



Towards an Interoperability Framework for a European e-Health Research Area – *Locating the Semantic Interoperability Domain*

Karl A Stroetmann, PhD MBA, Veli N Stroetmann, MD PhD



Institute for Communications- and Technology Research
Bonn / Germany
karl@empirica.com

WHO/EC Workshop on semantic interoperability, Brussels, Feb. 14-15, 2005

I2-Health

Interoperability Initiative for a European e-Health Area

Support Action for the eTEN Programme

Objectives:

- **identify interoperability and connectivity issues and priorities, barriers and gaps, and solution approaches**
- **focus on fundamental interoperability issues (identification of actors, organisations, adequate measures to achieve interoperability, integration tests and certification)**
- **analyse similarly key topics relating to e-prescription and messaging**
- **develop a roadmap and concrete projects involving all relevant actors - guided by an open discussion process amongst Member State Health Authorities**

e-Health ERA

Towards establishing a European e-Health Research Area

Coordination Action for the follow-up to the e-Health Action Plan

Objectives

- to improve transparency across Member States in respect of e-health strategies, implementation plans, research policies, and pre-deployment measures,
- identify priority RTD needs common to all or to subgroups of Member States, locate cooperation opportunities for joint research across Member States,
- focus in depth on topics selected for the strength of their expected impact on identified priorities, including in particular the European e-Health Action Plan,
- stimulate the establishment of sustainable mechanisms capable of arriving at evidence-based decisions on priorities for viable and effective trans-national RTD

Some definitions

- **Interface:** a boundary at which interaction occurs between two systems, processes, etc.
- **Integration:** combination of diverse application entities into a relationship which functions as a whole
- **Interoperability:** a state which exists between two application entities when, with regard to a specific task, one application entity can accept data from the other and perform that task in an appropriate and satisfactory manner without the need for extra operator intervention

(CEN Report CR 14300:1999 "Interoperability of health care multimedia report systems", and CEN/TC 251 "Short Strategic Study: Health Information Infrastructure", 2000)

Interoperability

- **Functional** and **syntactic** interoperability: the ability of two or more systems to exchange information (so that it is human readable by the receiver); and
- **Semantic** interoperability : the ability for information shared by systems to be understood at the level of formally defined domain concepts (so that the information is computer processable by the receiving system).

(Report from the CEN/ISSS eHealth Standardization Focus Group “Current and future standardization issues in the e-Health domain: Achieving interoperability”, draft 08.2004)

Interoperability profiles

A broad array of user-driven interoperability functional profiles necessary:

1. ***Health IT infrastructure profiles:*** helping to provide secure infrastructures, at local, regional, national, or European levels, upon which clinical data and information may be *securely exchanged and shared*.
2. ***Health information profiles:*** aiming at achieving *semantic interoperability* (clinical information can be interchanged and understood by different systems). This implies *shared information models, archetypes mechanisms, and registration of coding systems*.
3. ***Health workflow profiles:*** built upon the above two foundation categories, and needed to achieve an *active collaboration between health care providers (e.g., orders/results, referrals/reports, scheduling, prescriptions, etc.)*, and providing the most visible added-value to the users.

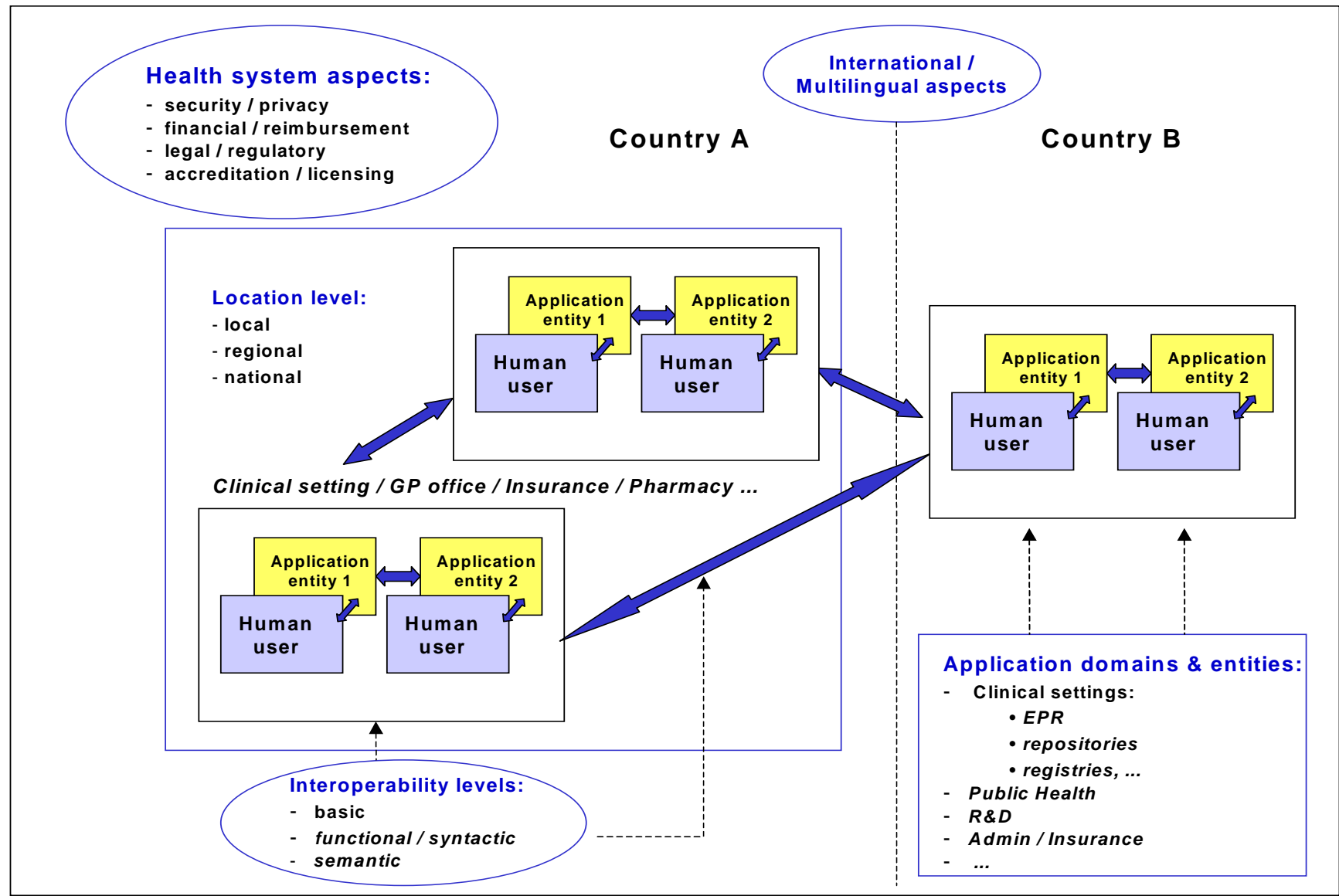
(Report from the CEN/ISSS eHealth Standardization Focus Group “Current and future standardization issues in the e-Health domain: Achieving interoperability”, draft 08.2004)

A human user oriented perspective

In a *multi-lingual context*, particularly when considering *cross-border health care*, we should go beyond the technical level and include *citizens (health professionals, patients, ...)* as part of the interoperable system, i.e. we need an interface between the "separate application entity on each side" as defined by CEN and others, and the person (clinician, nurse, patient, ...) who inputs the information into the unit and the one who interprets and acts on the output at the other side.

We may be able to capture this by a wider definition of what "semantic interoperability" means, i.e. we would have to translate, e.g., concepts and terms as defined and modelled by terminology systems like SNOMED CT not only into the respective *national language* but also with respect to the *medical culture and understanding in a given health system context*.

e-Health interoperability domain



Complexity of interoperability

Interoperability requirements	Applications requiring interoperability															
	Health and clinical services					Common infrastructure services					Public health		Admin		R&D	
	EHR / EPR	messages / requests	imaging	workflow	...	Identification		terminology	Security, PKI	citizen health info	surveillance / epidemiology	statistics	QA	reimbursement	supplies	HRM
						doctors: - license - speciality - place of work, ...	institutions - hospitals - pharmacies, ...									
1. Standards:																
- Basic /technical																
- Functional / syntax																
- Semantic																
- Templates for contents / optimal data sets																
- Localisation (Integration into national & other contexts)																
2. Implementation guides & regimens																
3. Certification																
4. Organisational rules																
- authorisation / institutional responsibilities																
- finance / reimbursement																
- accreditation																
- legal incl. security & privacy																
5. Global coordination																
a) Institutional setting																
- European coordination body for National e-health infrastructure institutions																
- legal basis																
- financing																
b) Generic European e-health framework architecture																
c) MS roadmap integration																
c) WHO: global perspective																

Overview of interoperability dimensions and issues - I

Interoperability requirements	Applications requiring interoperability																			
	Health and clinical services					Common infrastructure services					Public health			Admin			R&D			
	EHR / EPR	messages / requests	imaging	workflow	...	Identification			terminology	Security, PKI	citizen health info	surveillance / epidemiology	statistics	QA	reimbursement	supplies	HRM	knowledge management	guidelines	...
						patient	doctors: - license - speciality - place of work, ...	institutions - hospitals - pharmacies, ...												

Overview of interoperability dimensions and issues - II

Interoperability requirements	Applications requiring interoperability																			
	Health and clinical services					Common infrastructure services					Public health			Admin			R&D			
	EHR / EPR	messages / requests	imaging	workflow	...	Identification			terminology	Security, PKI	citizen health info	surveillance / epidemiology	statistics	QA	reimbursement	supplies	HRM	knowledge management	guidelines	...
						patient	doctors: - license - speciality - place of work, ...	institutions - hospitals - pharmacies, ...												
1. Standards:																				
- Basic / technical																				
- Functional / syntax																				
- Semantic																				
- Templates for contents / optimal data sets																				
- Localisation (Integration into national & other contexts)																				
2. Implementation guides & regimens																				
3. Certification																				

Overview of interoperability dimensions and issues - III

Interoperability requirements	Applications requiring interoperability																	
	Health and clinical services					Common infrastructure services					Public health			Admin			R&D	
4. Organisational rules																		
- authorisation / institutional responsibilities																		
- finance / reimbursement																		
- accreditation																		
- legal incl. security & privacy																		
5. Global coordination																		
a) Institutional setting																		
- European coordination body for National e-health infrastructure institutions																		
- legal basis																		
- financing																		
b) Generic European e-health framework architecture																		
c) MS roadmap integration																		
c) WHO: global perspective																		

Overview of dimensions and issues of semantic interoperability

Interoperability requirements	Applications requiring interoperability																		
	Health and clinical services					Common infrastructure services				Public health				Admin				R&D	
	EHR / EPR	messages / requests	imaging	workflow	...	Identification			terminology	Security, PKI	citizen health info	surveillance / epidemiology	statistics	QA	reimbursement	supplies	HRM	knowledge management	guidelines
						patient	doctors	institutions											
1. Standards:																			
- Basic / technical																			
- Functional/syntax																			
- Semantic																			
- Templates for contents / optimal data sets																			
- Localisation (Integration into national & other contexts)																			
2. Implementa- tion guides & regimens																			
3. Certification																			
4. Organisational rules																			
5. Global coordination																			