Collection of Ontology Network Life Cycle Models

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Ontology Network Life Cycle Models

The **ontology network life cycle model** defines in an abstract way how to develop an ontology network project; in other words, how to organize the processes and activities of the NeOn Glossary (Chapter 3) into phases or stages.
We propose two different life cycle models: (a) the ***waterfall model*** and (b) the ***iterative-incremental model***.

Ontology Network Life Cycle

The **ontology network life cycle** is the specific ordered sequence of processes and activities that ontology developers have to carry out during the life of the ontology network. That is, the life cycle instantiates a life cycle model.

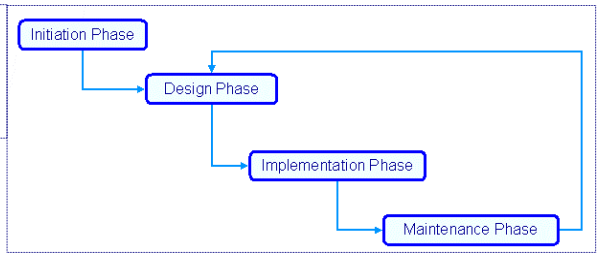
Waterfall Ontology Network Life Cycle Model (1)

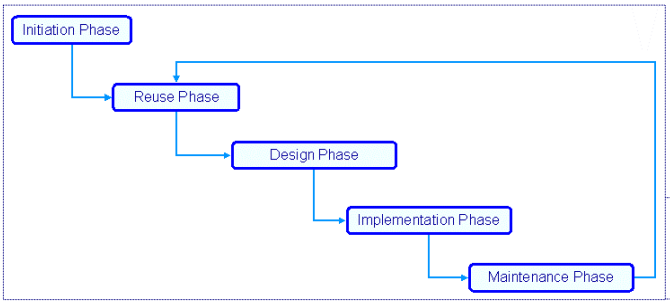
This model represents the stages as a waterfall, where a concrete stage must be completed before the following stage begins and where backtracking is permitted from the maintenance to the phase after the requirements.
The main assumption for using the proposed waterfall model is that the requirements are completely known, without ambiguities and unchangeable at the beginning of the ontology network development.
This model could be used in the following situations:

- In ontology projects with a short duration (e.g., 2 months).
- In ontology projects whose goal is to develop an existing ontology in a different formalism or language.
- In ontology projects in which the requirements are closed (e.g. to implement the content of an ISO standard).
- In ontology projects where ontologies should represent a small, well-understood domain.

This model includes a set of support activities that should be performed in all the phases. This set of activities includes the acquisition of knowledge in the domain in which the ontology is being developed, the evaluation and the assessment of the outputs, the project and configuration management and documentation.
Because of the importance of reusing and reengineering knowledge resources and merging ontological resources, we have defined the following five different versions of the waterfall ontology network life cycle model. These versions are intrinsically related to the scenarios (Chapter 3) identified in the NeOn Methodology.

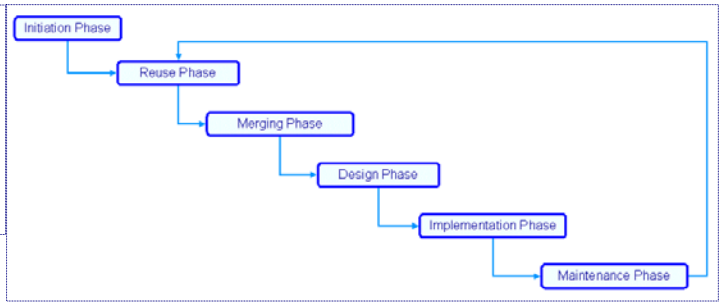
Four-Phase Waterfall Model. It represents the stages of an ontology network, starting with the initiation phase and going through the design phase and the implementation phase to the maintenance phase.





Five-Phase Waterfall Model. It extends the four-phase model with the reuse of existing ontological resources as they are.

Five-Phase + Merging Phase Waterfall Model. It is a special case of the five-phase model. It includes the Merging Phase to obtain a new ontological resource from two or more ontological resources previously selected in the reuse phase.



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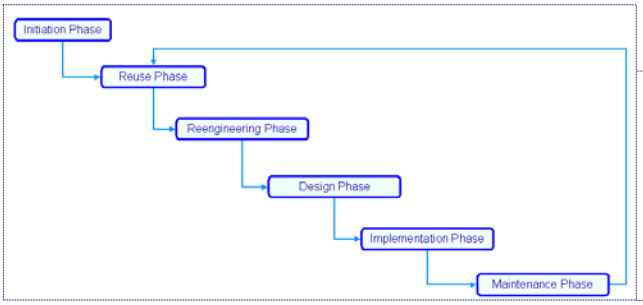
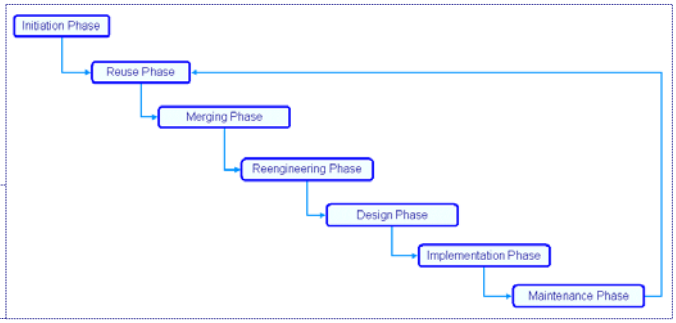
Waterfall Ontology Network Life Cycle Model (2)



Six-Phase Waterfall Model. It extends the five-phase model with the Reengineering Phase. It allows the re-engineering of ontological resources and non-ontological resources (NORs). It may occur that several knowledge resources are transformed into ontologies in the reengineering phase.



Six-Phase + Merging Phase Waterfall Model. It extends the six-phase model by including the Merging Phase after the reuse phase.

Iterative-Incremental Ontology Network Life Cycle Model

This model organizes the ontology development in a set of iterations (or short mini-projects with a fixed duration). Each iteration is scheduled as a single ontology project using a waterfall model.

Requirements specified in the Ontology Requirements Specification Document (Chapter 5) can be divided in different subsets. The result of any iteration is a functional and partial ontology that satisfies a subset of the requirements. Such a partial ontology can be used, evaluated and integrated in any other ontology network.

This model is based on the successive improvement and extension of the ontology network by means of performing multiple iterations with cyclic feedback and adaptation. Thus, the ontology grows incrementally.

This model could be used in ontology projects (1) with large groups of developers and complex developments, or (2) whose requirements are not completely known or can change during the development.

Correspondence between Processes and Activities and Life Cycle Model Phases

Initiation Phase:
- O. Requirements Specification (Chapter5)
- Scheduling (Chapter 7)
- O. Evaluation (Chapter 14)

Reuse Phase:
- NOR Reuse (Chapter 8)
- O. Search (Chapter 6)
- O. Reuse (Chapter 9 and 10)
- O. Statements Reuse (Chapter 11)
- O. Evaluation (Chapter 14)

Merging Phase:
- O. Aligning (Chapter 17)
- O. Evaluation (Chapter 14)

Reengineering Phase:
- NOR Reengineering (Chapter 8)
- O. Modularization (Chapter 15)
- O. Evaluation (Chapter 14)

Design Phase:
- O. Conceptualization (Chapter 12)
- O. Evolution (Chapter 16)
- O. Localization (Chapter 13)
- O. Evaluation (Chapter 14)

Implementation Phase:
- O. Evaluation (Chapter 14)

Maintenance Phase:
- O. Evaluation (Chapter 14)

Additional information:

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- *NeOn Deliverable D5.3.2 (http://www.neon-project.org/web-content/images/Publications/neon_2009_d532.pdf)*