WSP72 Systems Architecture

Structured Methods III: Integration & Synthesis of Behaviours

Lecture 16

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Overview

Key Concepts

Separation of Concerns

Functionality and Behaviour

Interpretation of Abstraction

Structural Type

Graphical Models

Key Topics

- Semantic Transformation for Alternative Behaviours[1]
- Interface Identification and Definition[2]

1. *Refer to Chapter 7.5 for more details*
2. *Refer to Chapter 7.2 for more details*

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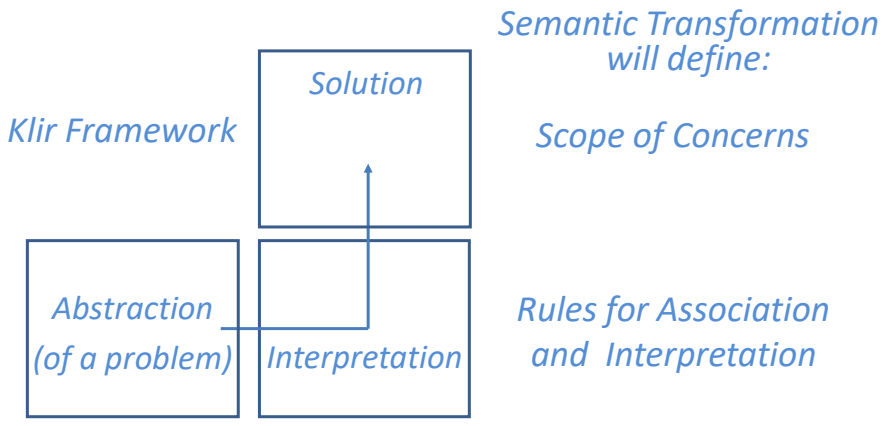
Abstraction and Interpretation
Applying the Klir approach to problem solving



Abstraction can be in terms of a language or model; in UML, language elements are models.

Semantic Associations **preserve meaning and relations**

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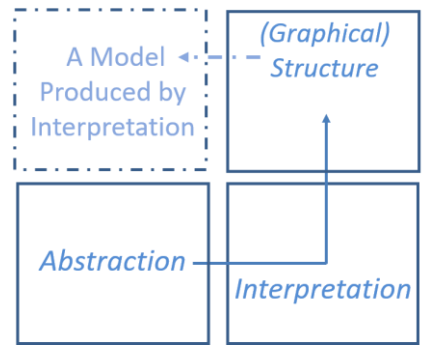
Semantic Transformation:
*Proposed Definition**

- Transformation of data to add semantic knowledge
- IEEE concept of *viewpoint*
  - Structuring rules
  - Focus on particular concerns
- Klir Methodology

  Use interpretation to increase information content



Semantic transformation is a technique for interpretation of a model of (or related to) a system into a semantically richer model by using a specified set of modeling and structuring rules.

* Ref [IEEE SoSE, Norway 2016]

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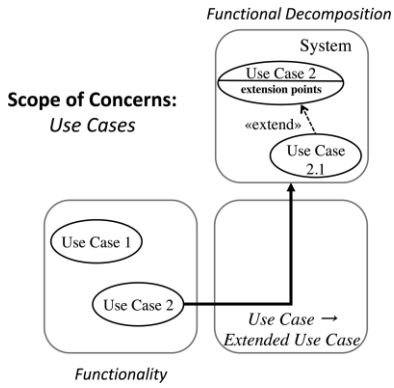
Extended Use Cases



Transformation Rules:
Extension & Extension Point based on alternative behaviour

ATCS Tutorial:
Aircraft identified non-complaint

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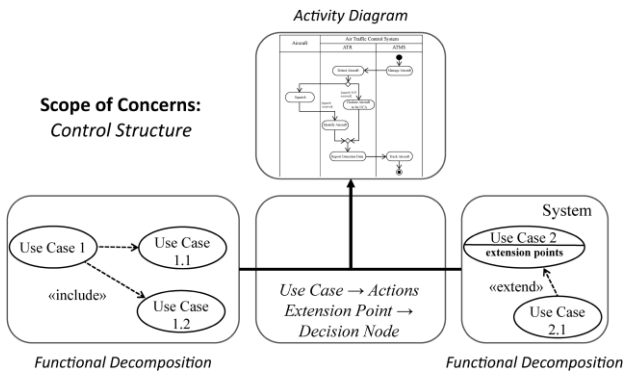
Synthesised Activity Diagram



Transformation Rules:
Decision Nodes based on Extension Points, ***alternative flow*** *merge* ***with basic flow***

ATCS Tutorial:
Decision after 'identify aircraft':
[compliance=True] *or* [compliance= False]?

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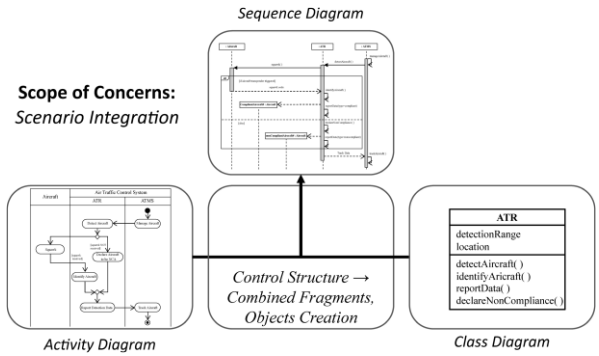
Synthesised Sequence Diagram



Transformation Rules:
Synthesis of Sequencing with Activity Flows and Message Exchange

ATCS Tutorial:
Usage of 'alt' fragments for alternative behaviours

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- *Interface Identification and Definition*[2]

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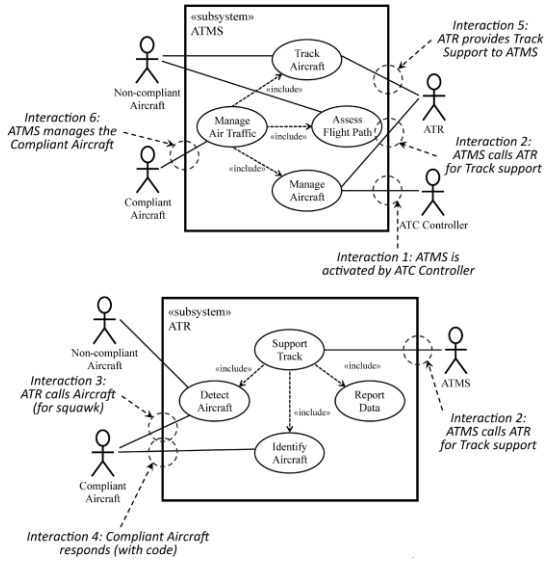
1. *Refer to Chapter 7.1 for more details*
2. *Refer to Chapter 7.2 for more details*

Initial Interface Identification



- Every association may result in the need of an interface
- This may not be the case if the interaction later is found to be only **indirect**
- Multiple interactions with the same stakeholder may be combined into one interface

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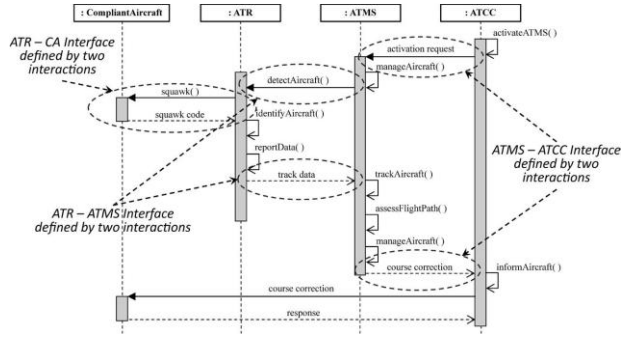
Detailed Interface Definition



- Are message exchanges consistent with the Use Case interactions?
- What to be exchanged through the interface?
- Confirms the definition of interfaces, which is to be specified using ports and flows, e.g., in SysML BDD/IBD (See Tutorial III)

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Questions?

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