



Vrije Universiteit Brussel

# **E-health notable developments**

(from building blocks to effective systems)

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- What is E-health??
- Technical building blocks
- Professional context
- Legal context
- Win-win situations
- Examples
- Perspectives



# What is E-health??

- ICT in healthcare
- Mostly: [I][i]nternet
- Healthcare telematics
- Medical records
- Telemedicine
- Digital imaging
- In fact: re-organising healthcare



# Technical building blocks

- Connectivity
- Security and encryption
- Authentication
- Databases (certified sources and others)
- XML applications
- Naming systems/ defining terms, codes, ...
- Sources/portals



# Legal framework

- Privacy legislation
- Organisation of the state
- Health care legislation
- Social sector organisation
  - State (Ministry of social affairs)
  - Private sector (health insurance)
- Health care professionals organisations
- Patients organisations



## **Internet (communication) technology**

- Victorious in the protocol-war
- Evolution towards permanent connectivity
- Wireless
- Broad-band
- Secured
- Professional use versus unprofessional



## Internet toolbox:

- Communication- and application protocols
- Client-server, broadcast, peer-to-peer
- Static – dynamic information
- Server processing (requires connection)
- Client processing (allows local processing )



## Available systems

- Practical considerations:
  - Paper: readable but (often) not accessible
  - Electronic: leakages can become disasters!
- PKI (public key infrastructure)
- Asymmetric encryption systems
- Patient identification separate from medical data
- Well managed medical identification-”number”



## Who is who?

- ***More subtle:***

**Who can announce with some “credibility” the identity-or role of an individual**

- In the medical world
  - Identities (patient/care-provider)
  - Role leads to access permissions
- Belgium: E-id central, no separate medical ID will be introduced



## Relational- and other models

- “standard technology”
- SQL: rather transmissible
- Internet linkages from databases: great
- Data storage: no acute problem
  - Cheap storage but: long term = 30years!



## **XML: “self describing documents”**

- Large consensus: XML solves EDI
- Not only “document” also “application”
- Control- and processing tools
- From text to meaningful data object
- Ontologies are under development



## What exactly are we talking about?

- ontology: precise definition of terms
  - MeSH (Medical Subject Headers)
  - BabelMeSH
- Nomenclature **systems**
  - **classifications: ICPC (primary care), ICD (diseases) WHO, Snomed**
  - Medication databases BCFI/ Delphi



## **Problem: reliability**

**(target public, aims, ...)**

- Authoritative sources: NLM (Pubmed, ...), Karolinska Institutet, Institut Pasteur, ...
- Authorities: Ministries, national/ regional portals
- Educational: teleconferencing, Université Virtuelle Francophone, ...
- Scientific: E-journals

**criteria:** HON-code of the Health On the Net Foundation in Geneva



## Team- versus individual approach in medicine

- Medical record
- Terminology
- Guidelines and clinical pathways
- The patients involvement



## Laws and regulations: based on paper!

- Progressively more understanding for “electronic documents”
- Protection of the individual’s privacy
- Electronic signature
- Privacy laws: general principles
- Specific laws required, otherwise: blocked
  - ex. telemedicine vs. recognised intervention requiring physical presence of patient and care-provider!



# Win-win situations

Team context: (without win-win: blocked)

Highly political context involving large budgets  
patient

- Care provider 1
- Care provider 2, 3, ...
- Mutual insurance organisations
- State healthcare budget (Belgium: RIZIV)
- Ministry(ies): health, social affairs, ...



# Examples

- Electronic medical records
- eHealth platform portal site
- Register for physiotherapy and nursing
- Electronic medical prescriptions



# Examples

- **Denmark**: EMP fully rolled-out
- **UK**: NHS major effort including electronic prescriptions
- **Netherlands**: central switch for health traffic, linking hospitals and individual health workers



# International benchmarks

	Infrastructure	EHR	Interoperability	Patient and health professional mobility	Legal and regulatory framework	Evaluation and impact analysis
Austria	✓	✓		✓	✓	
Belgium	✓	✓	✓		✓	
Bulgaria	✓				✓	✓
Cyprus	✓	✓		✓		
Czech Rep.	✓				✓	
Denmark	✓	✓	✓	✓	✓	
Estonia	✓	✓			✓	
Finland	✓	✓	✓	✓	✓	
France	✓		✓	✓	✓	✓
Germany	✓	✓		✓		
Greece	✓		✓	✓		
Hungary	✓	✓		✓	✓	
Ireland	✓	✓	✓			✓
Italy	✓	✓	✓	✓		
Latvia	✓	✓	✓	✓		
Lithuania	✓	✓				
Luxembourg	✓	✓				
Malta	✓			✓		
Netherlands	✓	✓				
Poland	✓					
Portugal	✓			✓		
Romania	✓	✓	✓			
Slovakia	✓	✓	✓			✓
Slovenia	✓	✓		✓		✓
Spain	✓	✓	✓	✓		
Sweden	✓	✓	✓	✓	✓	
UK	✓	✓	✓	✓	✓	✓
<b>2010</b>						
Iceland	✓	✓				
Liechtenstein	✓			✓		
Norway	✓	✓		✓	✓	
Switzerland	✓	✓		✓	✓	
Turkey	✓	✓		✓		



# Examples: electronic medical record

- Purpose: register the health state and history of the individual patient
- Cornerstone of good health care!
- Tool for communication between team members
- Patient-centric health care!
- Proven to be more effective than the written paper-based record!



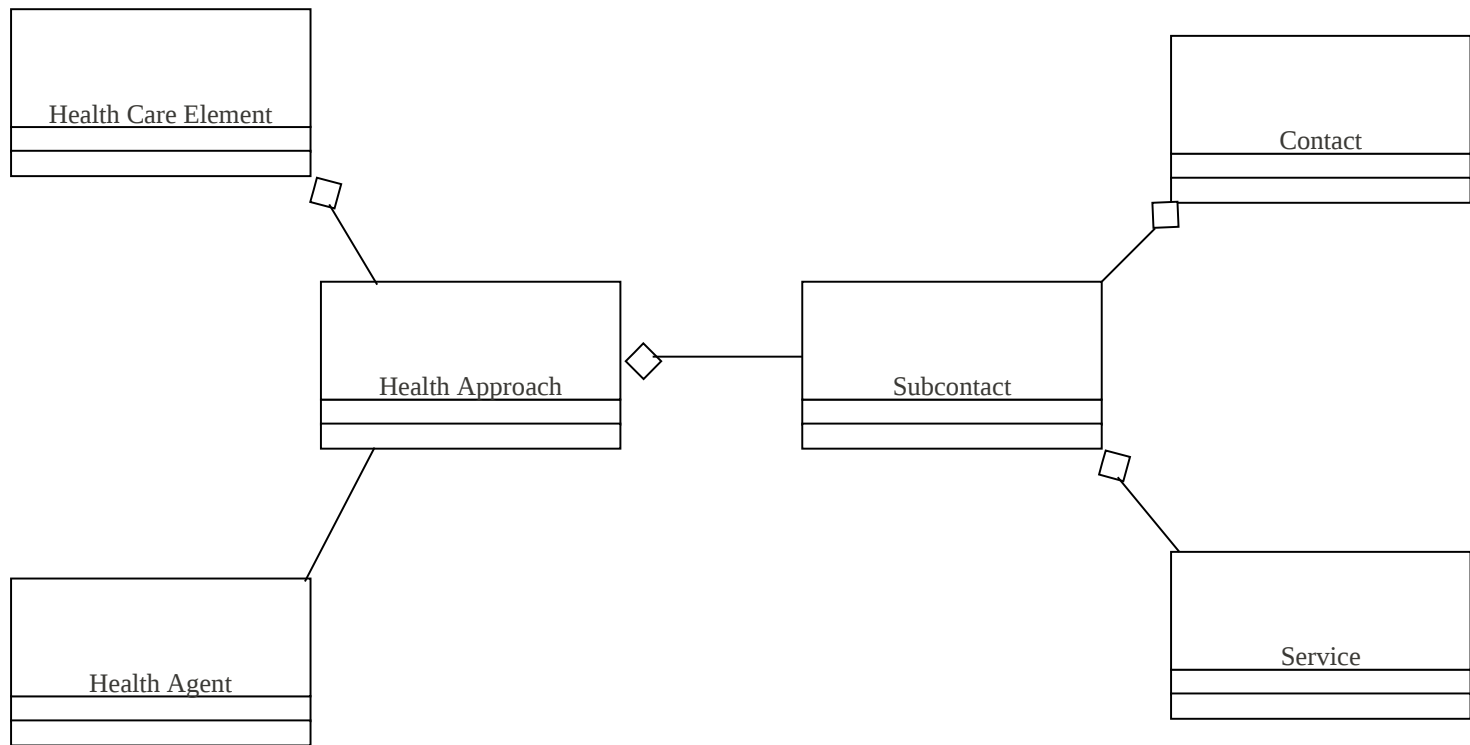
# Examples: electronic medical record (2)

- To be effective: structure required
- Different registration methods exist
- POMR (Problem Oriented Medical Registration)
  - Health care element
  - Approach
  - Service(s)
  - (in contrast to HL7 RIM!!!)



# Examples: electronic medical record (3)

## NORM for Belgian EMR architecture for GP's (uml)





# Examples: electronic medical record (4)

## 7 Basic concepts per patient record

	<b>Health care element</b>	Angina
	<b>Health care approach</b>	Follow-up
	<b>Service</b>	Bronco-x pills prescription
Patients request	<u>Subcontact</u>	
Visit Mon Dec. 11th	Contact	
Dr. Demo	Health agent	
Mrs. <u>Prima</u>	Patient	



# Examples: electronic medical record (5)

- Incentives: homologation/ financial support
- Yearly testing of packages: increasing requirements
  - POMR
  - Nomenclatures/classification
  - Export of summary records (XML format)
- Sector: from 40 packages in 1998 reduced to 17 in 2006!
- Underestimated: educational efforts



# Examples: eHealth platform

- Purpose: bring users in contact with the authentic sources
- Offer generic services for the whole sector in 1 place
- 2 interfaces: “human” en “programme”
- Start via pilot projects beyond discussion



# eHealth platform (2) Purpose (after Frank Robben):

## How ?

- By a well organised electronic service
- and information-exchange between all players in the health sector
- With appropriate guarantees concerning security of information and protection of the privacy

## what ?

- Optimising the quality and continuity of health care delivery
- Optimising the patients security
- Simplification of administrative formalities for all actors in health care
- Good support for a sound health care management



# eHealth platform (3) starting points:

- no centralized storage of personal health data
- secure electronic data interchange between the health players
- If the patient wishes, progressive pointing towards places where health data concerning him/her are kept, if he/she wishes so.
- respect for and support for
  - Existing local or regional initiatives concerning electronic cooperation in the health care sector( Réseau Santé Wallon, Abrumet, ...)
  - private initiatives concerning electronic services to the health sector



# eHealth platform organisation

Organs:

## **Management Committee**

- Representatives of the health care professionals
- Representatives of the Health Care Administration agencies
- Representatives of the concerned Ministries Health Care, Social Affairs, Computerisation and Budget
- Representatives of the Association of Physicians, Pharmacies, Cross-roads bank for social affairs

**Guiding Committee** With working groups: representatives of all relevant stakeholders and experts, presided by a physician



## Committee for the Privacy Protection: (CBPL)

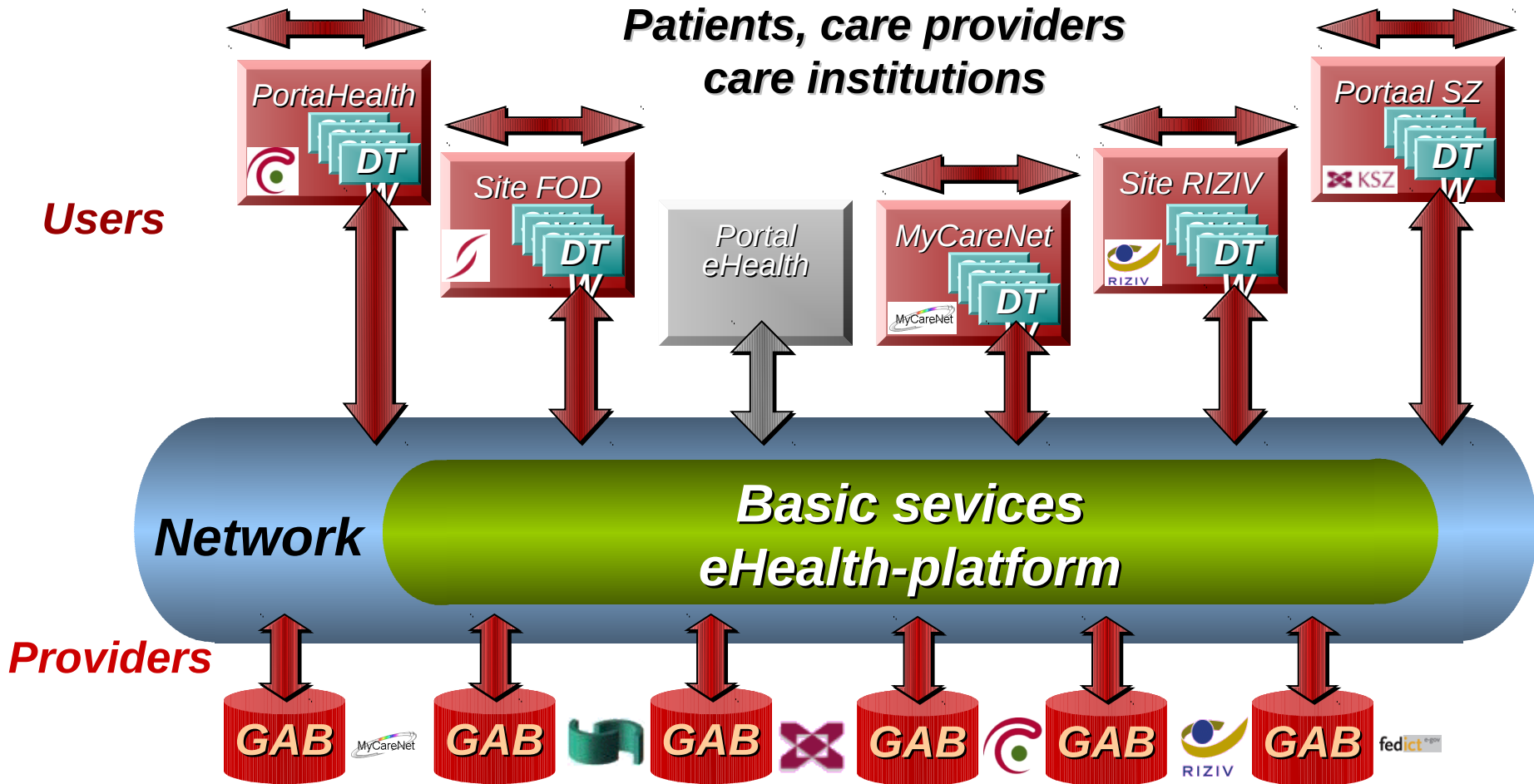
- 2 sections: social security and health

### tasks

- Deliver permits to exchange personal health data except when this is legally allowed (context of the health care)
- Reviewing the organisation and policy concerning security in electronic personal health data processing
- Advising and recommending concerning processing of personal health data
- Process complaints regarding any aspect of processing of personal health data



# Scheme eHealth platform:





# Scheme eHealth platform:

## **Basic service**

- A service realized and offered by eHealth-platform, that can be used by an added value offerer, to realize his added value service

## **Service with added value (DTW)**

- A service, offered to patients and/or health care workers
- The instance, responsible for the development and offering of the added-value service, can make use of the basic services as developed and offered by the eHealth-platform



# Schema eHealth platform:

## **validated authentic source (GAB)**

- A database offering information, on which eHealth-platform relies
- The manager of this database is responsible for the availability and the organisation and quality of the information offered



# eHealth platform: basic services

## **Portal site (<https://www.ehealth.fgov.be>), with amongst others:**

1. a search engine
2. integrated users- and access management
3. a content management system
4. managing logins
5. personal electronic mailbox for each health care worker
6. time stamping
7. Coding and anonimising service

## **Under development:**

**system for end-to-end encryption**



# eHealth platform: basic services

The screenshot shows the eHealth platform website interface. At the top, there are language options (NL, FR, DE), a search bar, and a 'Contact' link. The main header features the 'eHealth' logo and navigation links for 'Home' and 'My eHealth'. The main content area is divided into several sections:

- Vind een On-line dienst**: A section for finding online services. It includes a dropdown menu for 'Doelgroep:' with 'Zorgverlener' selected, and a 'Go' button.
- Welkom op de portaalsite van het eHealth-platform**: A welcome message explaining the platform's purpose, which is to provide a safe electronic information exchange between healthcare actors (doctors, pharmacists, patients, etc.) while respecting privacy and security. It mentions the goal of improving the quality of care and reducing administrative burdens.
- Nieuws**: A news section titled 'Goedkeuring van het wetsontwerp door de Kamer en de Senaat (2008/07/31)', announcing the approval of the law creating the eHealth platform.
- LOGIN**: A prominent red button for user login, with a sub-header 'Hoe krijgt u toegang tot eHealth?'.
- eHealth-platform**: A list of links for 'Missie', 'Organisatie', 'Wetgeving', 'Basisdiensten', 'Diensten met toegevoegde waarde', 'Gevalideerde authentieke bronnen', 'Standaarden', 'Veelgestelde vragen', and 'Contact'.
- eHealth-portaalsite**: A list of links for 'Doelgroepen', 'Toegang tot de eHealth-portaalsite', 'On-line diensten', and 'Contact'.

At the bottom, there are navigation tabs for 'Zorgverlener', 'Zorginstelling of -groepering', and 'Andere instelling'. The footer contains copyright information (©2008 eHealth), links for 'Privacy' and 'Gebruikersreglement', and a 'Powered by Smals' logo.



# eHealth platform: authentic sources

## **cadaster of care providers**

- Managed by the Federal Ministry of Health and Environment
- Comprises information concerning the diploma, specialisation of the individual healthcare professional, identified by the ID number of social security (INSZ)

## **database of RIZIV (social security administration) recognition**

- Managed by: RIZIV
- Comprises all relevant information concerning healthcare professionals recognised by the social security administration, identified by the INSZ



# eHealth platform: authentic sources (2)

## Database comprising persons, mandated to represent healthcare institutions or a group of healthcare professionals

- Managed by: partly Federal administration of social security (part user management of enterprises), partly Federal Ministry of Health
- Contains info relating individual persons (by means of their INSZ number) to mandates in the name of health care institutions or groups of care providers enabling them to use specific applications



# eHealth platform: services with added value

## in production

- Input into and consultation of the Cancer Register (basic services 1, 2 and 3 – encryption specific for the Cancer Register system)
- feedback to hospitals concerning the health care services they provided and the related costs (basic services 1, 2 and 3)
- on-line electronic ordering of certificates for provided services and specific documents (Medattest) (basic service 1)
- coding en anonimising van of person related data for RIZIV (basic service 6)
- Consultation of last wills concerning end of life arrangement (euthanasia) (basic services 1, 2 and 3)



# eHealth platform: services with added value (2)

## in test

- electronic transfer of third payer invoices by nurses (grouped) to mutual insurers (basic services 2, 3 and 4)
- Electronic consulting of the current insurance status by nurses (grouped) (basic services 2, 3 and 4)
- Input into and consulting of the shared arthritis-record, including electronic processing of reimbursement of anti-TNF-medication (Safe – Shared Arthritis File for Electronic use) (basic services 1, 2 and 3)
- Input into and consulting of the register with hip- and knee-prostheses (Orthopride – Orthopedic Prosthesis Identification Data) (basic services 1, 2, 3 and later 7, 8)



# eHealth platform: services with added value (3)

## Under development

- Electronic management of watch services by general physicians and dentists (Medega) (basic services 1, 2 and 3)
- Support for electronic care-prescriptions in hospitals (basic service 5)
- Therapeutic projects
- interactive website for Ethical Committees regarding medical experiments in Belgium



# eHealth platform: requests for support

Consortium Recip-e (pharmacists, physicians and mutual insurers)

- electronic prescription in the first line sector

Federal Agency for Medication and Health Products

- making the medication database available to the professional sector



# Examples: medical registers (physical therapists, nurses)

## Simplification measures (cost effective!)

- Abolition of “paper registers”
- Registration of treatments “on digital support”
- Certified packages:
  - Generate “pseudo-registers” (automatically, weekly)
  - XML KMEHR message “idefix” (chaining, time-stamping)
  - Tools for reporting and analysis allowing controls



## Medical prescriptions:

- Central in medical treatments
- Often hand-written
- In USA yearly +- 7000 deaths
- Fraud, theft, forging
- Over-medication ??
- No added value possible when on paper



## **Electronic Medical Prescription:**

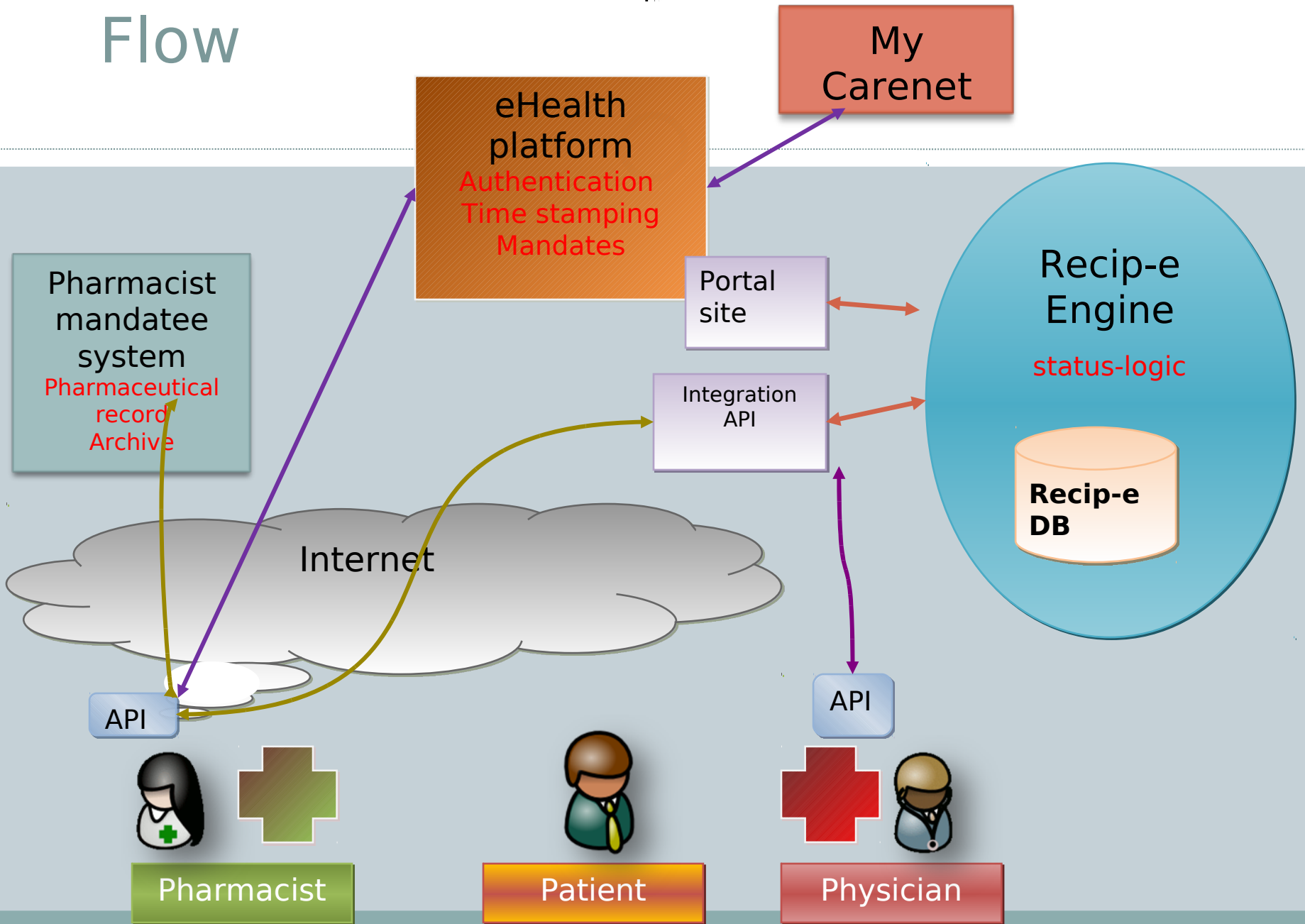
- Avoid erroneous interpretation
- Possibly: concurrently with paper
- Avoiding fraud, theft, forging
- Over-medication can be discovered
- Diverse added values possible, requiring law changes



# Recip-e project

- Phase 0: pilot study (till 05/2009)
- Financing for pilot by **RIZIV/INAMI**, support by **eHealth-platform**
- Call for tenders: industrial partner: fall 2009
- Phase 1: pilot implementation and testing (2010 -2013)
- Phase 2: roll-out with bar-coded paper prescription as token (-2013)
- Phase 3: full operation without *need* for paper prescriptions
- Phase 4: future developments
  
- Depending on availability, additional functionalities and/or simplification of administrative flows can be added
  - Insurability
  - Chapter 4 certificate requests (physicians, pharmacists)

# Flow





# Recip-e

ONE modification  $\leftrightarrow$  the paper prescription:  
*addition of the Recip-e -ID*

Unique number in **Bar-code format**, linking paper to **electronic prescription**

All modifications are without overhead for  
physicians, pharmacists and patients

**In summary:** «painless introduction»



12AB45YUI67



Naam en voornaam van de voorschrijver

.....

**DOOR DE VOORSCHRIJVER IN TE VULLEN:**

naam en voornaam  
van de rechthebbende: .....

Vorbehouden aan het  
verpakkingsvnet

R/ 1-ALPHA LEO  
Caps. 30 x 0,25 µg  
S/ 1 capsule per dag

Stempel van de voorschrijver

.....

Datum en handtekening van de  
voorschrijver

28. 11. 20

Uitvoerbaar vanaf voornoemde datum of  
vanaf:

.....

**GENEESMIDDELENOVORSCHRIFT**



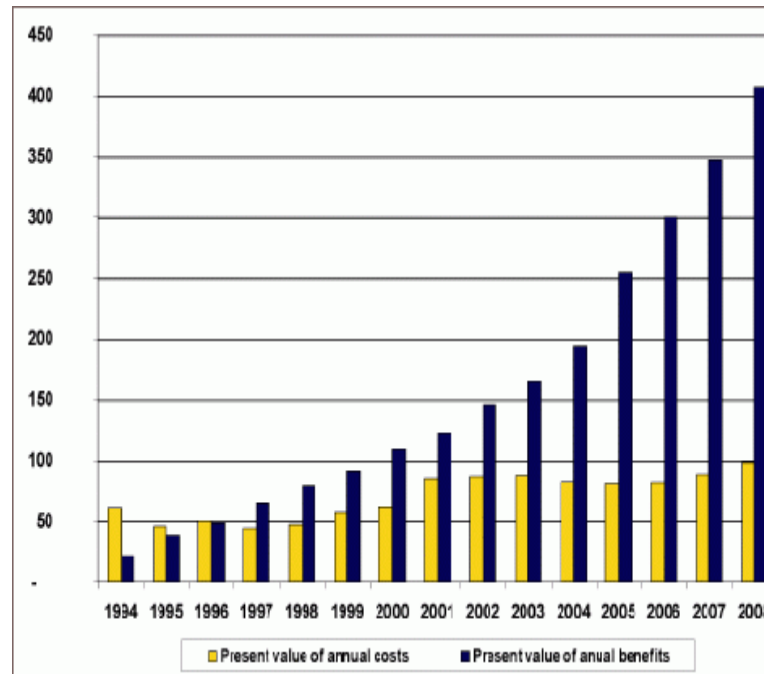
# Recip-e: next developments

- archiving prescriptions in the form of a distributed pharmaceutical (physiotherapy, ...) record
- upload of the OTC (over the counter products) by the pharmacists
- links and downloads of relevant medication prescribed within the hospitals
- cross border prescriptions (epSOS2 project)
- relevant overviews can be made available to all involved parties (under supervision of the Privacy Commission)



## Study: "eHealth is Worth it"

(The economic benefits of implemented eHealth solutions at ten European sites)





## Belgium:

- eHealth-platform
- Flow projects
- Homologation (physicians, dentists, nurses, physical therapists)
- Summary Health Record (SUMEHR)

## Flanders:

- Report Vlaamse Raad voor Wetenschapsbeleid
- IBBT → some e-health projects (Share4Health)
- Flemish Health System



## Europe:

- Ehealth on the Ministerial agenda
- Research
- Standards
- Effective field realisations

## Transnational projects:

- EPSOS (prescriptions and summary records)
- CALLIOPE (ehealth governance)



## World:

- WHO: Report and working group
- World wide initiatives
  - RAFT (Geneva Univ. Hospital + Africa)
  - Eb@le-santé (RDC)
  - OpenClinic vs Open MRS
- Standards
- Effective field realisations versus national policies



# Conclusion

E-health offers great perspectives

Technical tools are mostly available, but organisational skills and political willingness are also required

Solid approaches lead to win-win for all involved, but require changes!



## Conclusion (2)

### Challenges:

- Acceptability by the sector
- Finding evidence, comparable to drug-testing
- Educating the care providers to use the available tools appropriately
- Will patient centered health care survive?



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# Any Questions??





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