

Coding Support Systems: the SISCO.web Approach

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Context

- ▶ **CNR-IIT collaborates on different initiatives and projects promoting coding support and semantic interoperability within the context of the Italian federated Electronic Health Record (FSE)**
 - ▶ **Terminology Services and Coding Support Tools are developed for helping Physicians in validating coding/finding the right term and code for clinical conditions in EHR and clinical documents.**

Coding System required in the Italian federated EHR

▶ **ICD-9-CM**

for diagnoses coding in the Problem list and for interventions coding in the Patient Summary and in Discharge letters

▶ **LOINC** (*Logical Observation Identifiers Names and Codes*)

for laboratory tests and observations coding in the Laboratory report

▶ **ATC** (*Anatomical Therapeutic Chemical Classification System*)

for active substances but also for coding drug classes

▶ **AIC** (*Autorizzazione all'Immissione in Commercio*)

for medications' commercial name coding

Prime Minister Decree N. 178/2015 on FSE

What about ICPC?

- ▶ Not required neither considered by the new regulations for the coding of Episode of care, problem list, or diagnoses.
- ▶ Used by ~300/54,000 GPs in ad hoc softwares which integrates the ICPC-2-E version translated by ICPC Club Italy.
 - ▶ Transcoding between ICPC2 e ICD-9-CM was needed to share data codified in ICPC
- ▶ Experimental uses for the coding of the main problem and complaints in the Triage record and in the coding of the reason for encounter/access at hospital (Emergency Department setting in the Campania and Calabria Regions)

Coding support systems initiatives in Family Care

Development of a Coding Support System (CSS), to support GPs in the validation of clinical diagnoses coding when filling in the Patient Summary

- ▶ Committed by the Agency of Digital Italy and performed in collaboration of the Italian WHO-FIC Collaborating Center.
- ▶ Requirements:
 - ▶ Use of CDA2 HL7 compliant Patient Summaries as input (XML file).
 - ▶ ICD-9-CM mandatory for coding the Problem list, Procedures and Interventions, and adverse reactions sections (although domain experts, still report critical issues in its use).
 - ▶ Based on coding-rules.
- ▶ Main content of the Knowledge Base:
 - ▶ A processable version of the ICD-9-CM Alphabetical index including about 300,000 entries
 - ▶ The ICD-9-CM Ontology (systematic index)
 - ▶ GP'S PROBLEMS - REFERENCE GLOSSARY extracted by 250.000 EHR

CSS Coding rules

Focus of the analysis is firstly the *Problem text* edited by the GP, and secondarily the *ICD-9-CM code*.

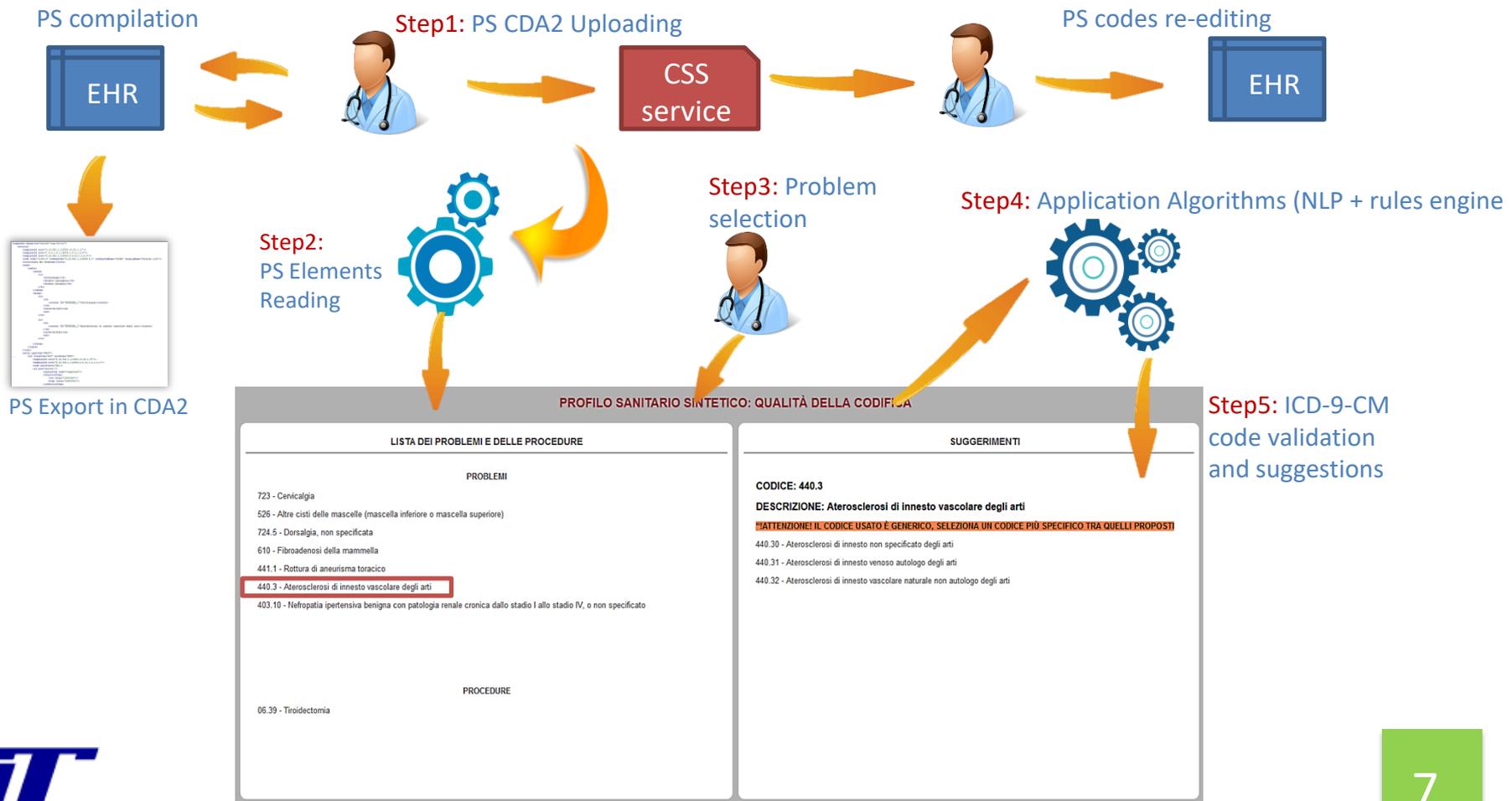
▶ Basic rule coming from ICD:

- ▶ *Codes should be selected only among leaf codes.*

▶ Specific rules built on the system:

- i. If the ICD-9-CM code label is equal to the coder text, then the code is correct.*
- ii. If there is no perfect match between the pairs coder text/code and the ICD-9-CM label and code, a search with a number of NLP techniques is made on the tabular and on the alphabetic index, to select a number of candidates for GP's choice.*
- iii. If an ICD-9-CM code has a "code first" or a "code also" note, such note is presented to the coder.*
- iv. If the coder text is equal to some non-terminal code label, descendants are shown to the coder for a more precise selection.*
- v. For some ICD-9-CM code, rules on compatible sex and ages are available. Since the service has access to the full PS, such information is used for a consistency check.*
- vi. If the coder ICD-9-CM label matched to the coder text excludes the code used by the GP, then an alert message is presented to the GP to allow him correct the code together with suggestions of more appropriate codes.*

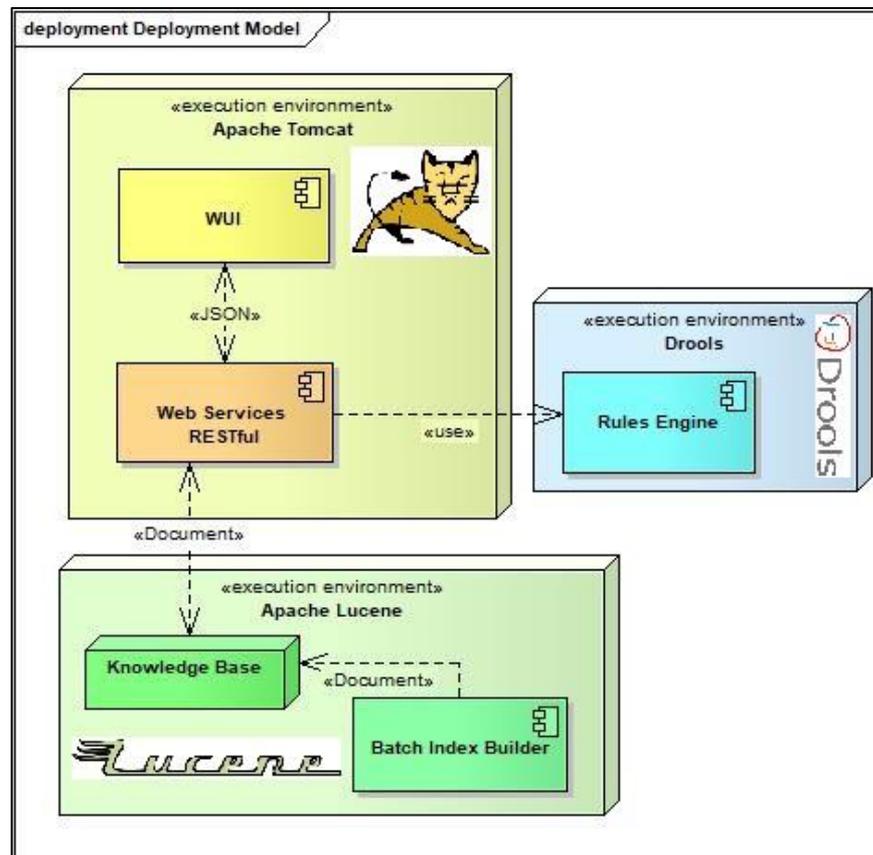
CSS workflow



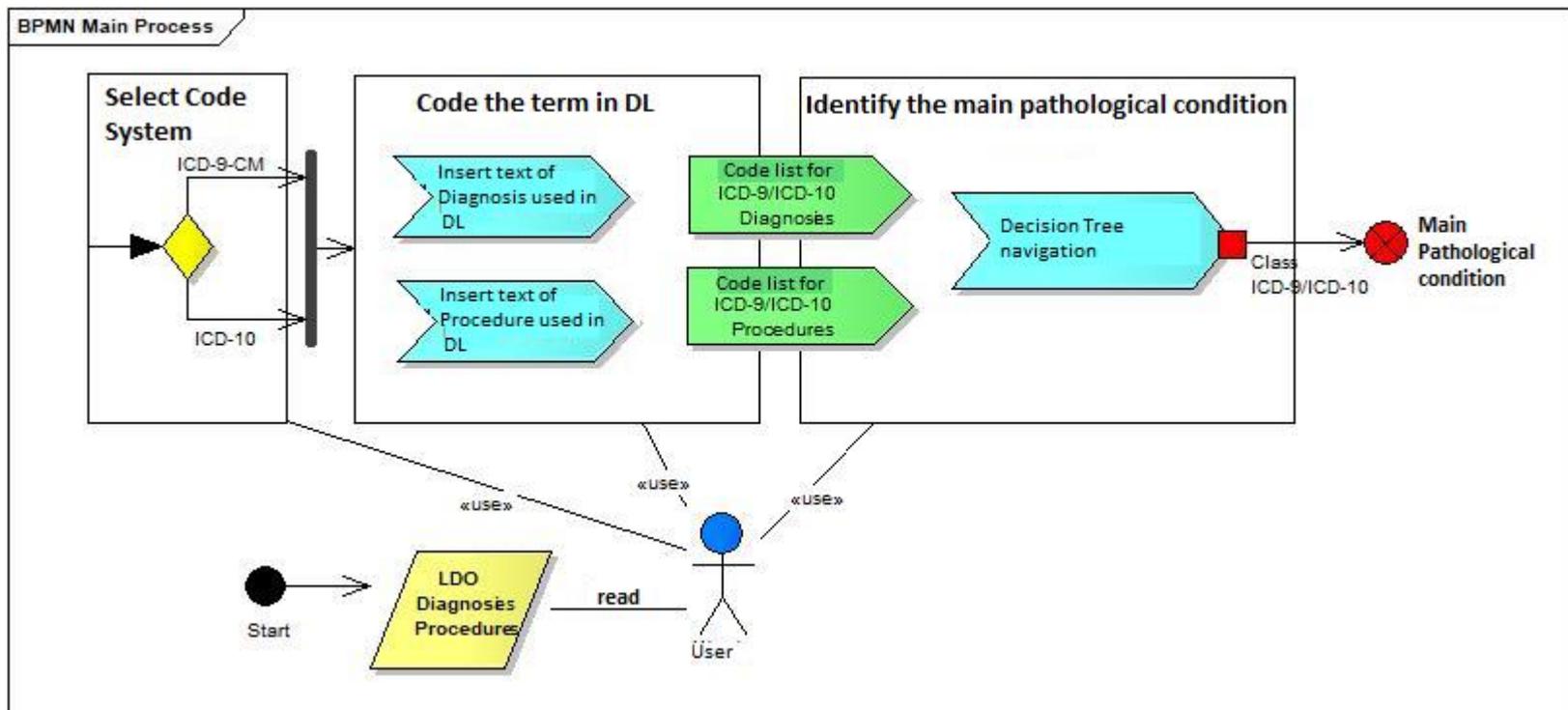
SISCO.web – Coding Support System for Discharge Letters in Hospitals

- ▶ Project Duration: 2 years (2017-2019)
- ▶ Partners: Italian WHO-FIC Collaborating Center (Udine), University of Udine and Fondazione Bruno Kessler (Trento)
- ▶ Objective:
 - ▶ To develop a CSS for physicians of Friuli – Venezia – Giulia Region to help them in the coding of diagnoses (with ICD9-CM and ICD10) in *Hospital Discharge Letters*
- ▶ Use of:
 - ▶ controlled vocabularies mapped to ICD9-CM and ICD-10 to use the most appropriate term and code for each pathological condition.
 - ▶ NLP algorithms, rule engines and decision trees to guide the physician in the selection of the right principal condition among multiple diagnoses.

SISCO.web Architecture



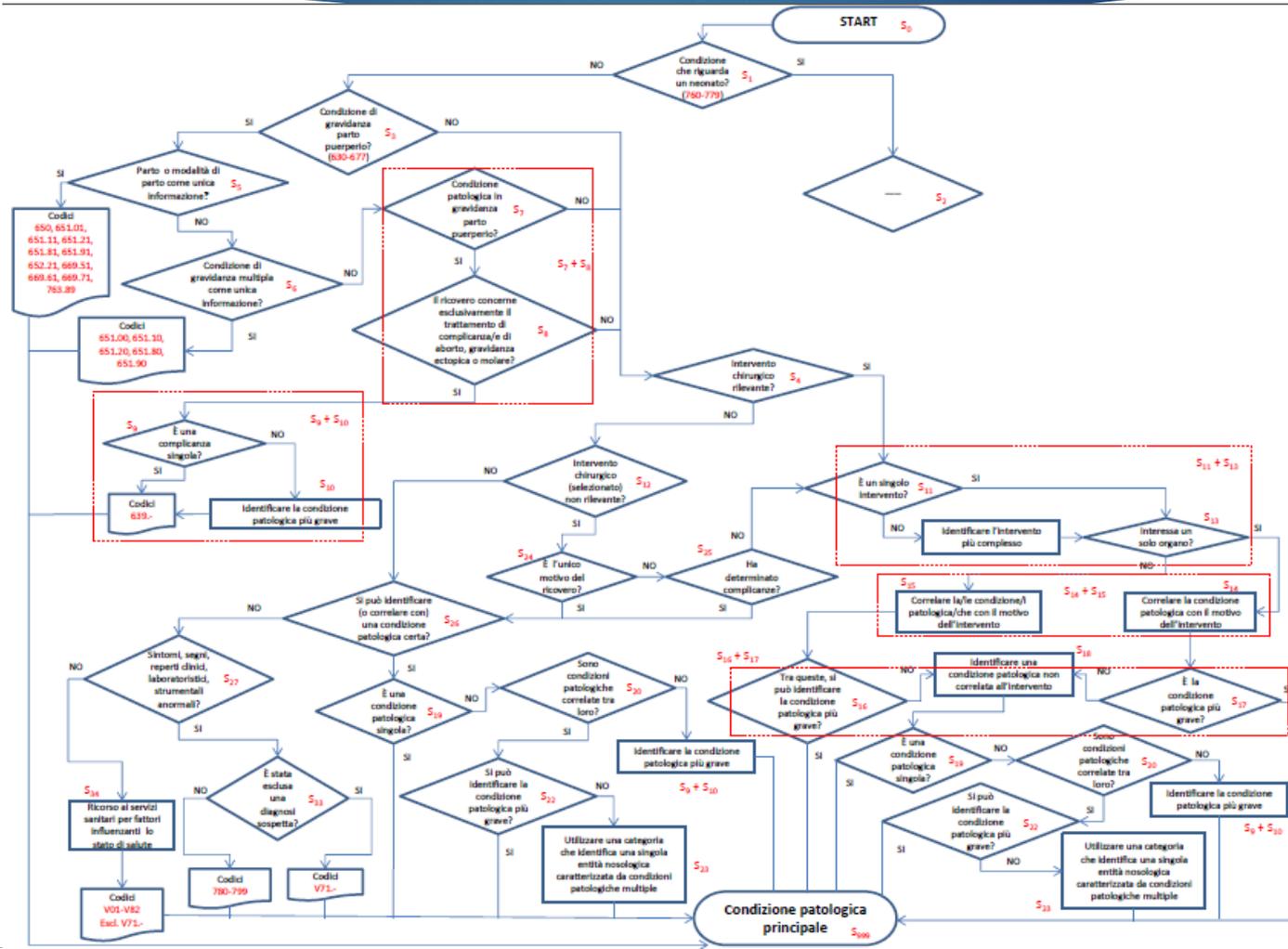
SISCO.web Main process



SISCO.web Knowledge Base

- ▶ The KB used by the Lucene Index in the Coding Tool includes the ICD-9-CM systematic index integrated with:
 - ▶ ICD-9-CM alphabetical index;
 - ▶ ICD-9-CM Chapters and Ranges (that can be used as filters for the search)
 - ▶ The reference glossary of diagnoses in common language
 - ▶ Terms derived from the classification of Rare Diseases and their synonyms;
 - ▶ Diagnoses and pathological conditions extracted from a regional Emergency Departments databases;
 - ▶ Diagnoses and procedures synonyms derived by other controlled vocabularies (e.g. MeSH).
- ▶ All these resources have mapping to ICD-9-CM

SISCO.web Decision Tree and rules



Preliminary results and next steps

Done:

- ▶ Requirements analysis and design of the system
- ▶ Resources collection, preparation and integration
- ▶ Decision trees for identifying main pathological condition both for ICD-9-CM and for ICD-10
- ▶ Implementation of the Search Index, and the rule engine implemented

Work in progress:

- ▶ Design of the Web User Interface
- ▶ Integration of the services

To do:

- ▶ Integration between Diagnoses, Procedures and Anatomical entities to automatize some steps of the decision trees
- ▶ Training and test of the system with a group of Physicians in Friuli-Venezia-Giulia to validate the CSS

Q Diagnosi ▾ delirium

✕ Cancella

Termini correlati

demenza
subacuto
senile
presenile
indotto da sostanze

Risultati della ricerca

290.11	Demenza presenile con delirium	+
290.3	Demenza senile con delirium	+
290.41	Demenza vascolare con delirium	+
291.0	Delirium da astinenza da alcool	+
292.81	Delirium indotto da sostanze	+
293.0	Delirium da condizioni patologiche classificate altrove	+
293.1	Delirium subacuto	+

Diagnosi selezionate

084.5	Malaria mista Malaria (febbre) da piu' di un parassita	✕
291.0	Delirium da astinenza da alcool	✕

Procedure selezionate

✓ Seleziona condizione principale

Thank you for your
kind attention !

Дякую за увагу



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