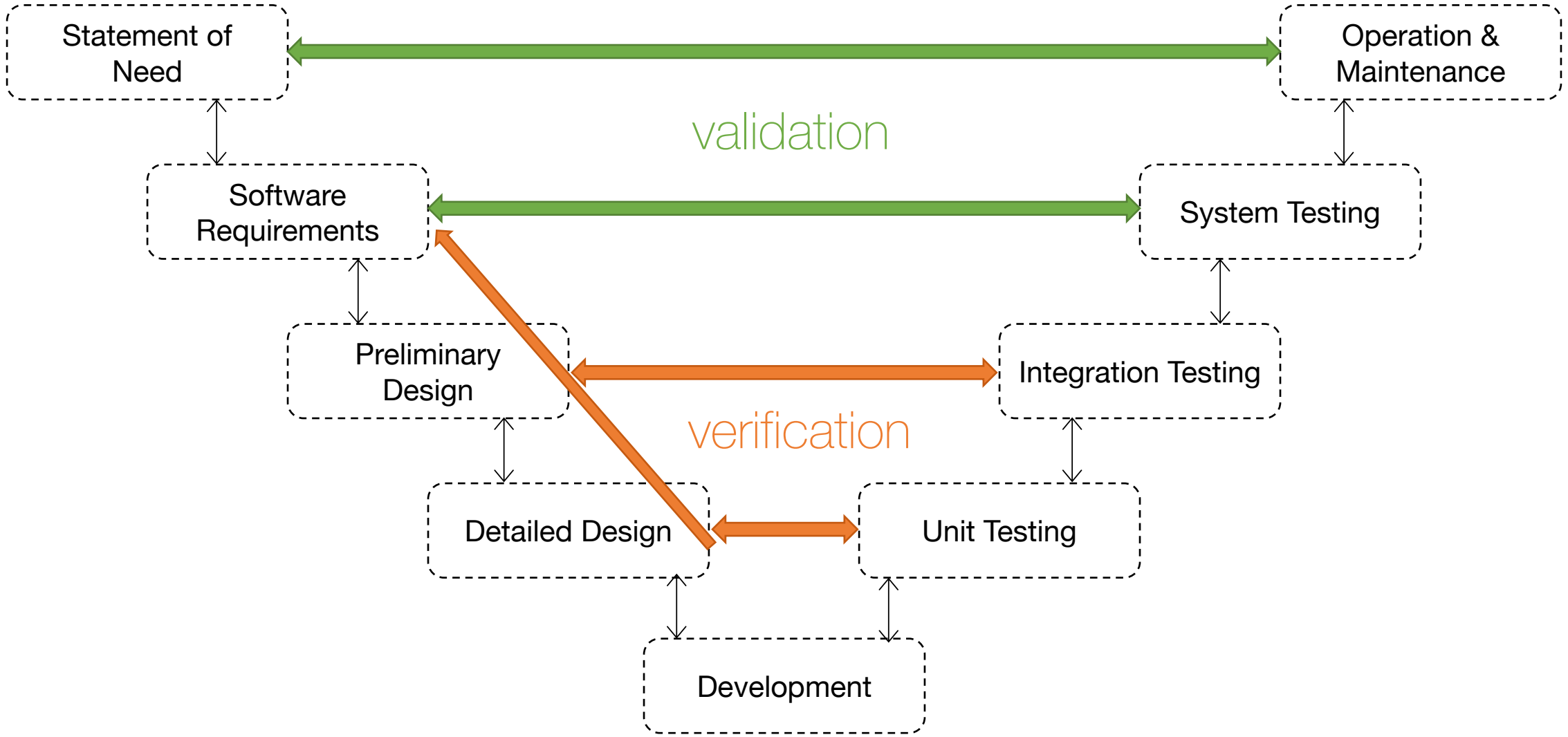
Continuous Requirements Engineering using Model Federation

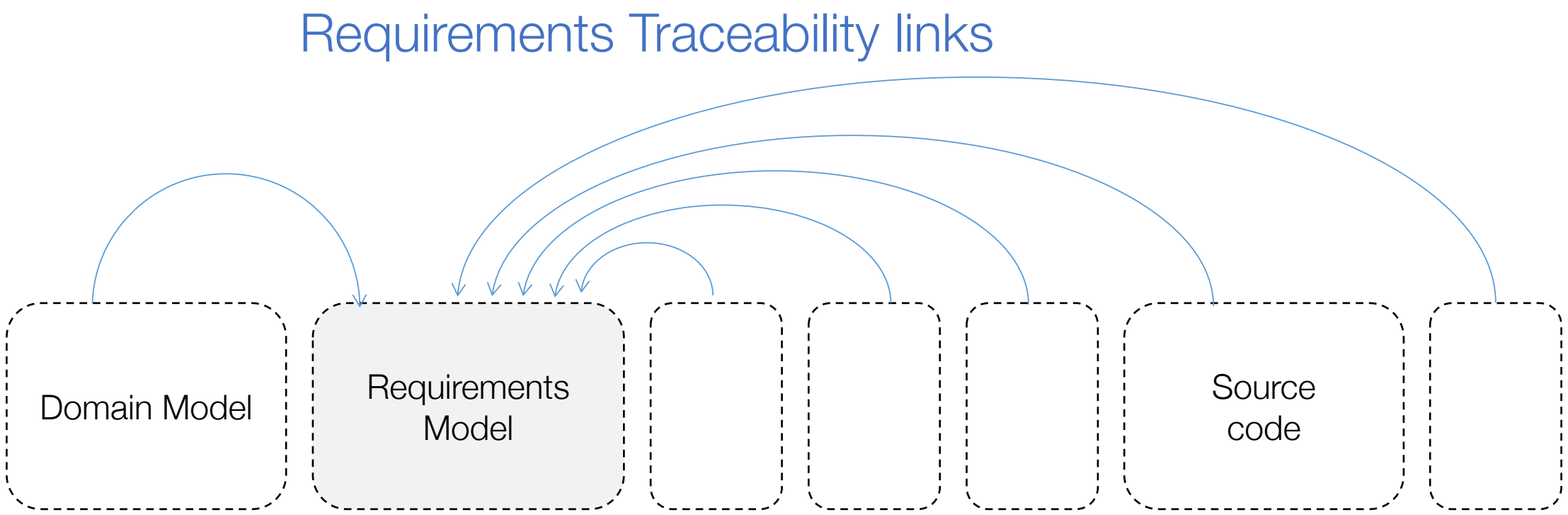
Originally presented at RE'16

Talk by: Fahad R. Golra

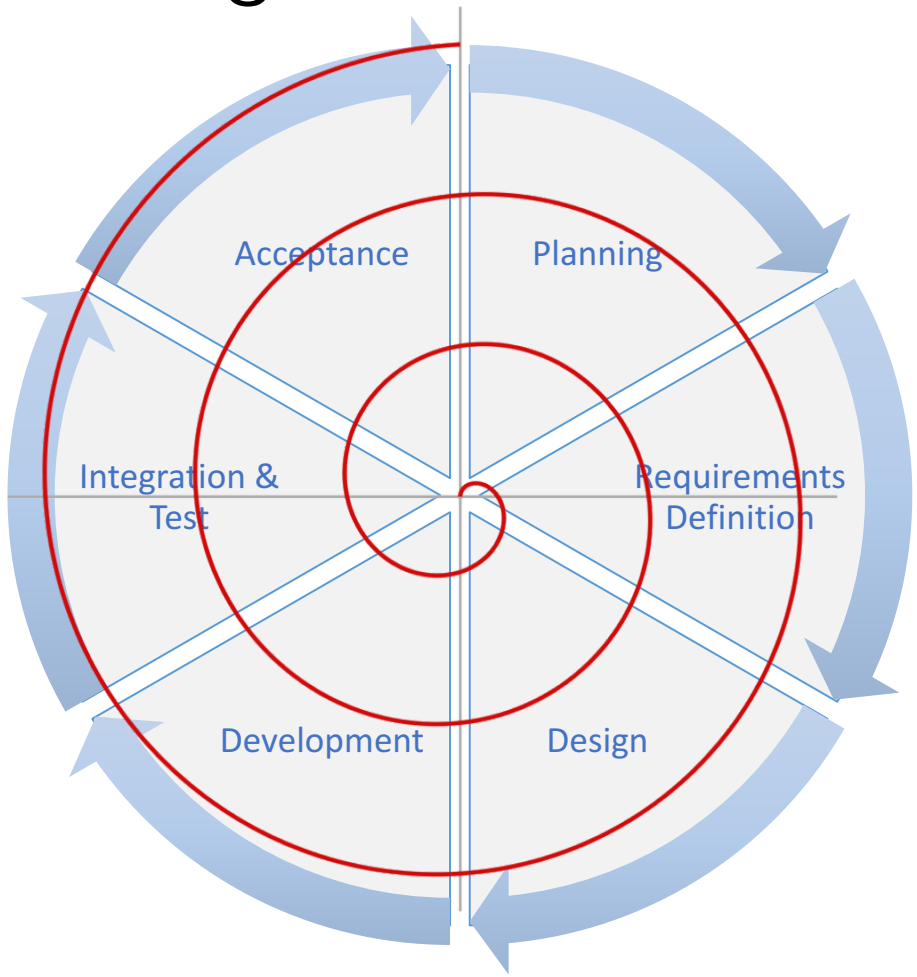
Development Lifecycle

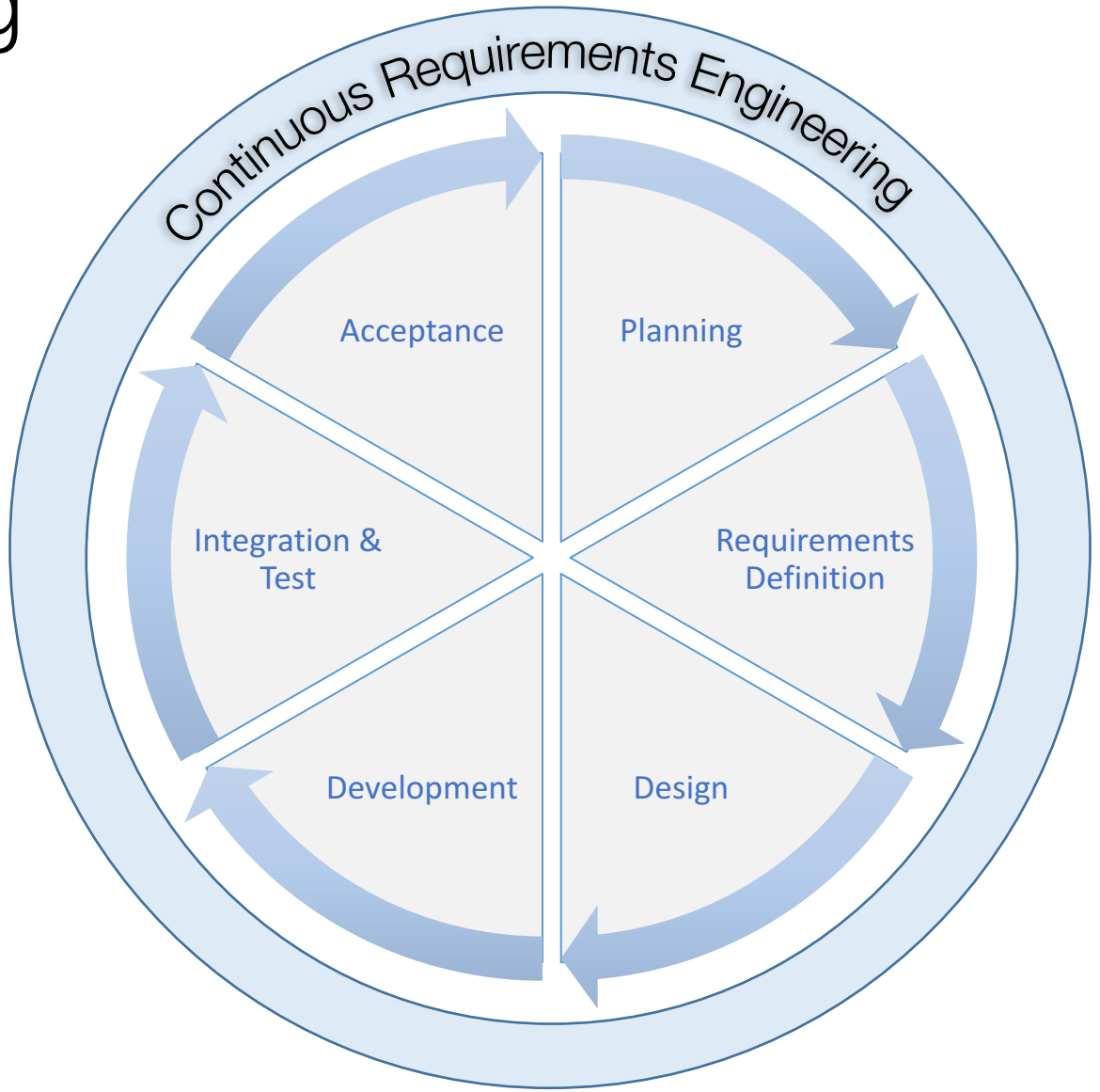


Software Development Artifacts



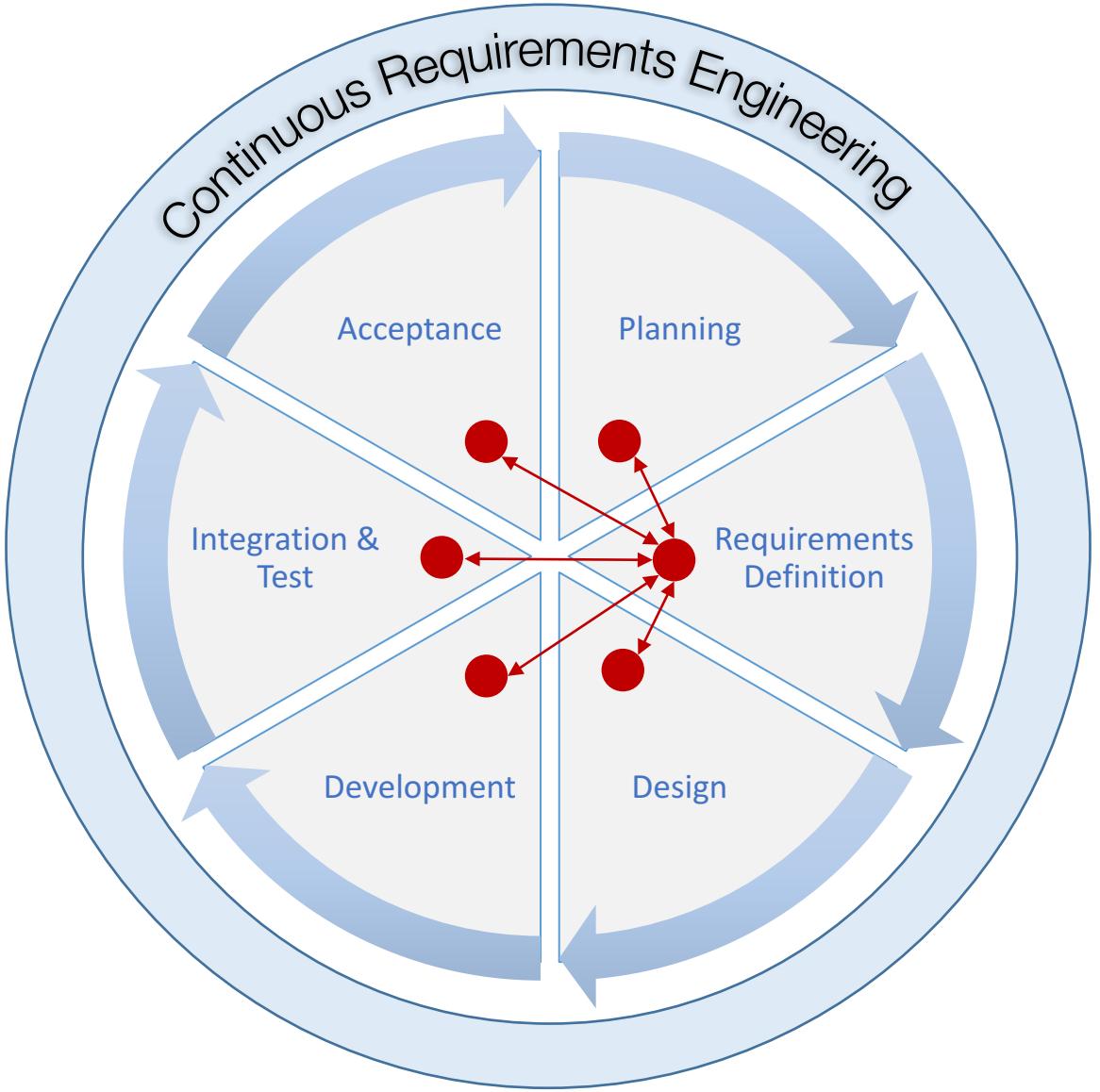
Requirements Engineering Coverage





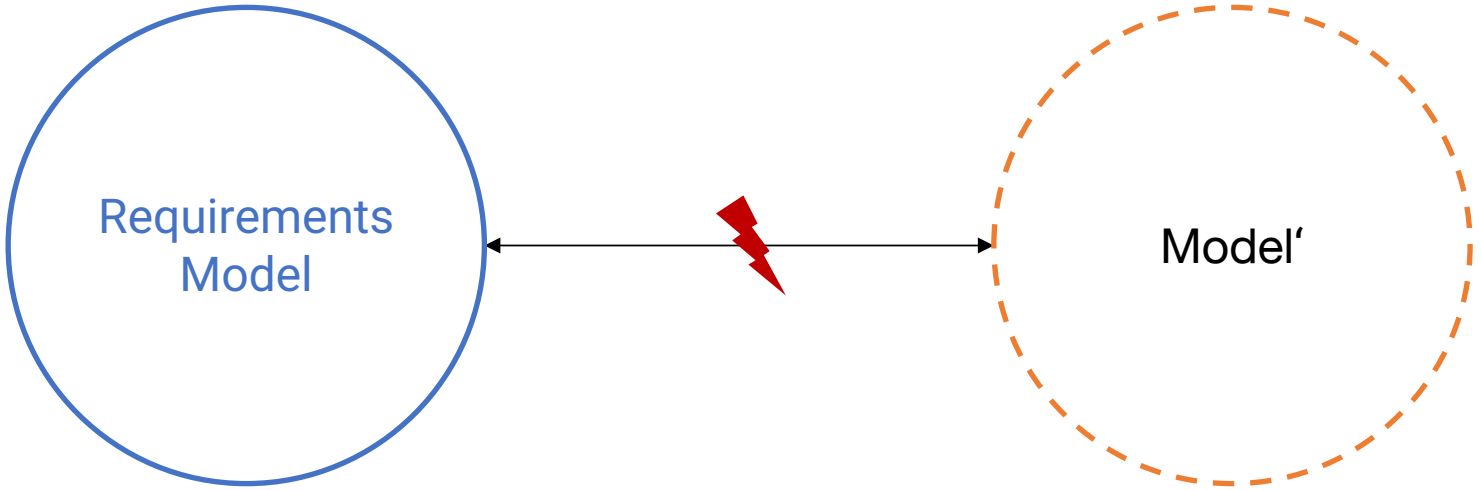
Software Development Artifacts

Linking requirements to the artifacts (models) of all the phases of software development lifecycle



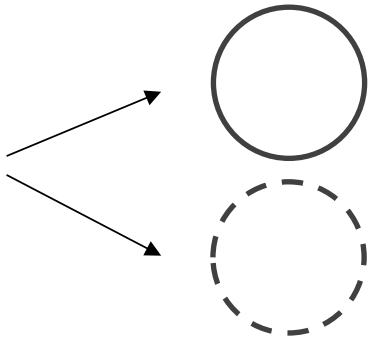
Linking Requirements

- SRS
- KAOS
- i*/Tropos
- Use Cases
- Story Maps
- Scenarios
- ...

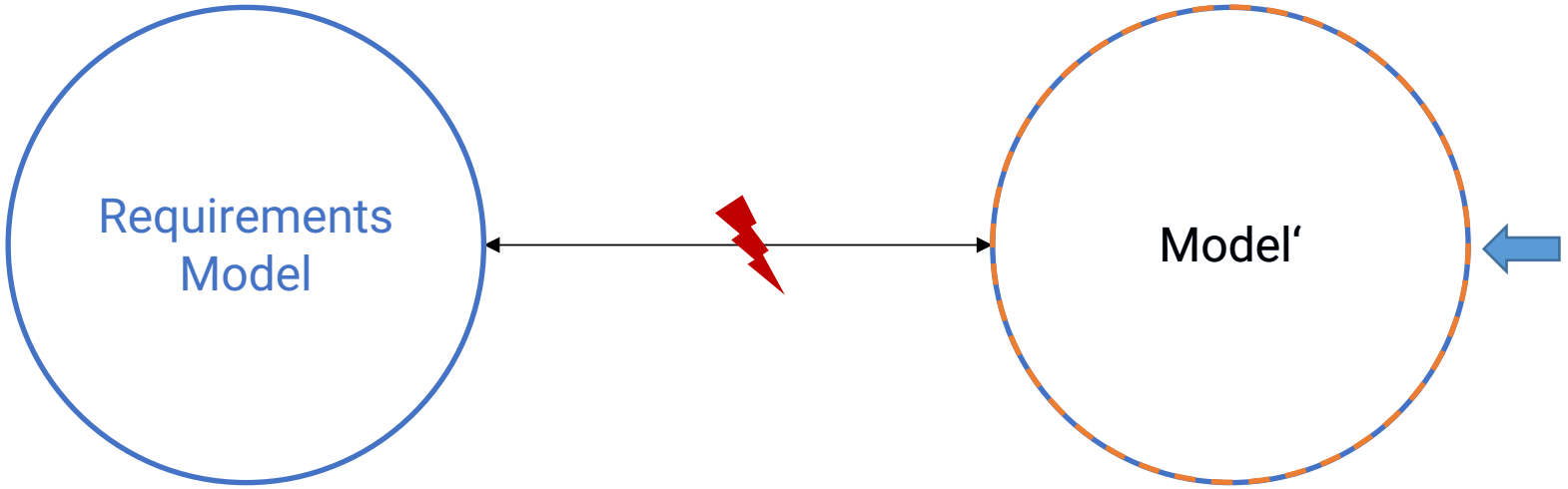


- Class Models
- Entity/Relationship
- Code
- Databases
- Test cases
- Reviews
- Documentation
- …

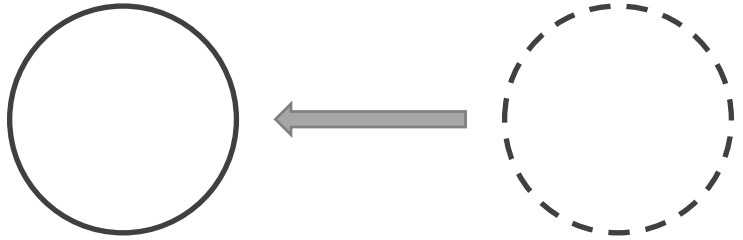
Different paradigms



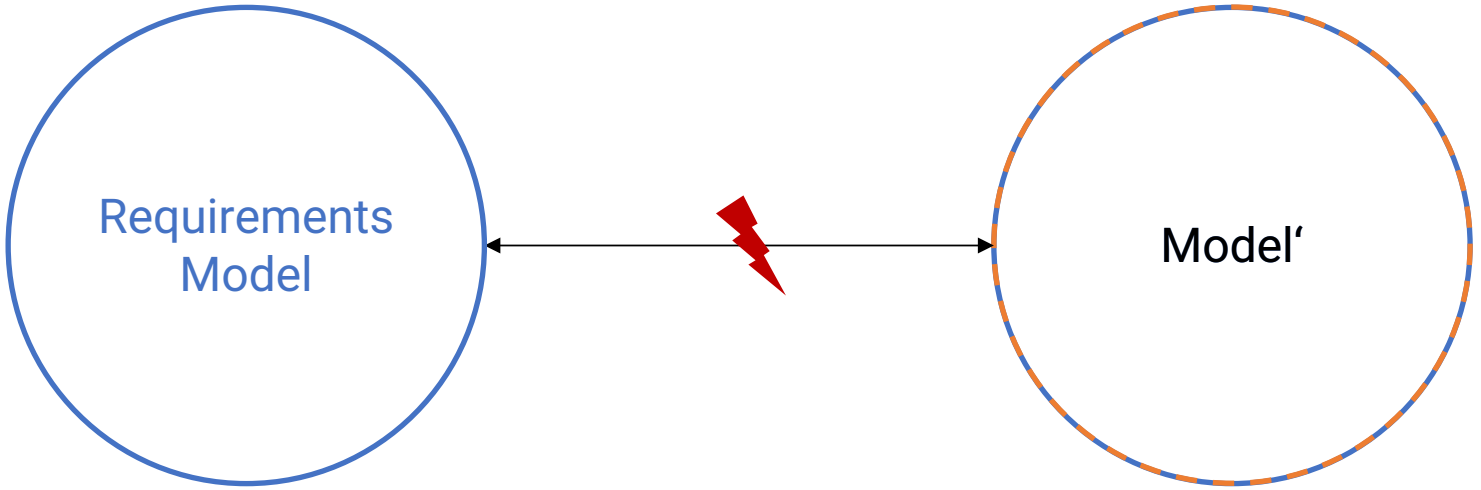
Linking Requirements



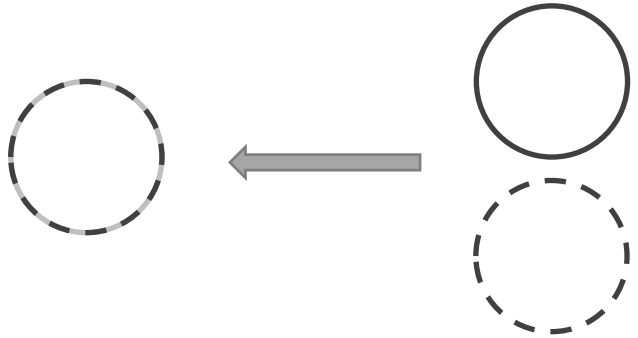
Model Transformation =



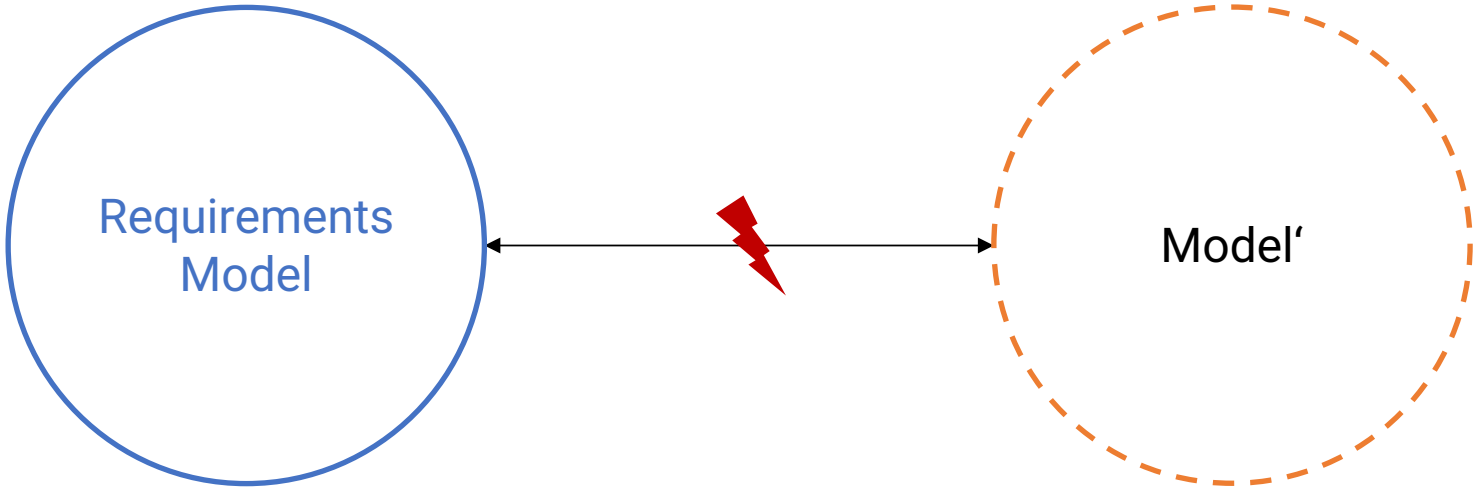
Linking Requirements



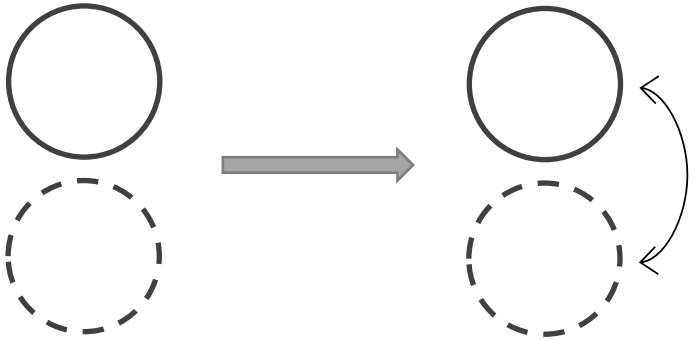
Model Composition =



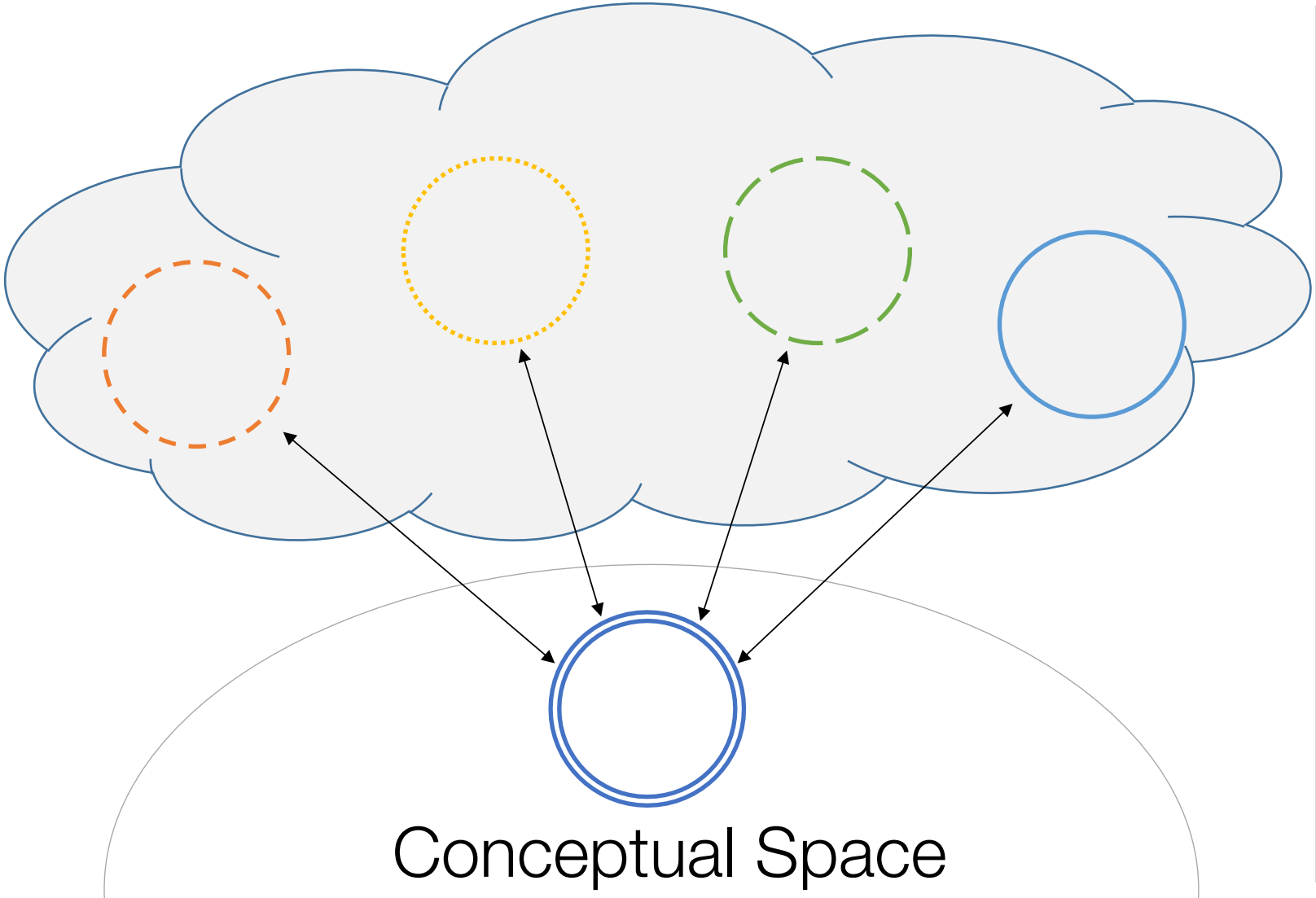
Linking Requirements



Model Federation =



Model Federation

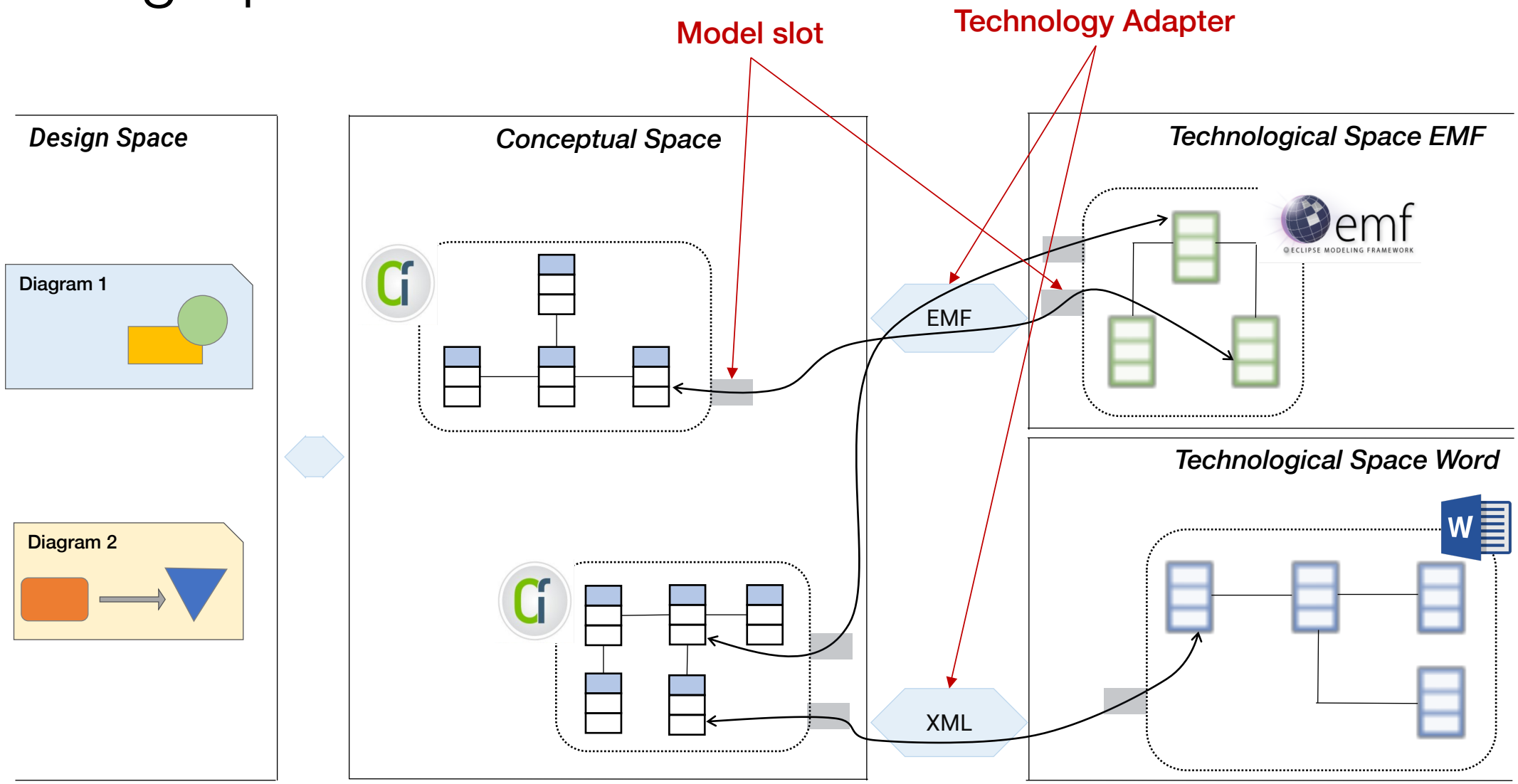


Multiple paradigms

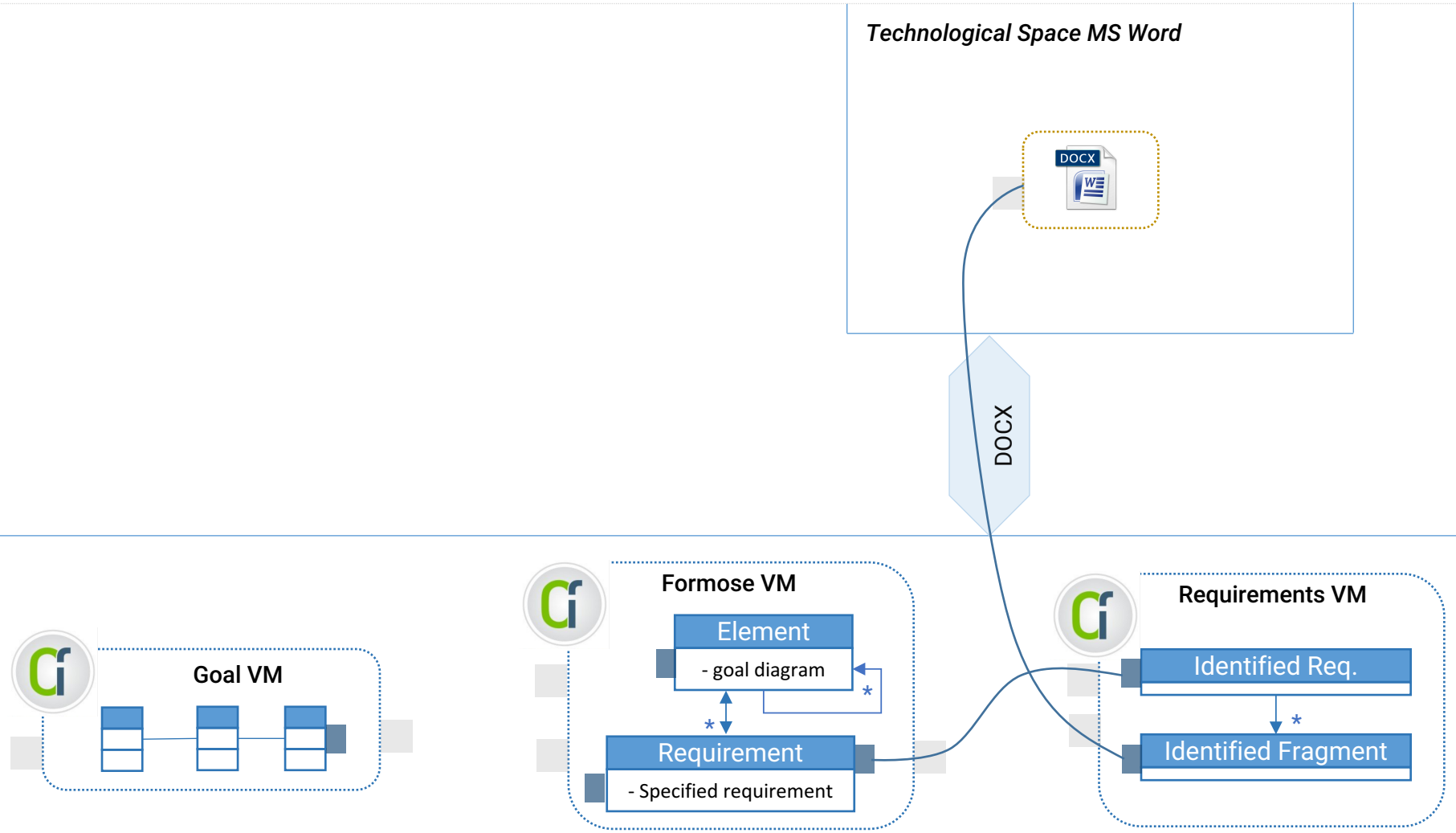
Usage examples:

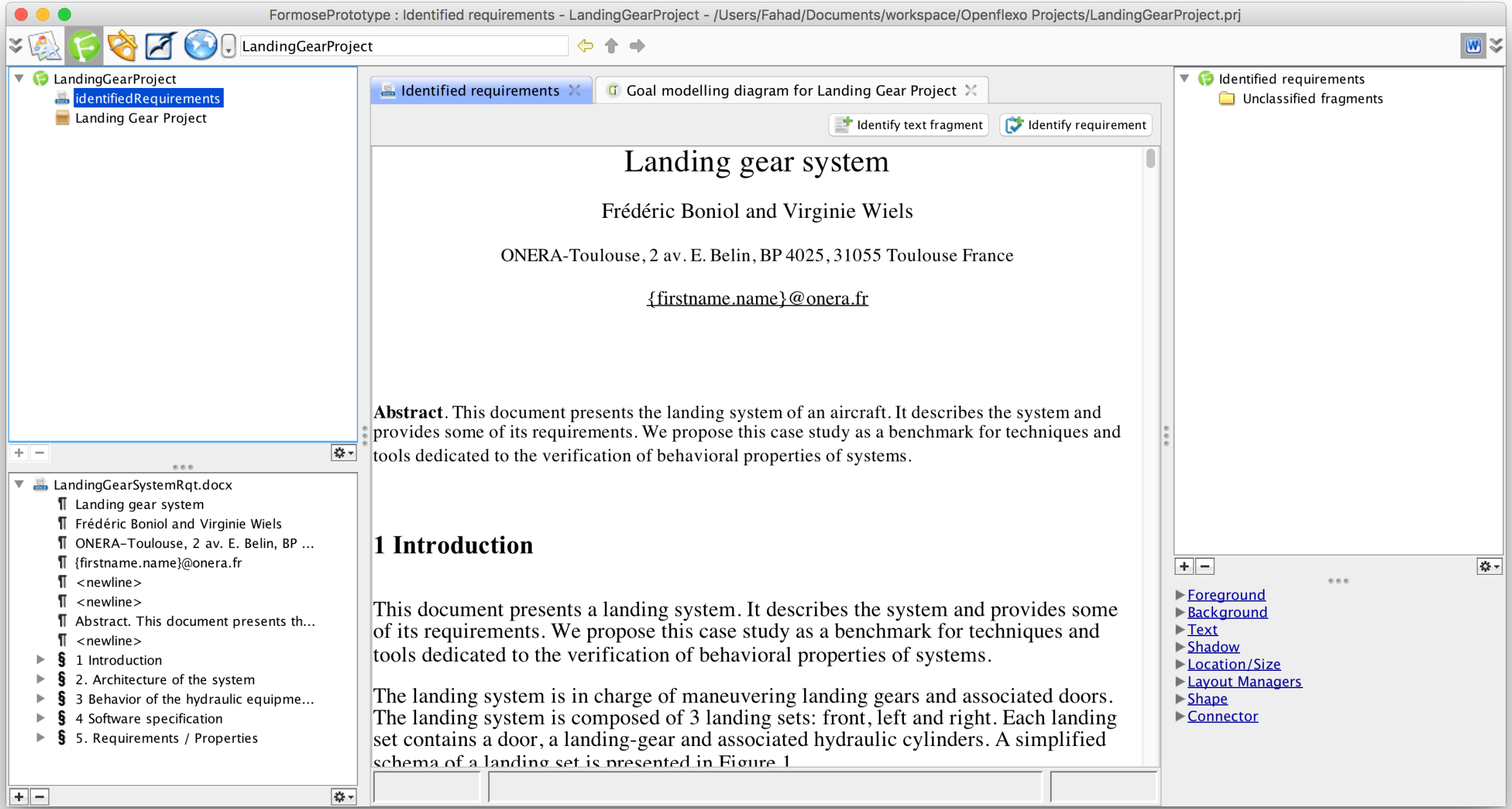
- Synchronizing models
- View development

Modeling space



Model Federation for Requirements Engineering




FormosePrototype : Identified requirements - LandingGearProject - /Users/Fahad/Documents/workspace/Openflexo Projects/LandingGearProject.prj
LandingGearProject
LandingGearProject
identifiedRequirements
Landing Gear Project
LandingGearSystemRqt.docx
Landing gear system
Frédéric Boniol and Virginie Wiels
ONERA-Toulouse, 2 av. E. Belin, BP ...
{firstname.name}@onera.fr
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Abstract. This document presents th...
<newline>
1 Introduction
2. Architecture of the system
3 Behavior of the hydraulic equipme...
4 Software specification
5. Requirements / Properties
Identified requirements
Goal modelling diagram for Landing Gear Project
Identify text fragment
Identify requirement
Landing gear system
Frédéric Boniol and Virginie Wiels
ONERA-Toulouse, 2 av. E. Belin, BP 4025, 31055 Toulouse France
{firstname.name}@onera.fr
Abstract. This document presents the landing system of an aircraft. It describes the system and provides some of its requirements. We propose this case study as a benchmark for techniques and tools dedicated to the verification of behavioral properties of systems.
1 Introduction
This document presents a landing system. It describes the system and provides some of its requirements. We propose this case study as a benchmark for techniques and tools dedicated to the verification of behavioral properties of systems.
The landing system is in charge of maneuvering landing gears and associated doors. The landing system is composed of 3 landing sets: front, left and right. Each landing set contains a door, a landing-gear and associated hydraulic cylinders. A simplified schema of a landing set is presented in Figure 1
Identified requirements
Unclassified fragments
Foreground
Background
Text
Shadow
Location/Size
Layout Managers
Shape
Connector

FormosePrototype : Identified requirements - LandingGearProject - /Users/Fahad/Documents/workspace/Openflexo Projects/LandingGearProject.prj

LandingGearProject

- LandingGearProject
  - identifiedRequirements
  - Landing Gear Project

- LandingGearSystemRqt.docx
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  - <newline>
  - Abstract. This document presents th...
  - <newline>
  - § 1 Introduction
  - § 2. Architecture of the system
  - § 3 Behavior of the hydraulic equipme...
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  - § 5. Requirements / Properties

Identified requirements | Goal modelling diagram for Landing Gear Project

Identify text fragment | Identify requirement

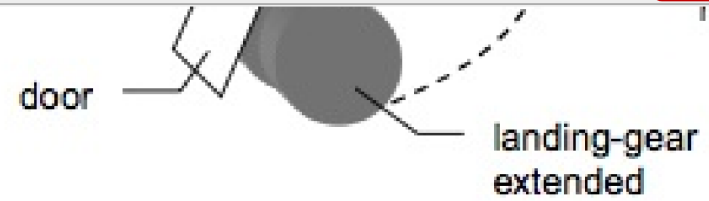

***Fig. 1**. Landing set*

The system is controlled digitally in nominal mode and analogically in emergency mode. In this case study, we do not consider the emergency mode. However, in order to allow the pilot to activate the emergency command, the system has to elaborate health parameters for all the equipments involved in the landing gear function. This health monitoring part is in the scope of the case study.

In nominal mode, the landing sequence is: open the doors of the landing gear boxes, extend the landing gears and close the doors. This sequence is illustrated in Figure 2. After taking off, the retraction sequence to be performed is: open the doors, retract the landing gears and close the doors. '

This system is representative of critical embedded systems. The action to be done at each time depends on the state of all the physical devices and on their temporal behavior. When considering such systems, the challenge is firstly to model and to program the software part controlling the landing and the retrac- tion sequence, and secondly to prove safety requirements taking into account the physical behavior of

- Identified requirements
  - Unclassified fragments
    - In nominal mode, the landing sequen...

- Foreground
- Background
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FormosePrototype : Identified requirements - LandingGearProject - /Users/Fahad/Documents/workspace/Openflexo Projects/LandingGearProject.prj

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Identified requirements | Goal modelling diagram for Landing Gear Project

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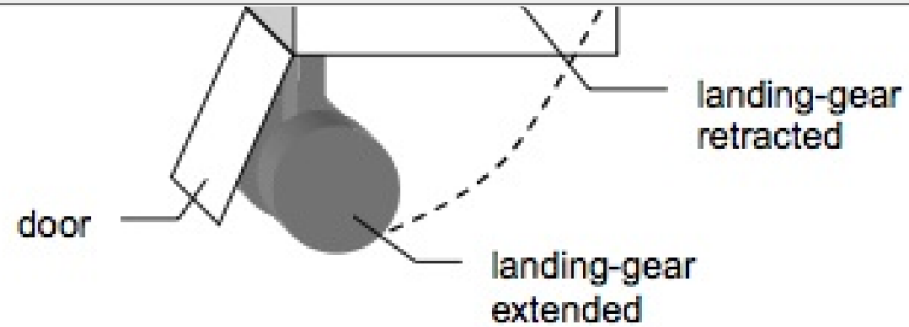

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- Identified requirements
  - normal model requirement
  - Unclassified fragments
    - In nominal mode, the landing sequen...
    - The digital part is composed of two...
    - These outputs are synthesized by ea...
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- Foreground
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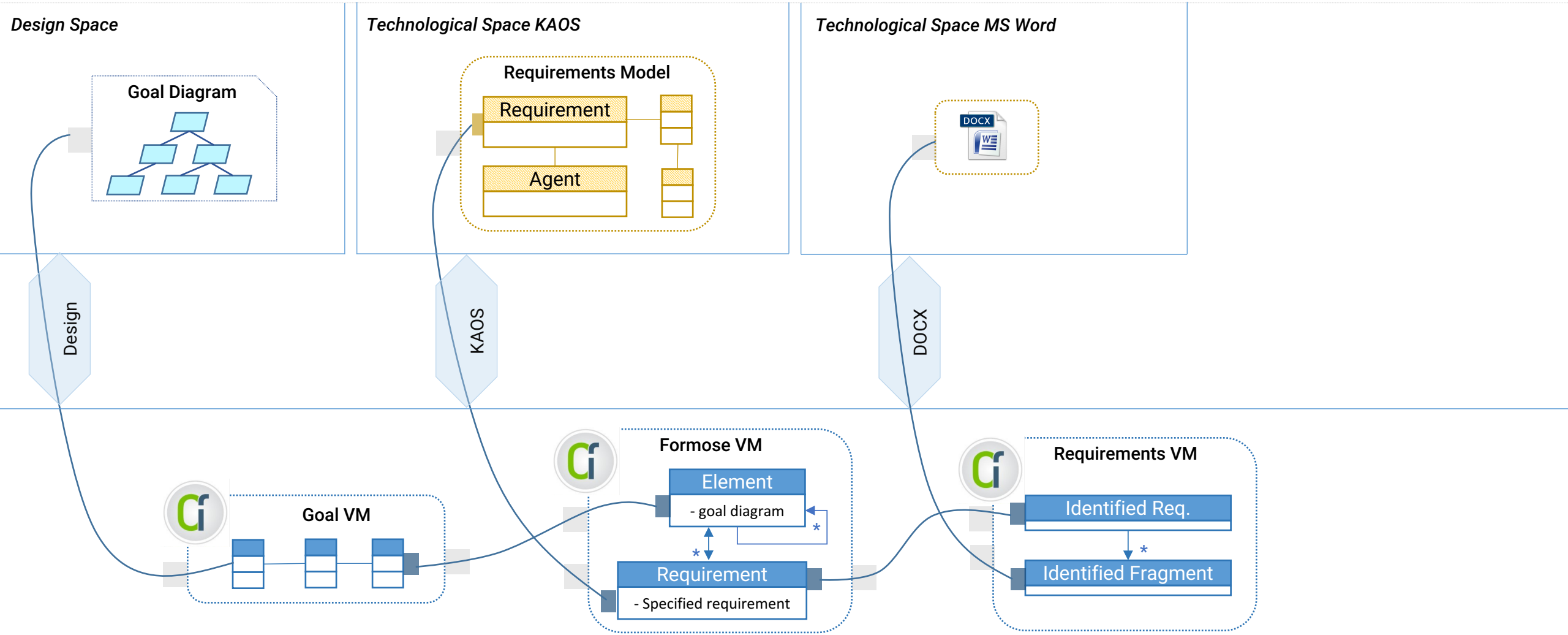
Model Federation for Requirements Engineering



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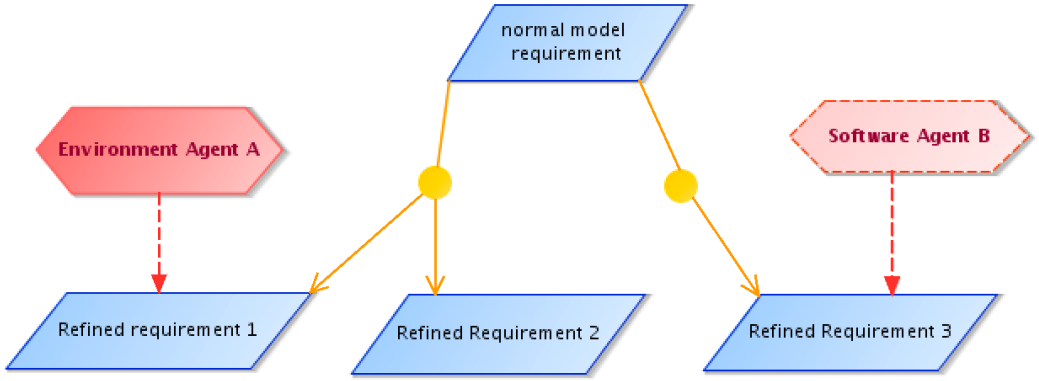
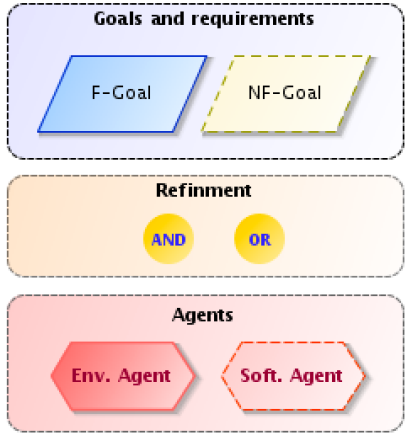


Controlled diagramming - CTRL-drag to draw edges

100%

GoalPalette | Common



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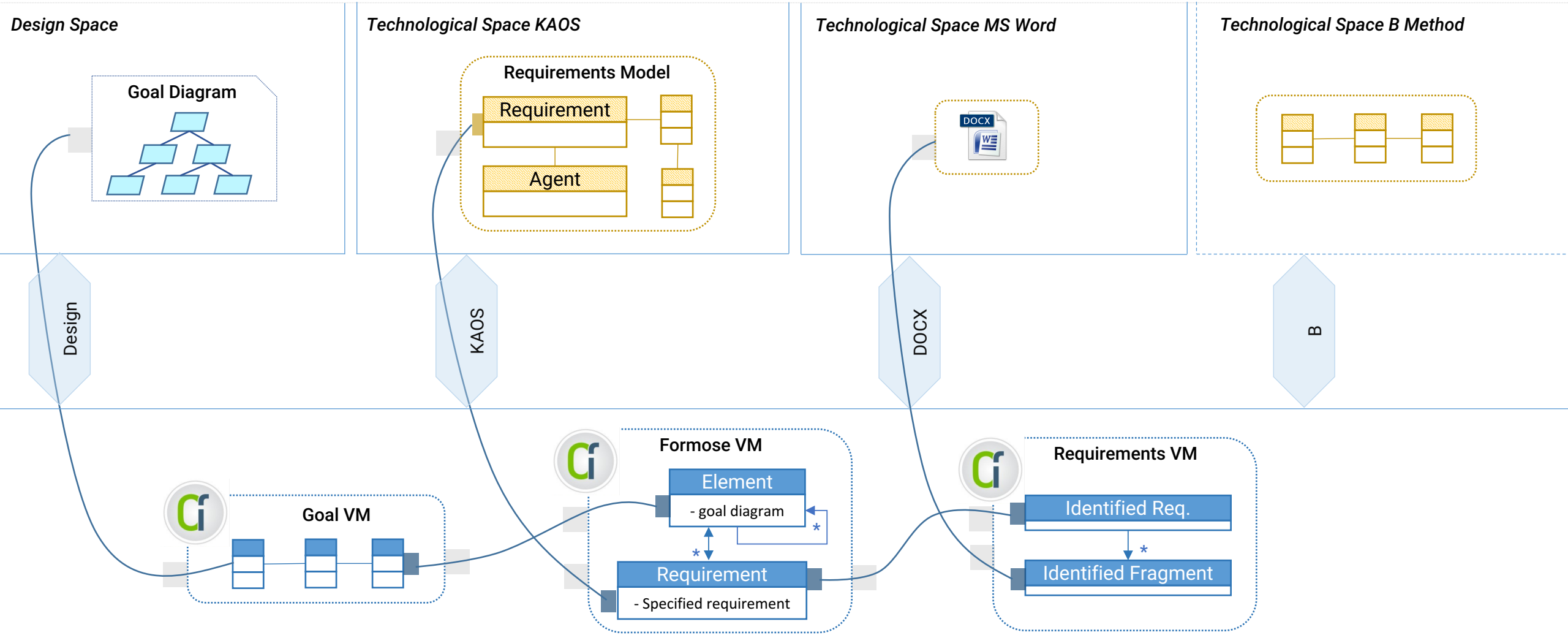
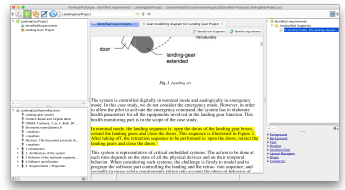
Model Federation for Requirements Engineering



Requirements Elicitation Process



1 Gather information resources

2 Federate information resources

3 Identify/ Elicit Requirements

4 Specify Requirements

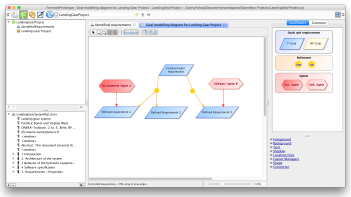
5 Map requirements to project elements

6 Decompose project elements

7 Define goals for project elements from requirements

8 Refine goals to requirements

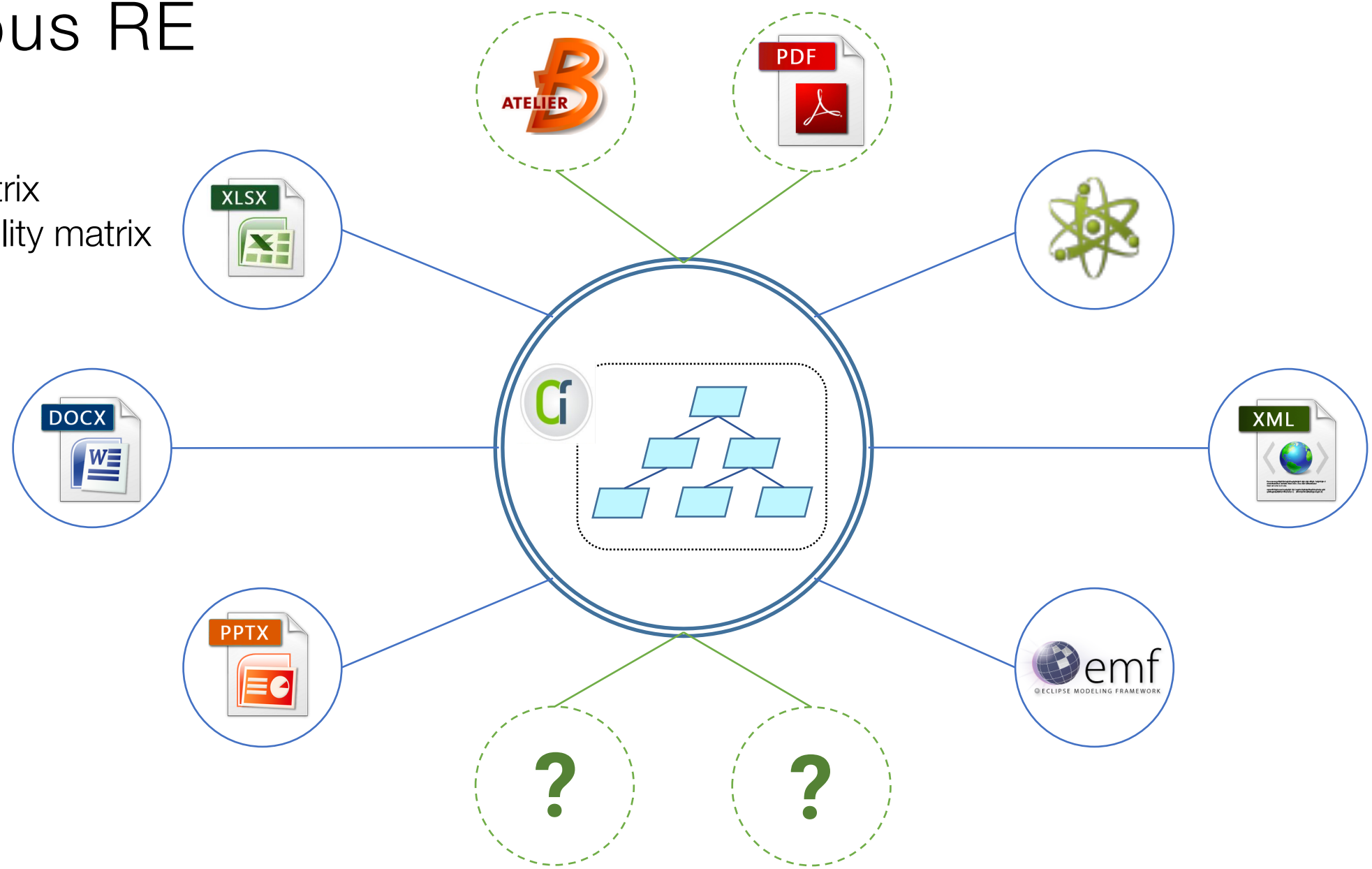
View under development



Continuous RE

- Test matrix
- Traceability matrix
- ...

- Reports
- Project docs
- ...



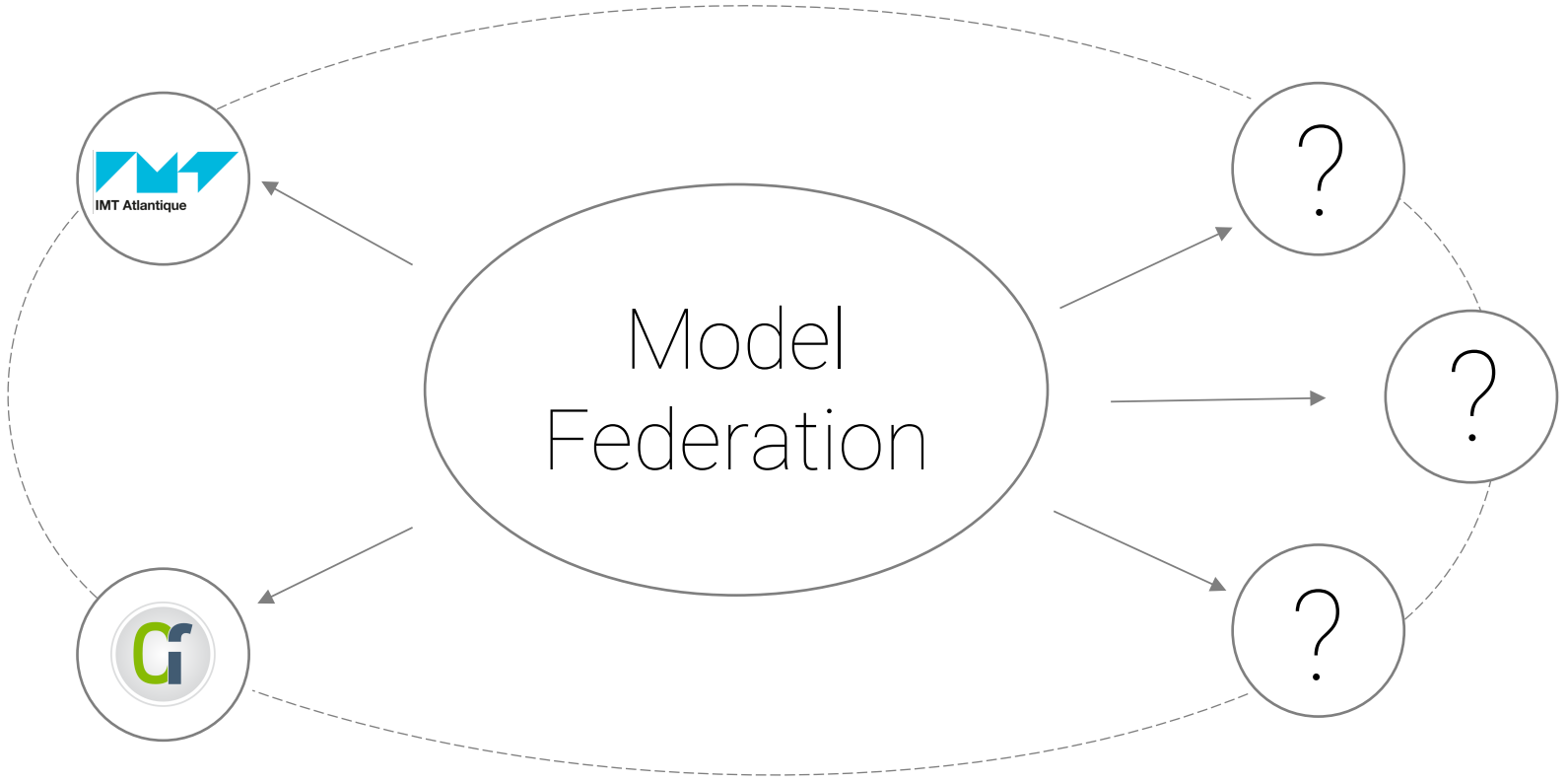
We are open for Collaborations ...

Free Modeling

Requirement Engineering

System Engineering

Process Modeling



Thank you

Contact: fahad.golra@imt-atlantique.fr