definition of telemedicine adopted by an international consultation group convened by the WHO in Geneva in December 1997 says:

"Telemedicine is the delivery of health-care services, where distance is a critical factor, by health-care professionals using information and communication technologies for the exchange of valid information far diagnosis, treatment and prevention of disease and injuries, and for the continuing education of health-care providers as well as research and evaluation, all in the interests of advancing the health of individuals and their communities."

Internet in medicine

- Diffusion of Internet services in healthcare;
- Building of web sites and portals in medicine fields;
- Sharing and accessing to clinical information (protocols of care, guidelines, etc.);
- Teleconsulting and telediagnosis in peripherical health structures and also at home **(Telemedicine).**.

TELEMEDICINE METHODS and Services

Teleconsulting:
clinicians ⟷ clinicians
Telediagnosis:
clinicians → phisicians
Telemonitoring:
clinical centers → patients
Telesurveillance:
health structure → patients
Tele-emergency:
first aid → health operators (ambulances) → patients

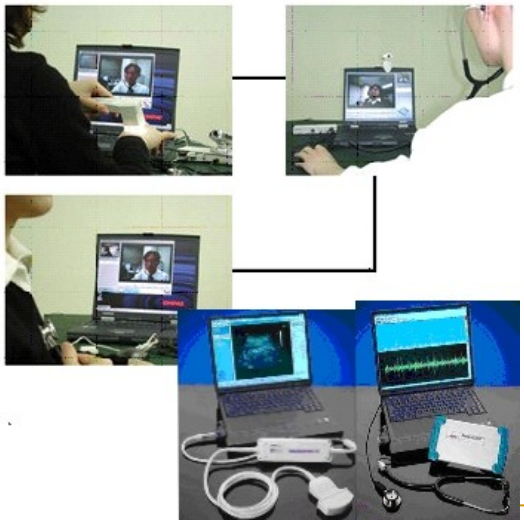
TELEMEDICINE APPLICATIONS

The main application areas of telemedicine systems are:

- telehomecare and telecardiology,
- teleradiology,
- telepathology
- teleophthalmology
- ……..
- TeleHome Care

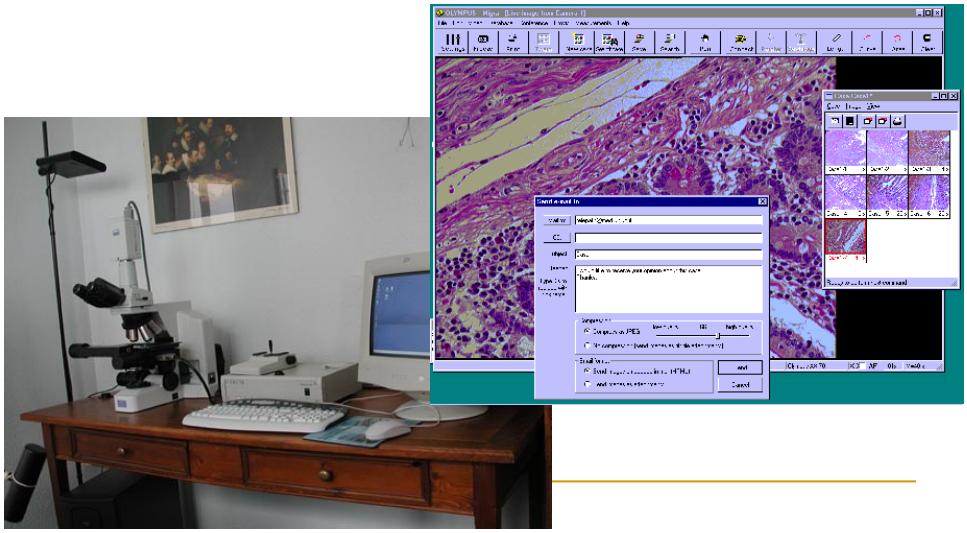
(There are other specialties that use telemedicine services, as teledermatology,telesurgery, telepsychiatry etc., but these are poor of applications at moment).

Tele-Cardiology

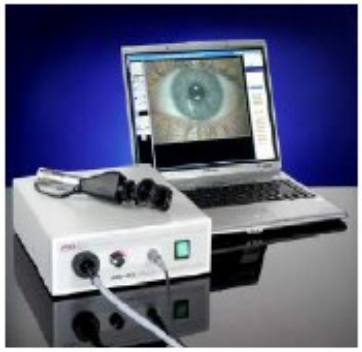


TeleRadiology

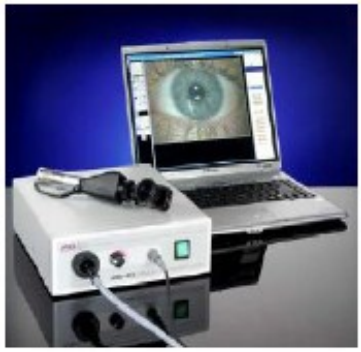
TelePathology



Teleophthalmology



Teleophthalmology



Device

Retinograph

JPEG IMAGE OF RETINA

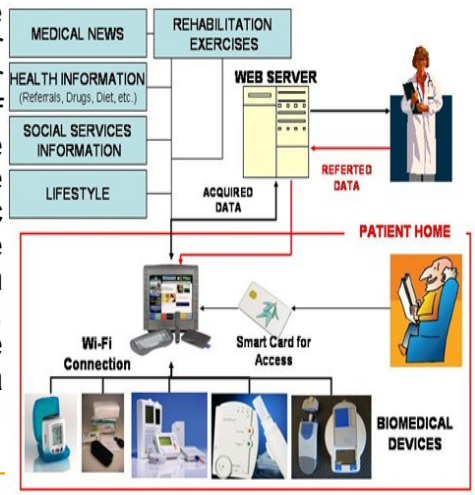
TELECARE

- Tele-Home Care allows to offer medical assistance to the patients directly to their home
- Tele-Home Care may improve the quality of life of patients
- Home-care and community based health service are becoming an increasingly important part of the healthcare services, allowing the so called "Continuity of care"

Telemonitoring - TeleHomeCare

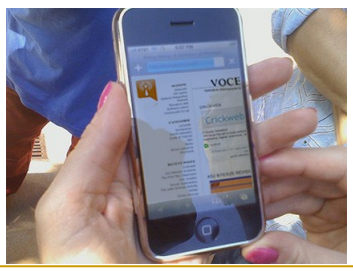
T-Care Project

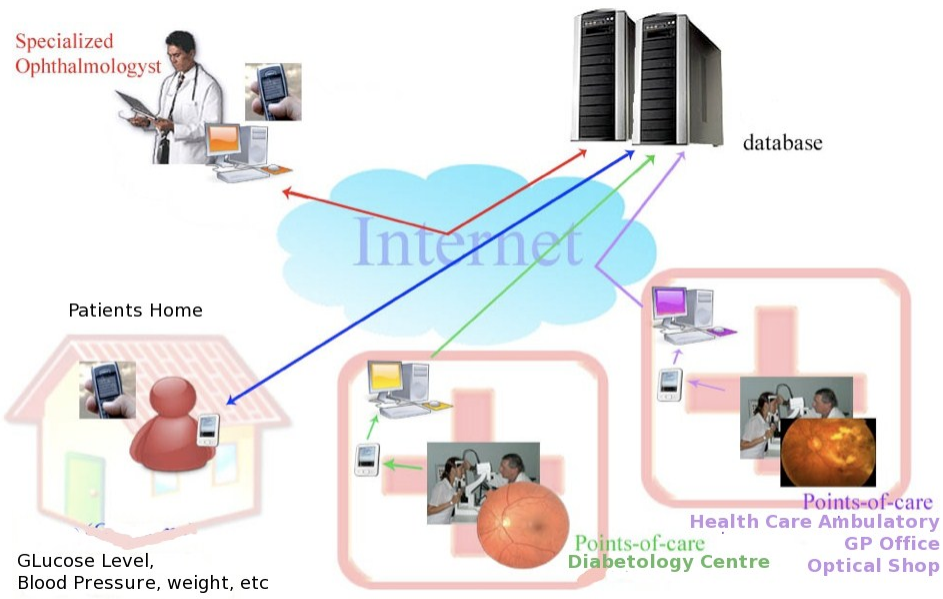
T-Care is an innovative integrated system in order to support and to favour the independet linving of the elderly or disable people, especially those suffering with chronic diseases, in the meanwhile ensuring them timely health assistance, allert, usin a basic home appliance like a TV as a main user interface



Communication tools

- Mobile phones or Smart Phones / PDA connected with the simple biomedical devices for “at home” data acquiring and data transmission;

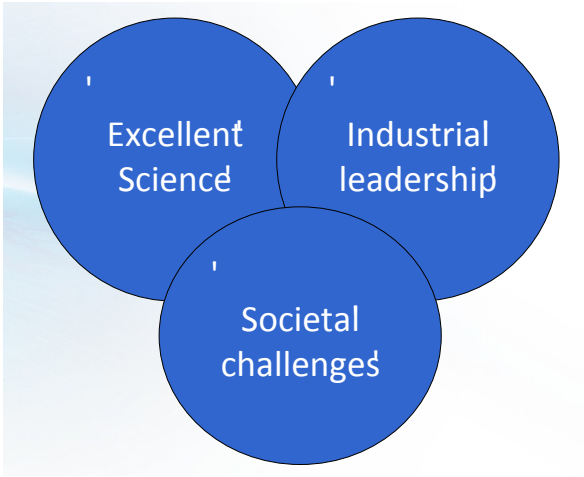




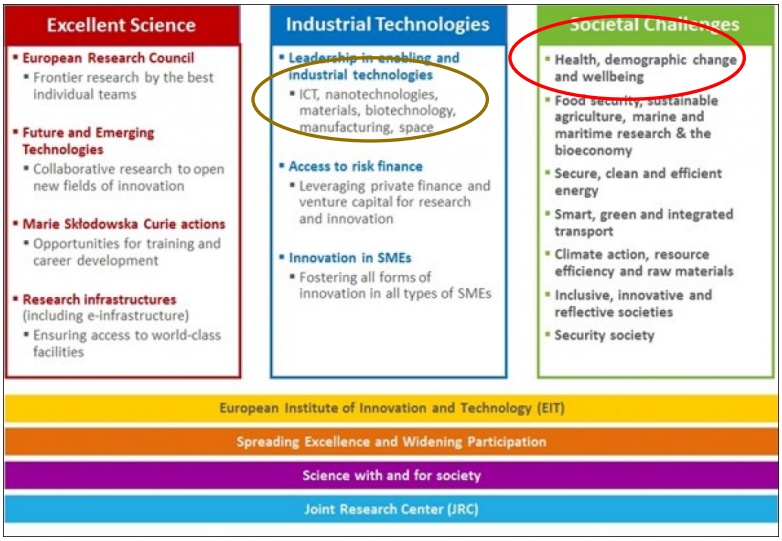
Horizon 2020 What's new

- **A single programme** bringing together three separate programmes/initiatives*
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Focus on societal challenges** facing EU society, e.g. health, clean energy and transport
- **Simplified access,** for all companies, universities, institutes in all EU countries and beyond

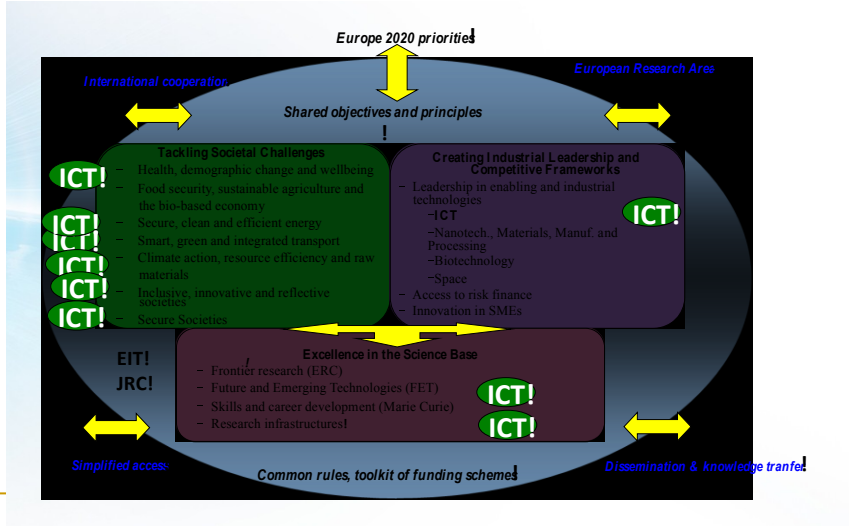
H2020:


Excellent Science
Industrial leadership
Societal challenges

H2020

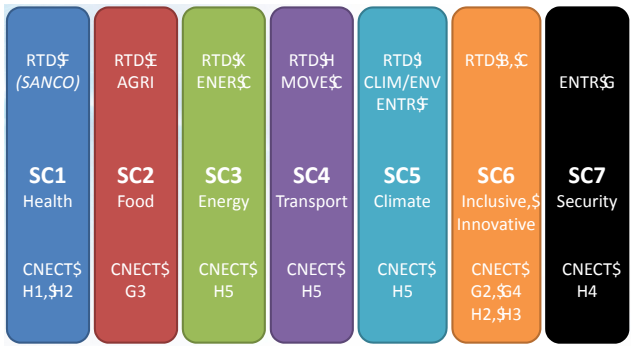

Excellent Science
European Research Council
Frontier research by the best individual teams
Future and Emerging Technologies
Collaborative research to open new fields of innovation
Marie Skłodowska Curie actions
Opportunities for training and career development
Research infrastructures (including e-infrastructure)
Ensuring access to world-class facilities
Industrial Technologies
Leadership in enabling and industrial technologies
ICT, nanotechnologies, materials, biotechnology, manufacturing, space
Access to risk finance
Leveraging private finance and venture capital for research and innovation
Innovation in SMEs
Fostering all forms of innovation in all types of SMEs
Societal Challenges
Health, demographic change and wellbeing
Food security, sustainable agriculture, marine and maritime research & the bioeconomy
Secure, clean and efficient energy
Smart, green and integrated transport
Climate action, resource efficiency and raw materials
Inclusive, innovative and reflective societies
Security society
European Institute of Innovation and Technology (EIT)
Spreading Excellence and Widening Participation
Science with and for society
Joint Research Center (JRC)

ICT in Horizon 2020



ICT & "Societal Challenges"

Addressed essentially through the "Excellency in Science" and LEIT initiatives



E.g., "Smart cities"(SC3) e "Ageing" (SC1) are in these "cross-cutting" challenges

HORIZON 2020: WORK PROGRAMME 2014 – 2015

- *8. Health, demographic change and wellbeing*

- **1.** Understanding health, ageing and disease PHC 1-3
- **2.** Effective health promotion, disease prevention, preparedness and screening PHC 4-9
- **3.** Improving diagnosis PHC 10-12
- **4.** Innovative treatments and technologies PHC 13-18
- **5.** Advancing active and healthy ageing PHC 19-22
- **6.** Integrated, sustainable, citizen-centred care PHC 23-29
- **7.** Improving health information, data exploitation and providing an evidence base for health policies and regulation PHC 30-34

(PHC= *personalising health and care*)

Personalising health and care: PHC

- Understanding health, ageing and disease 7
- PHC 1 – 2014: Understanding health, ageing and disease: determinants, risk factors and pathways .....
- PHC 2 – 2015: Understanding diseases: systems medicine 8
- PHC 3 - 2015: Understanding common mechanisms of diseases and their relevance in co-morbidities .....

Personalising health and care PHC

- Effective health promotion, disease prevention, preparedness and screening
- PHC 4 – 2015: Health promotion and disease prevention: improved inter-sector co-operation for environment and health based interventions 10
- PHC 5 – 2014: Health promotion and disease prevention: translating 'omics' into stratified approaches 11
- PHC 6 – 2014: Evaluating existing screening and prevention programmes 12
- PHC 7 – 2014: Improving the control of infectious epidemics and foodborne outbreaks through rapid identification of pathogens (see also societal challenge 2) 13
- PHC 8 – 2014: Vaccine development for poverty-related and neglected infectious diseases: Tuberculosis 15
- PHC 9 – 2015: Vaccine development for poverty-related and neglected infectious diseases: HIV/AIDS .....

Personalising health and care PHC

- Improving diagnosis 18
- PHC 10 – 2014: Development of new diagnostic tools and technologies: *in vitro devices, assays and platforms* *18*
- PHC 11 – 2015: Development of new diagnostic tools and technologies: *in vivo medical imaging technologies* *19*
- PHC 12 – 2014/2015: Clinical research for the validation of biomarkers and/or diagnostic medical devices .....

Personalising health and care PHC

Personalising health and care PHC

Personalising health and care PHC

Personalising health and care PHC

Personalising health and care PHC Co-ordination activities

Personalising health and care PHC Co-ordination activities

Personalising health and care PHC
Other actions

Calls dealing with the eHealth domain:

1. Calls with deadline **15 April 2014** :

- PHC-19-2014

- PHC-26-2014: Self-management of health and disease: citizen engagement and health (this call includes the mHealth topic);

- PHC-34-2014: eHealth interoperability.

- 2. Calls with deadline **21 April 2015** :

- PHC-25-2015: Advanced *ICT* systems and services for integrated care;
- PHC-27-2015: Self-management of health and disease and patient empowerment supported by *ICT*;
- PHC-28-2015: Self-management of health and disease and decision support systems based on predictive computer modelling used by the patient him or herself;
- PHC-29-2015: Public procurement of innovative *eHealth* services;
- PHC-30-2015: Digital representation of health data to improve disease diagnosis and treatment.

- These calls are all 'single stage' :

only one evaluation round instead of two.

Ogni call è caratterizzata da

Topic Description

Topic Conditions & Documents

Submission Service

International cooperation actions / 2014-2015 (overall budget 27 M€)

- **Coordinated calls**
- **•EU-Brazil (7 M€)**
- •Cloud computing, including security aspects
- •High performance computing
- •Experimental platforms

- **•EU-Japan (6 M€)**
- •Technologies combining big data, internet of things in the cloud
- •Optical communications
- •Acces networks for densely located users
- •Experimentation and development on federated Japan-EU testbeds
- ► Warning: still subject to Commission Decision
- **•International partnership building and support to dialogues with high income countries (USA, Canada, East Asia and Oceania) (3 M€)**
- **•International partnership building in low and middle income countries (11 M€)**

EU-Japan Research and Development Cooperation in Net Futures

- °° EUJ 1 – 2014: Technologies combining big data, internet of things in the cloud
- °° EUJ 2 – 2014: Optical communications
- °° EUJ 3 – 2014: Access networks for densely located users
- °° EUJ 4 – 2014: Experimentation and development on federated Japan – EU testbeds

EU-Brazil Research and Development Cooperation in Advanced Cyber Infrastructure

- °° EUB 1 – 2015: Cloud Computing, including security aspects
- °° EUB 2 – 2015: High Performance Computing (HPC)
- °° EUB 3 – 2015: Experimental Platforms