



KDI ● **Knowledge and Data Integration**

iTelos Structure

Data Integration Methodology Structure

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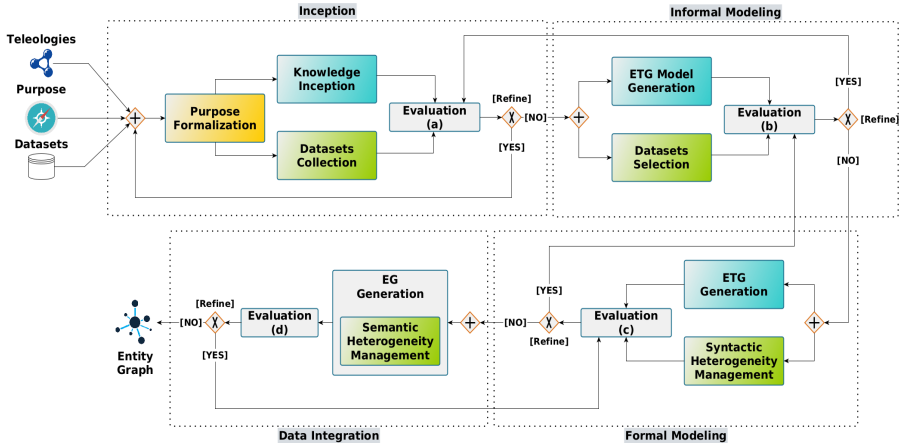
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iTelos General Structure



iTelos Structure - General Aspects

- Phase-based methodology.
- Process leaded by the *Purpose*, formalized along the different phases.
- Knowledge and data layers executed in parallel.
- Layer sync through Evaluation.
- Backward flow for error recovery.

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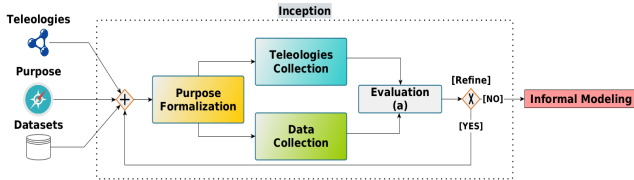
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iTelos Phases - Inception



Inputs:

- Purpose.
- List of data sources.
- List of reference teleologies.

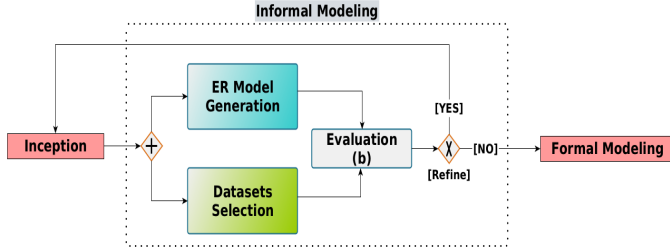
Outputs:

- Competency Question (CQ) list.
- Datasets.
- Reference teleologies.

Objectives:

- Formalize the project's Purpose.
- **Knowledge layer:** Collect the reference teleologies needed.
- **Data layer:** Collect the datasets needed. The data collection activity includes the DTA-1 (See iTelos Principles - slide 6).

iTelos Phases - Informal Modeling



Inputs:

- CQ list.
- Datasets.
- Reference teleologies.

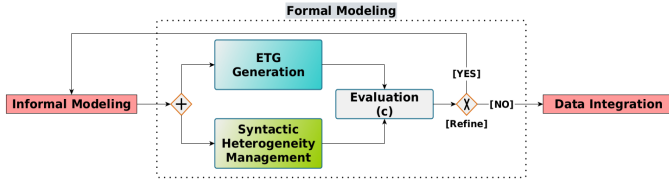
Outputs:

- ETG Model.
- Datasets selected.

Objectives:

- **Knowledge layer:** Create, from the CQs the model of the desired ETG.
- **Data layer:** The whole set of datasets collected is filtered selecting only the relevant elements.

iTelos Phases - Formal Modeling



Inputs:

- ETG Model.
- Selected Datasets.
- Reference teleologies.

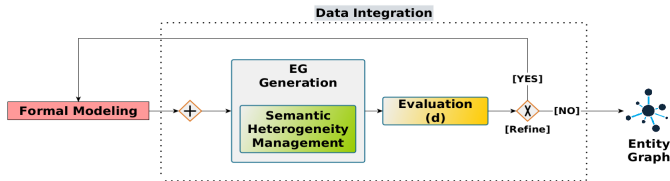
Outputs:

- ETG.
- Datasets syntactically formatted.

Objectives:

- **Knowledge layer:** Create a shareable ETG, following the ETG model and reusing as much as possible the reference teleologies conceptualization.
- **Data layer:** The datasets selected are, in this phase, elaborated through the DTA-2.1 (See iTelos Principles - slide 6).

iTelos Phases - Data Integration



Inputs:

- ETG.
- Datasets syntactically formatted.

Outputs:

- EG.
- Metadata.
- Project documentation.

Objectives: Merge the knowledge and data layer, mapping the datasets on the ETG produced. The ETG (KG) is, in this phase, populated with the Entity values, building the EG. We deal with the semantic heterogeneity within the data through the DTA-2.2 and DTA-2.3. Moreover, this final phase finalizes the Metadata for the resources involved in the project, defined through a specific standard (DCAT).

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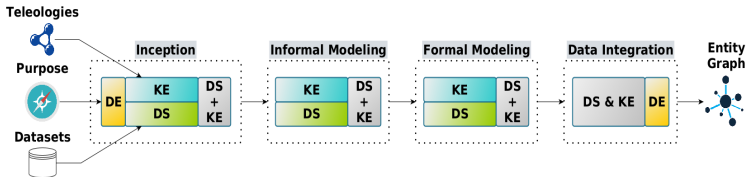
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iTelos Roles

iTelos is composed by several different activities performed along the four phases. Some of those activities involves the management of knowledge resources while others are focused on data resources. Such a difference is handled by different roles along the entire process.

We can identify three main roles in iTelos:

- Knowledge Engineer (KE)
- Data Scientist (DS)
- Domain Expert (DE)



iTelos Roles - Data Scientist

The Data Scientist (DS) is a person having data management and programming skills, which is in charge of performing all the **data layer activities**, those involving the datasets collection and DTAs.

The DS is, always involved in the **evaluation activities**, in the end of each iTelos phase, in order to guarantee the best alignment with the parallel knowledge layer.

In the last phase the DS, supported by the KE, is responsible for the **mapping procedure** that allows the merge between knowledge and data layer.

iTelos Roles - Knowledge Engineer

The Knowledge Engineer (KE) is a person having knowledge representation skills, able to use schema modeling tool (such as Protégè, that will be illustrated during this course), which is in charge of performing all the **knowledge layer activities**, those involving teleologies collection and knowledge modeling.

Like the DS, the KE is always involved in the **evaluation activities**, in the end of each iTelos phase, in order to guarantee the best alignment with the parallel data layer.

iTelos Roles - Domain Expert

The Domain Expert (DE) is the first role that appears in the methodology. She/He is a person who has a **detailed knowledge of the Domain of Interest** in which the DI project takes place.

The DE is fundamental in the first activity of **Purpose Formalization**, where the Purpose, as main project requirement is evolved (partially formalized) in a set of Competency Questions, which will helps both KE and DS to properly handle the resources for which they are responsible.

Moreover, the DE trough the CQs support the evaluation activities along the different iTelos phases. In particular in the last evaluation activity, the DE, is responsible to **verify that the methodology final outcome** (EG) is suitable for the initial Purpose.

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iTelos Structure - Summary

In this lecture we discussed:

- how the structure of iTelos is formed;
- what are the general aspects involved in the structure;
- what are the objectives of each iTelos phase;
- what are the roles adopted by who needs to exploit the methodology, and their effort along the DI process.



KDI : Knowledge and Data Integration



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