

EHR

European Standards

TNO Quality for Life
Prorec.nl



Topics to be covered

1. Introduction

2. Interoperability, eHealth

3. Standards

4. Standards definition, types of ..

- **Standards: NSO, CEN, ISO, HL7)**

5. EHR (definition)

6. CEN/TC 251

- **EN13606, HISA, Consys**
- **Relationship with HL7, Eurorec, OpenEHR**

7. How to implement: Open Source (TNO proposal for Ministry of Health)

Introduction

- **Gerard Freriks, MD**
- Convenor of CEN/TC 251 WG1 (*information models*)
- active in NEN, ISO/TC215, HL7
- Prorec, Eurorec
- TNO projects:
 - Strategy
 - Systems Architecture
 - EHR
 - Information security
 - Quality of ICT in healthcare

History

- If you would understand anything, observe its beginning and its development.

Aristotl

- History is a myth that men agree to believe.

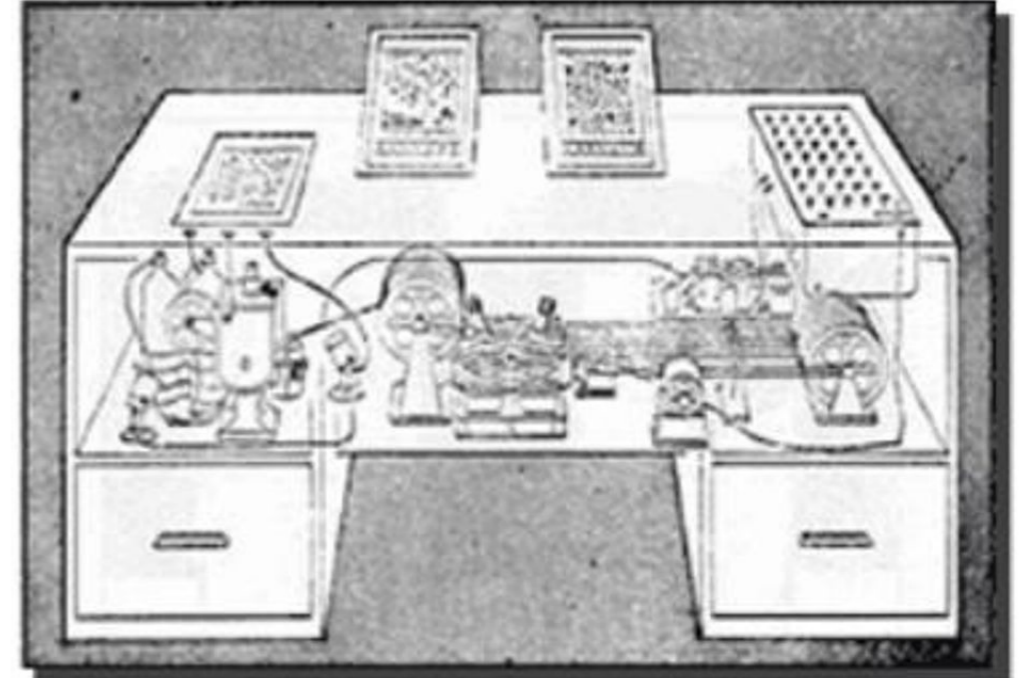
Napoleon

History

- **Vannavar Bush**
(*advisor of President Roosevelt*)

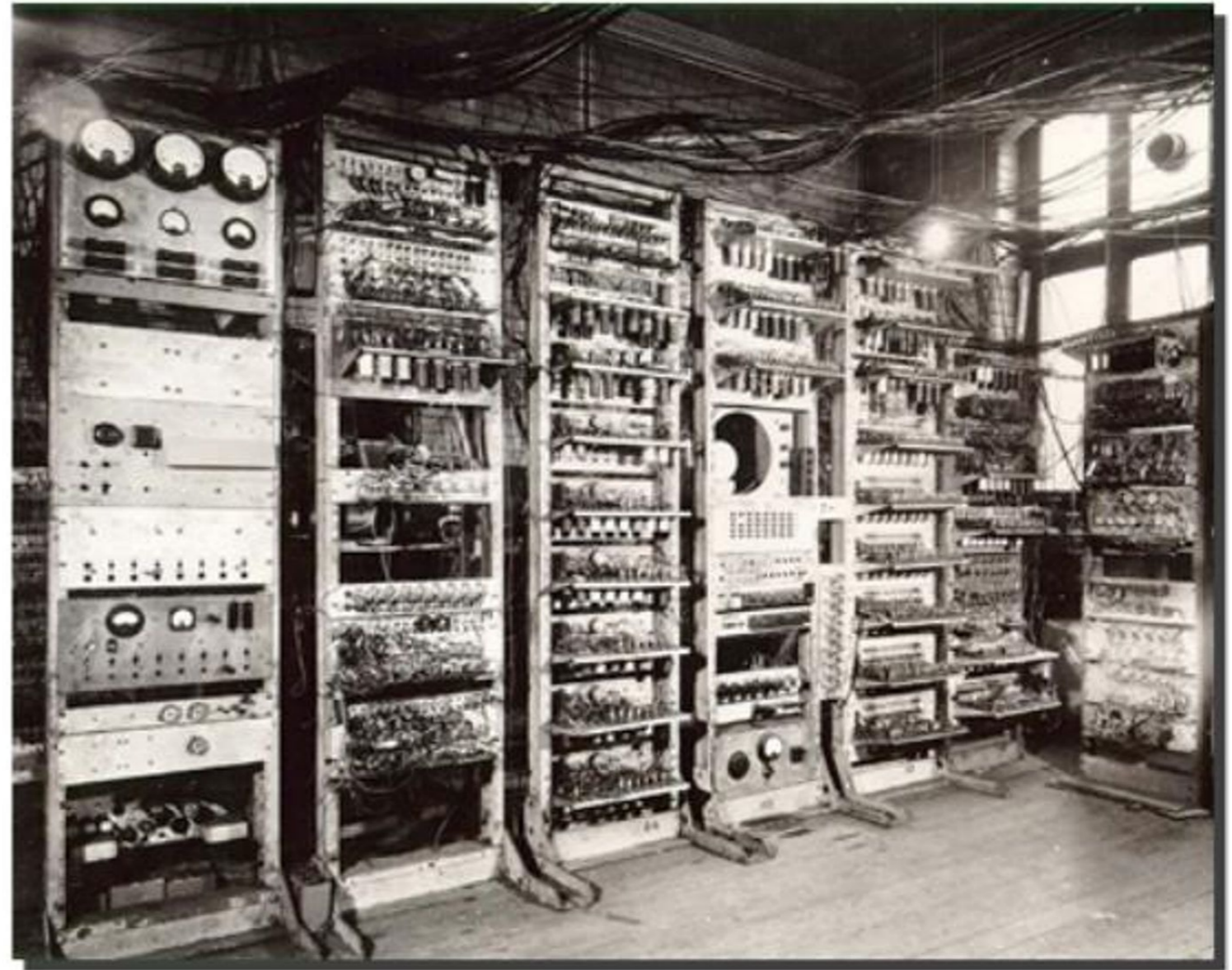
- Predicted in 1946 the Internet.
The MEMEX

- Founded the organisation that developed ARPANET.



History

- One of the first general electronic computers



History

Photo # NH 96566-KN First Computer "Bug", 1945

9/2

9/9

0800 Antan started
 1000 " stopped - antan ✓
 13⁰⁰ MC (032) MP - MC ~~1.98244000~~ { 1.2700 9.037 847 025
 (032) PRO 2 2.130476415 (2) 9.037 846 995 connect
 connect 2.130476415 4.615925059 (-2)
 connect 2.130676415
 Relays 6-2 in 033 failed special speed test
 in relay 11.00 test.

Relay
 2145
 relay 337

- The first bug

1100 Started Cosine Tapc (Sine check)
 1525 Started Multi Adder Test.

1545



Relay #70 Panel F
 (moth) in relay.

First actual case of bug being found.
~~16~~ 1630 antan started.
 1700 closed down.

History

- IBM 7090 in 1960.
- Watson, director IBM:
- “The world will need 10-20 computers at most”



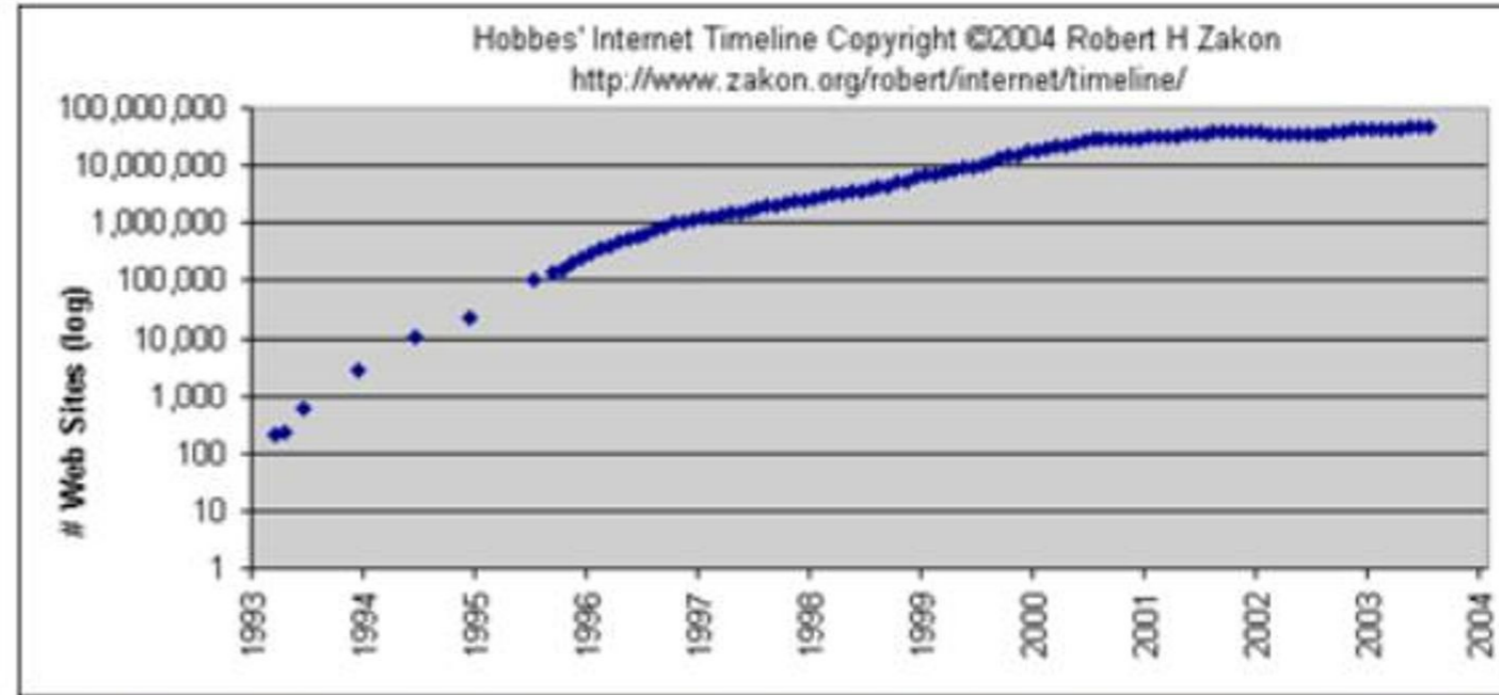
History

- Portable
- Connected to the world
- More powerful



History

- The amazing number of web-sites



- What is the weather on the Virgin Islands?



History

- What has changed?

- Is there any progress?



Amazement

-1-

**QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.**

**QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.**

Amazement

-2-

Vliegwinkel.nl

Home | Vliegticket | Hotel | Autohuur | Vakanties | Verzekeringen | Aanbiedingen

• Vliegticket zoeken • Ticketaanbiedingen • Rond de Wereld tickets • Groepsreizen

Stap 1 Zoeken | **Stap 2 Selecteren** | **Stap 3 Reserveren** | **Stap 4 Betalen** | **Stap 5 Bevestiging**

Vliegticket Retour Enkele reis

Heenreis

Van Zoek Naar Zoek

Datum Kalender Tijd

Amazement

-3-

- This Laptop is able to process the medical images shown using Open Source software. (Osiris)
- Any PC is able to book flights, hotels, and cars electronically.

But in healthcare

in general

systems are NOT able to exchange simple things like:

Name, Address, Date of Birth!

Interoperability

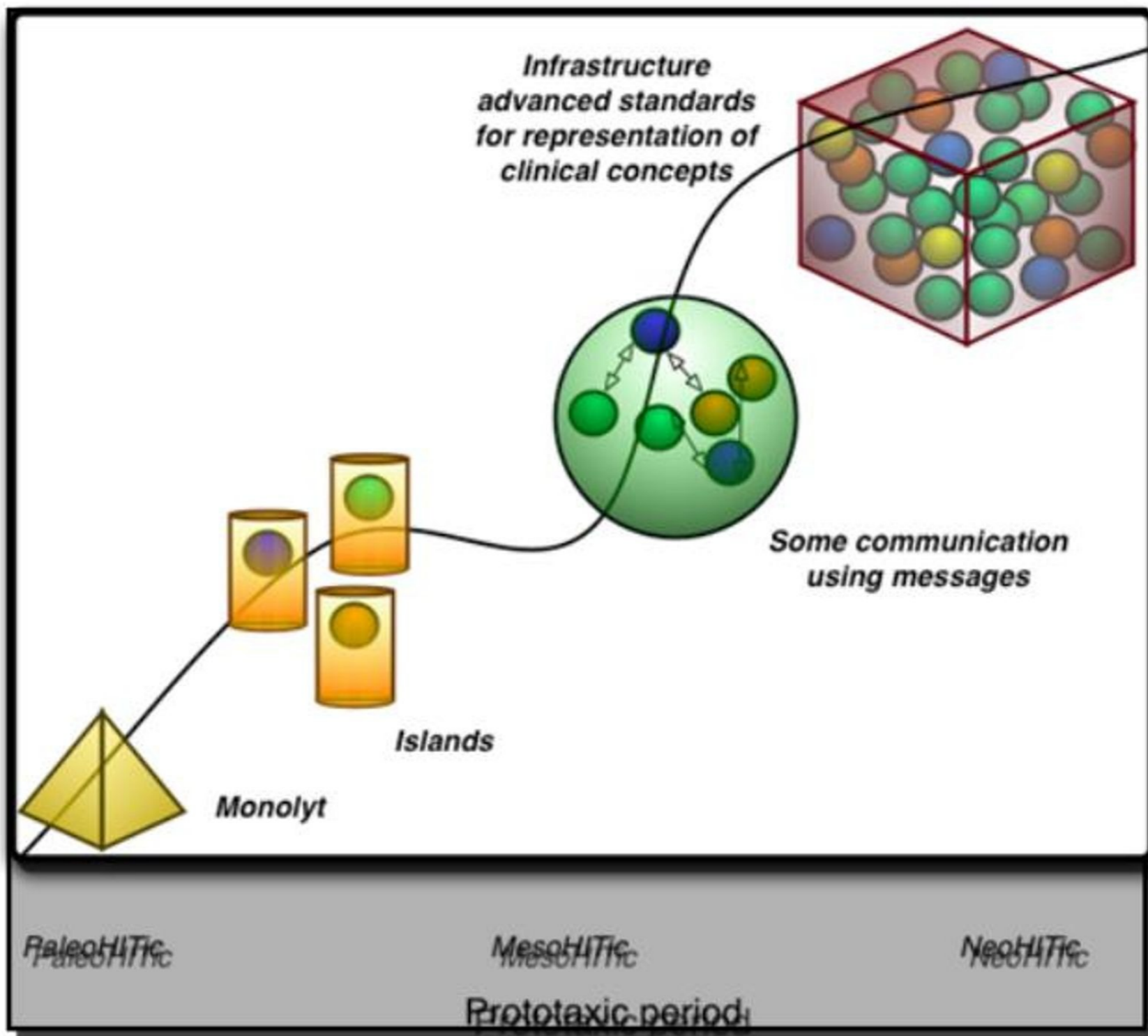


We're stuck on an interoperable definition of interoperability

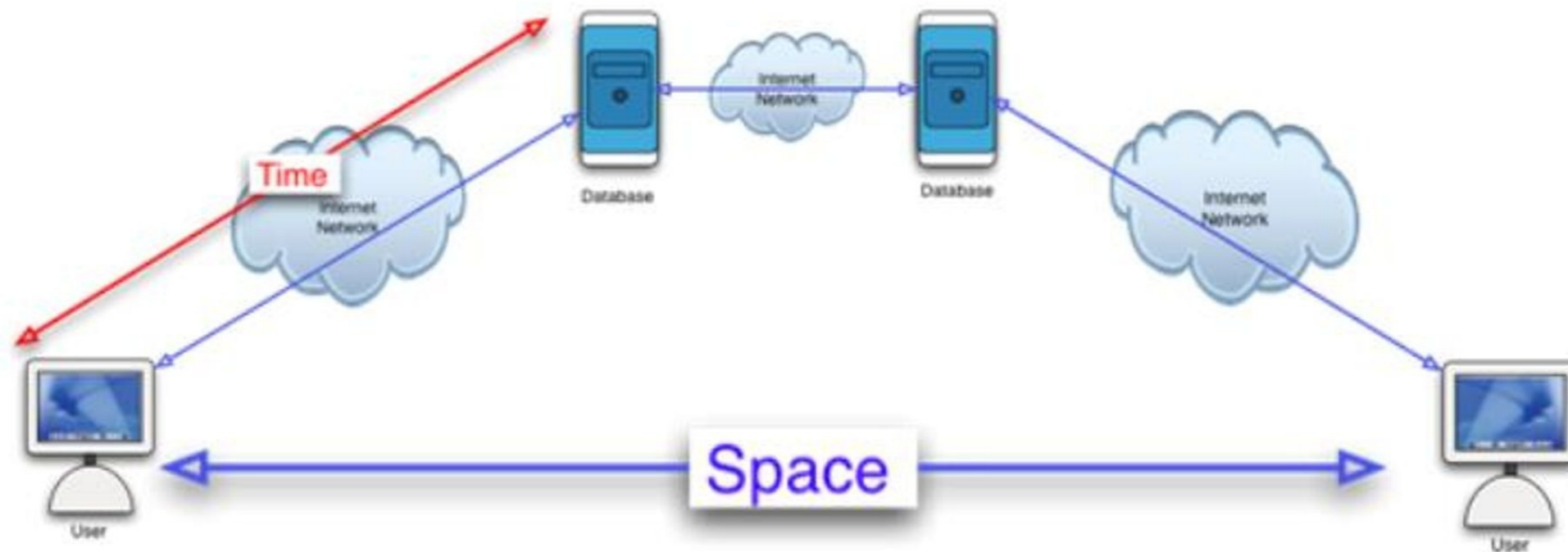


$$e^{i\pi} + 1 = 0$$





Interoperability e-Health



Transport of data, information and
knowledge
over:

Time

Space

Context, Community, Culture

Interoperability e-Health



**E-Health
needs many
shared points of reference**

Interoperability e-Health



Without
standards and standards organisations
there are
no shared points of reference

Roadmap e-Health

Present situation

Healthcar
e

Health care
Logistics

Info-
structure

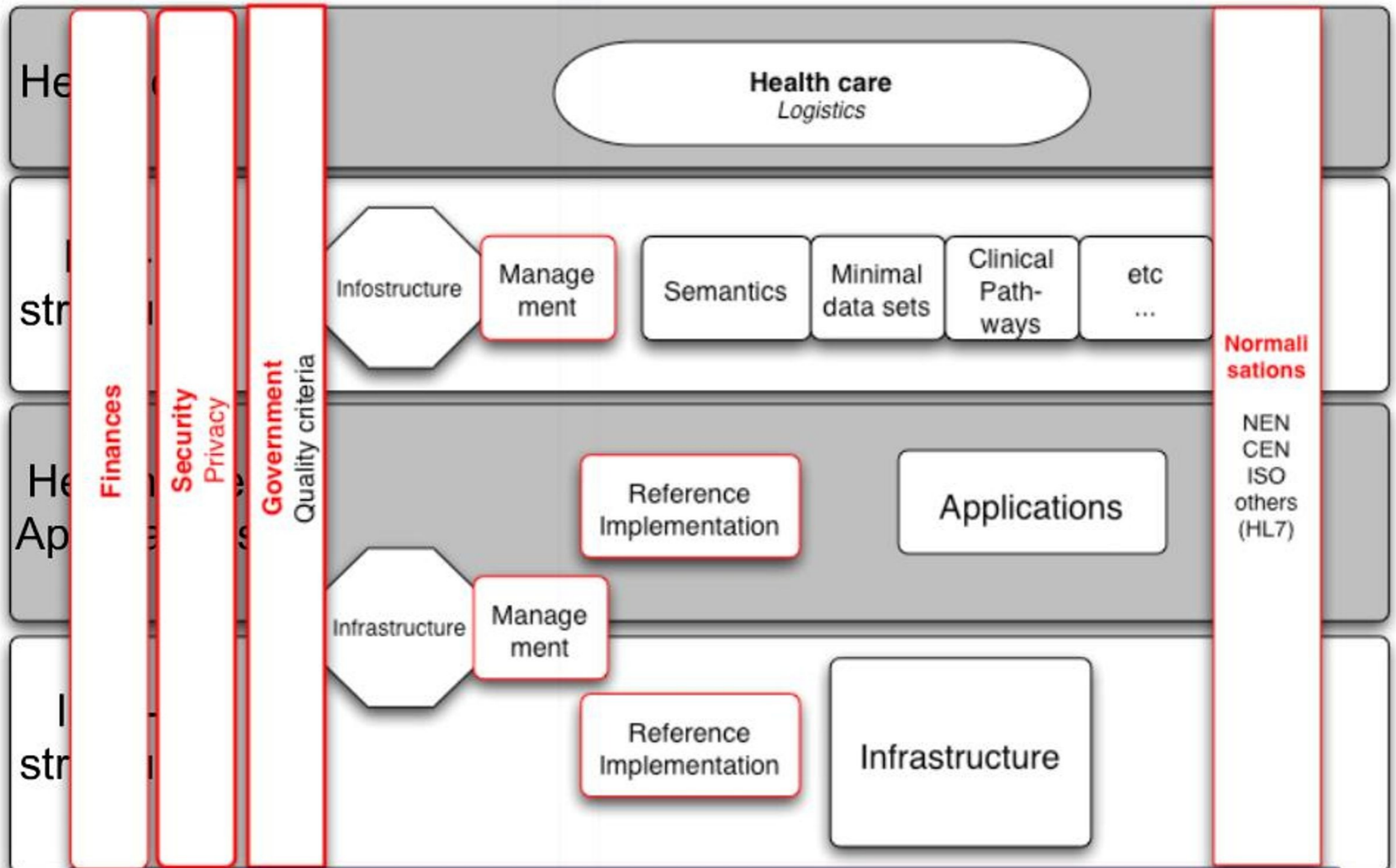
Healthcare
Applications

Applications

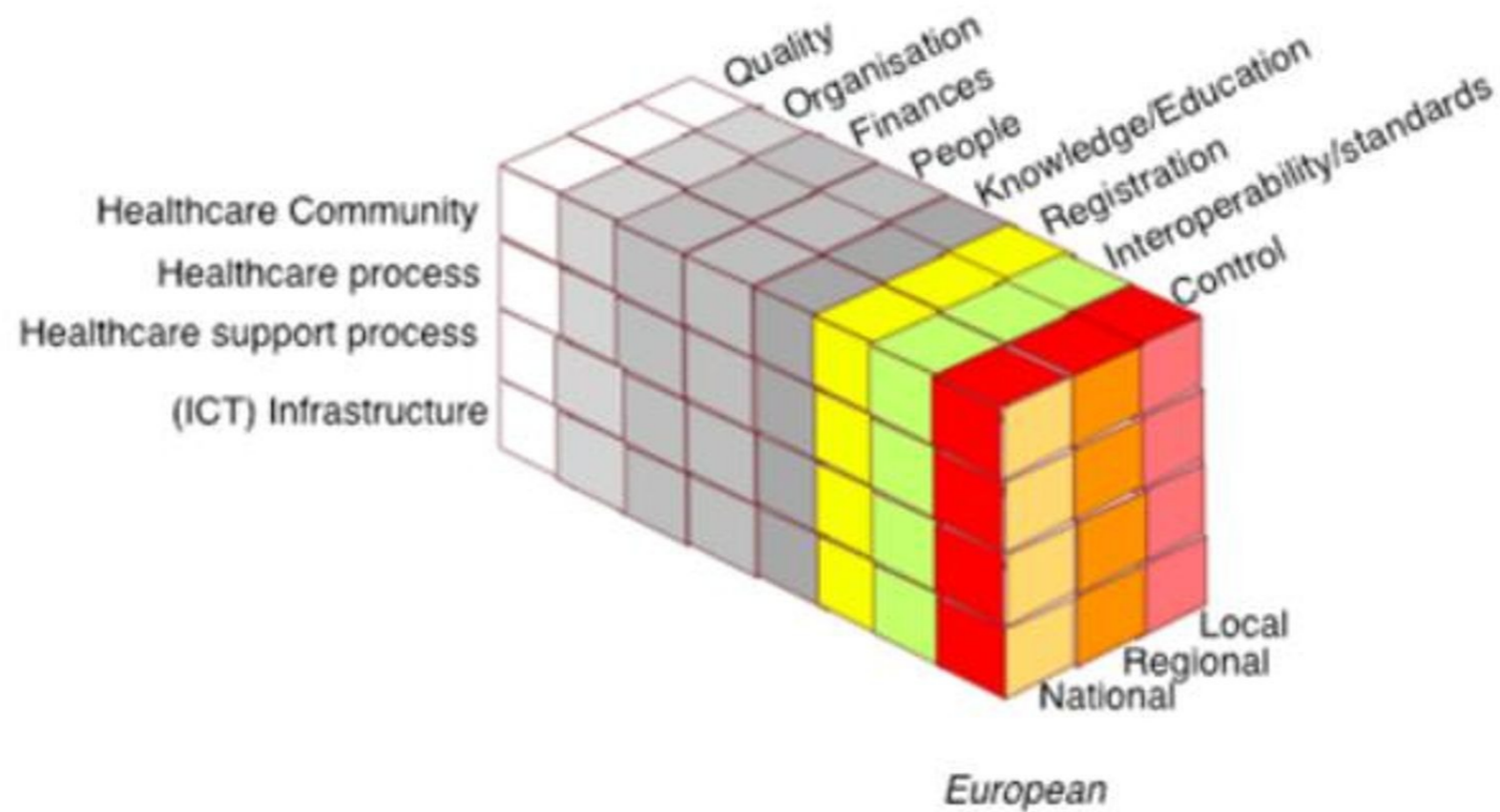
Infra-
structure

Roadmap e-Health

Future situation



Interoperability e-Health



Standardisation

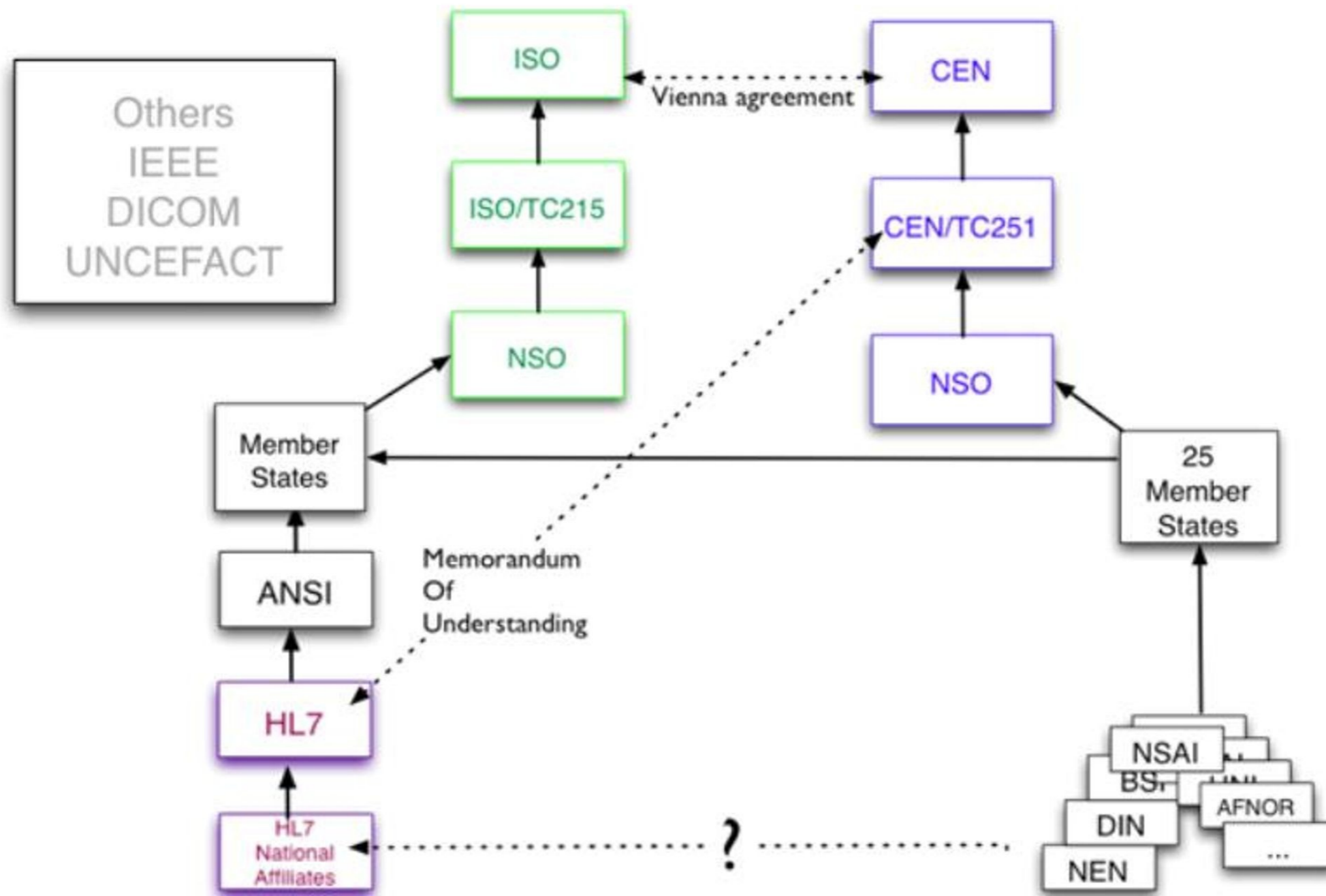


Finally standardisation
was successful

Standardisation Context

- Requirements
Government, Healthcare providers, ICT industry
- Standardisation process
National organisation, CEN, ISO, HL7, DICOM, others
- Quality Assurance
Testing, accreditation, certification

Standardisation Organisations



Why European Standards

- European Directives regulate the operation of National Standardisation Bodies and CEN
- European Standards are used in National or European legislation and procurement
- European Standards can be used in Quality Assurance and certification (e.g. medical devices)

Standard definition

- **Standard:**
[ISO/IEC Guide 2:1996]

defines a standard as a document, established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context

Definition

Interoperability

- [ISO/IEC TR 10000-1:1998]

The ability of two or more IT systems to

**Syntactical
Interoperability**

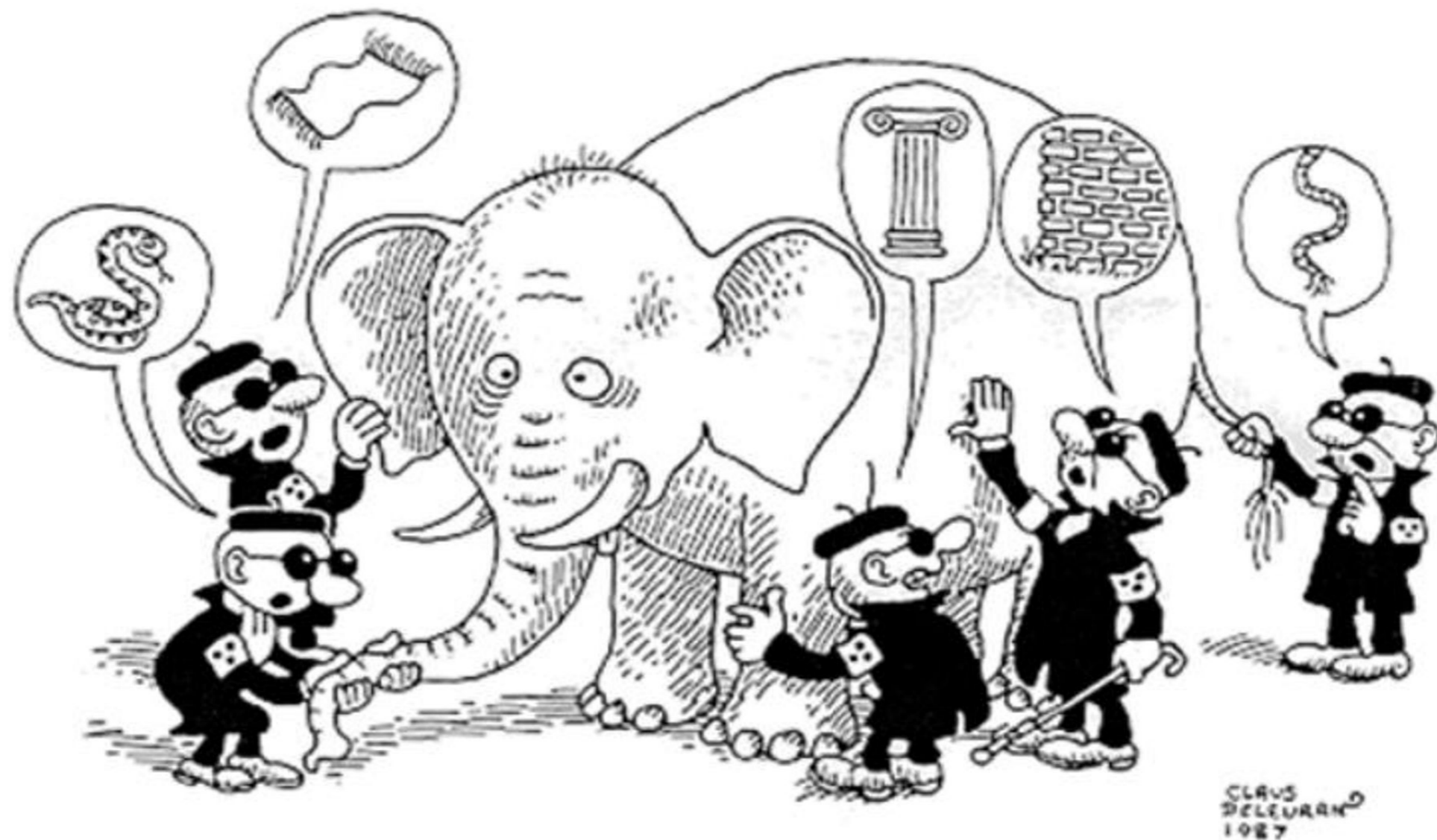
exchange information and

to make mutual use of the information

**Semantic
Interoperability**

that has been exchanged.

What is an EHR?



Slide kindly provided by Søren Vingtoft

- **ISO DTR 20514 (EHR definition and scope)**



The basic-generic definition for the EHR is *a repository of information, regarding the health status of a subject of care, in computer processable form.*

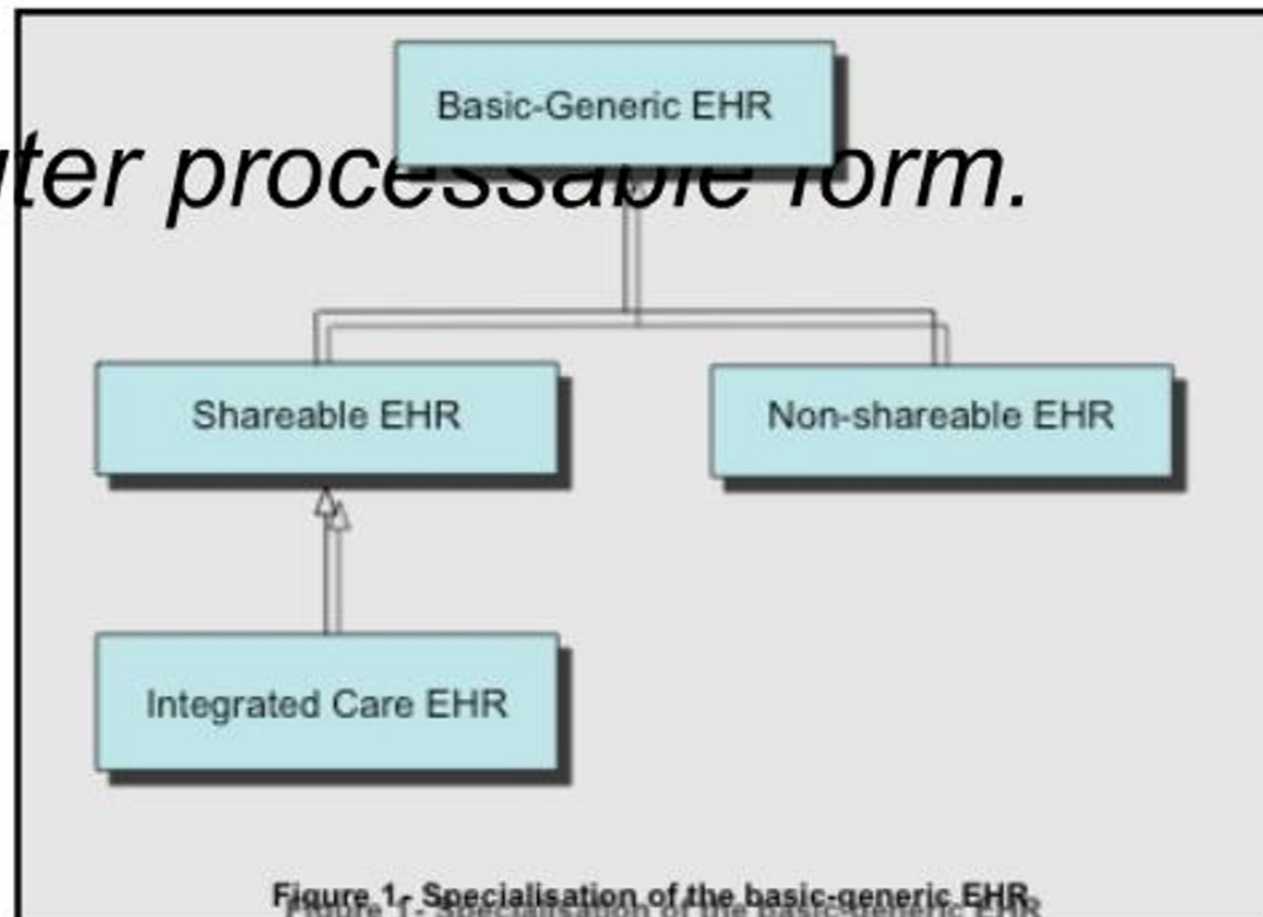


Figure 1. Specialisation of the basic-generic EHR.

• The sharing of EHR information can take place at three different levels:

- *level 1 - between different clinical disciplines or other users, all of whom may be using the same application, requiring different or ad hoc organisation of EHRs,*
- *level 2 - between different applications at a single EHR node – i.e. at a particular location where the EHR is stored and maintained, and*
- *level 3 - across different EHR nodes – i.e. across different EHR locations and/or different EHR systems.*

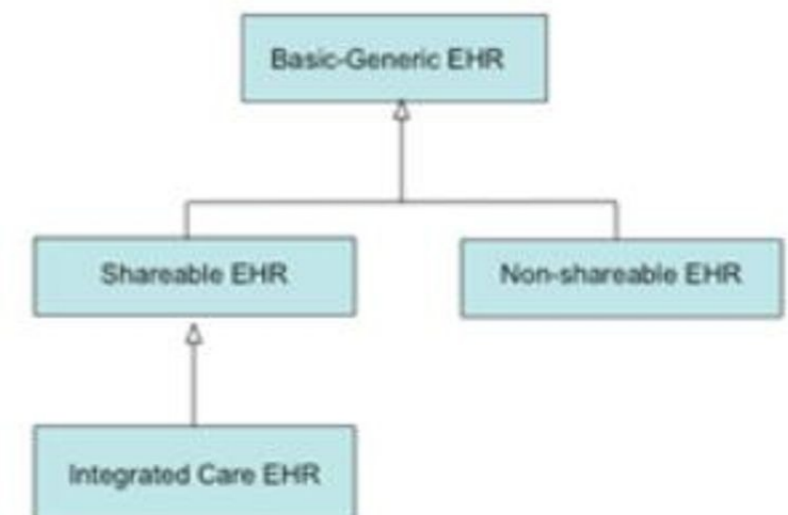


Figure 1- Specialisation of the basic-generic EHR

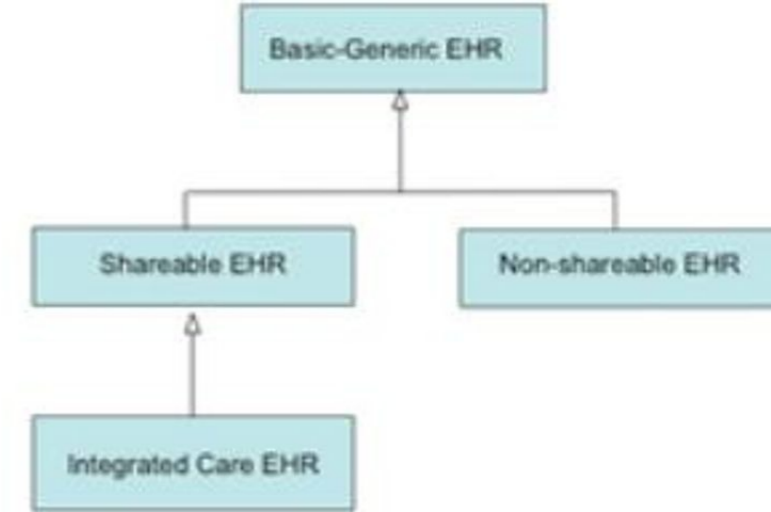


Figure 1 - Specialisation of the basic-generic EHR

● Definition:

The **Integrated Care EHR** is defined as

a repository of information regarding the health of a subject of care in computer processable form, stored and transmitted securely, and accessible by multiple authorised users.

It has a commonly agreed logical information model which is independent of EHR systems.

Its primary purpose is the support of continuing, efficient and quality integrated health care and it contains information which is retrospective, concurrent and prospective.

- **Operational definition EHR:**
- A series of agreements with the aim to:
 - Transport patient related information over at least 5 dimensions:
 - time (1)
 - place (3)
 - Community, culture and context (1)

CEN/TC251



CEN/TC251

- Wg 1: Information Models
- Wg 2: Terminology and knowledge representation
- Wg 3: Security, safety and quality
- Wg 4: Technology for interoperability

(Medical devices communication)

CEN/TC251 standards

Healthcare

Health care
Logistics

Info-
structure

Healthcare
Applications

EN13606
EHRcom

Applications

Infra-
structure

HISA
Health Information Systems Architecture

CEN/TC251

EN 13606

- Would you like to have a EHR system that:
 - Is capable to exchange information between EHR's?
 - Is flexible and can be adapted to local requirements?
 - Makes documents and information persistent?
 - Not only stores data and information but is capable of dealing with interoperable protocols?
 - Is language independent?

EHRCOM

- CEN/TC251 EN13606 EPD norm
- makes this reality
- a generic reference model of any document is the starting point that is mapped onto the database
- all clinical and non-clinical concepts (archetypes) are based on this reference model of any document
- when clinical opinions change archetypes change but not the reference model of the generic document and its mapping on the data base used

EHRcom

- How?

EHRcom

- Each EHR consists of:
- Header
- Structure with rubrics (e.g. SOAP)
- And is filled with clinical concept models (archetypes)

Patient a.bxa

Asthma Report

History

1. Frequency of wheezing

- Daily and continual
- Daily and not continual
- Episodes per week

Laboratory

- Peak Flow
- L/Min

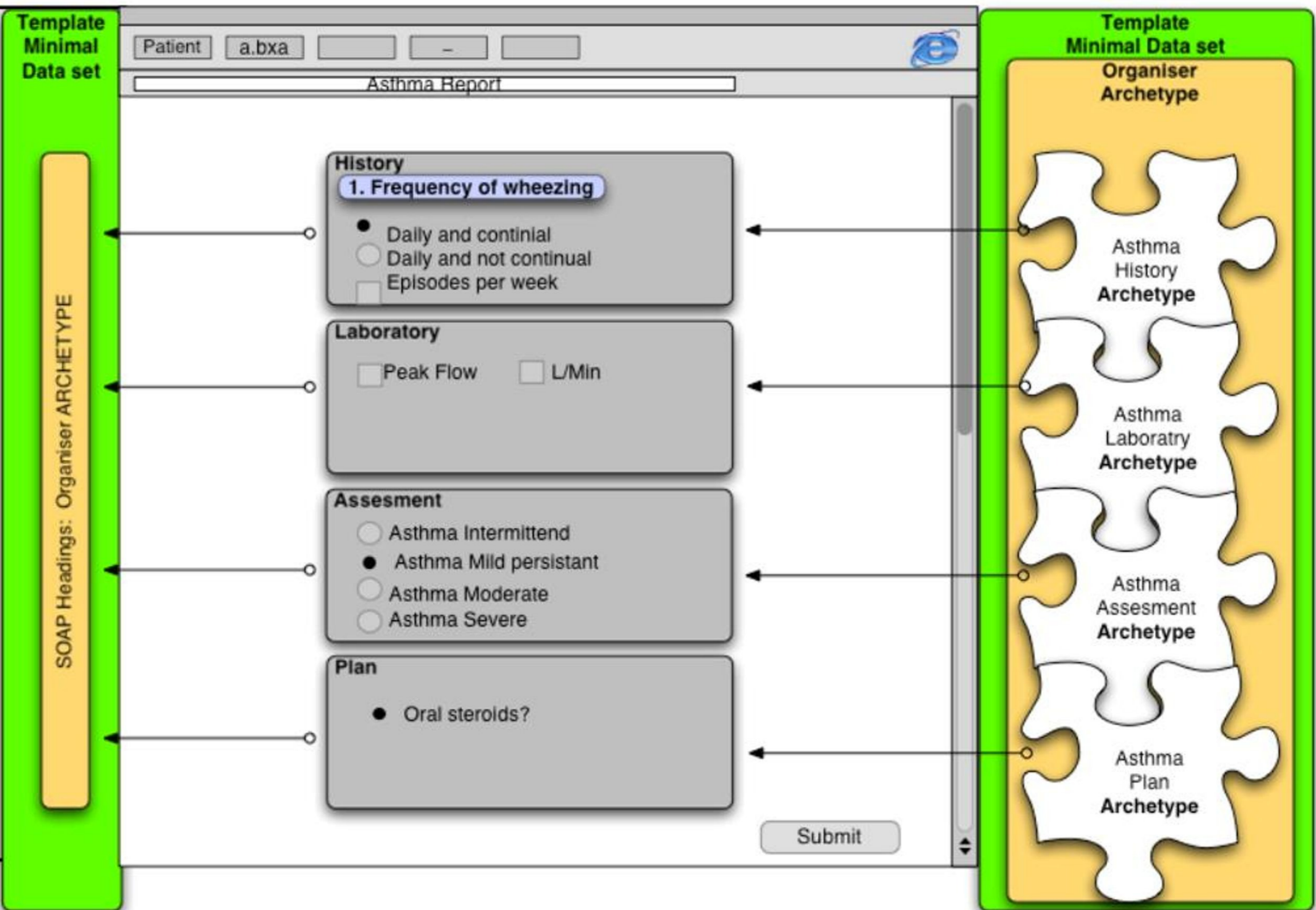
Assesment

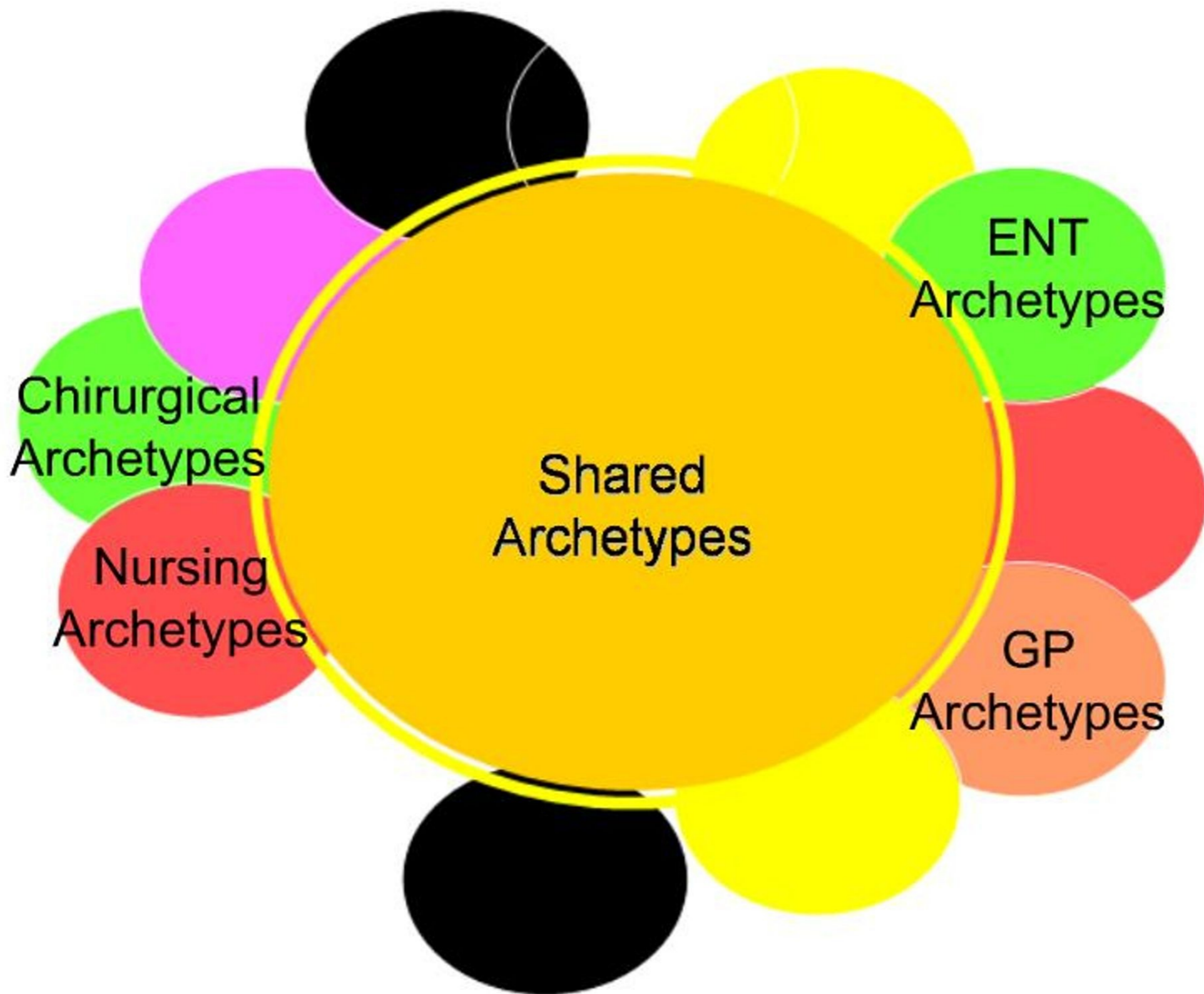
- Asthma Intermittent
- Asthma Mild persistant
- Asthma Moderate
- Asthma Severe

Plan

- Oral steroids?

Submit





Messages	Documents
update database	updates healthcare professionals
not persistent	persistent
data	collection of selected data, information and knowledge
???	Collection of data, information and knowledge that is attestable by an healthcare provider
content fixed	content very flexible
Edifact, HL7 v2, HL7 v3	CEN/TC251 EN13606 EHR, HL7 CDA

open EHR research

pedigree

1992
Good European Health Record: requirements and EHR architecture



EHCR SupA:
revised requirements and architecture
Synapses:

FHR and Clinical Object Dictionary
SynEx:

middleware component architecture

Medicate:
remote asthma monitoring and alerts

6WINIT: wireless IPv6

Good Electronic Health Record

GPGC project (1):
EHR kernel services

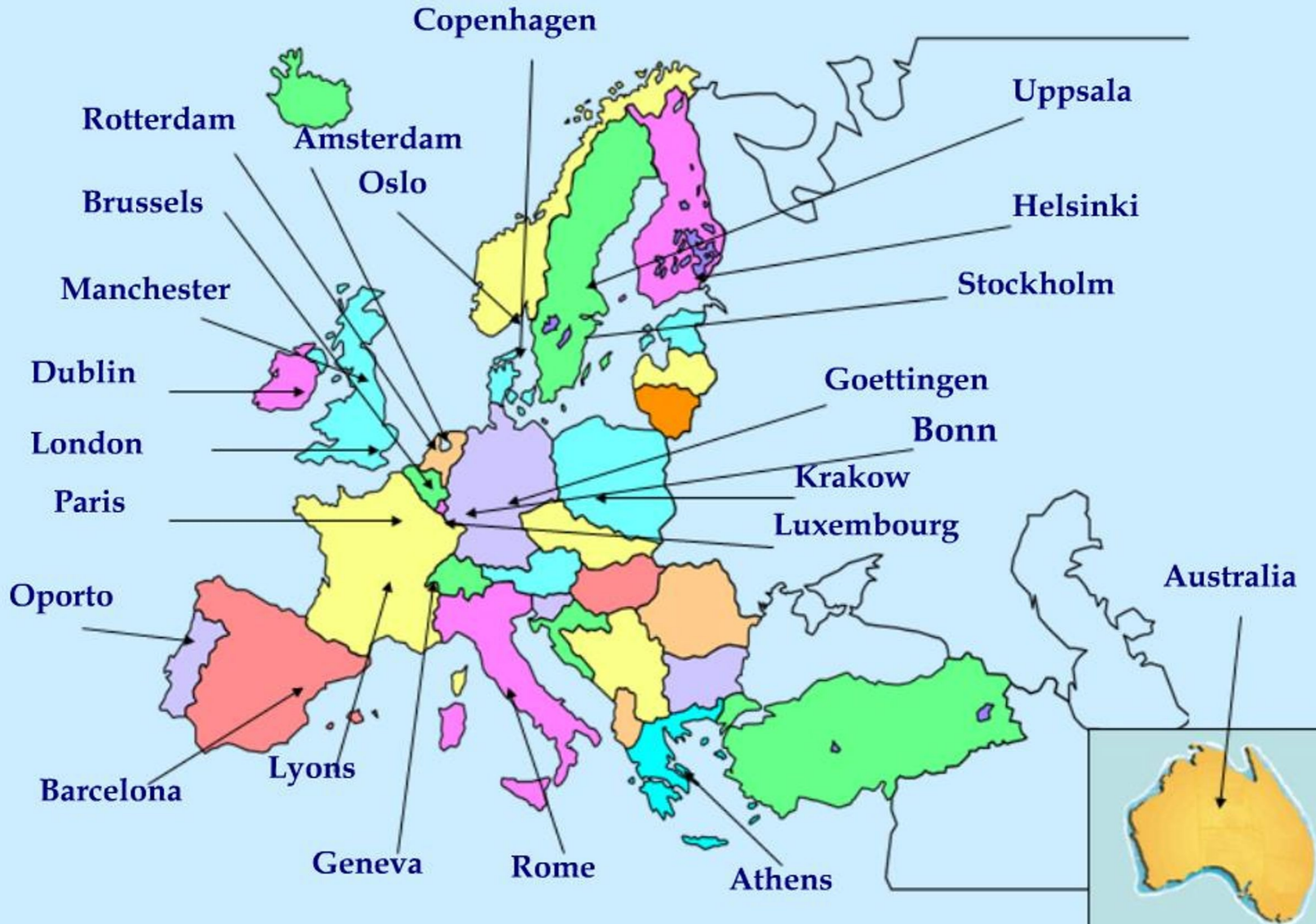
GPGC project (2):
legacy data transformation

GPGC project (3):
diabetes extraction and merge

mNET: wireless demonstrator

2004
openEHR

Contributing EHR demonstrator sites



Engaging with standards

- Key membership and leadership of EHR standards development:
 - CEN 13606 EHR Communications
 - CEN TS 14796 Data Types
 - ISO TS 18308 (EHR Requirements)
 - ISO DTR 20514 (EHR definition and scope)
 - HL7 EHR Functional Specification
 - HL7 Templates specification
 - HL7 Clinical Document Architecture
- Adopting standards within *openEHR* components
- Contributing to next-generation standardisation

CEN/TC251 EN 13606 EHR

- part 1: Generic **model** of any document
- part 2: Archetype Description Language (**ADL**) and meta model
- part 3: Standardised **Archetypes** and term list
- part 4: **Patient Mandate**
- part 5: **Implementatie Guidance**

CEN/TC251 EN 13606 EHR

- Finished by early 2006
- Together with Standard Australia
- Harmonised with HL7 v3 developments
- Work in ISO/TC215 is starting

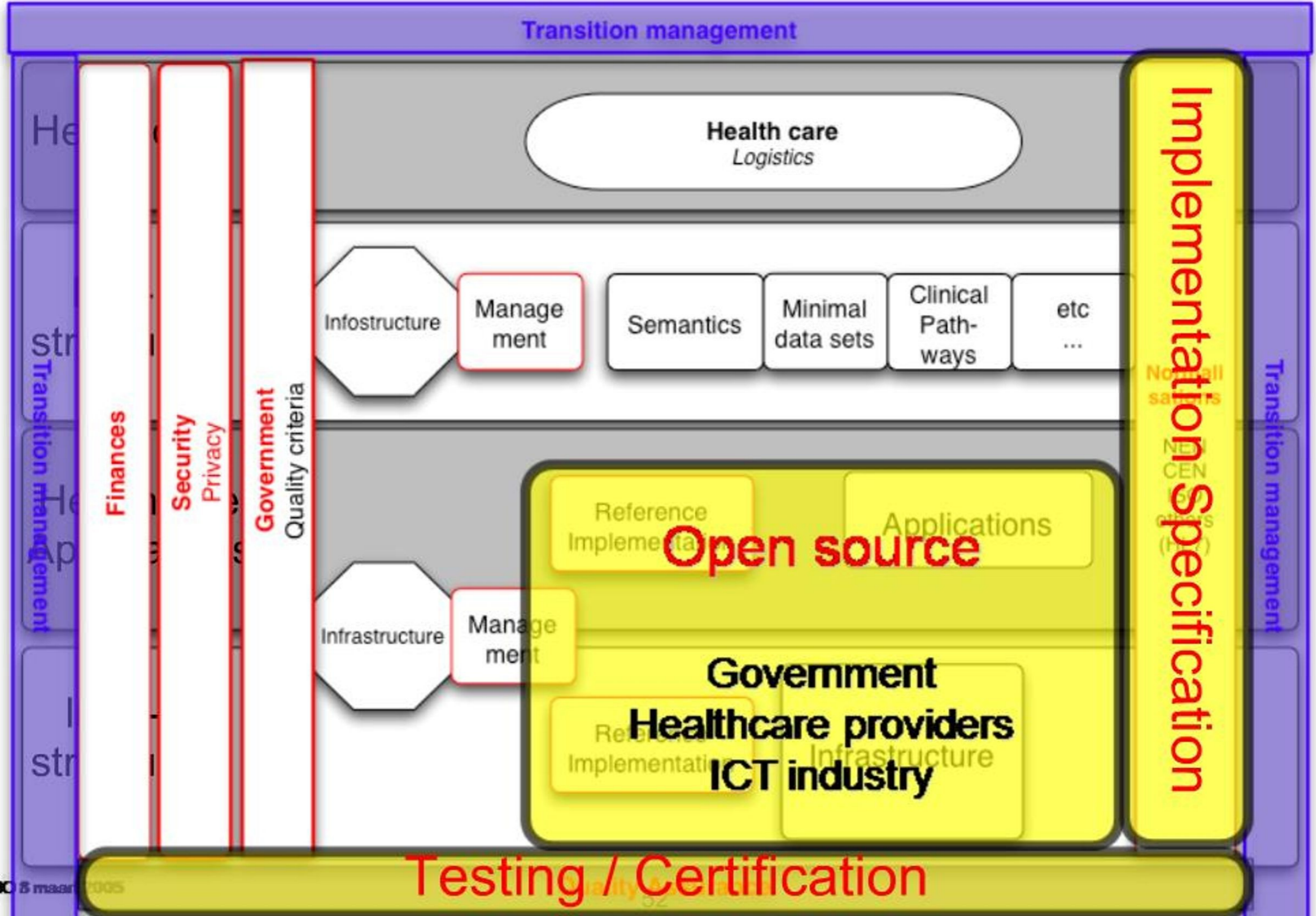
Co-operation

- **CEN/TC251 co-operates with:**
- HL7 (Harmonisation)
- Standards Australia
- ISO/TC251
- OpenEHR
- EuroRec

How to implement nationaly

- Document infrastructure
- EN13606 EHRcom

TNO proposal



Conclusions

- **eHealth**
Shared points of reference = Standards
- **CEN/TC251 standards** (13606, HISA, Consys)
cover a complete spectrum of requirements
- **European standards**
must be used in procurement and can be used
in National legislation
- **Open Source**
based on standards produce a level playing field for
the ICT industry