

epSOS

Semantic Interoperability

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- **Europe-wide large scale pilot** on cross-border interchange of patient health information
- **European Patients Smart Open Services** - a European eHealth Project
- Electronic patient record systems, focusing on
 - **patient summary**
 - **ePrescription/eDispensation**
 - driven forward by many European member states.
- Interoperability among systems and services must be achieved between the different national and/or regional systems.
- epSOS aims at building and evaluating a service infrastructure demonstrating cross-border interoperability between Electronic Health Record Systems in Europe.



epSOS Participating Countries



- Austria
- Czech Republic
- Denmark
- France
- Germany
- Greece
- Italy – Lombardy
- The Netherlands
- Slovakia
- Spain
- Spain – Andalusia
- Spain – Castilla la Mancha
- Spain – Catalonia
- Sweden
- United Kingdom – England
- United Kingdom – Scotland

27 beneficiaries representing **12 EU member states**, including ministries of health, national competence centers and industry members.



- Work Package (WP) 3.1 and 3.2 – functional requirements
- 3.3 – Architecture
- 3.4 – Common Technical Components
- **3.5 – Semantic Services**
- 3.6 – Identity Management
- 3.7 – Security Specifications
- **Transversal WPs** – Legal, Implementation, Deployment, Project Management, Administrative.



Semantic Interoperability



- Semantic Interoperability is the ability of communicating entities to **share unambiguous meaning**
- The **sender** of the document must be able to reliably transmit all sufficient and necessary information
- The **receiver** of the document must be able to correctly interpret its interlocutor
- Both must be aware of, and agree upon, each other behaviors for given interactions.



Semantic Interoperability



- Semantic Interoperability needs to have the same:
 - Concepts, Syntax, Terminology
- Challenging task in the pan-European space with many different languages, cultural differences and different levels of health IT infrastructure



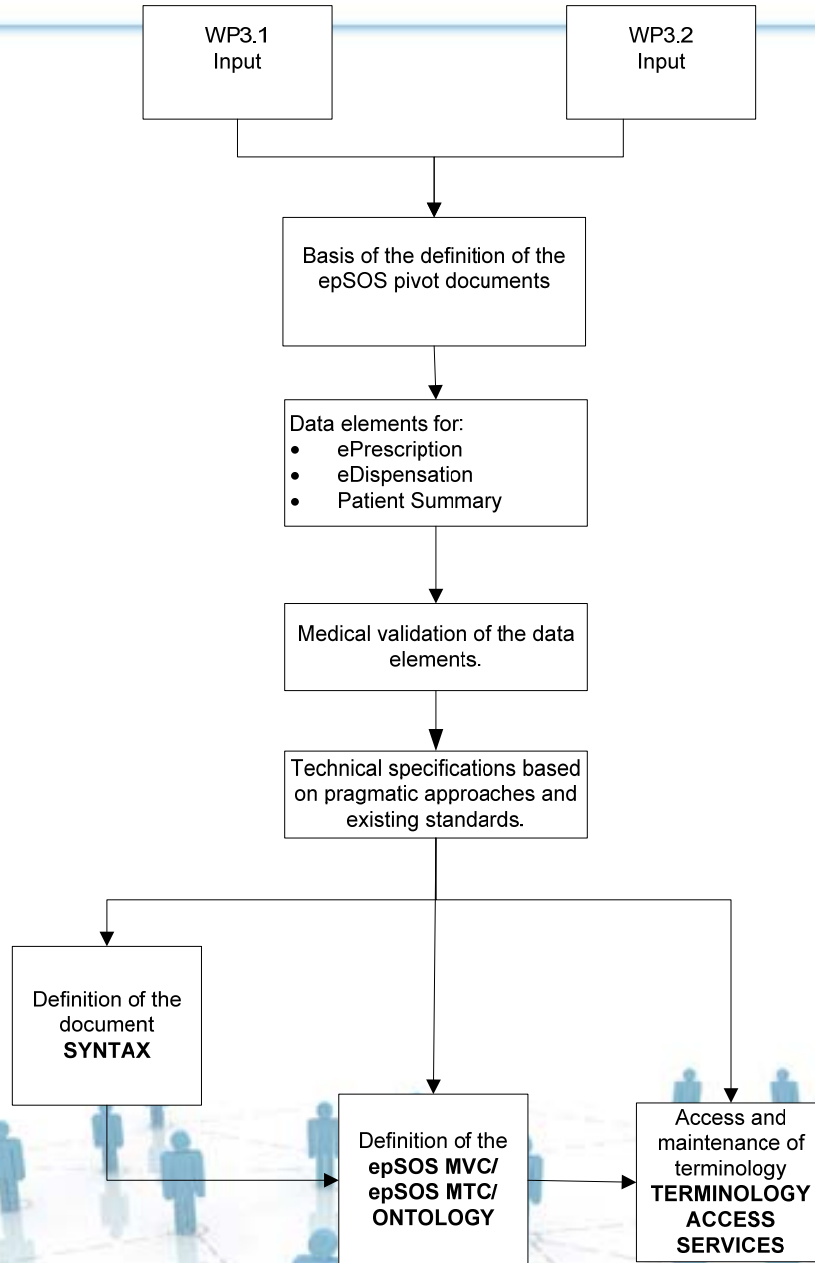
- epSOS work-package 3.5 had difficult tasks to accomplish



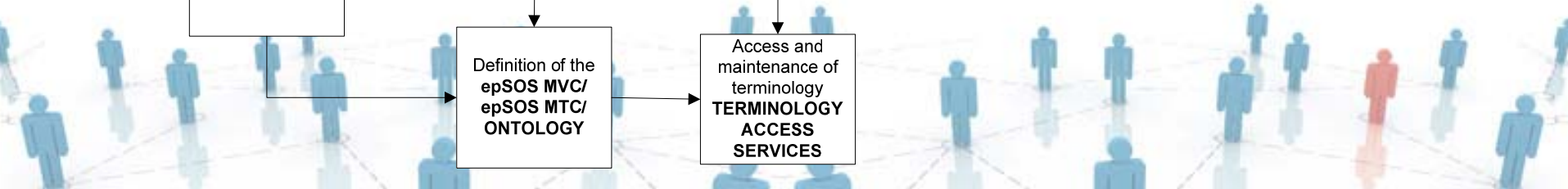
Tasks

- **T3.5.1:** Establishing a common definition of the medical knowledge to be used
- **T3.5.2:** Examine the existing terminology used
- **T3.5.3:** Determine a mechanism for managing terminology
- **T3.5.4:** Defining a common clinical data structure
- **T3.5.5.** Service specifications





General Methodology



Results - 1



-  [D3.5.2_epSOS_WP3_5_v0.0.5_20100223.pdf](#)
-  [D.3.5.2_Appendix_A_Glossary_v0.0.3_20100216.pdf](#)
-  [D3.5.2_Appendix_B_Data Elements Correspondence_v0.0.6_20100216.pdf](#)
-  [D3.5.2_Appendix_C_Pivot_Document_Specifications_v0.0.6_20100223.pdf](#)
-  [D3.5.2_Appendix_D_epSOS_Master_Value_Set_Catalogue_v0.0.3_20100215.pdf](#)
-  [D.3.5.2_Appendix_E_Ontology_v0.3_20100223.pdf](#)
-  [D3.5.2_Appendix_F_Terminology_Access_Services_v0.0.4_20100215.pdf](#)
-  [D3.5.2_Appendix_G_EN13606_implementation_v20091007.pdf](#)





Semantic Implementation

- **Terminology and Service Specifications**

-  [epSOS_MVC_V0 99_31032010.xls](#)
-  [Error Report_Country_XX_xx_31032010.xls](#)
-  [National_Code_System_Country_XX_xx_31032010.xls](#)
-  [Omission Report_Country_XX_xx_31032010.xls](#)
-  [Guidelines MVC MTC.doc](#)
-  [Guidelines MVC MTC.pdf](#)

Architecture of the National Contact Point in a Box (NCP-in-a-Box)

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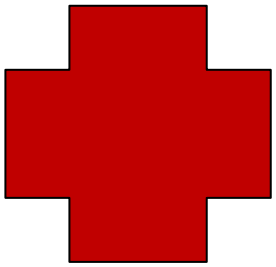


epSOS

Semantic Interoperability

Actual Use Case





Hospital in Dijon
(CHU Dijon)

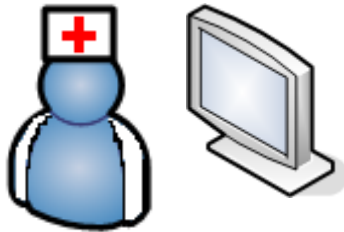


- Maria Schmidt, a 25 year old **Austrian** student enrolled in the Erasmus program, shows up at the Emergency department at the CHU Dijon (Hospital in Dijon). The chief complaint is abdominal pains following 3 to 4 hours after a meal.
- An abdominal x-rays show signs of intestinal occlusion. The overall clinical presentation is inconclusive, with a diffuse abdominal pain and apparently not needing surgical intervention.
- The physician considers keeping the patient under observation only, the other choice being performing an exploratory lapartomy (Ex-Lap).

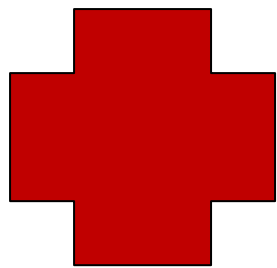
Request to the French NCP



- As the physician knows that epSOS can provide more information, he searches for the patient. The search is directed towards the French National Contact Point (NCP) which in turn will provide the location of the student's Patient Summary (Austria).



French NCP



CHU de Dijon



Request from NCP France to NCP Austria



- The French NCP performs, based on protocols which are out of scope for the semantic presentation, a request for information to the Austrian NCP.

French NCP



Request for information

Austrian NCP



Austrian Patient Summary – 1



1. The Austrian Patient Summary belonging to this patient is located.
2. The document is syntactically transformed into the epSOS CDA format, according to the specifications.

original



Transformation

xml - epSOS CDA



National Connector and National Transformer

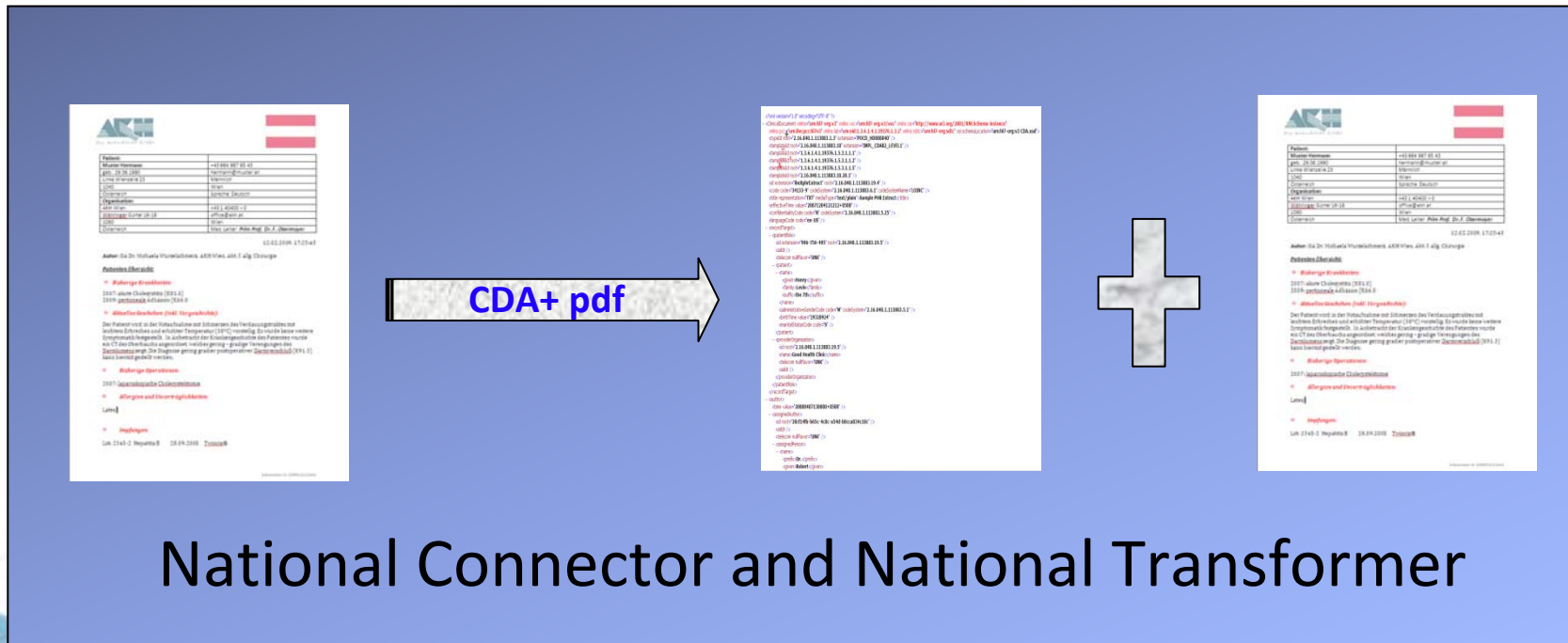
Austrian Patient Summary – 2



1. The original document is transformed into an epSOS CDA document as shown
2. The original document is also transformed into a pdf
3. The pdf has the same CDA header as the epSOS CDA document (in order to provide the link and the traceability between the two documents)

epSOS CDA

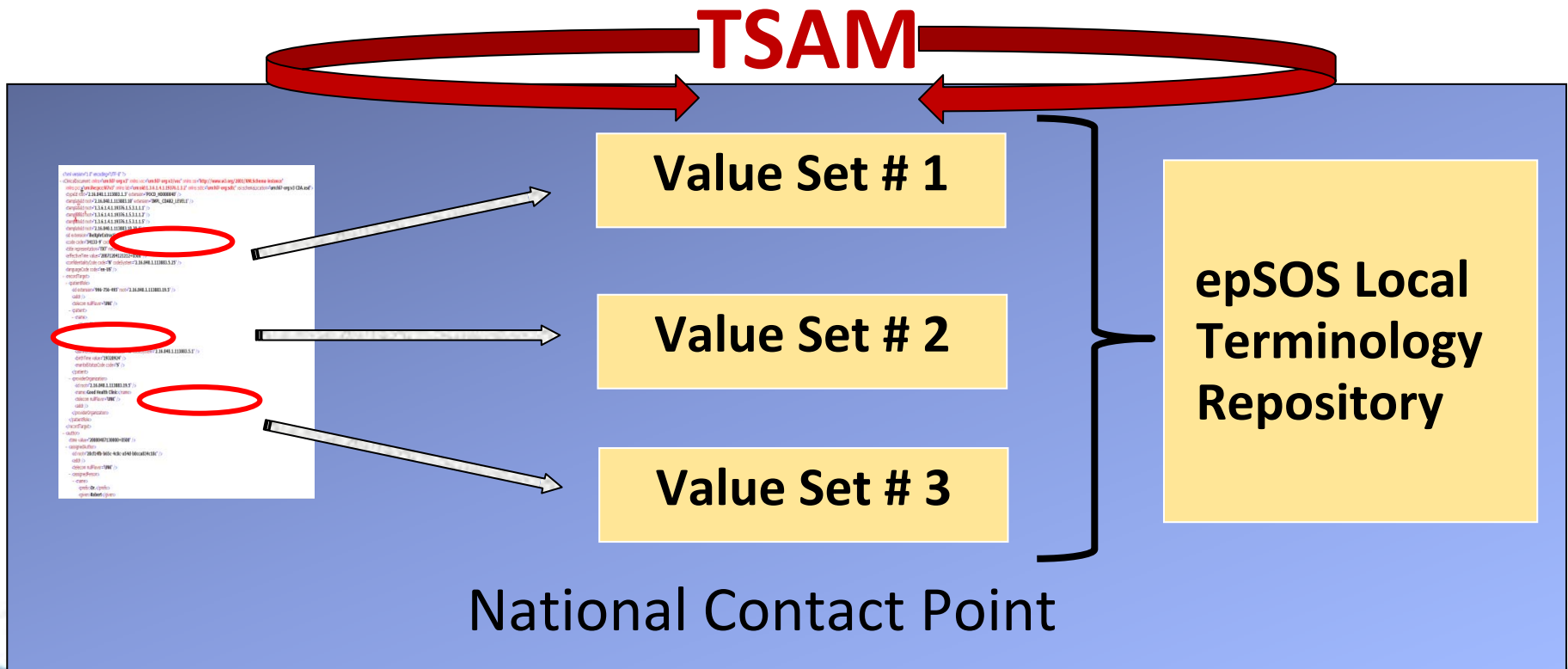
original pdf with the same CDA header



National Connector and National Transformer



The document epSOS CDA uses the Terminology Services interface of the Terminology Services Access Manager (TSAM). These services use a data base containing the epSOS Local (National) Terminology Repository





⇒ *Bisherige Krankheiten:*

2007: akute Cholezystitis (K81.0)
2009: peritoneale Adhäsion (K66.0)

⇒ *Aktuelles Geschehen (inkl. Vorgeschichte):*

Der Patient wird in der Notaufnahme mit Schmerzen des Verdauungstraktes mit leichtem Erbrechen und erhöhter Temperatur (38°C) vorstellig. Es wurde keine weitere Symptomatik festgestellt. In Anbetracht der Krankengeschichte des Patienten wurde ein CT des Oberbauchs angeordnet, welches gering - gradige Verengungen des Darmlumens zeigt. Die Diagnose gering gradiger postoperativer Darmverschluß (K91.3) kann hiermit gestellt werden.

⇒ *Bisherige Operationen:*

2007: laparoskopische Cholecystektomie (HM110)

⇒ *Allergien und Unverträglichkeiten:*

Latex (111088007)

⇒ *Impfungen:*

Lot: 2345-2 Hepatitis B (34689006) | 28.09.2005 Twinrix®

epSOS Local
Terminology
Repository

epSOS terms





- The Local Terminology Repository contains a subset the epSOS Central Reference Terminology Server.
- If an update is made to the epSOS Central Reference Terminology Server, the Local Terminology Repositories are notified and updated.
- The content is originally in English, the terms are based on criterias defined by the use-cases identified by the Member States (epSOS Master Value Sets Catalogue - MVC).
- The Member States have translated the terms in their language and transcoded into them in their national coding system leveraging the epSOS Ontology. This results in the epSOS Master Translation/Transcoding Catalogue – MTC





- The content of the MVC is based on the semantic functional use-cases.
- Selected according to careful criteria: existing code systems, international, most commonly used in MS, having already translations, etc.
- There are **three** pivot documents to define with **17** sections
- This gives a total of **175 coded elements**.
- The coded elements lead to **42 value sets**, each describing a particular value set.
- The values sets are listed in order of their appearance in the Master Value Set Catalogue:
 - A value set an extraction from an official codes sytem, with a few exceptions particular to epSOS such as epSOSErrorCodes, epSOS SpecialTerms or epSOS Coded Elements.
 - A value set is characterized by an epSOS OID and an epSOS Display Name (for example – epSOSBloodGroup - 1.3.6.1.4.1.12559.11.10.1.3.1.42.20)



1.	epSOSCodedElements	Internal to epSOS	175
2.	epSOSActCode	HL7ActCode	20
3.	epSOSActiveIngredient	ATC	5596
4.	epSOSAdverseEventType	SNOMED CT	9
5.	epSOSAllergenNoDrugs	SNOMED CT	103
6.	epSOSBloodGroup	SNOMED CT	12
7.	epSOSBloodPressure	LOINC	2
8.	epSOSCodeNoMedication	SNOMED CT	3
9.	epSOSCodeProb	SNOMED CT	7
10.	epSOSConfidentiality	HL7 Confidentiality	7
11.	epSOSCountry	ISO-3166-1	11
12.	epSOSDocumentCode	LOINC	3





13. epSOSDoseForm	EDQM	490
14. epSOSNameQualifier	HL7:EntityNamePartQualifier	11
15. epSOSSpecialTerms	Internal to epSOS	2
16. epSOSErrorCodes	Internal to epSOS	50
17. epSOSGender	HL7 AdministrativeGender	3
18. epSOSHealthcareProfessionalRoles	ISCO	8
19. epSOSActCode	IHEActCode Vocabulary	8
20. epSOSRoleCode	IHERoleCode Vocabulary	4
21. epSOSIllnessesandDisorders	ICD-10 171	7
22. epSOSLanguage	ISO-639-1	12
23. epSOSMedicalDevices	SNOMED CT	201
24. epSOSNullFavor	HL7:NullFavor	12
25. epSOSPackage	EDQM	74





26. epSOSPersonalRelationship	HL7:PersonalRelationshipRoleType	34
27. epSOSPregnancyInformation	LOINC	3
28. epSOSProcedures	SNOMED CT	66
29. epSOSReactionAllergy	SNOMED CT	8
30. epSOSResolutionOutcome	SNOMED CT	8
31. epSOSRoleClass	HL7:RoleClass	2
32. epSOSRouteofAdministration	EDQM	60
33. epSOSSections	LOINC	17
34. epSOSSeverity	SNOMED CT	7
35. epSOSSocialHistory	SNOMED CT	8
36. epSOSstatusCode	SNOMED CT	4
37. epSOSTelecomAdress	HL7:TelecommunicationAddressUse	8





38. epSOSTimingEvent	HL7:TimingEvent	17
39. epSOSUnits	UCUM	40
40. epSOSUnknownInformation	SNOMED CT	7
41. epSOSURL	HL7:URL Scheme	10
42. epSOSVaccine	SNOMED CT	29

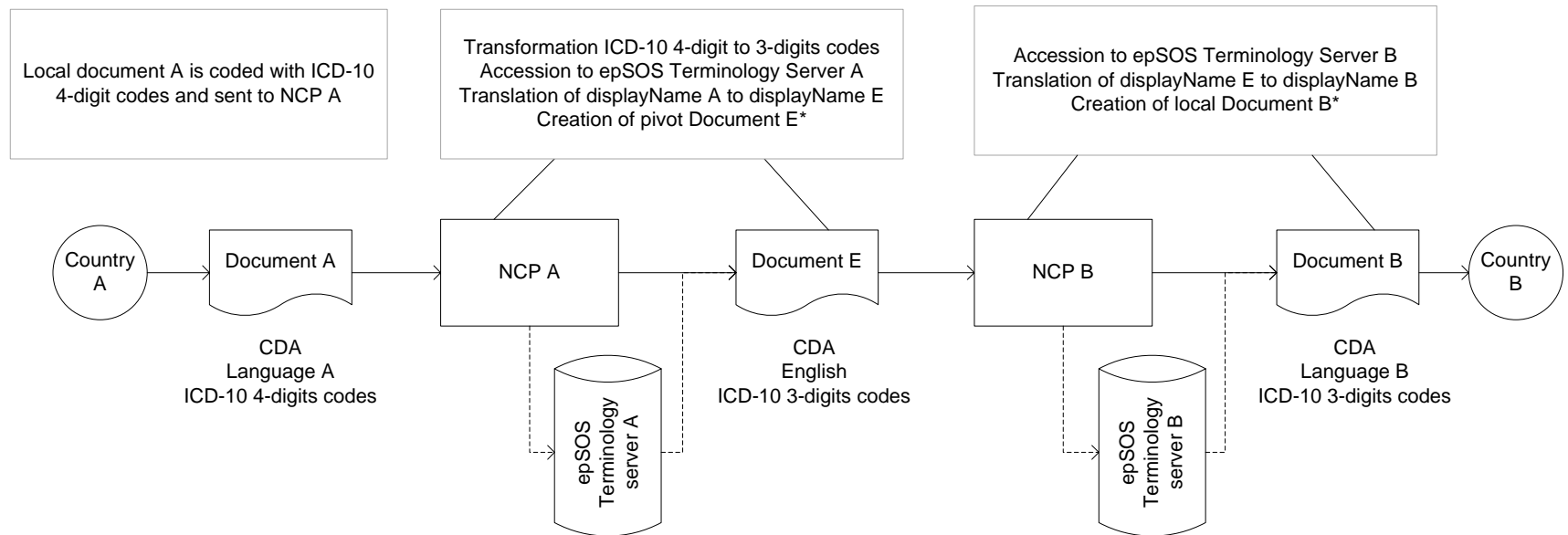
Number and granularity of terms have evolved following quality review.



Original granularity is kept



- Simplified view of the MTC applying to this use case



* Initial 4-digits code with displayName A are kept into CDA documents E and B and are still available





- Simplified view of the MTC applying to this use case

German	epSOS Reference Terminology Code	epSOS Reference Terminology Display Name	French Display Name
TRANSLATION			
Hepatitis B	34689006 (SNOMED CT)	Hepatitis B virus vaccine	Vaccin contre le virus de l'hépatite B
Impfungen	11369-6 (LOINC)	History of Immunizations	Vaccinations
Allergien und Unverträglichkeiten	48765-2 (LOINC)	Allergies, Adverse Reactions, Alerts	Allergies et réactions adverses
Latex	111088007 (SNOMED CT)	Latex	Latex
Bisherige Operationen	47519-4 (LOINC)	History of Procedures	Antécédents chirurgicaux
Aktuelles Geschehen (inkl. Vorgeschichte)	10164-2 (LOINC)	History of Present Illness	Historie de la maladie
akute Cholezystitis (K81.0)	K81 (ICD-10)	Cholecystitis	Cholécystite
peritoneale Adhäsion (K66.0)	K66 (ICD-10)	Other disorders of peritoneum	Autres maladies du péritoine
TRANSCODING			
laparoskopische Cholecystektomie (HM110)	38102005 (SNOMED CT)	Cholecystectomy	Cholécystectomie, par laparotomie (HMFA007)
Code system: <i>Leistungskatalog 2010</i>			Code system: <i>Classification Commune des Actes Médicaux</i>

Terms from different code systems are transcoded using the epSOS Reference Terminology present in the epSOS MVC

Please do note that these examples are not yet validated by the Member States, being work in progress.



- The Austrian NCP sends two documents to the French NCP:
 - the transformed document (the pivot CDA document)
 - the original document in a *pdf* format to the French NCP in a CDA wrapper

French NCP



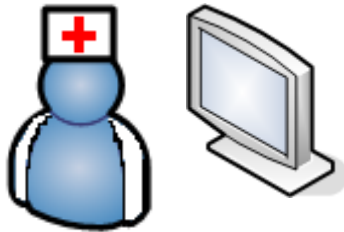
Austrian NCP



Results available for the French physician



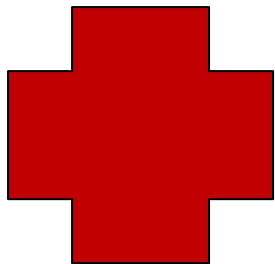
- The French physician receives the original document as pdf in German as well as the transformed document in the epSOS format.



original pdf with the same CDA header

epSOS CDA

French NCP



CHU de Dijon



Austrian Patient Summary understandable by the French physician



ANTECEDENTS MEDICAUX

Date	Code	Libellé	Code original	Libellé originale
2007	K81	Cholécystite	K81.0	akute Cholezystitis
2009	K66	Autres maladies du péritoine	K66.0	peritoneale Adhäsion

ANTECEDENTS CHIRURGICAUX

Date	Code	Libellé	Code original	Libellé originale
2007	HMFA007	Cholécystectomie	HM110	laparoskopische Cholecystektomie

HISTOIRE DE LA MALADIE

Der Patient wird in der Notaufnahme mit Schmerzen des Verdauungstraktes mit leichtem Erbrechen und erhöhter Temperatur (38°C) vorstellig. Es wurde keine weitere Symptomatik festgestellt. In Anbetracht der Krankengeschichte des Patienten wurde ein CT des Oberbauchs angeordnet, welches gering – gradige Verengungen des Darmlumens zeigt. Die Diagnose gering gradier postoperativer Darmverschluss (K91.3) kann hiermit gestellt werden.

Code	Diagnostic principal	Code original	Libellé originale
K91	Atteintes de l'appareil digestif après un acte à visée diagnostique et thérapeutique, non classées ailleurs	K91.3	postoperativer Darmverschluss

ALLERGIES

Allergène	Réaction observée	Gravité
Latex	-	-

VACCINATIONS

Date	Type du vaccin	Nom	Lot N°
28/09/2005	HEPATITE B	Twinrix*	2345-2

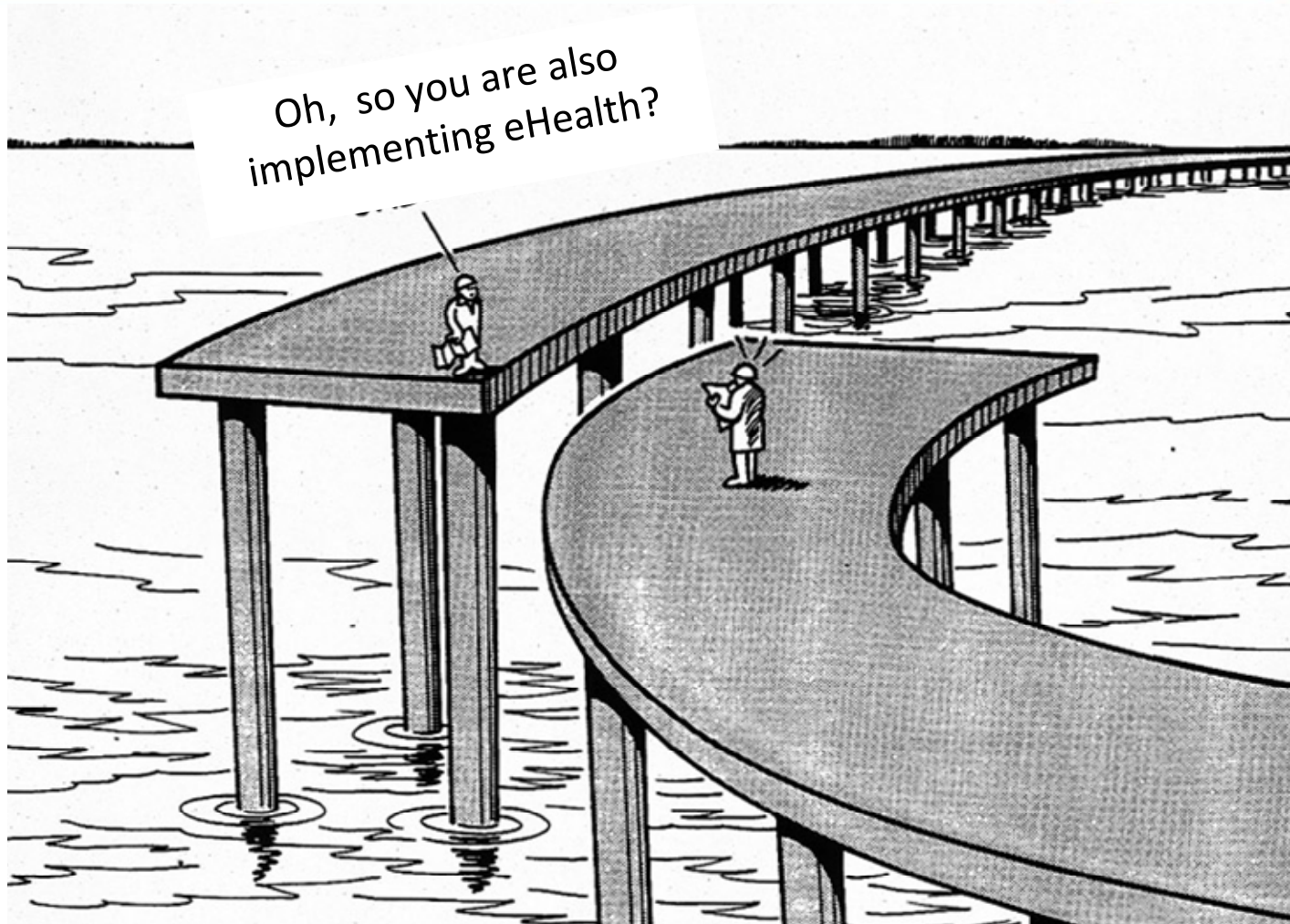


- The French physician sees the following helpful information in the Austrian Patient Summary obtained via epSOS services:
 - 3 years ago: emergency cholecystectomy
 - 1 year ago repeated sub-occlusive episodes.
- Based on these useful information an abdominal scan is done showing a peritoneal bridge occlusion.
- A laparotomy is performed.

epSOS has helped the attending physician in providing better care for the patient!



Most important lesson - cooperation



base from Mikael Erlandsson





Thank you for your attention!
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