

Functionality

In the scope of the C3-Cloud solution, the team developed the Semantic Interoperability Suite (SIS). The SIS handles both structural mappings among different information models and resolves semantic mismatches due to the use of different terminology systems and different compositional aggregations, used to represent the same clinical concept. Due to local terminologies used, the SIS is developed in close relation with the pilot sites and offers them the opportunity to keep on using their local coding systems with the possibility to benefit from Standardized and European wide deployable ICT solutions.

Solution Components

To achieve its purpose, the structural mapper consists of pilot site dedicated local format mappers. These mappers provide precise mappings to create correspondence to every relevant data exported by the pilot site to its correct interpretation and place in a FHIR resource. The FHIR resources mapped from pilot site data are defined in the C3-Cloud data dictionary.

Regarding the semantic mapper, a clinical concept mapping sheet is being maintained as the source of reference, which includes all the clinical concepts that are needed by the CDS services, in reference terminologies like SNOMED-CT, LOINC and WHO ATC, and all the local codes that are used by the pilot sites for these concepts. Following the current pilot site needs, available language versions are English, Spanish and Swedish. Further language versions can be integrated on demand and with close collaboration concerned partners.

Users

Targeted group of users include:

- Health professionals who need structured and sharable computerized records, new decision support systems to improve the diagnosis and treatment of patients.
- Researchers in life sciences who must have tools to manage data integration and knowledge platforms.
- Citizens who are the primary beneficiaries of e-Health applications and must have IT tools to access knowledge and to improve their own care.
- EHR system vendors or other platform solution provider that treat complex medical data from heterogeneous information systems.

Benefits

Expected benefits are to:

- Support integrated care for National & European wide deployable ICT solutions to adopting vendors.
- Improve cooperation among healthcare providers, patients and informal care givers.
- Offers end users to keep on using their local coding system with the possibility to benefit from standardized Decision Support Modules and guidelines.

Benchmarking

- Possibility to consider all the local codes that are used by the pilot sites
- Usage of standards initiatives (FHIR) and reference terminologies like SNOMED-CT, LOINC and WHO ATC
- Created Value of new mappings (structural and Semantic) for the community

Limitations

To maintain and update clinical content for the knowledge hub part will be challenging to define sustainable maintenance actions and partners responsibilities as time passes. The SIS is an open source and the community has the possibility to enrich its content knowledge hub. Further additional feature upgrades would be:

- Automatizations of the mapping process and maintenance of the knowledge hub, with a validation process of involved experts.
- Provide SIS terminology mapper services (interface, module) as open service for potential users with an idea to enrich the resources and clinical content.
- Consider end users feedbacks following the evaluation at pilot sites.

Business Model

The team is interested to establish collaboration with relevant partners to improve the current Technology Readiness Level scale of the SIS services. We are looking at a licencing model for the service. Main stakeholders who would license the SIS solution are:

- Healthcare system industry & vendors: Electronic Health Record (EHR), Electronic Medical Record (EMR), Personal Health Record (PHR)
- Clinical Research centers, Pharma, Terminologists and Researchers in life sciences (basic, clinical or epidemiological)

Implementation

C3-Cloud Semantic Interoperability Suite can be easily deployed by running its related Docker image as containers.

Dependencies

C3-Cloud SIS is implemented as a fully deployable exchange suite, running on independent Docker containers. It is based on HTTP communication standards, with embedded JSON content. Regarding the terminology server, Python 3 is used to develop an application that reads the mappings from use case files and creates an HTTP service (Flask) that is able to achieve the tasks listed in the specifications.

Customization

Trainings can be provided to health professionals and pilot study management team so end users in each site become efficient with the system. A comprehensive testing is also carried out by health professionals and technical partners. As a final attempt to reassure bugs are fixed before the system goes live.