KGE - Knowledge Graph Engineering

iTelos Methodology

Phase 1 - Inception

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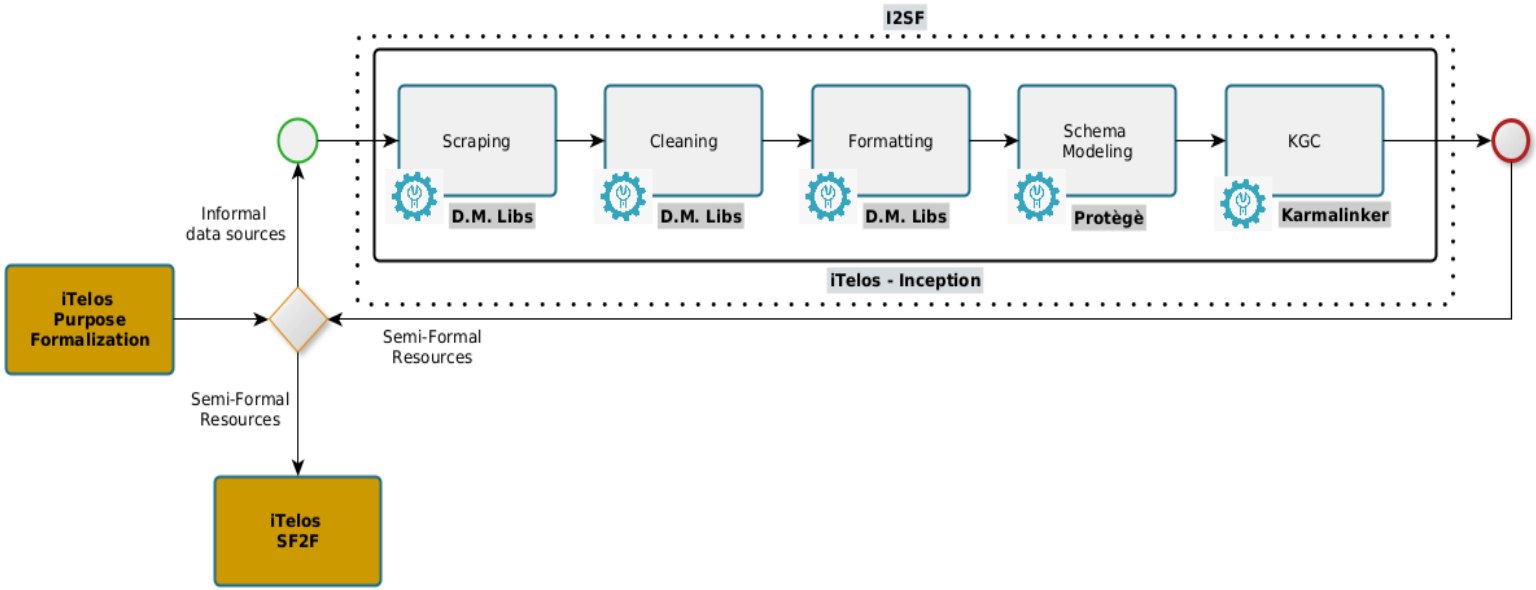
Inception



- **Input**: a set of data sources identified previously, plus the initial user's Purpose.
- **Output**: a set of semi-formal resources, created from the informal resources extracted by the data sources in input.
- **Objective**: to extract, clean, format and model the informal resources required to satisfy the Purpose, collected from the input data sources.

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Inception - Input

- **The Purpose**: the initial purpose is always considered as input for each iTelos phase.
  - It allows to make the right decisions over the issues to be addressed within each phase.
  - In the Inception phase, the Purpose supports the data management activities, by **clarifying the relevance of data**, and data values, to achieve the desired output.
- **Data source list**: the list of (data and knowledge) sources identified in the previous phase.

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Inception - Activities

- The Inception phase aims to collect and semi-formalize the resources (knowledge and data) used to build the final KG.
- Due to the **heterogeneity of the sources**, provided in input, the execution of this phase can be different source by source, or even dataset by dataset.
  - different collection procedures;
  - different cleaning and formatting activities;
  - different schemas to be modeled for each resource collected;
- As a consequence, an **iterative execution** over the source list is considered for this phase.

Inception - Scraping (collection)

- The first activity of Inception phase aims to collect the required resources.
- Collecting data can be done in several ways:
  - asking for datasets directly to owners;
  - accessing data through automatic or semi automatic portals (catalogs);
  - scraping data from sources (this usually requires scraping libraries customization);
  - producing our own data (data collection apps and tools [iLog]).

Inception - Scraping (collection)

- Collecting data, in general, aims to achieve the following two results:
  - Increase the number of **entities** (entity types)
  - Increase the number of **entity attributes** (entity type properties)

- Are the resources collected covering your list of CQs ?
  - **yes** - let's proceed on.
  - **no** - go back to source identification.

Inception - Cleaning

- The cleaning activity aims to **remove "noise"** from the set of resources collected.
- "Noise" is intended to be:
  - entire **datasets** without any information to be considered to satisfy the Purpose;
    - (it happens often collecting automatically or receiving huge amount of data)
  - **entities**, within single datasets, with no relevance for the Purpose;
  - entity **attributes and entity attribute's values**, within single datasets, with no relevance for the Purpose.

Inception - Formatting

- Now the set of resources (as well as entities and relative entity attributes) has been finalized.
- The Formatting activity aims to:
  - **align the differ formats** present in the heterogeneous resource set (datasets formats and data values formats);
  - **anonymize the data** collected; required only if sensible information (like personal data) are included in the datasets collected).

Note: the format alignment over common standards (CSV, XML, TSV, JSON, RDF and OWL) is strongly recommended, mainly for two reasons:

- Reusability.
- Compliance with iTelos activities.

Inception - Schema modeling

- In order to produce Semi-Formal resources the dataset collected, cleaned and formatted have to be **associated to a schema** representing the information their are carrying.
- Such a schema has to be formally defined in RDF-OWL, using a specific tool suggested by iTelos (**Protègè**).
- How to define a schema for the single dataset ?
  - The dataset structure is **self-explanatory**, thus reducing the modeling effort.
  - The dataset's **information needs to be interpreted**, thus a point of view is required for such an interpretation.
    - Which one ? **The Purpose**.

Inception - KGC

- The Knowledge Graph Construction activity takes in input:
  - (data layer resources) The datasets collected, cleaned and formatted.
  - (knowledge layer resources) The schemas produced (extracted) for each datasets.
- the objective of this activity is to create, for each pair composed by a dataset and its relative schema, a **single object representing a semi-formal information model**.
- Such an object is represented by a (dataset-specific) KG.
- To achieve this result a specific tool is offered by iTelos (Karma) used to map each dataset over its own schema, thus merging data and knowledge layer of a KG. [1]

[1] This tool is exploited also in the last iTleos phase when the final KG is building

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Inception - In practice

- The Inception phase is executed in practice by the follwing steps:

  1. (re)use and implementation (customization) of **data management libraries**, to execute the **scraping**, **cleaning** and **formatting** activities;
  2. datasets schema modeling using **Protègè** ;
  3. KGC activity executed using the **Karma** tool[2].

Note: In the next lectures, demos will be presented for each tool mentioned.

[2] https://usc-isi-i2.github.io/karma/

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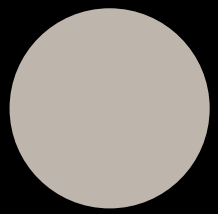

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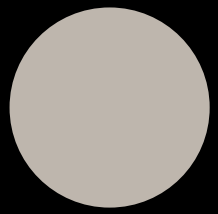

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