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Challenges to define a national eHealth platform

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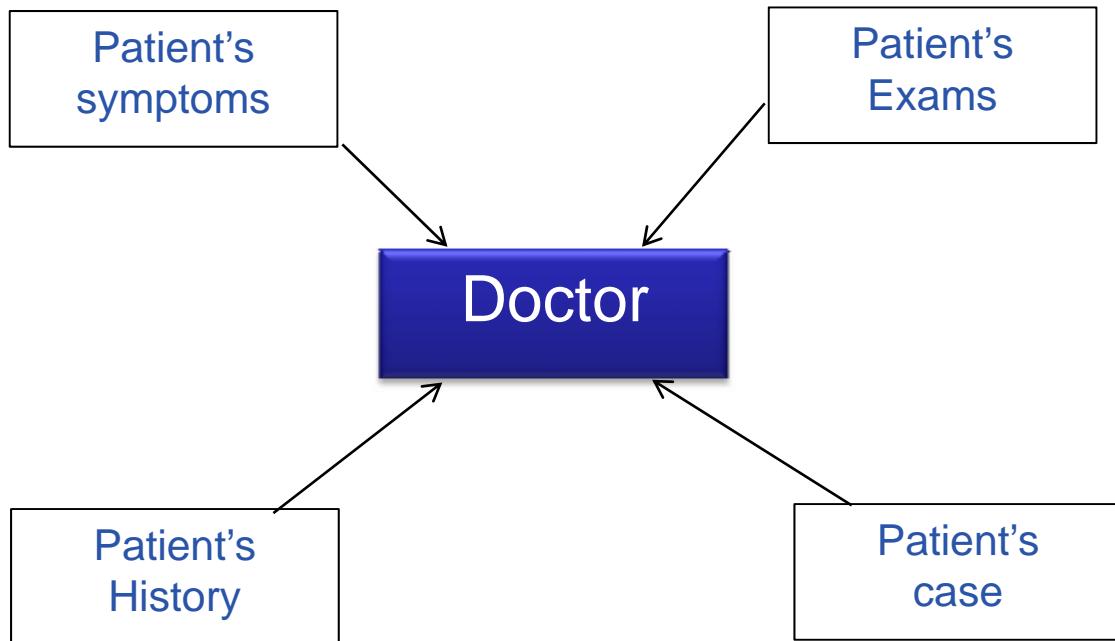
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CR SANTEC

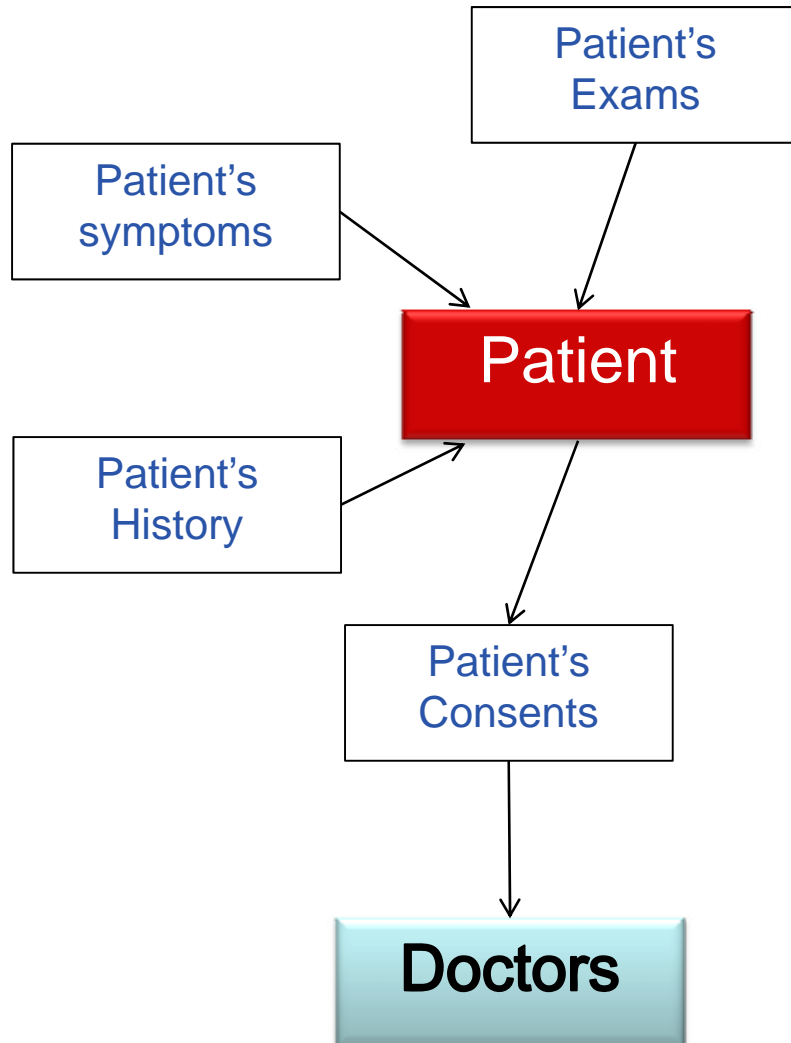
- General view
 - Doctor center X Patient center architecture
- Requirements and constraints
 - Organization
 - Law, ethic, responsibilities, adm. processes, quality and statistics
 - Information
 - Sources, documents, policies, consents, contents and data treatment
 - Technology
 - Network, messages, dependability and reliability, interface
- Architecture
 - Luxembourgish eHealth Platform: Current State
 - Security Strategy

Doctor centered X Patient centered



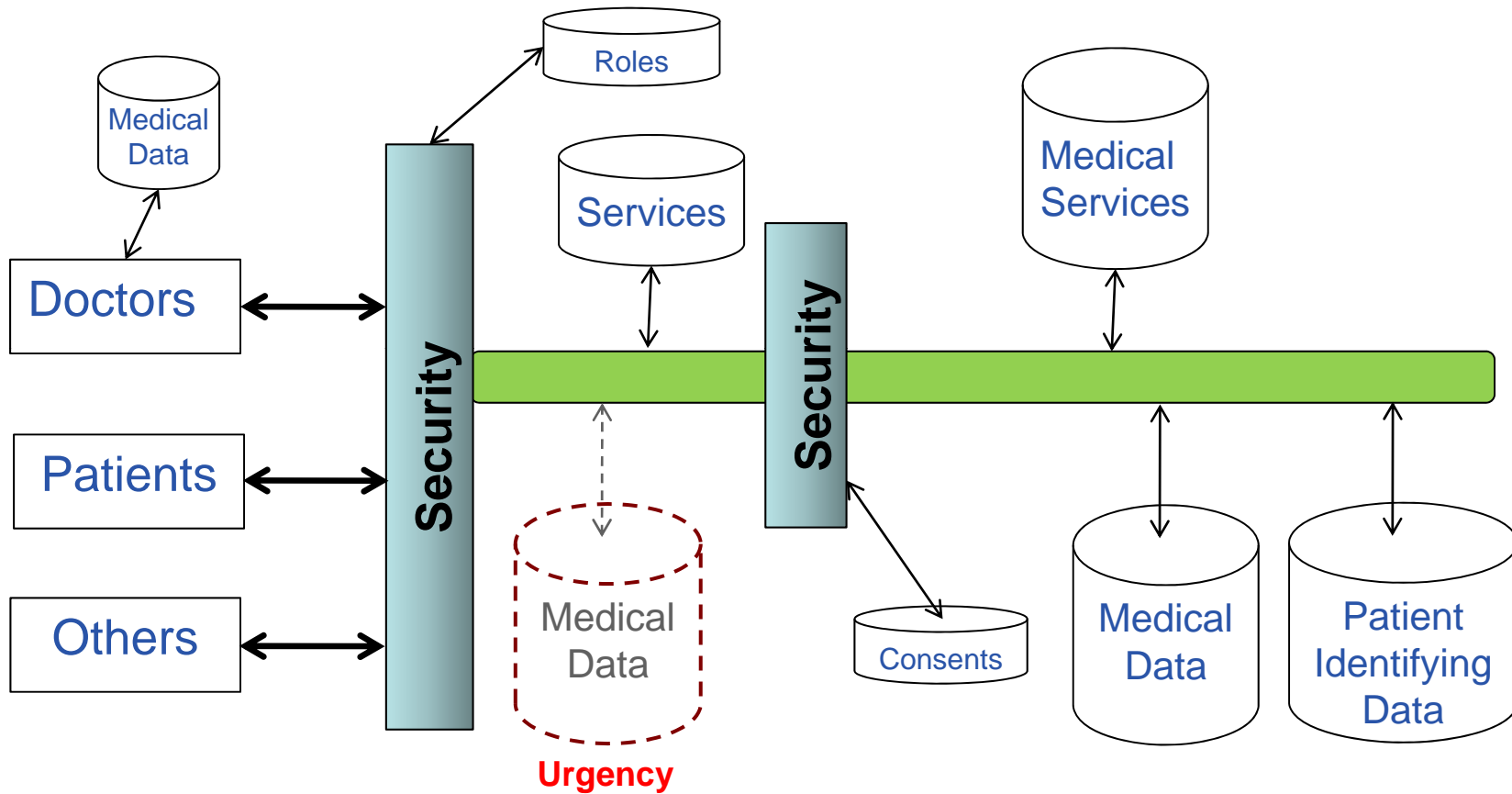
- Doctors are the owner of patient's data
- Services are implemented to satisfy doctors' needs
- Access rights are based on roles
- All medical data are available to doctors

Doctor centered X Patient centered



- ❑ Patients are the owner of their medical data
- ❑ Services are implemented to satisfy needs of patients and healthcare professionals
- ❑ Access rights are based on roles and consents declaration
- ❑ Only a subset of medical data are available to doctors

Doctor centered X Patient centered



General View: Two level of protection system

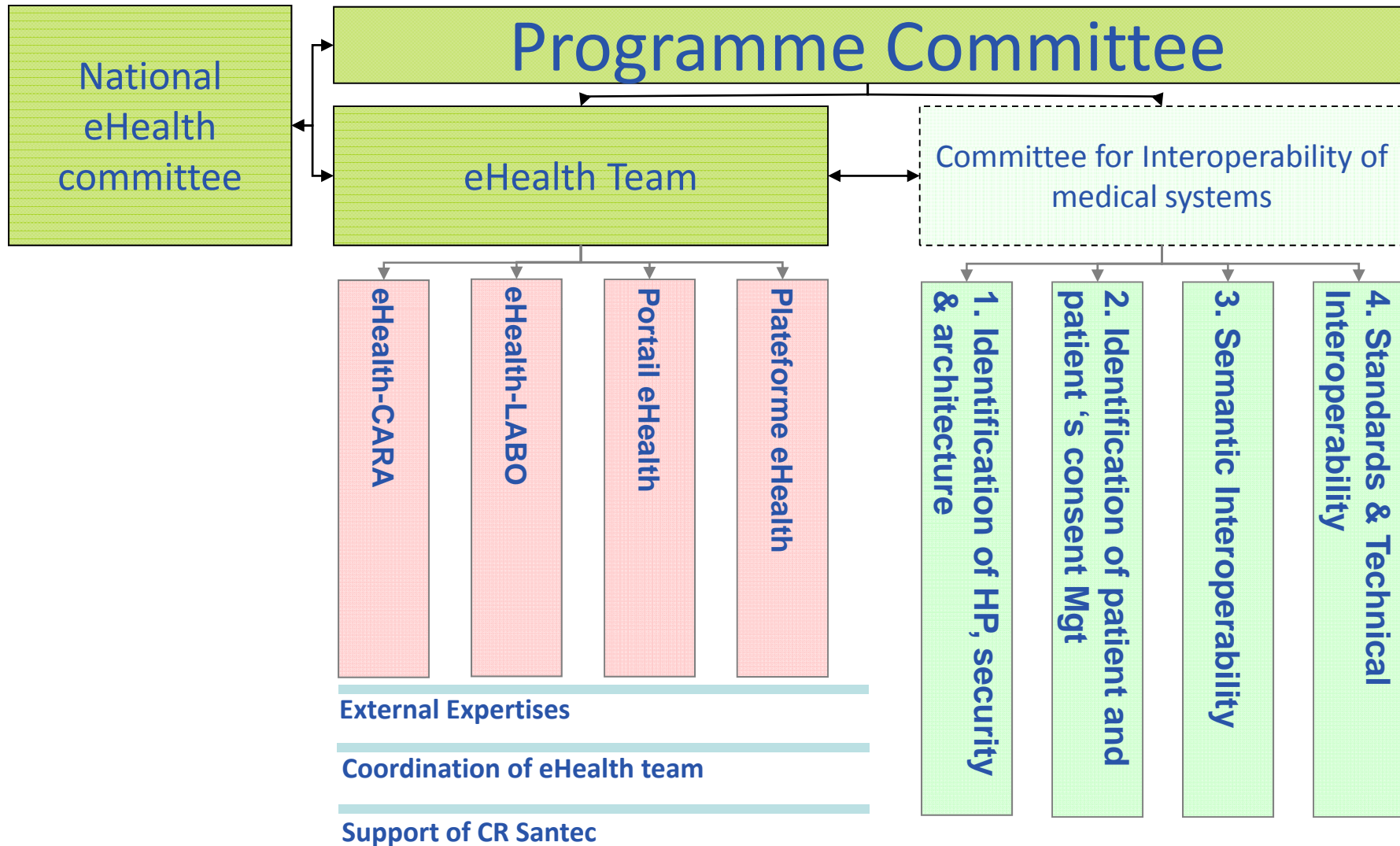
Requirements and constraints

Organization

- ❑ Administrative process
 - ❑ Organigram, decision-makers, financial aspects
- ❑ Quality (main interest but complex data)
 - ❑ What kind of improvements do you want?
 - ❑ What are the indicators?
 - ❑ What can be measured? When? By who?
- ❑ Legal aspects
 - ❑ Data can be Centralized?
 - ❑ Cases: Sweden, Luxembourg
 - ❑ Responsibilities over data
 - ❑ Who store, enter, modify or is the owner of the data?
- ❑ Statistics
 - ❑ Permissions, alerts, exceptions

Example

Organisational Structure



Information

- Existing documents (exchanges)
 - Forms, files, free text
- Sources of information
 - Ministry
 - Patients, suppliers, healthcare professional
 - Database of reference
 - Medication, drug interactions, diagnostic, clinical protocols
 - Terminologies of reference
 - UMLS, ICD10, MeSH, SNOMED, LOINC
- Policies
- Patient Consent
- EHR (Electronic Health Records)
 - Summary, EPR (patient), EMR (medical), ECR (case)

Example

Example of Pat. Consent: Denial

WHO('Smith');
 WHAT('denial');
 PERM('Read,Write,Copy,Delete');
 DATA('all');
 START(05/10/2009);
 DURATION(60);
 WHY('trust reason').

Dr Smith will not have the
permission to read, modify,
copy and delete data starting
from 5th October 2009 for a
duration of 60 days for trust
reason

5193-8:Hepatitis B virus surface Ab:Acnc:Pt:Ser:Qn:EIA

5193-8	Code LOINC
Hepatitis B virus surface Ab	Composant / Analyse
ACnc	Propriété
Pt	Temps
Ser	Système
Qn	Echelle
EIA	Méthode

LOINC

Technology

□ Network

- Server / Communication
 - Centralized, decentralized, Internet, Intranet, UMTS
- Security
 - Smartcard, Anonymization, Encryption

□ Messages

- Structure
 - CDA, proprietary
- Protocol
 - SOAP, HL7, DICOM

□ Dependability/Reliability

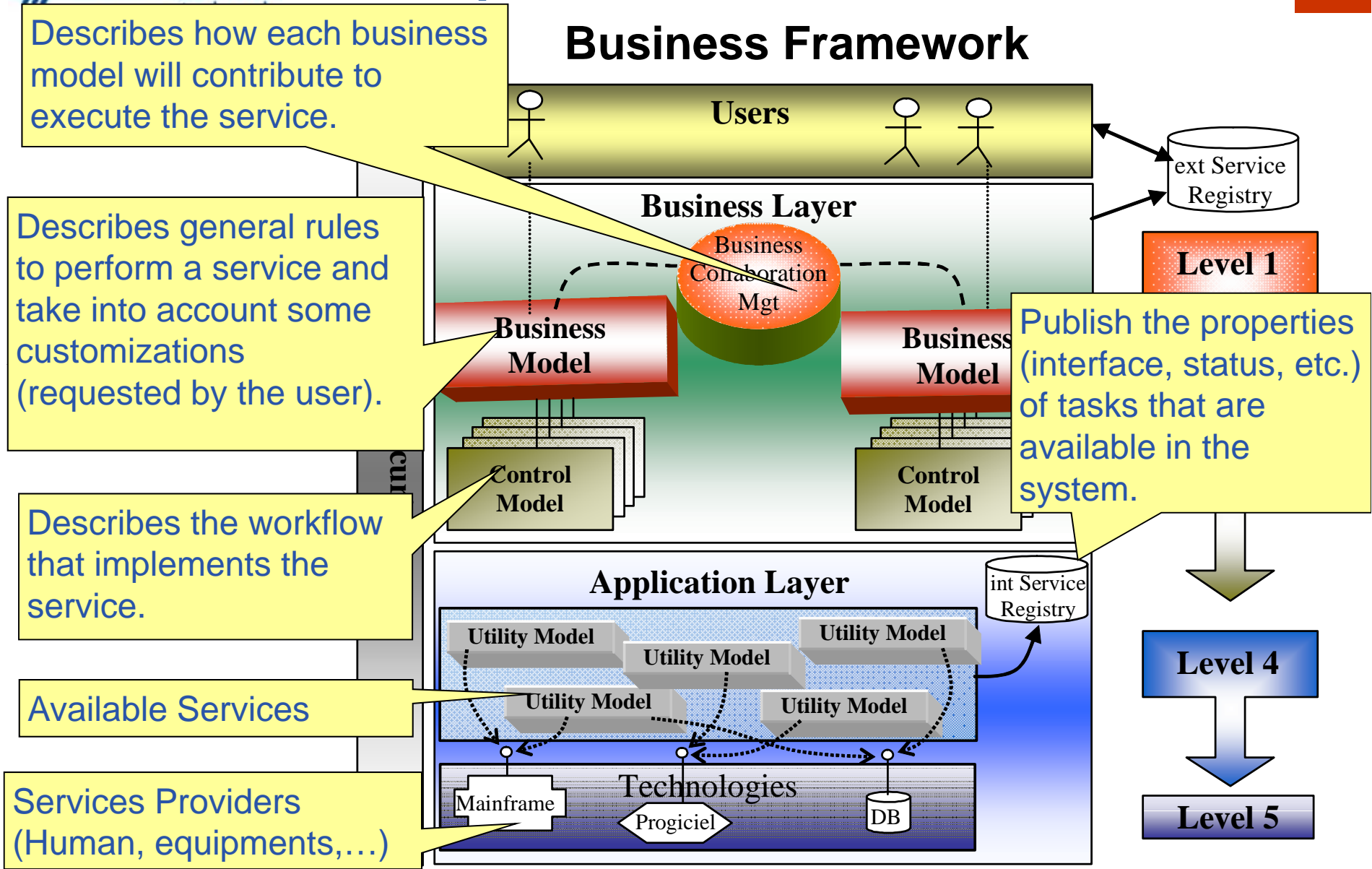
- One lab can produce more than 100.000 exams/day

□ User Interface and Portability

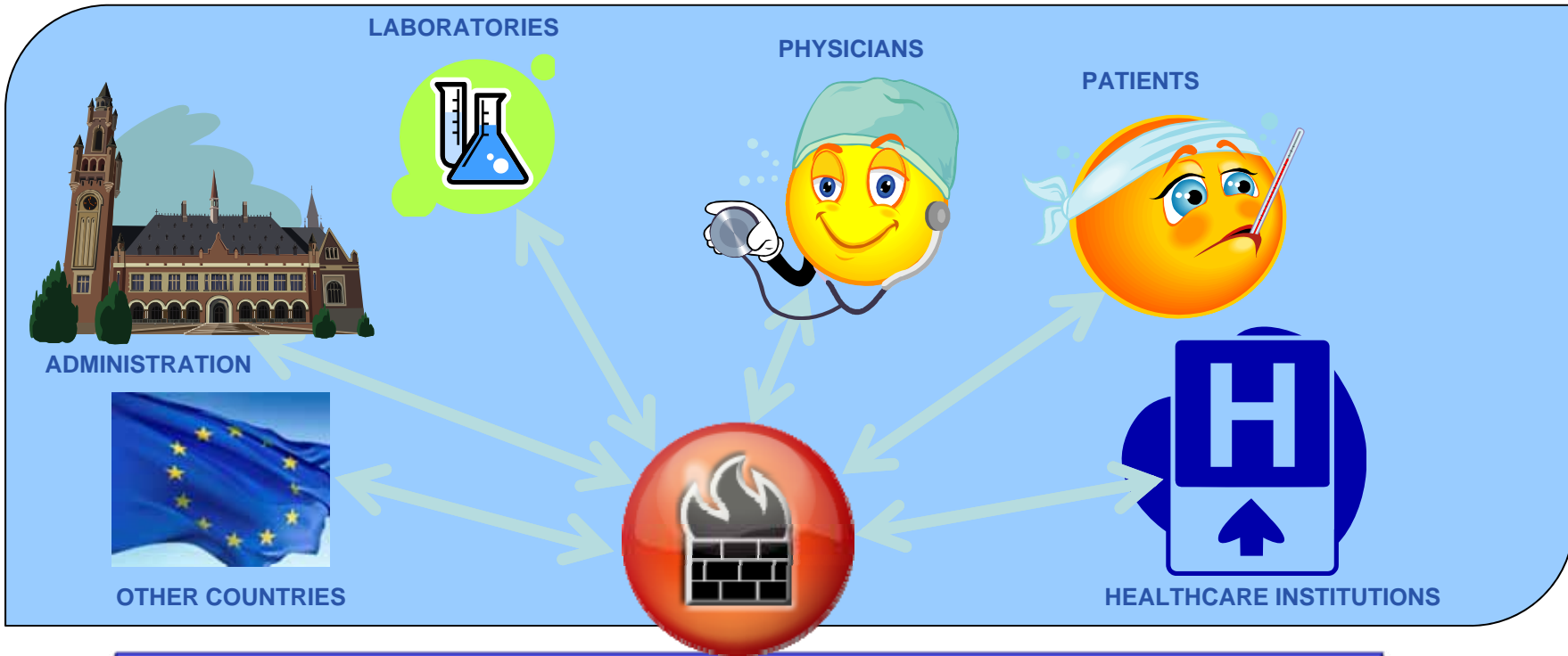
- Mobile Solutions, Remote measurement, GUI

Example

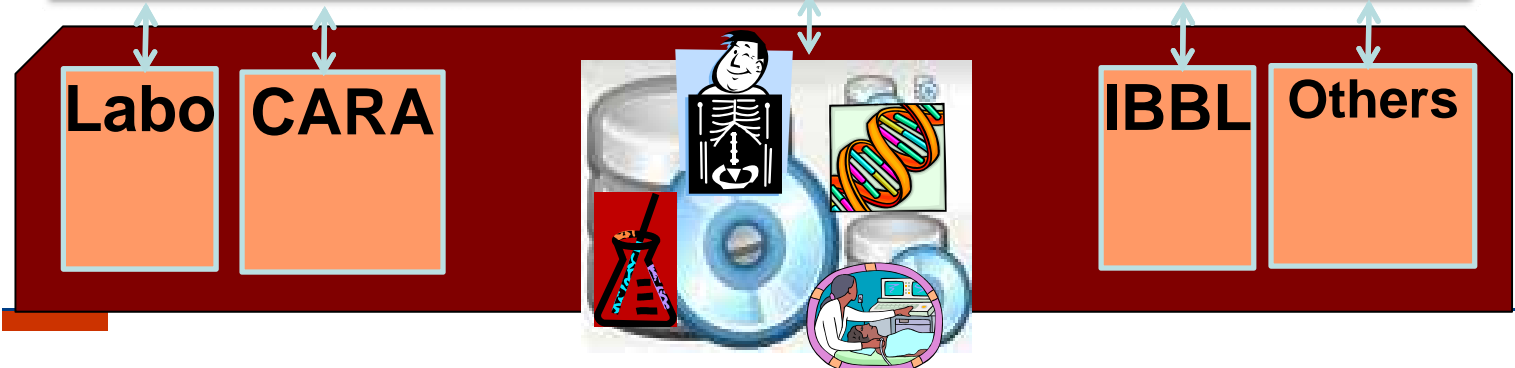
Business Framework



Luxembourgish eHealth Platform: Current state

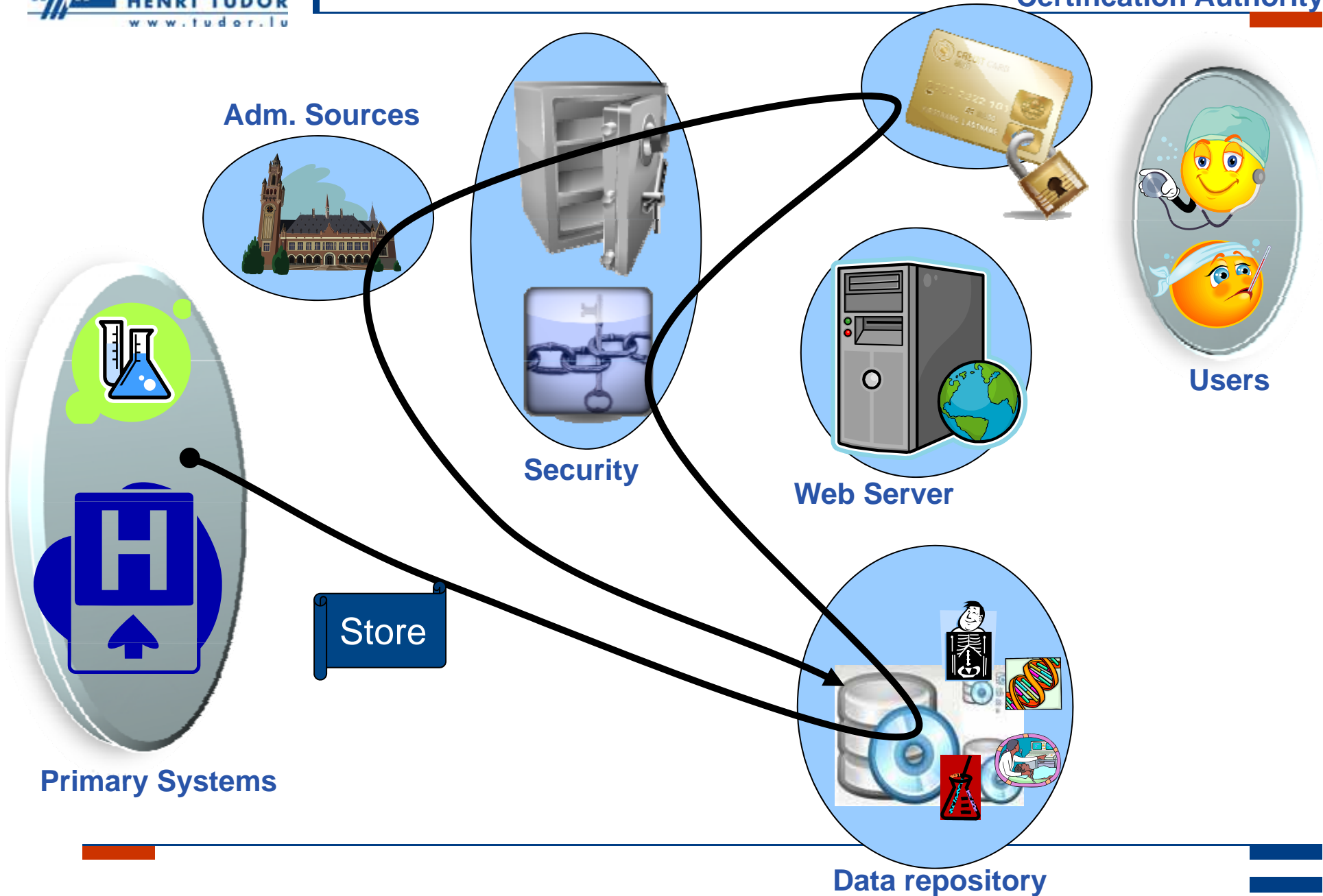


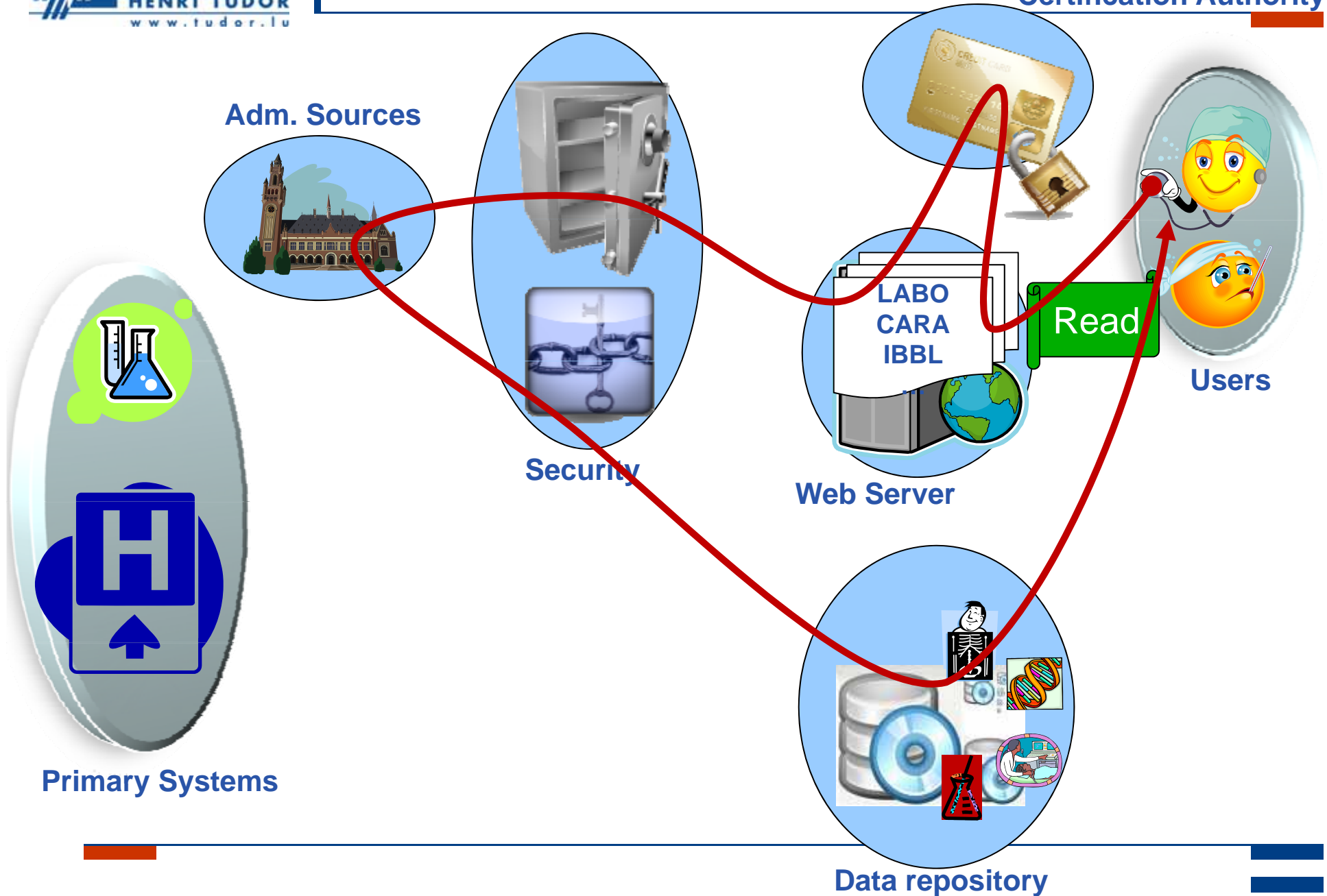
HEALTHNET



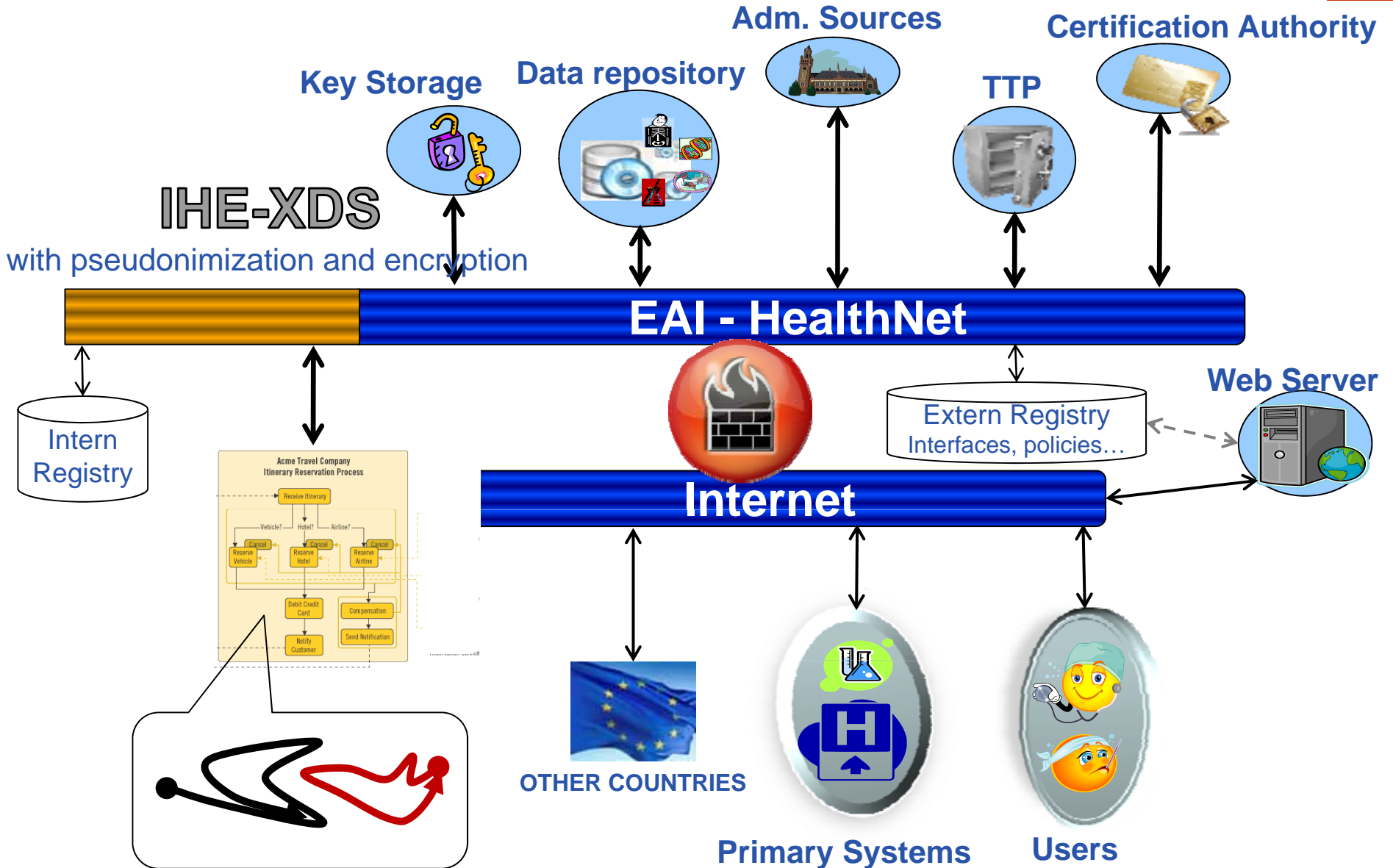
Business
Models







Network view



Some Challenges (Short term)

- Security Strategy
- Evolving Ontologies and Semantic Interoperability
- Patient Consent Description
- Medical Treatments Description (Clinical Pathway)
- ePrescription workflow
- Decision Support Systems for Diagnosis
 - Costs: minimization of exams
 - Risks: Allergies, Interactions
 - Statistics: Frequently used treatments, epidemic alerts, etc.

□ Data Storage

- Large amount of data
- Transfer of large files (Images, films)

□ System Modeling

- Human behavior model
- Remote Monitoring (Model-based supervision)

□ Automatic (Re-)composition of Services

- Fault detection of Services (QoS not enough)
- Fault recovering of Business Models (New Control Model)

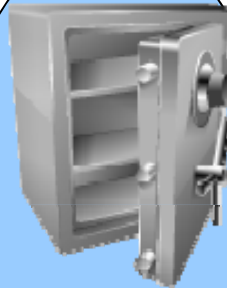
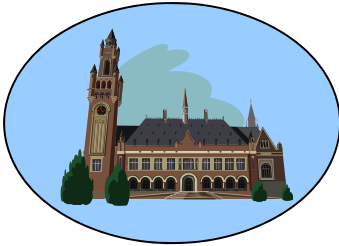
The challenge is to protect private data of patients from external and internal unauthorized people.

- ❑ One single server cannot have access to medical data + Patient Identifying data (Except the client)
 - ❑ Patients' Health Records are anonymized
 - ❑ Non-anonymized data are encrypted
 - ❑ All data **cannot** be stored in **one** central system
- ❑ Access rights are established according to roles and patient consents
 - ❑ All users are identified by eCards
- ❑ The source of data must be checked
 - ❑ Data exchanged are signed (and tracked)

Example of Security Strategy

Certification Authority

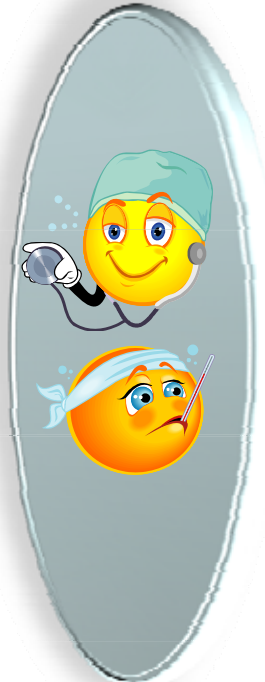
Adm. Sources



Security



Web Server



Users

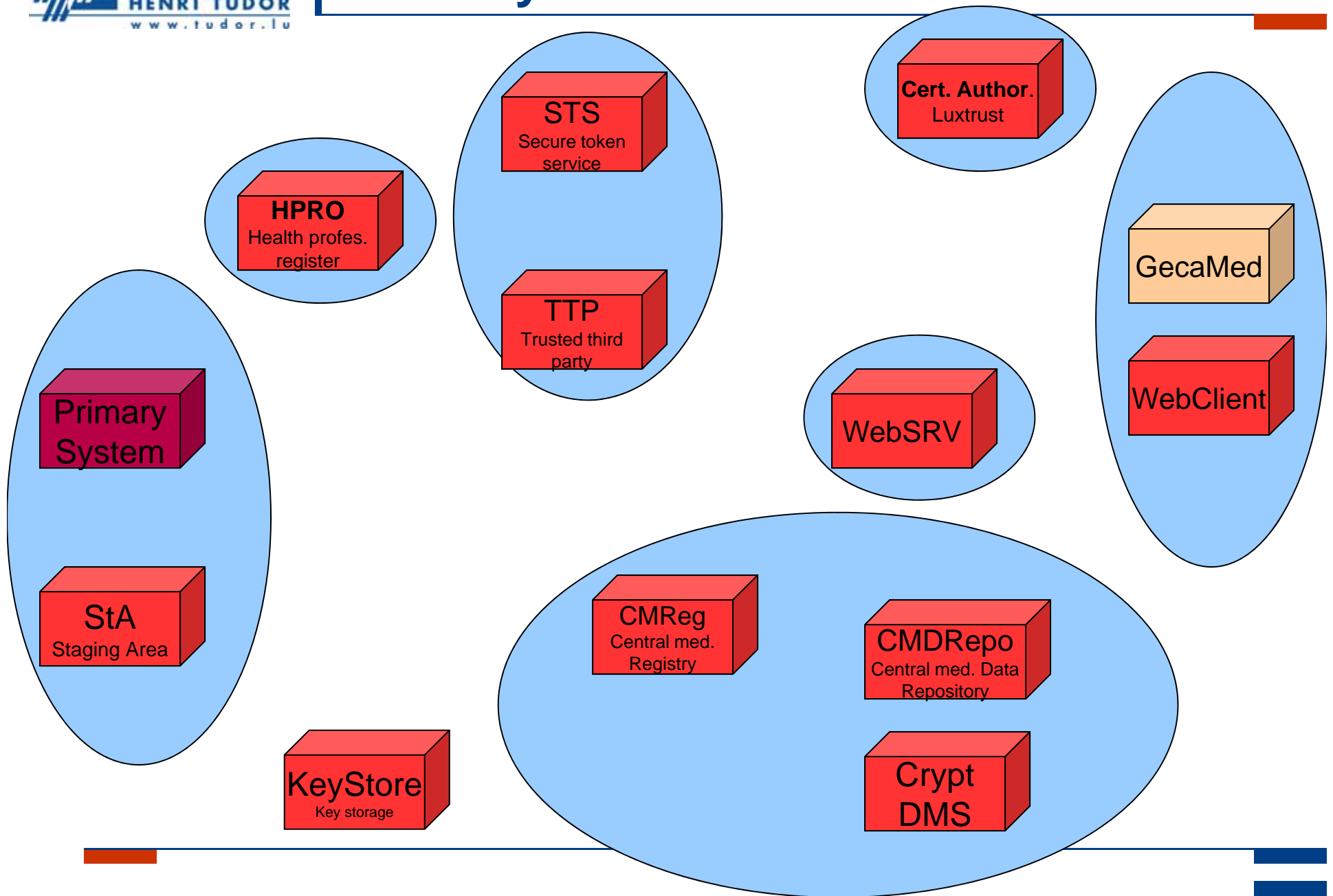


Primary Systems

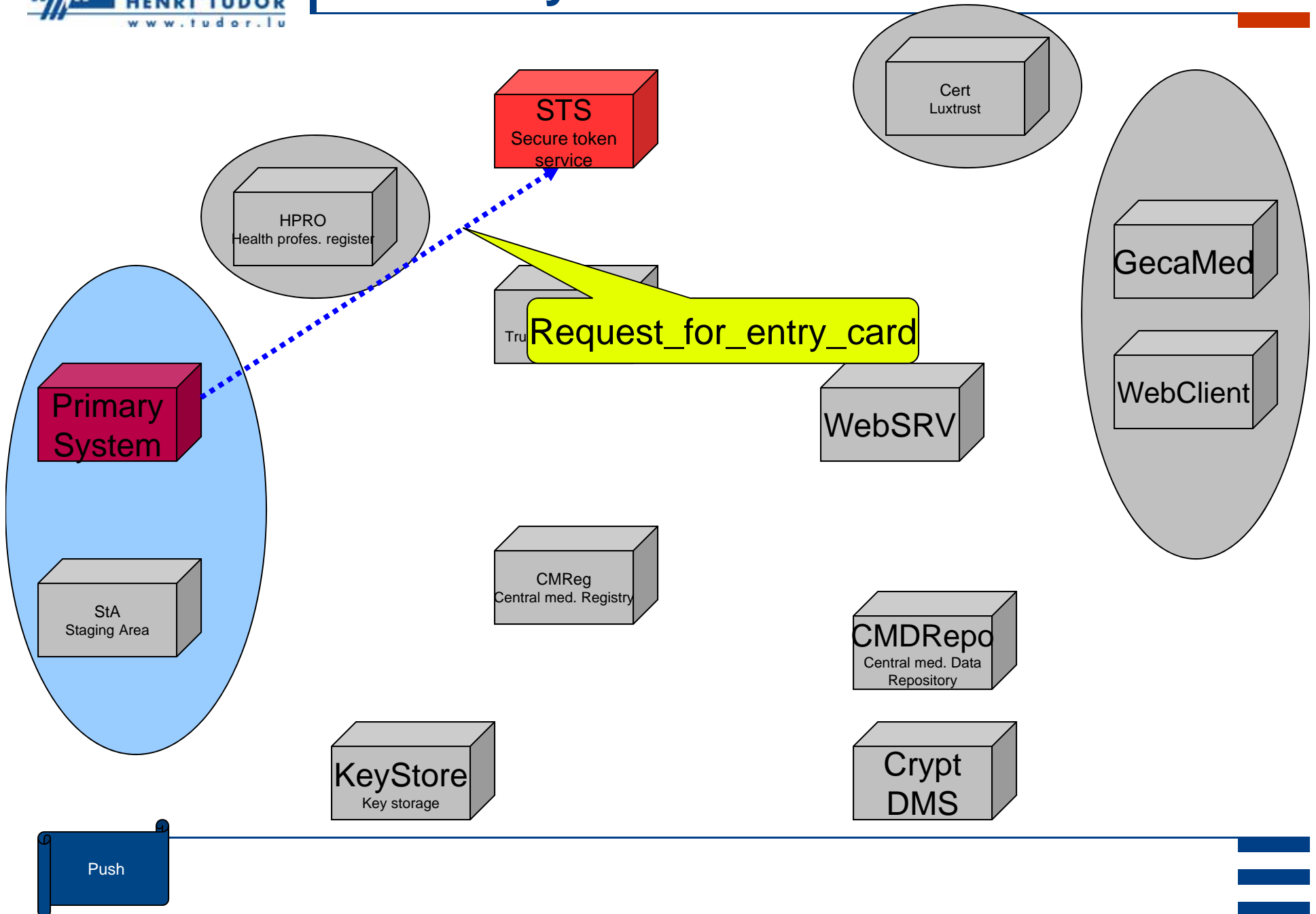


Data repository

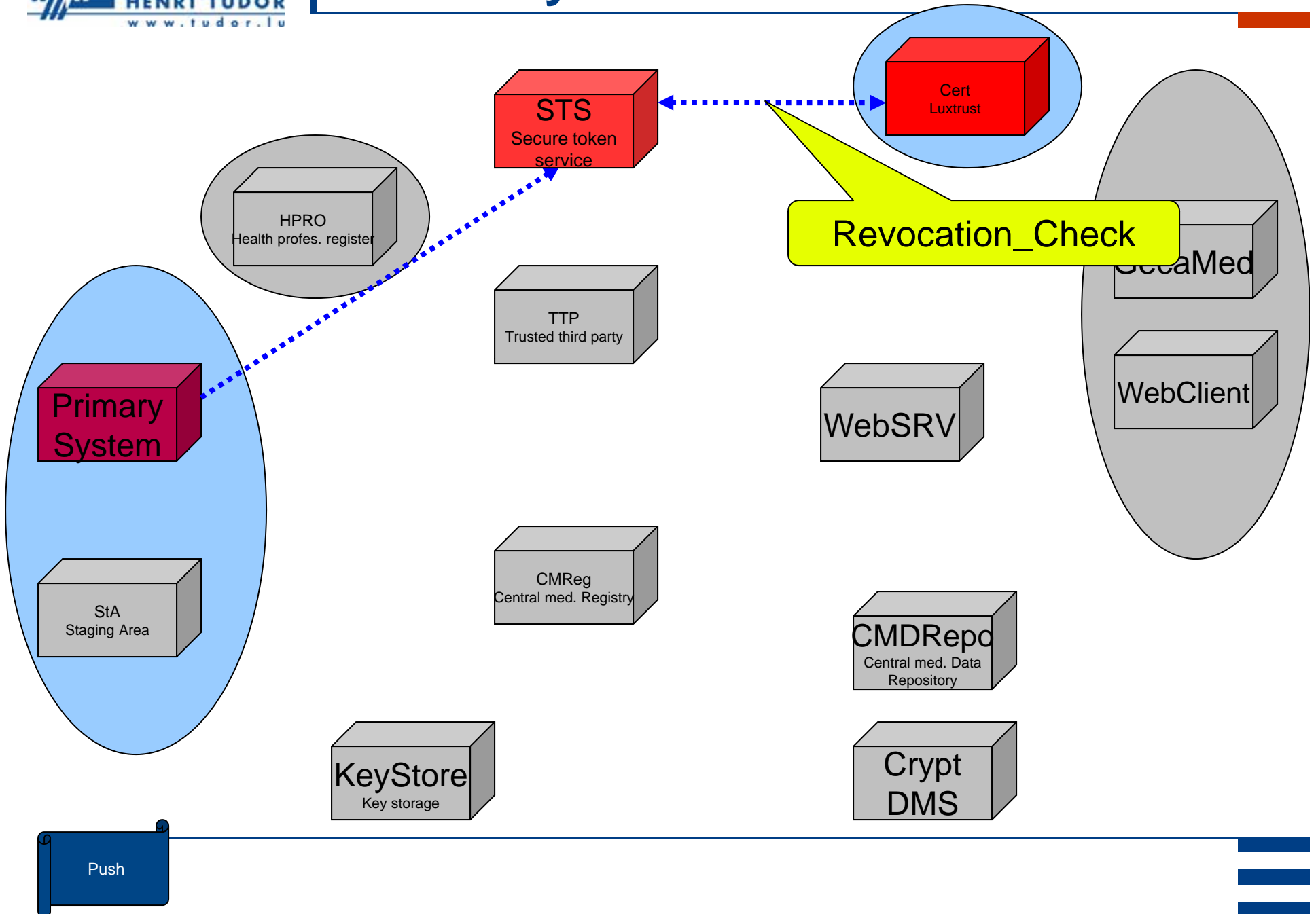
Core System



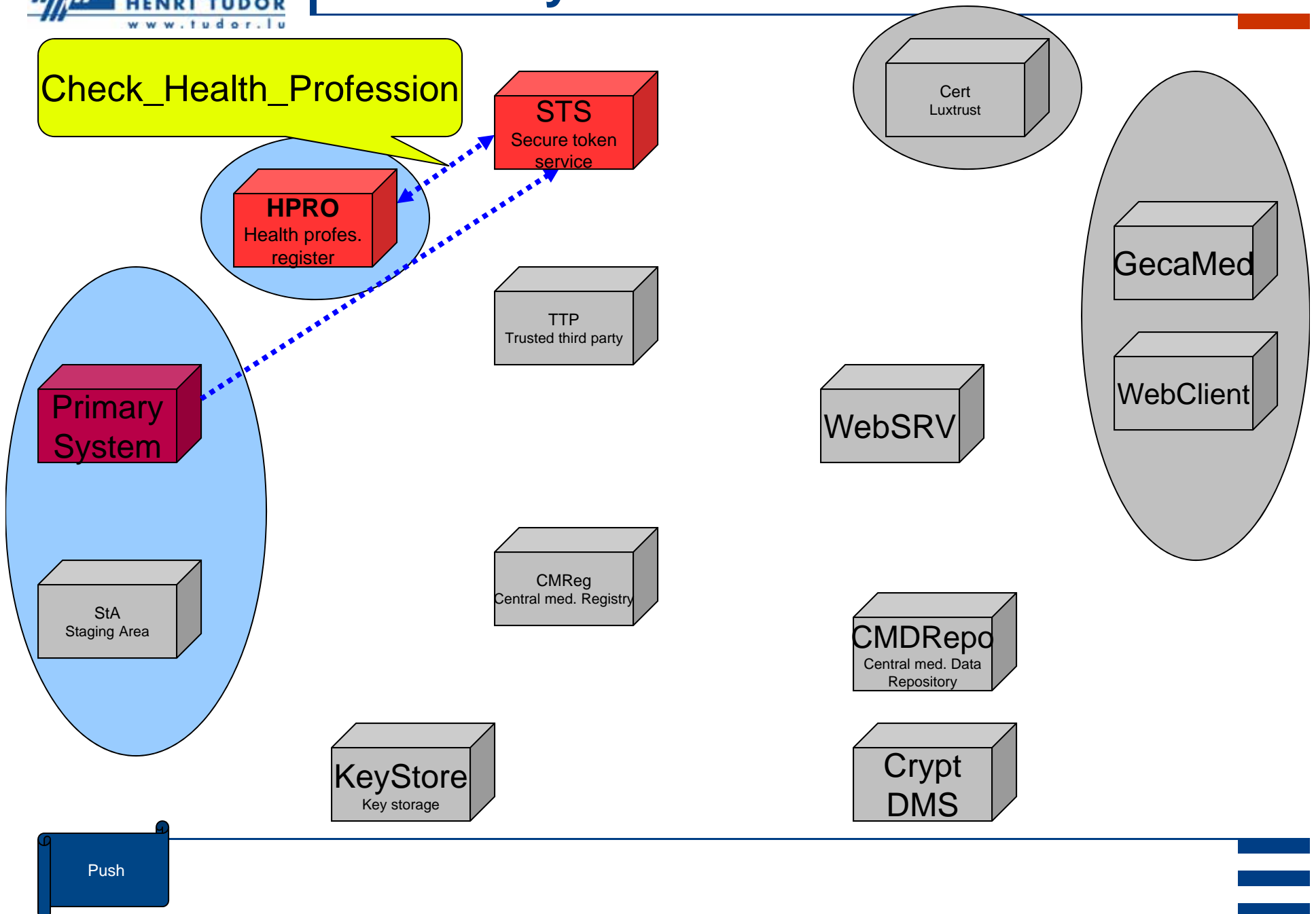
Get Entry Card



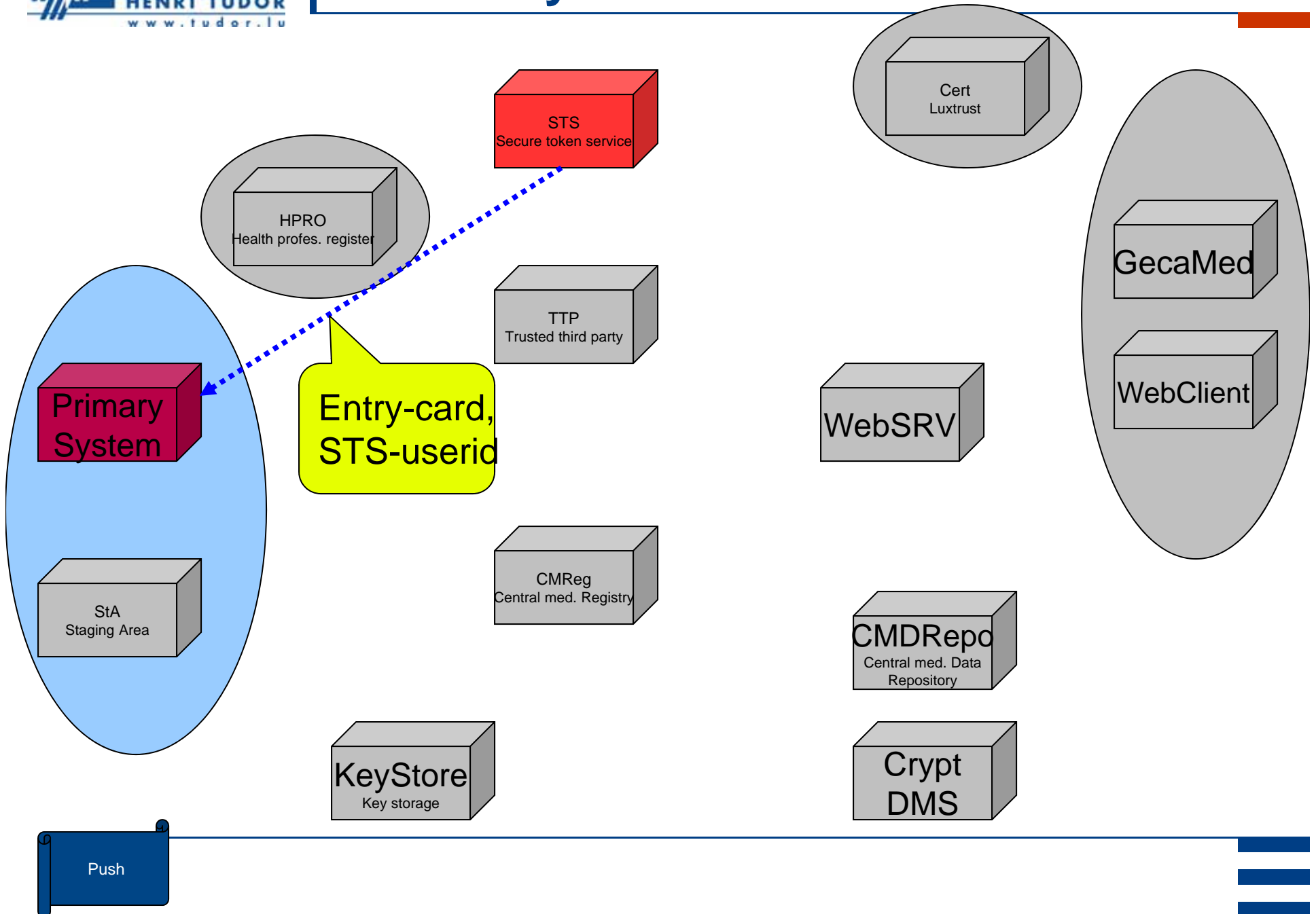
Get Entry Card



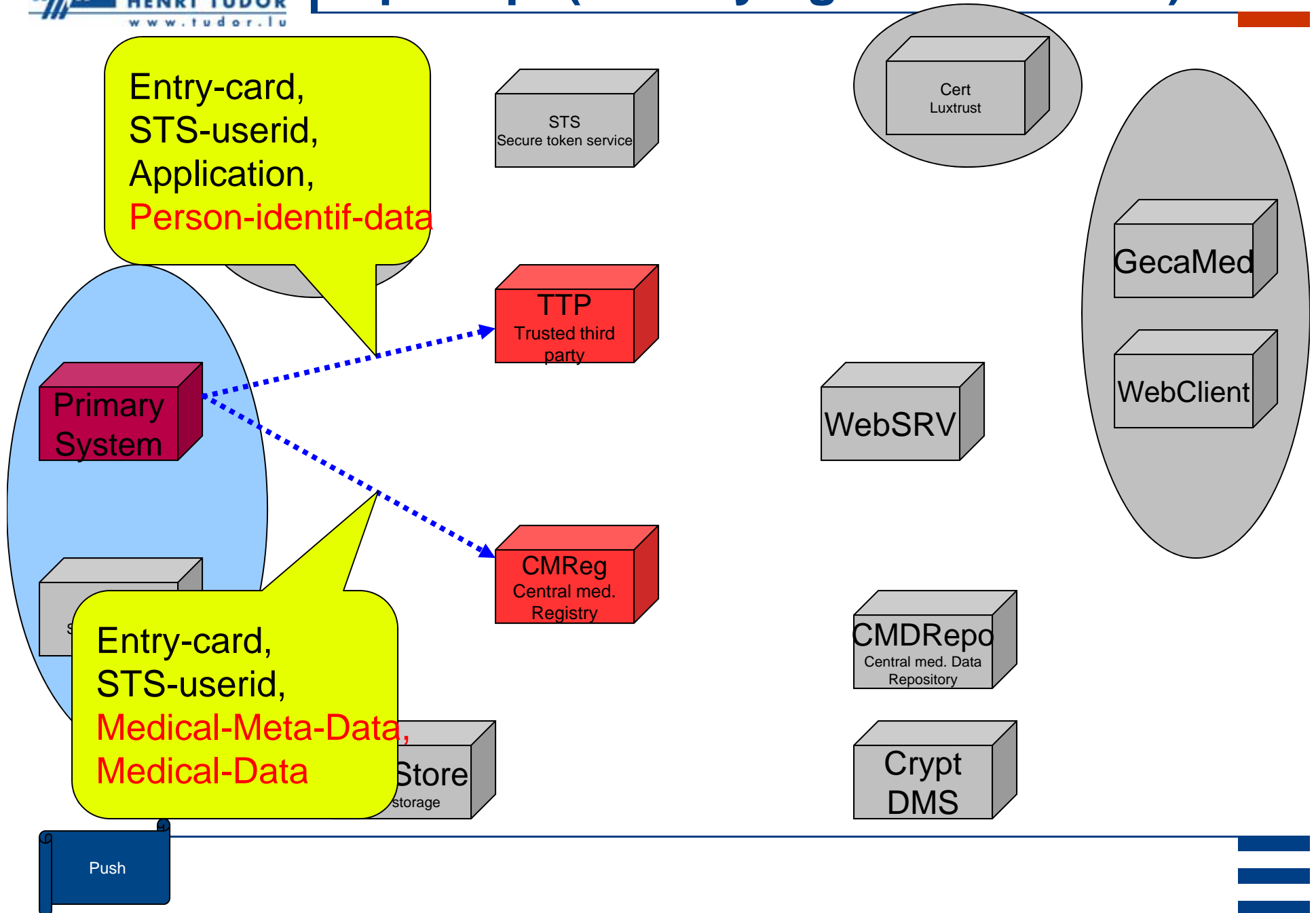
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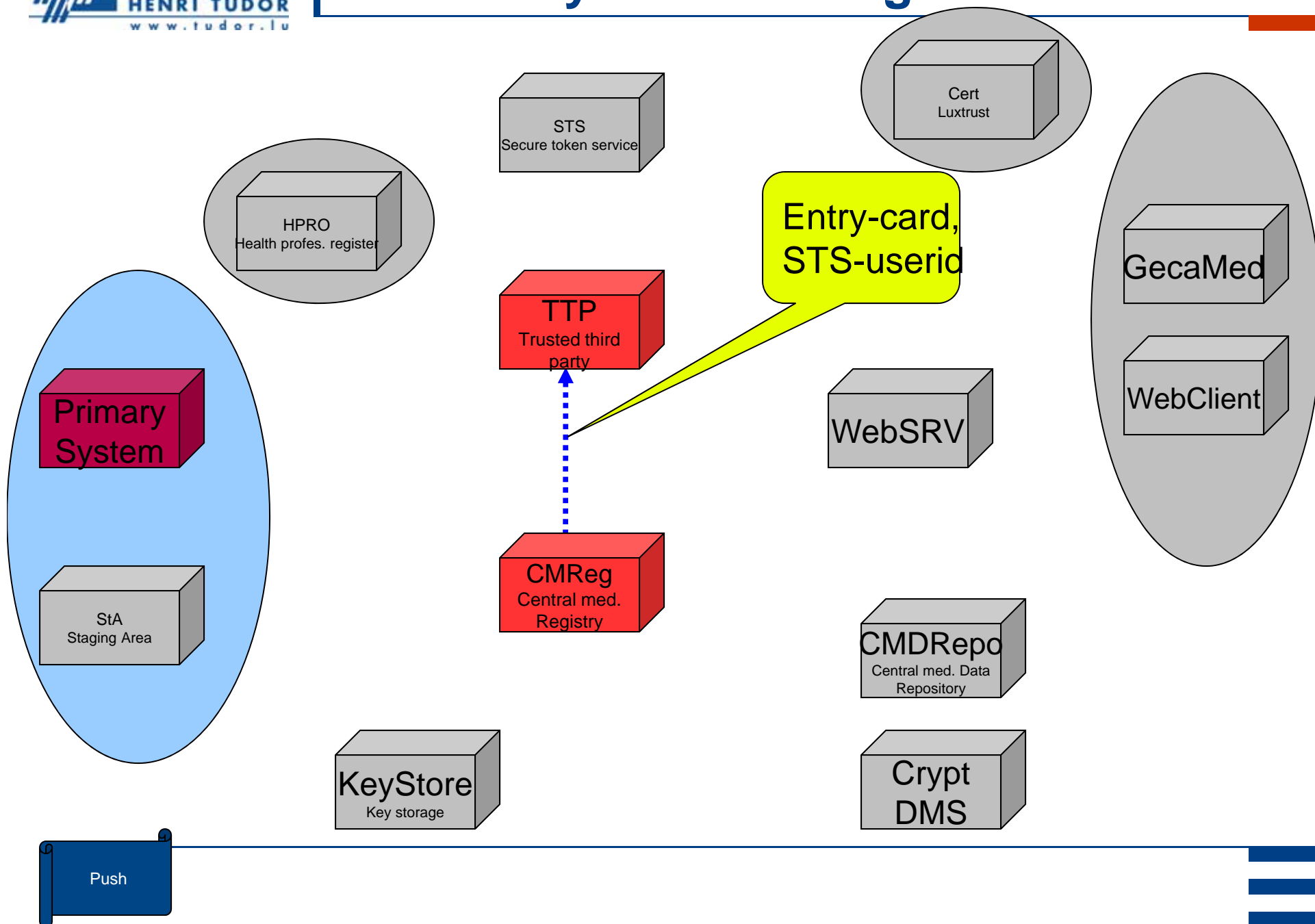
Get Entry Card



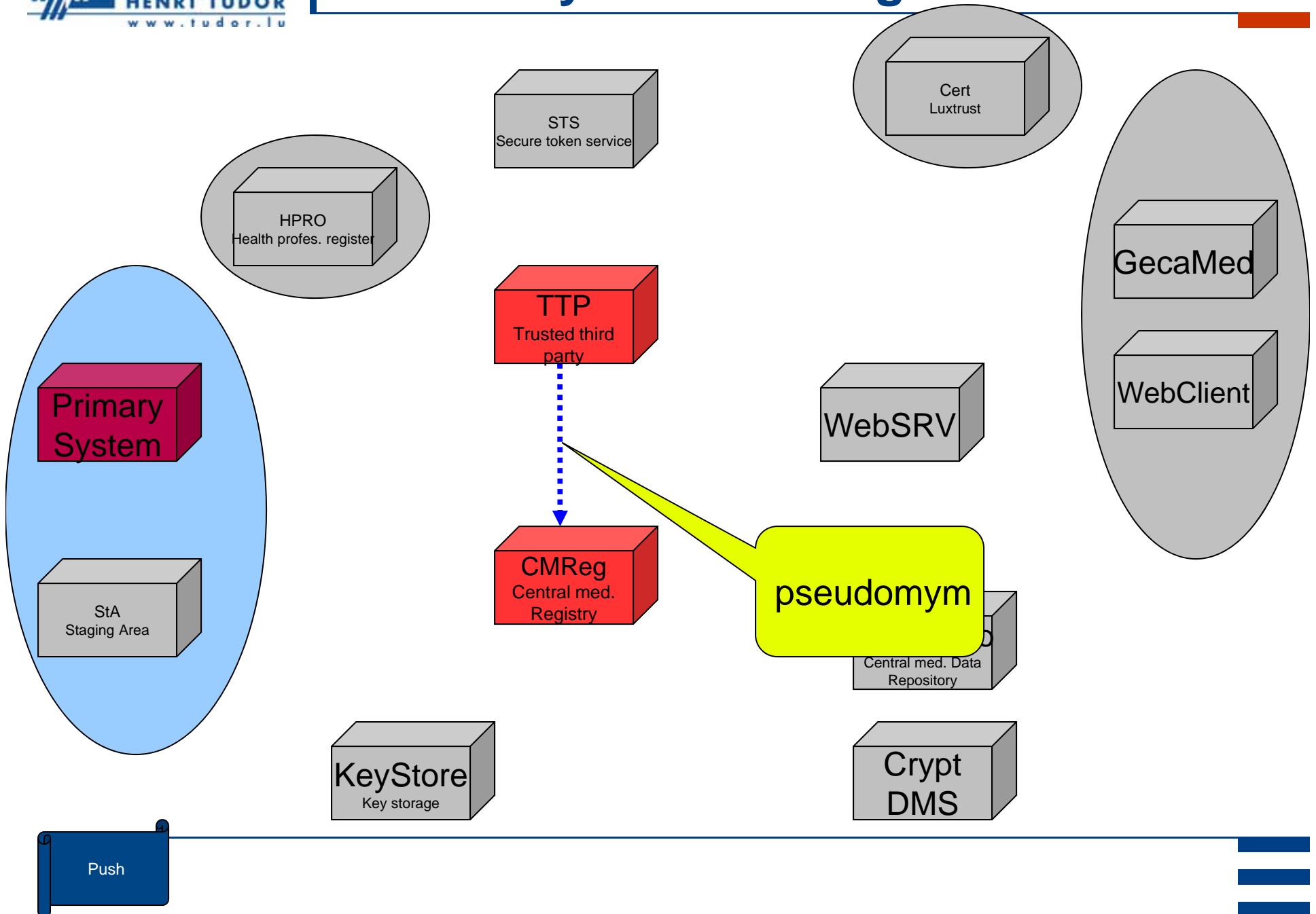
Split Up (identifying & medic data)



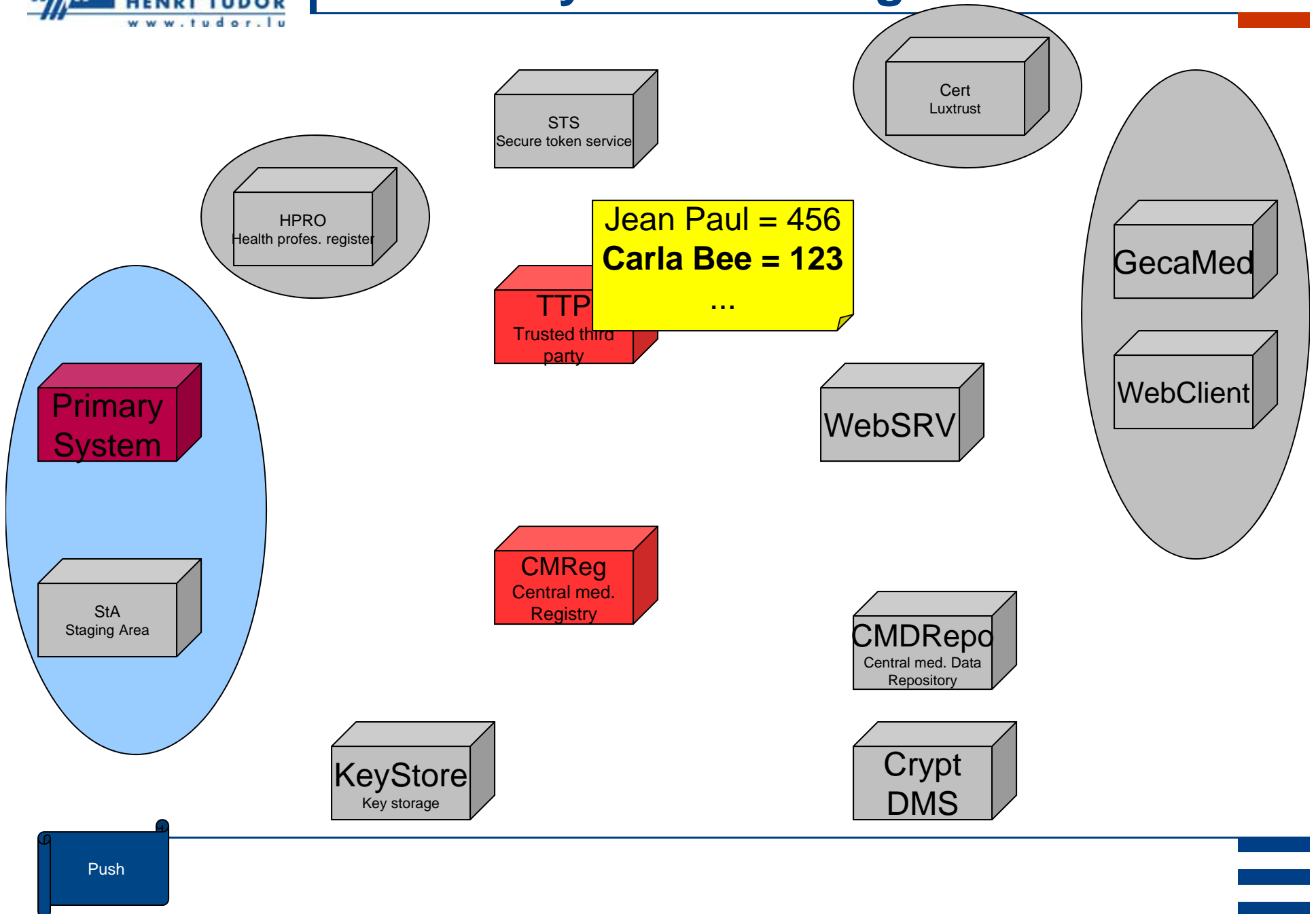
Pseudonymized Storage



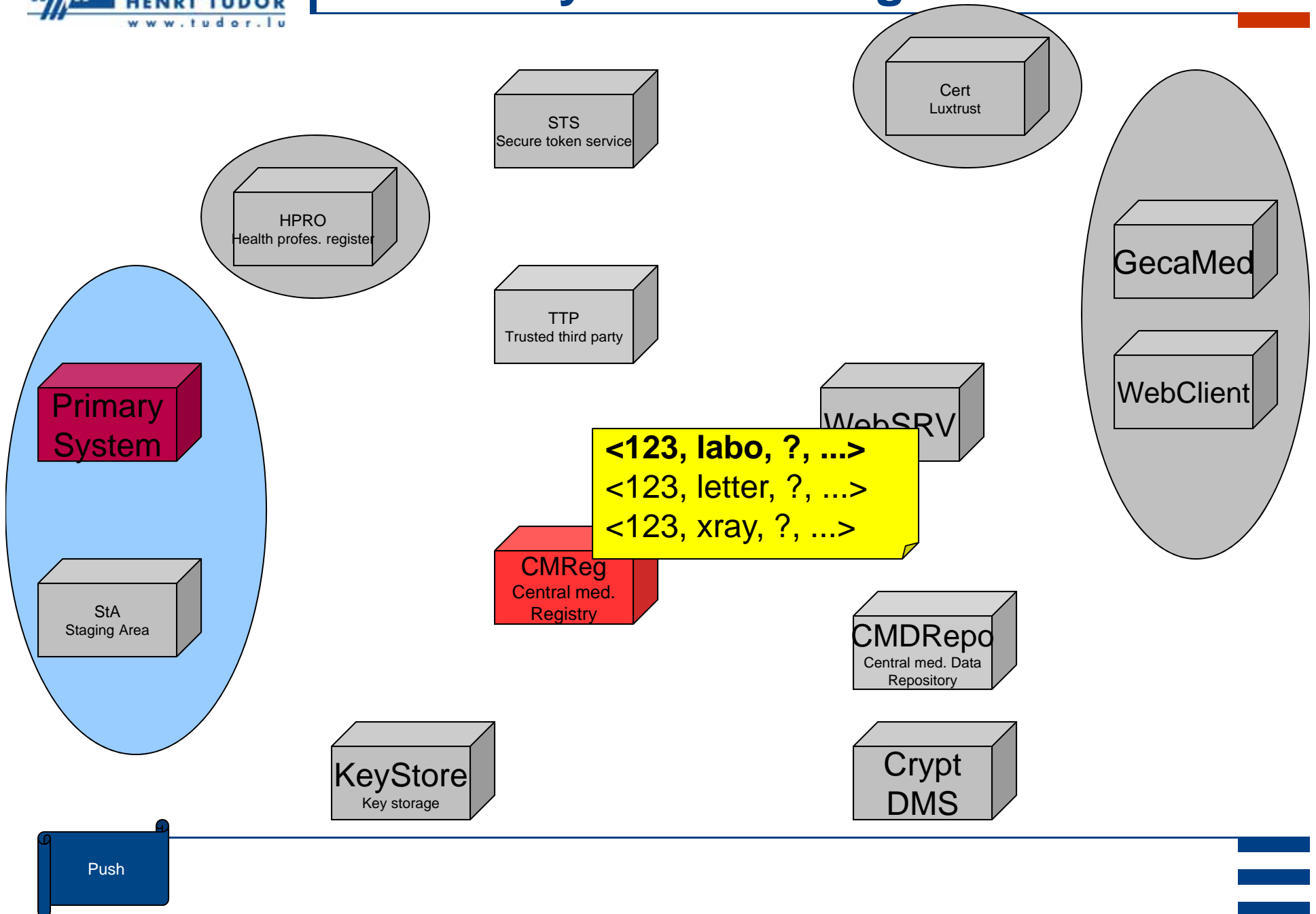
Pseudonymized Storage



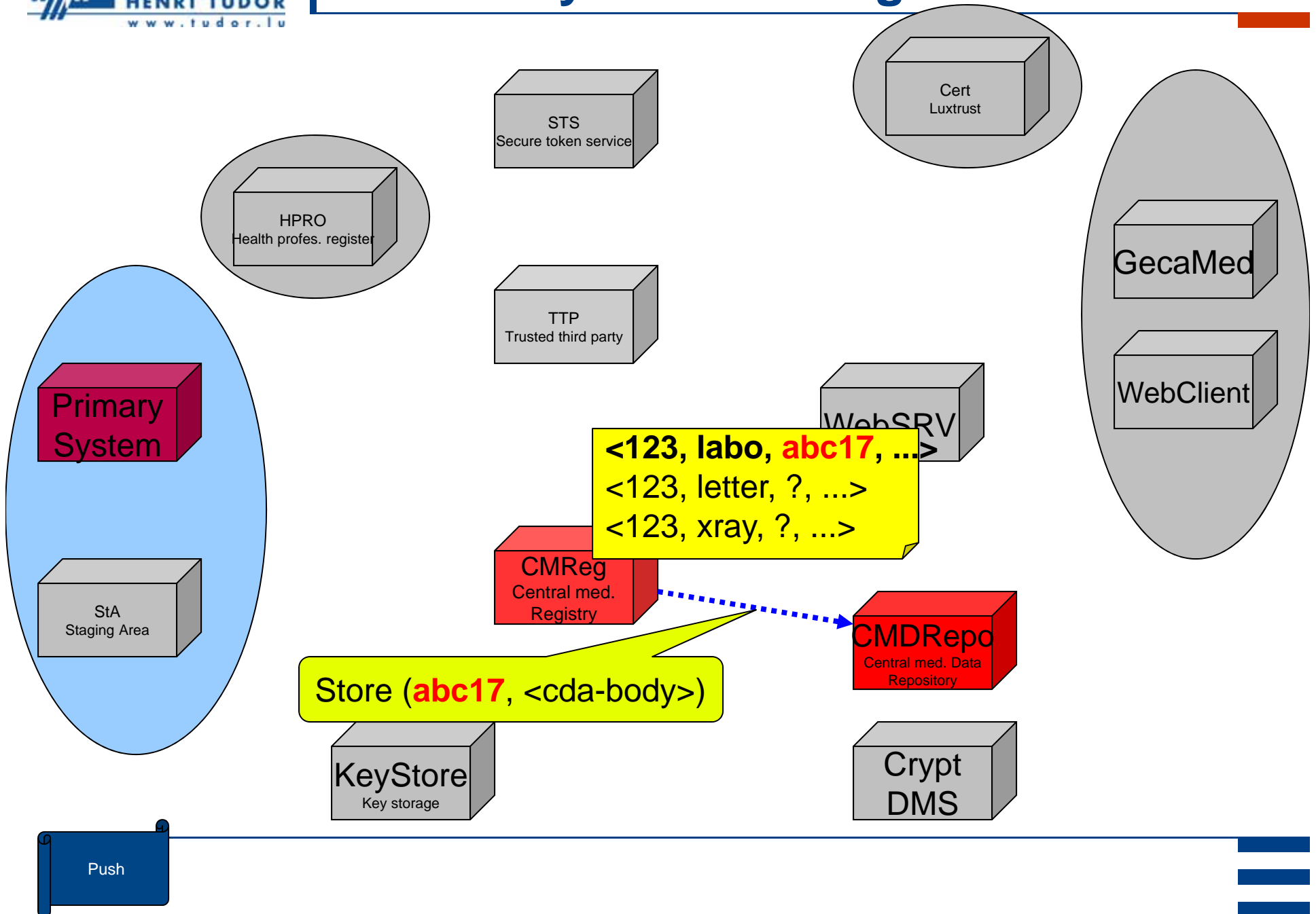
Pseudonymized Storage



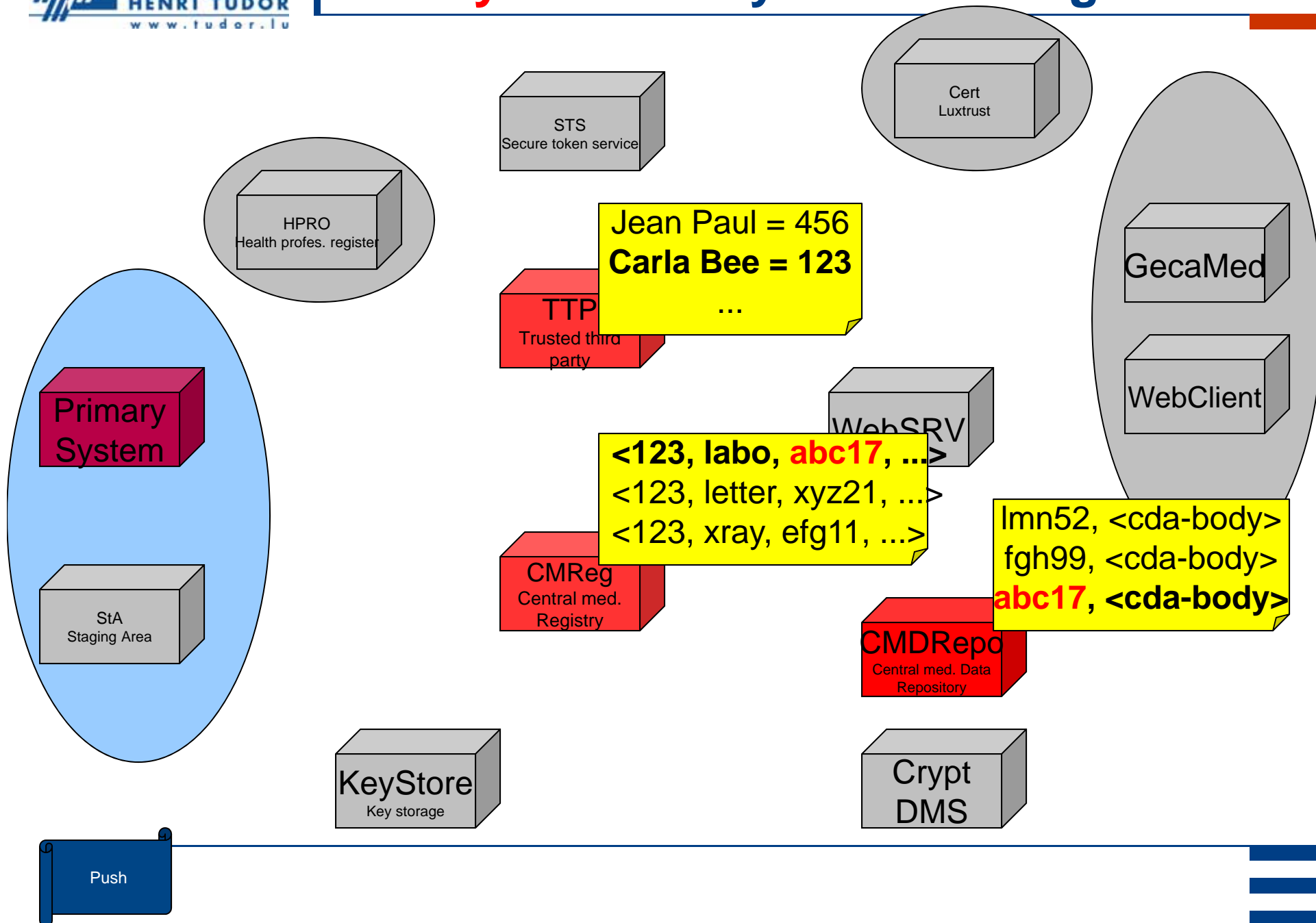
Pseudonymized Storage



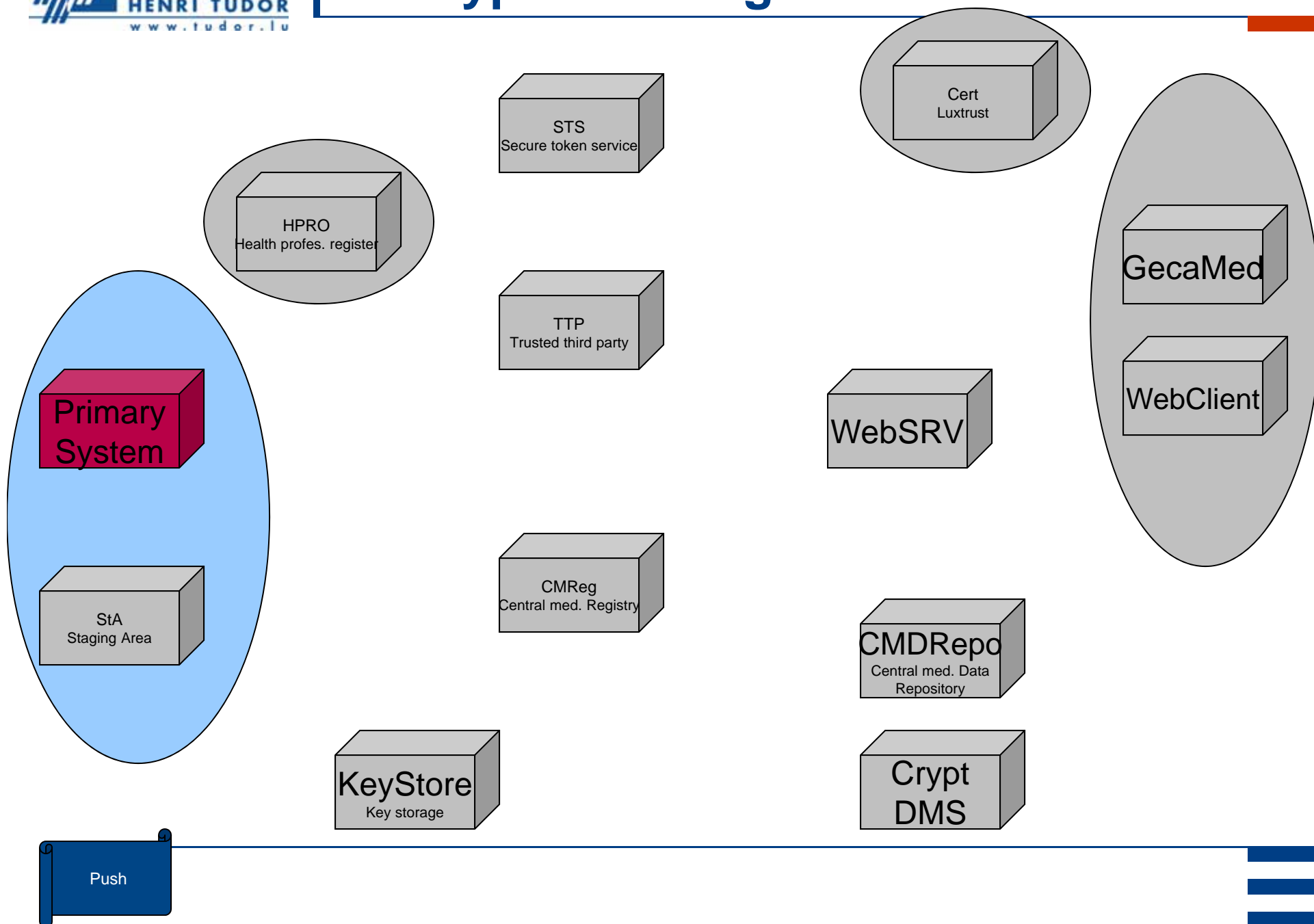
Pseudonymized Storage



Ready: Pseudonymized Storage

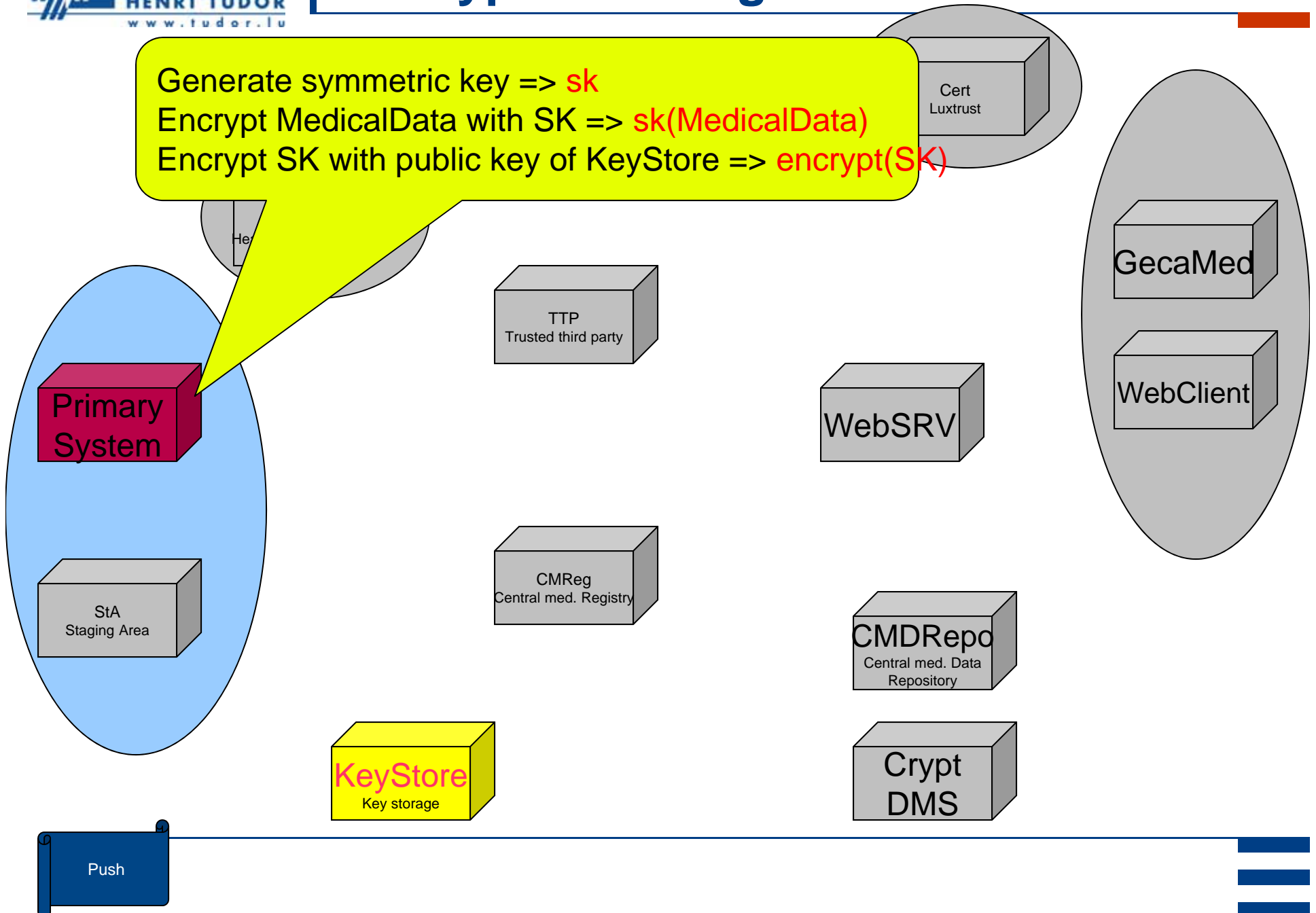


Encrypted Storage

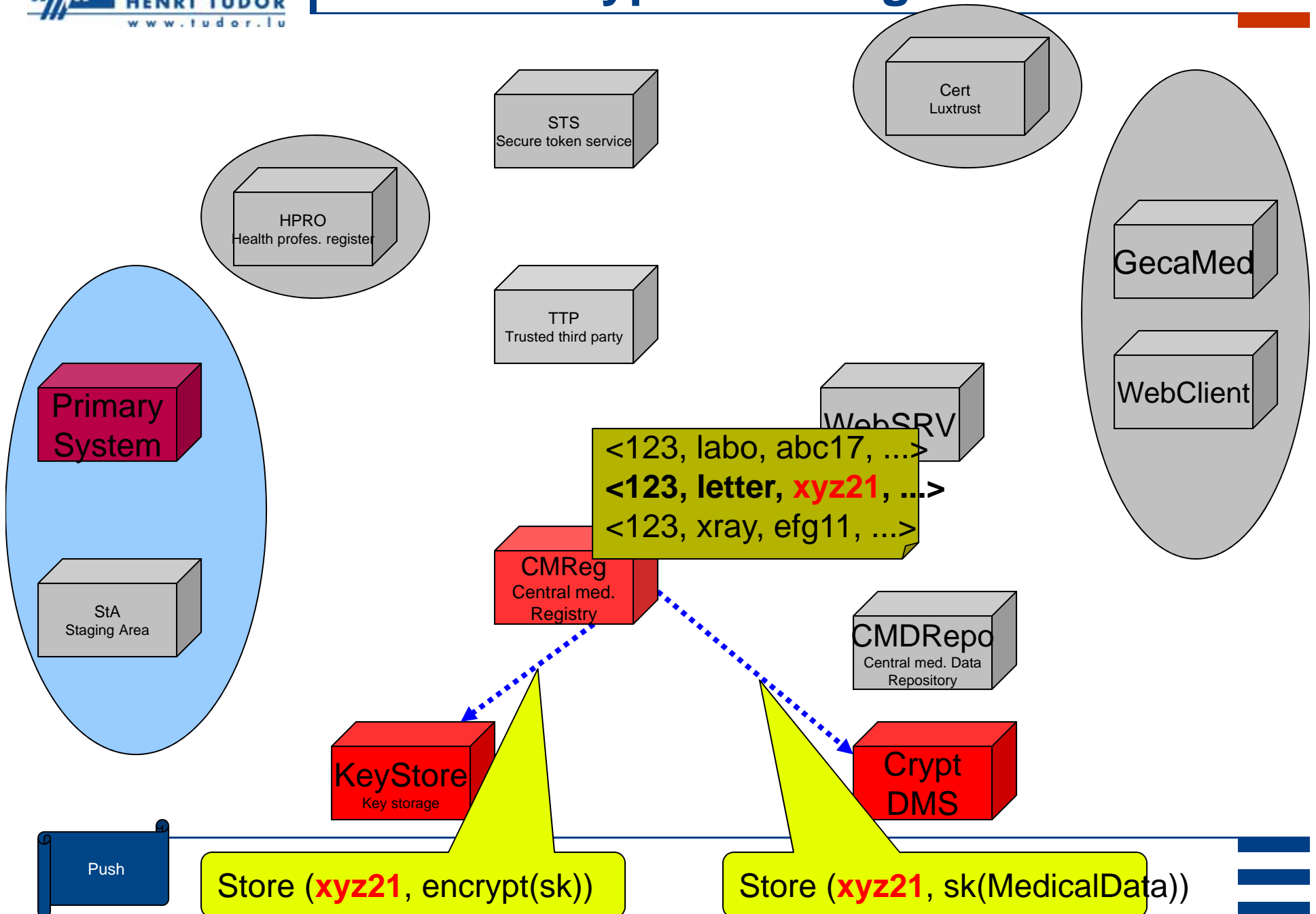


Encrypted Storage

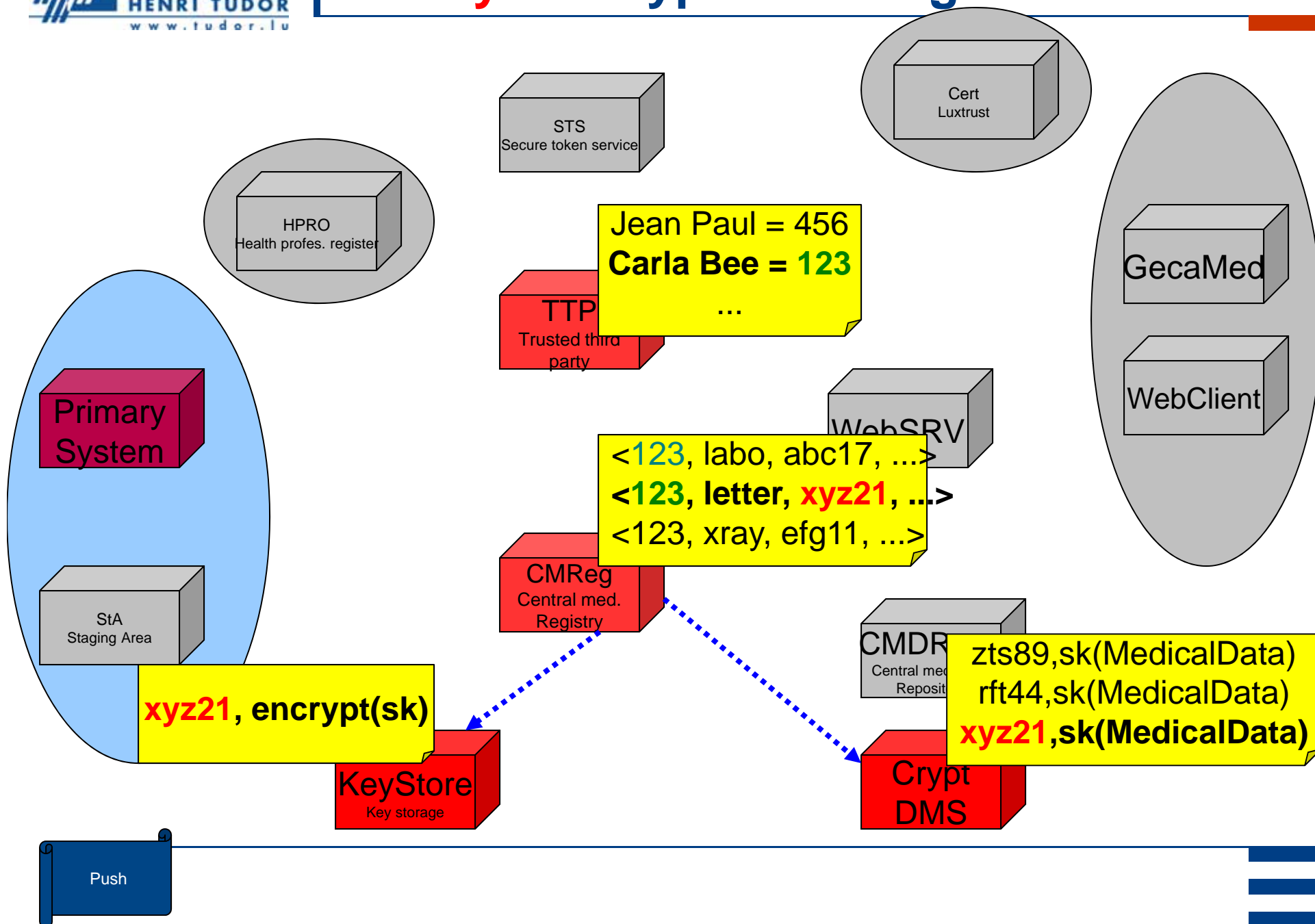
Generate symmetric key => **sk**
Encrypt MedicalData with SK => **sk(MedicalData)**
Encrypt SK with public key of KeyStore => **encrypt(SK)**



Here: Encrypted Storage



Ready: Encrypted Storage





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Thanks for your attention

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