

---

**Toward Semantic Interoperability of EHR systems:  
a joint effort for Europe**

**Electronic health records and systems**

**Dipak Kalra**  
UCL

**on behalf of the Semantic Health consortium**

**Expert Workshop on Friday, May 16, 2008, Brussels**

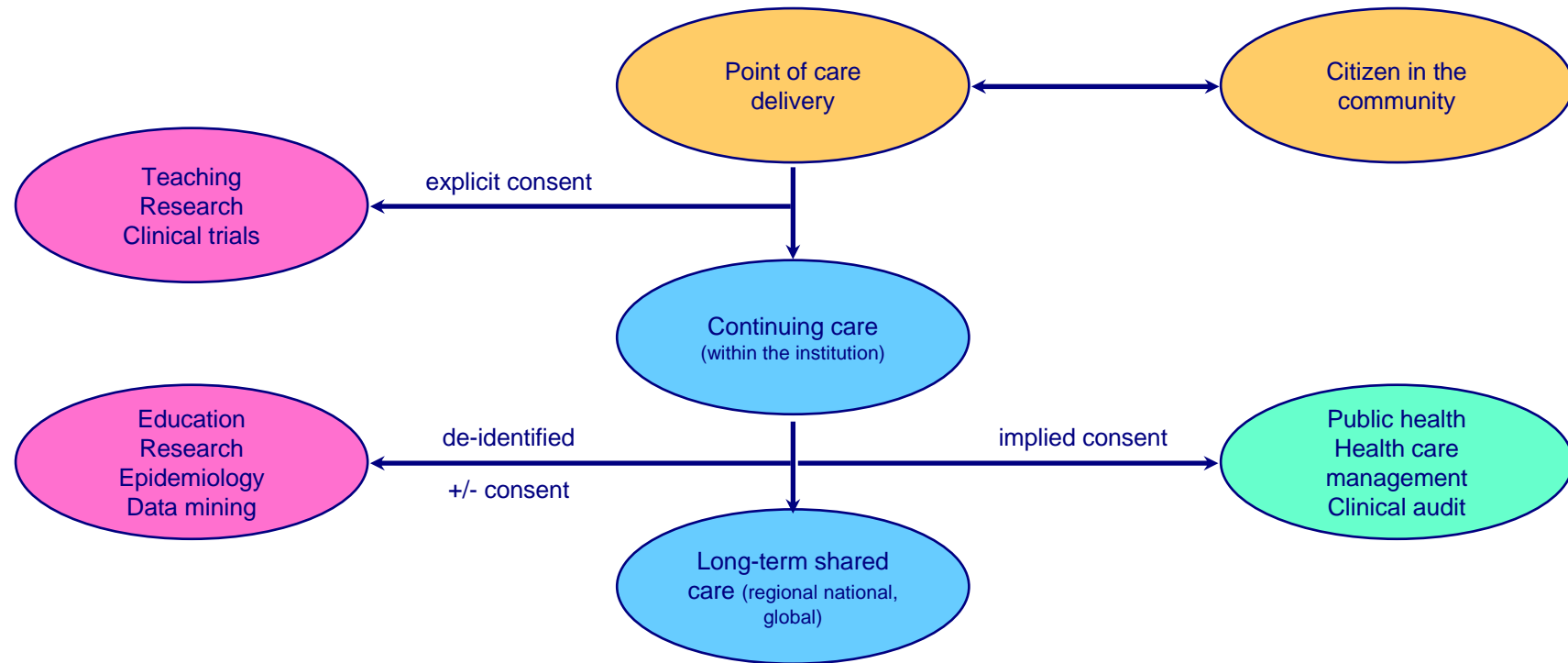
# Goals for EHR semantic interoperability

---

- To support patient safety, quality of care, chronic disease management, extended homecare, patient empowerment
  - enable the safe, meaningful sharing and combining of health record data between heterogeneous systems and actors / care providers
  - enable the integration and safe use of computerised protocols, alerts and care pathways by EHR systems
  - link EHR data to explanatory and educational materials to support patient and family engagement and professional development
  - ensure the necessary data quality and consistency to enable meaningful and reliable use of longitudinal and heterogeneous data for public health, research, health service management

**Clinical meaning (data, information, knowledge)  
must be capable of being represented consistently**

# Clinical data life-cycle



## Governance requirements

- Faithfulness
- Completeness
- Medico-legal integrity
- Standards conformance
- Consistent semantics
- Privacy management

## Holistic requirements

- Empowering and respecting Educating  
Supporting diverse cultures and  
professions Capable of evolution

# Levels of semantic interoperability

(as defined in the SemanticHealth Roadmap)

---

- **Level 1 = Technical**
  - data structures permit mapping of corresponding parts of an information structure between systems
  - i.e. the data can be imported
- **Level 2 = Unidirectional semantic interoperability**
  - the receiver can interpret the data, from the perspective of the sender
  - i.e. the data can be processed meaningfully
- **Level 3 = Full semantic interoperability**
  - received data can be combined seamlessly with local data and processed homogeneously
  - i.e. the data can be processed seamlessly

# The challenge

---

- **Full semantic interoperability (Level 3) is required across heterogeneous EHRs in order to gain the benefits of computerised support for reminders, alerts, decision support, workflow management and evidence based health care**
  - i.e. to improve effectiveness and to reduce clinical risk

# The challenge

---

- **However, it is recognised that achieving Level 3 across the entirety of healthcare would be a lengthy, expensive and possibly unattainable goal**
- **The problems of semantic interoperability are not yet proving to be a major concern to e-Health programmes**
- **Clinical and vendor stakeholders have not strongly argued for the universal adoption of structured and/or coded data within EHRs**

# Recommended priority use cases: for safe shared care

---

- **New medication prescriptions**
  - requiring comprehensive information on concurrent medication and details of known allergies and conditions (not simple ETP)
- **Reminders and prompts**
  - for overdue or overlooked health care actions and interventions
- **Long term conditions**
  - supporting clinical guidelines and other forms of evidence to determine the optimal management strategy and care pathway for a given patient
- **Care transfers**
  - referrals and within-team workflow such as the degree of urgency and the expectations of the referring clinician from another team member
- **Care co-ordination**
  - ensuring that a high-level view can be taken of distributed (multi-team) care to protect against duplication, delay and incompatible interventions
- **Medical summaries**
- **Personal Health Records**

# EHR Roadmap : short term actions

---

- **Areas needing adoption**
  - Agree on a **generic model** for EHR communications: consider EN13606
  - Adopt a standardised approach for **representing and sharing clinical data structure specifications**: agree to use openEHR archetypes / templates
  - Collaborate on **key use cases for shared care & patient safety**, and on formalising the corresponding terminology sub-sets
  - Seed **clinical fora to develop care pathways and archetypes** to meet the needs of safe and evidence based care in different medical domains and disciplines
  - Strengthen **clinical user training** in the use of EHRs, terminology and structured records

# EHR Roadmap : Medium term actions

---

- Areas needing wide-scale evaluations
  - Develop **best practice in archetype design** and terminology binding to them
  - Design coherent clinical content coverage for large clinical domains
  - Establish **useful exemplars of SNOMED-CT value-sets** being adopted within EHR systems and delivered in meaningful ways to clinical users
  - Develop the **business rules and validation processes** for using term co-ordination within structured EHRs
  - Semantic interoperability for privacy management
  - Identify and **evaluate the benefits** of interoperable EHRs for various stakeholders & health systems

# EHR Roadmap : Medium term actions

---

- **Areas needing investment**
  - **Industry sponsored or nationally supported open source approaches for:**
    - **Archetype & template authoring and quality validation tools (including archetype certification)**
    - **Terminology servers, term browsers for SNOMED CT, support for term co-ordination and terminological queries**
  - **Global multi-cultural dimension - not just term translation but internationalisation across health care paradigms and cultural differences**
  - **Health informatics education**

# EHR Roadmap : Long term actions

---

- **Areas needing research**
  - **Terminology binding** to archetypes and record structures
  - **Archetype indexing** (including ontology resources) and archetype/template repository services
  - **EHR visualisation applications** that can support search and navigation within large and complex health records electronically
  - **Linking EHR data to educational materials** and clinical evidence
  - **Evaluations** of citizen and clinical acceptance of shared EHRs
  - **Semantic interoperability goals and solutions for Personal Health Records** and near patient e-Health