

eHealth usecase

Alessio Carenini



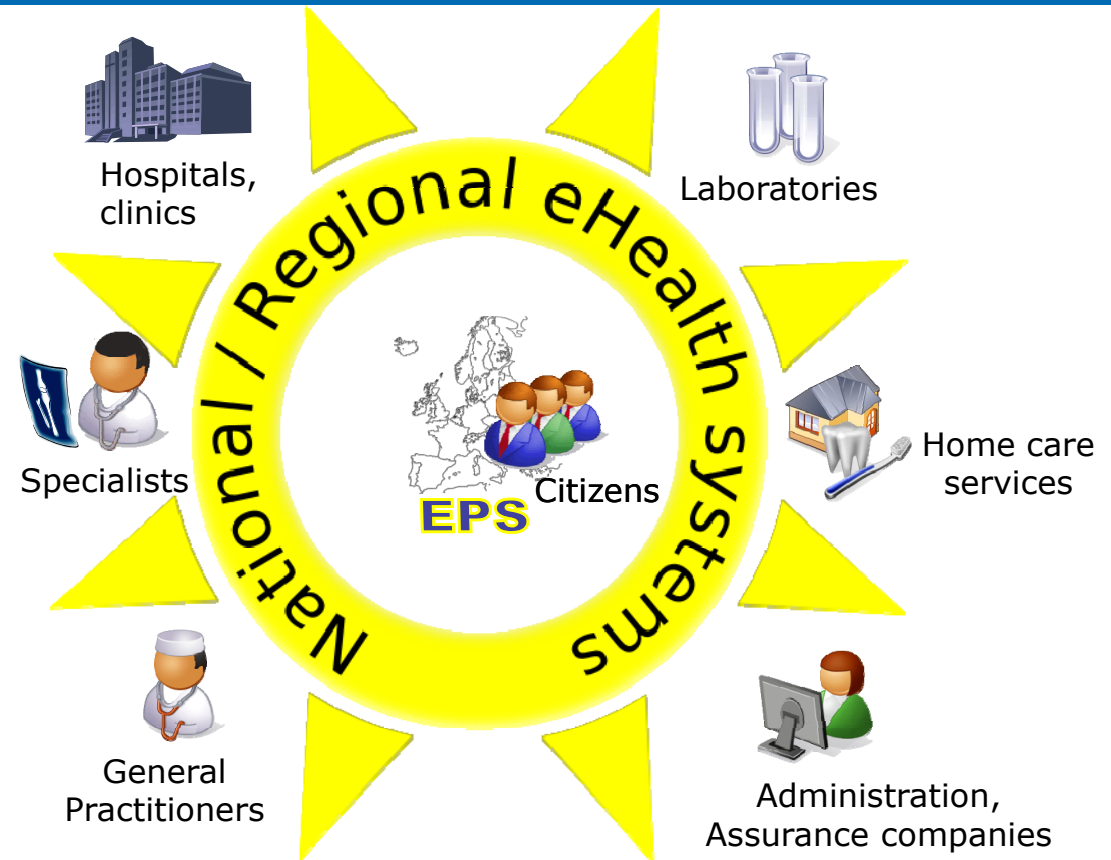
The eHealth Scenario in TripCom

The European Patient Summary (EPS)



An infrastructure for sharing **patient summary** at **European level**

- 5.000 health authorities
- More than 1 million users (clinicians and administrative staff)
- 500 millions citizen summaries



- Current national eHealth systems cannot be adopted as-is at an EU-wide level:
- All of them force the adoption of a particular standard
- All of them assume to operate with the same laws and privacy regulations
- Regulations in a country prevents its eHealth system to operate as-is in another country

- EPS is not considered as a “de facto standard”, but it must integrate with existing systems
 - NOT existing application
 - BUT
 - Existing regional or country-wide ehealth systems
 - NHS Spine (mixed centralized/distributed system)
 - AORTA (purely decentralized system with centralized access)
 - CRS-SISS
- The aim is demonstrating that the EPS can act as a “bridge” for system that are not designed to interoperate
 - Different standards (or different dialects of the same standard)
 - Different privacy laws

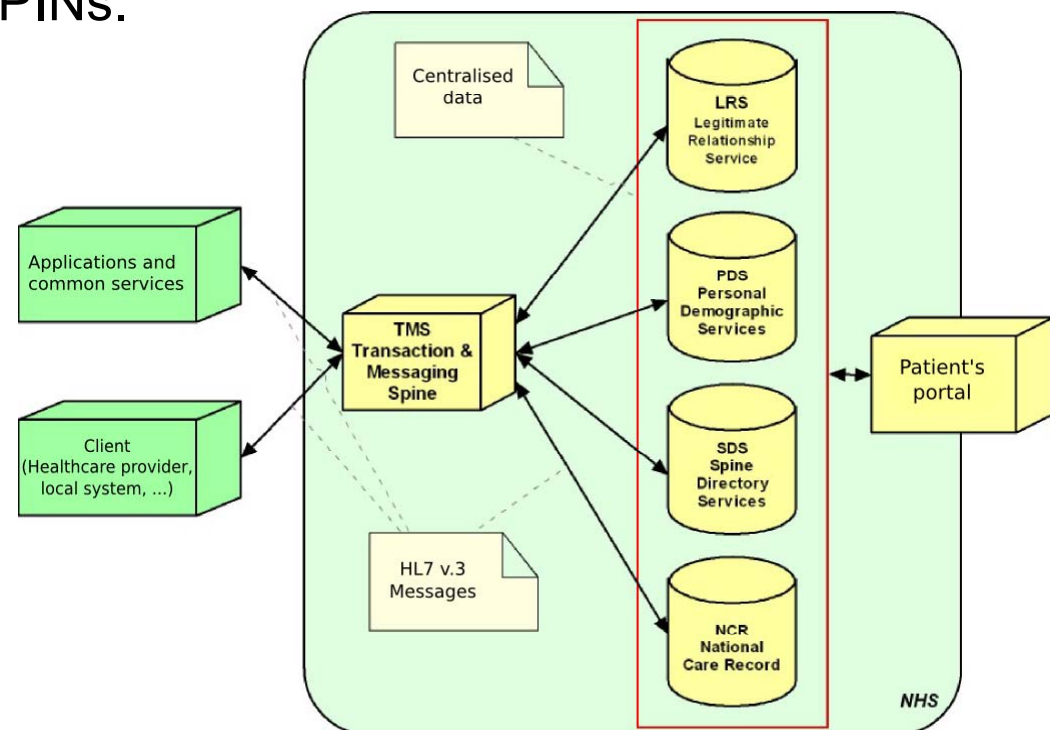
- EPS is not a decision support system
- A DSS is about interpreting data in order to suggest information to a decision maker
 - Interpretation of clinical data is not unequivocal!
 - A set of symptoms can be interpreted in two different ways according to medical knowledge in two different countries
 - Asserted data cannot be distinguished from inferred data (SPARQL doesn't allow it)
 - Who takes the responsibility for possibly erroneous inferred data?

eHealth national systems: state of the art

UK: NHS Spine



- Demographics of all the patients are centrally stored in the Personal Demographic Services repository
- Medical data can be either stored in the National Care Record or in local systems
- Access with smart cards containing digital certificates (PKI) and individual PINs.
- Role-based access control with SAML assertions
- Message exchange through a custom version of HL7 v.3

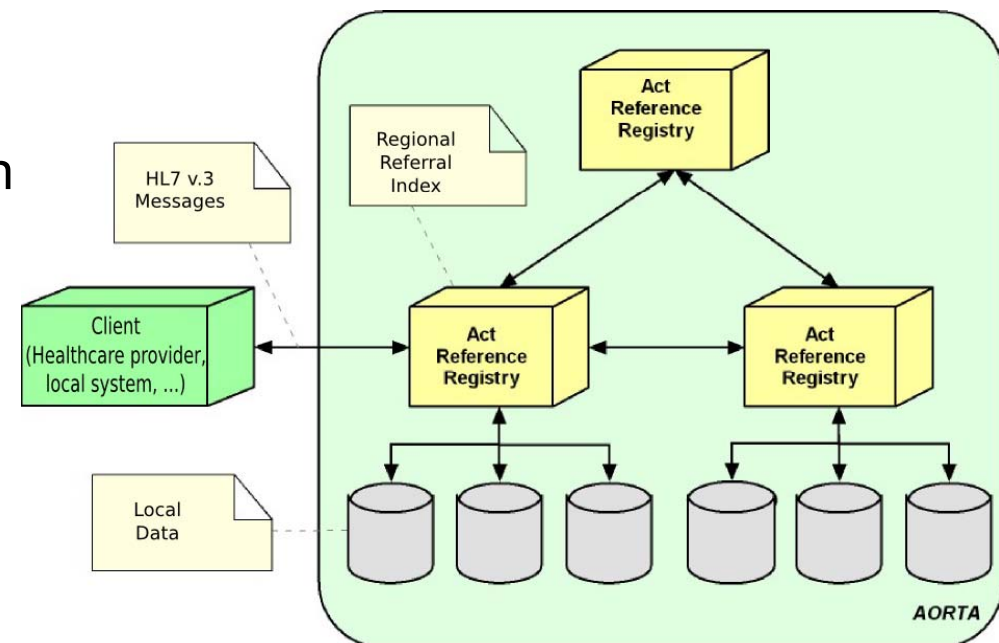


eHealth national systems: state of the art

The Netherlands: AORTA



- Distributed architecture with a central Hub
 - Clients ask the Hub for data
 - The Hub locates data, fetches and returns it to the client
- No central repository of clinical data → data belongs to the source organization
- Data exchange through custom HL7 v.3 messages
- Unique Healthcare Practitioner ID (UZI) card and pincode
 - Identification and authentication of healthcare practitioner
 - Role of health practitioner
 - Relies on PKI



eHealth national systems: state of the art Italy (Lombardy region): CRS-SISS



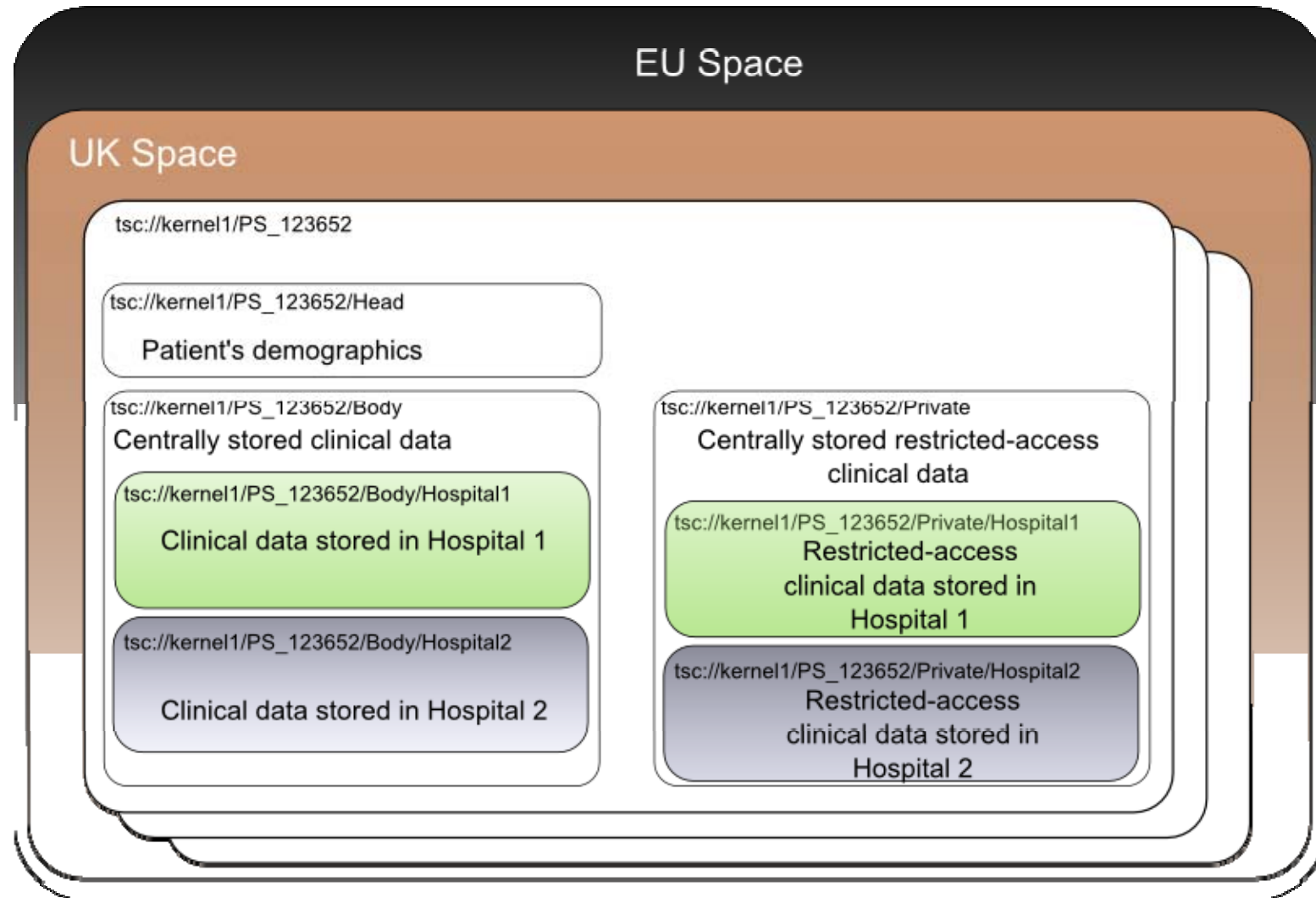
- 3-levels architecture
 - Central database (healthcare central domain)
 - Routing layer (healthcare extranet)
 - Local systems
- Medical data are stored in the local systems, the healthcare central domain acts as
 - Demographics database
 - Booking and prescriptions management
- Access with smart cards (both for citizens and doctors) containing digital certificates (PKI) and individual PINs.
- Role-based access control with SAML assertions, the regional health authority operates as a SAML Identity Provider

eHealth national systems: state of the art Italy (Lombardy region): CRS-SISS

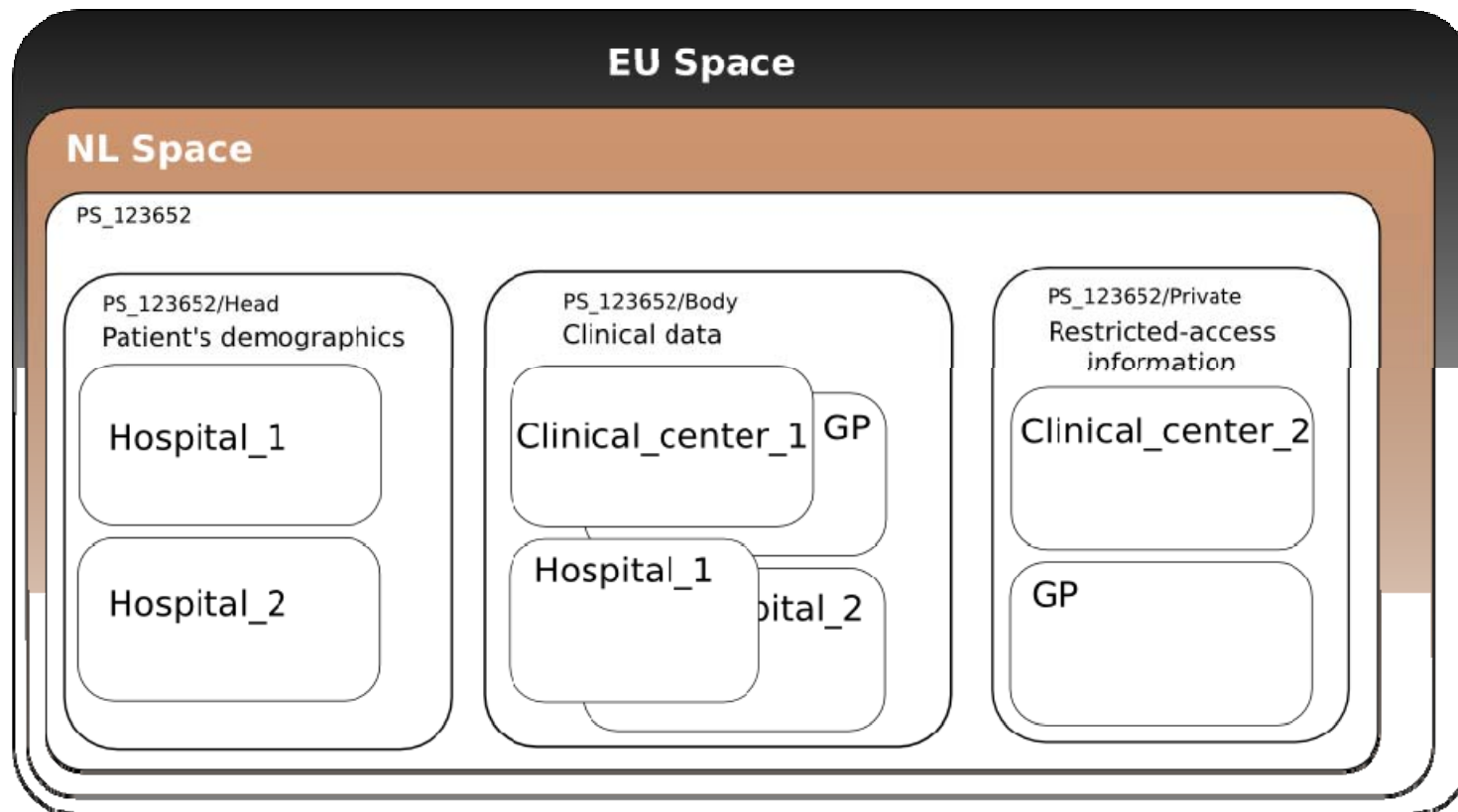


- Data: HL7 v.3 messages can be automatically lifted to their RDF representation
- Security: SAML security assertions can be natively used when interacting with the TS
- User-restricted data: Sealed envelopes correspond to the Private subspace of a Patient Summary
- PS spaces structures:
 - Demographics centrally stored → on a set of kernels managed by the same authority
 - Clinical data can be centralized or distributed
 - Centralized data in the main Body/Private PS subspace and managed by a single kernel
 - Distributed data inside subspaces of Body/Private spaces and managed by remote kernels

Integrating the EPS with NHS Spine (2)

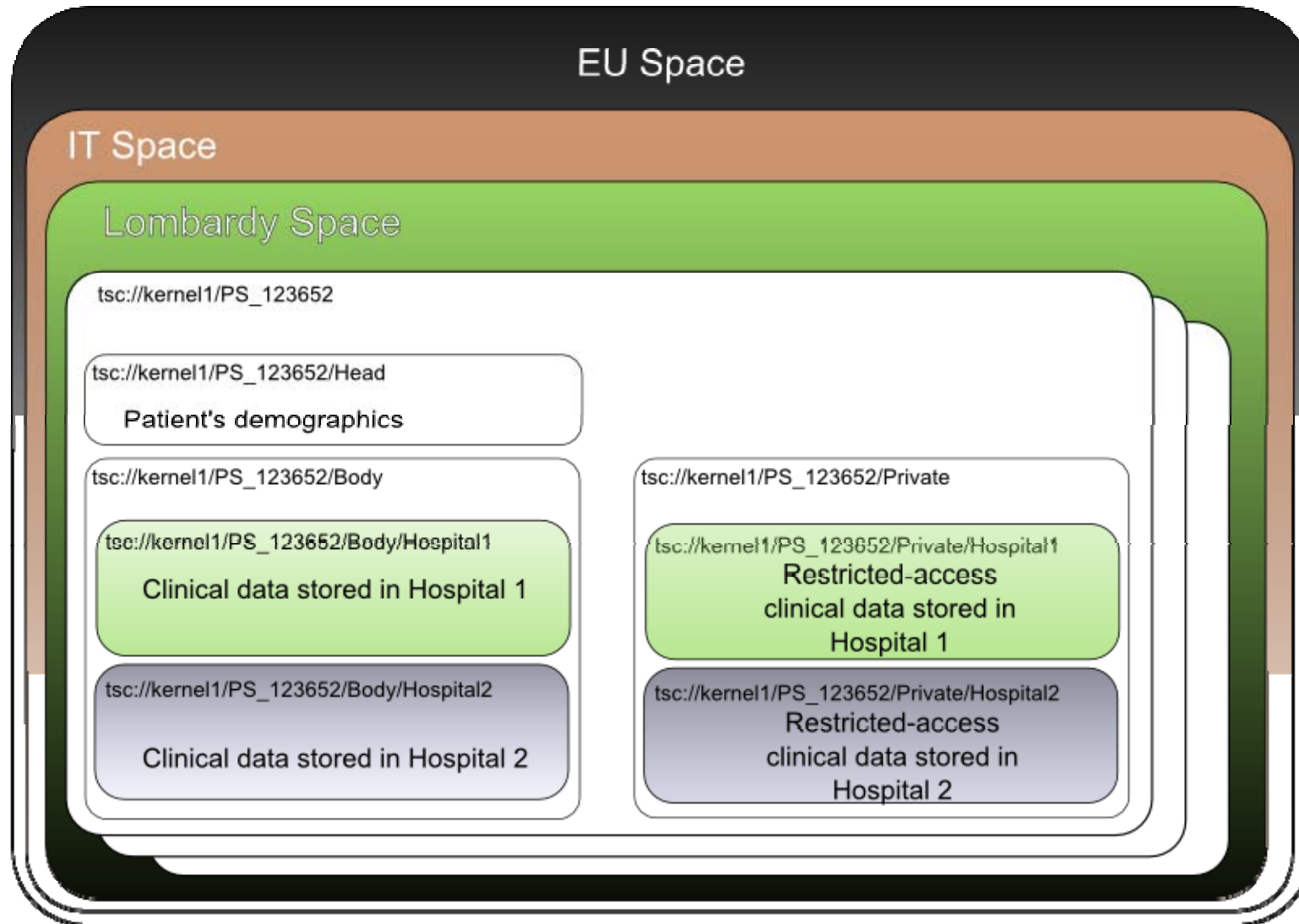


- Data: HL7 v.3 messages can be automatically lifted to their RDF representation
- Data for building patient summaries **MUST** be held in a space owned by the originating Health Authority



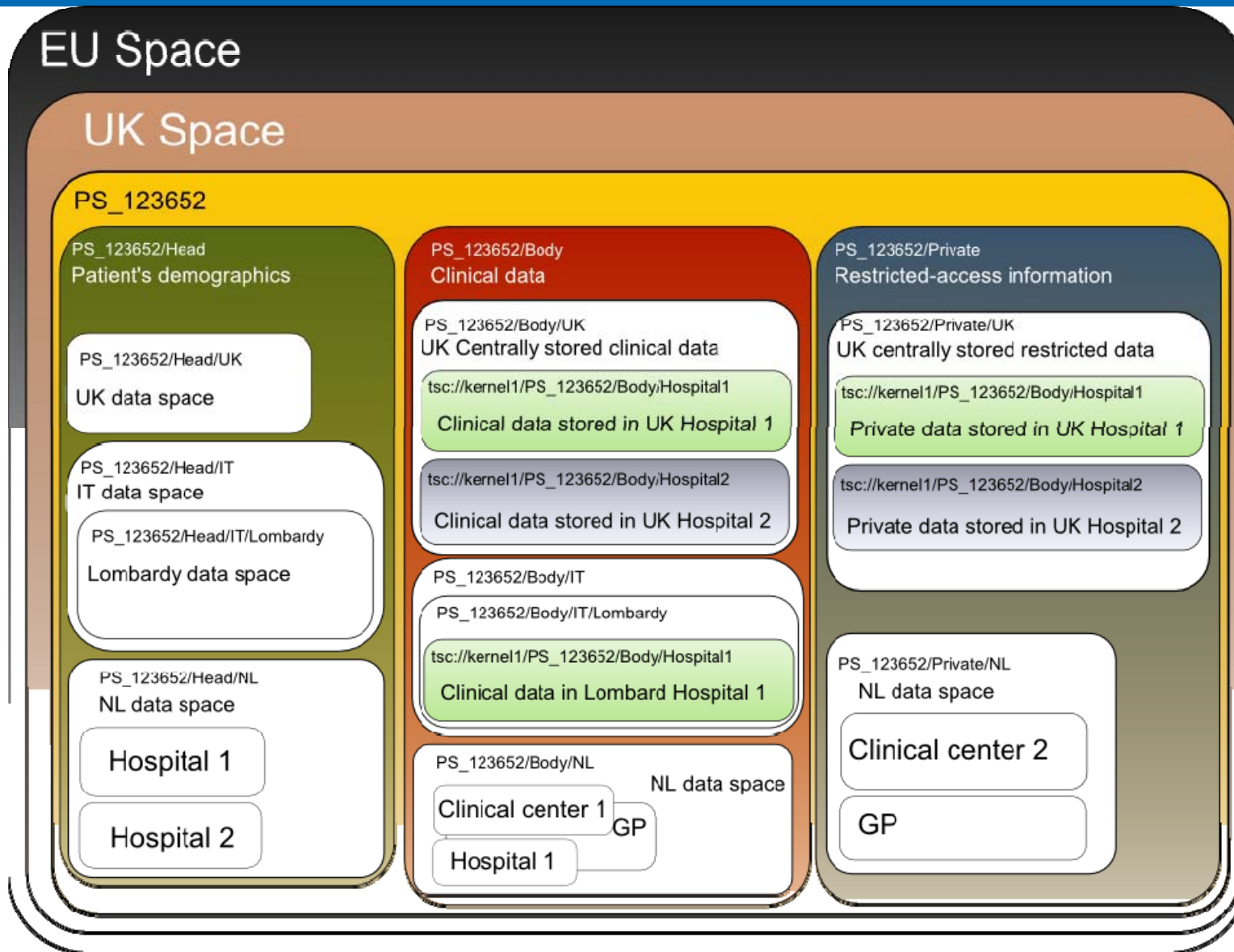
- Data: HL7 v.3 messages can be automatically lifted to their RDF representation
- Security: SAML assertions and healthcare central domain are already compliant with EPS security requirements
- Demographics is centrally stored: must be stored on a kernel (or set of kernels) owned by the central healthcare authority
- Medical data is distributed: must be stored on the kernels of the local healthcare providers
- Lombardy must be compliant with Italian privacy laws: Lombardy main space is a subspace of the Italian main space

Integrating the EPS with CRS-SISS (2)



- EPS spaces must be configured in order to be used as a central repository by NHS Spine and as a registry by AORTA
- Nation-wide spaces ensure uniqueness of the PS spaces identifiers
- Policies of the top-level spaces just specify very basic rules
- Recursive read and policy evaluation is massively used
- Inside a PS
 - PS policies must allow evaluated starting from the leaf spaces
 - A PS is still divided into 3 main areas
 - Each “contributing nation” manages a subspace inside each of the 3 areas
 - The spaces of the “contributing nation” are hosted on the kernels managed by the “contributing nation”

Integrating AORTA, NHS Spine and CRS-SISS with the EPS (2)



State of the demo application



European Patient Summary

[Home](#) | [Social history](#) | [Alerts](#) | [Problems](#) | [Medications](#) | [Encounters](#) | [Immunizations](#) | [People](#) | [Organizations](#)

Date Created: 2007-06-14
From: Dr. Georgina Grey (General Practitioner)
London City Health Authority (Providing Organization)

sorted by: [labels](#); [then by...](#) • grouped as sorted



1. <http://www.tripcom.org/ontologies/eps/EPS-Instance1#patient> ([link](#))

label: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#patient>
type: Demographics
URI: <http://www.tripcom.org/ontologies/eps/PS-Instance1#patient>
Postal code: SE11
City: London
Name: Mr. Christian C. Corrs
Other ID type: Passport Number
Phone number: +44 734 2837464
Birth date: 1970-03-16
Street address: 12 Main Street Boulevard
Object ID: 2.16.840.1.113883.999.1.301
Country: Britain, UK
rdf:type: [Demographics](#)
E-Mail address: <mailto:christian@ukcompany.com>
Gender: Male
Other ID: UK-274856 S

European Patient Summary

[Home](#) | [Social history](#) | [Alerts](#) | [Problems](#) | [Medications](#) | [Encounters](#) | [Immunizations](#) | [People](#) | [Organizations](#)

Date Created: 2007-06-14
From: Dr. Georgina Grey (General Practitioner)
 London City Health Authority (Providing Organization)

Clinical Records

[\(Import records from eHR\)](#)

Social History

Type	Date	Description	Status
<input type="checkbox"/> Keep private	<input type="text"/>	<input type="text"/>	<input type="text"/>

TABLE • TILES

4 epsx:Social_history

Status	Type	Description	Source org. name	Source org. role	Date
Current	Marital Status	Married	London City Healthcare Authority	Healthcare Authority	2007-05-02T00:00:00Z
Current	Language	English	London City Healthcare Authority	Healthcare Authority	1970-10-1T00:00:00Z
Current	Ethnicity	Caucasian			1970-3-16T00:00:00Z
Current	Alcohol assumption	10 std glasses/day			2001-11-01T00:00:00Z

Status

4 Current

Type

- 1 Alcohol assumption
- 1 Ethnicity
- 1 Language
- 1 Marital Status

European Patient Summary

[Home](#) | [Social history](#) | [Alerts](#) | [Problems](#) | [Medications](#) | [Encounters](#) | [Immunizations](#) | [People](#) | [Organizations](#)

Date Created: 2007-06-14
From: Dr. Georgina Grey (General Practitioner)
 London City Health Authority (Providing Organization)

3 Organizations

sorted by: [Relations](#), [Postal codes](#), [Cities](#), and [Countries](#); then by... • grouped as sorted

Blood Analysis Laboratory (1)

- http://www.tripcom.org/ontologies/eps/EPS-Instance1#problem1_actor ([link](#))

label: http://www.tripcom.org/ontologies/eps/EPS-Instance1#problem1_actor
 type: Organization
 URI: http://www.tripcom.org/ontologies/eps/EPS-Instance1#problem1_actor
 Name: St. John Hospital
 rdf:type: [Organization](#)
 Object ID: 2.16.840.1.113883.999.1.401
 Relation: Blood Analysis Laboratory
 Phone number: +44 12 4732331

Healthcare Authority (2)

- <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority2> ([link](#))

label: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority2>
 type: Organization
 URI: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority2>
 Postal code: 27439
 City: Bolzano
 Name: Ospedale Maggiore dell'Alto Adige
 rdf:type: [Organization](#)
 Object ID: 2.16.840.1.113883.999.2.102
 Street address: Via Mille 18
 Relation: Healthcare Authority
 Phone number: +39 0287 8365532
 Country: IT

- <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority1> ([link](#))

label: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority1>
 type: Organization
 URI: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#healthcareAuthority1>
 Postal code: SE 15
 City: London
 Name: London City Healthcare Authority
 rdf:type: [Organization](#)
 Object ID: 2.16.840.1.113883.999.1.101
 Street address: 12, Trafalgar Square
 Relation: Healthcare Authority
 Phone number: +44 204 7302443

Relation

- Blood Analysis Laboratory
- Healthcare Authority

Postal code

- (missing this field)
- 27439
- SE 15

City

- (missing this field)
- Bolzano
- London

Country

- (missing this field)
- Britain, UK
- IT

European Patient Summary

[Home](#) | [Social history](#) | [Alerts](#) | [Problems](#) | [Medications](#) | [Encounters](#) | [Immunizations](#) | [People](#) | [Organizations](#)

Date Created: 2007-06-14
From: Dr. Georgina Grey (General Practitioner)
 London City Health Authority (Providing Organization)

[\(Import records from eHR\)](#)

Product (Code)	Date	Status	Form & Refills	Strength	Quantity	Instruction
<input type="checkbox"/> Keep private <input type="button" value="v"/>	<input type="text"/>	Active (UMLS C0205177) <input type="button" value="v"/>	Form: <input type="text"/> Refill: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

1 epsx:Medication

sorted by: [Dates](#), [Status](#), [Entry authors](#), and [epsx:source_organization_name](#); then by... • grouped as sorted

1. <http://www.tripcom.org/ontologies/eps/EPS-Instance1#medication1> [\(link\)](#)

label: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#medication1>
 type: epsx:Medication
 URI: <http://www.tripcom.org/ontologies/eps/EPS-Instance1#medication1>
 Quantity: 10
 Status: Active
 Strength unit: milligram(s)
 Author role: General Practitioner
 Quantity unit: tabs
 Refill: 0
 Product code: 218402
 Product coding system: [rxnorm:RXNORM](#)
 Product name: Mirapex
 Strength: 0.125
 rdf:type: [epsx:Medication](#)
 Date: 2007-11-16T09:13:00Z
 Instruction: Take 2 hours before bedtime
 Form: Tablet
 Entry author: Dr. Georgina Grey

Status

1 Active

Product name

1 Mirapex