Automatic code generation

It is more than the Code

Kerstin Persson

Saab Aeronautics

Background

Airborne software characteristics

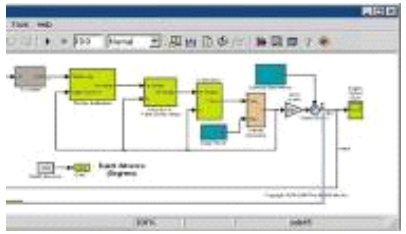
- Safety levels (A: safety critical -> E: non-critical)
- Requirement based verification
- Declare compliance against
  - Requirements
  - Development process including for example code standard

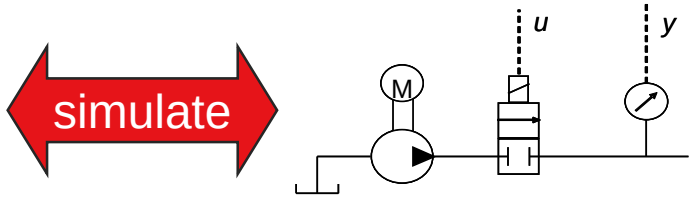
Extensive testing and simulation.

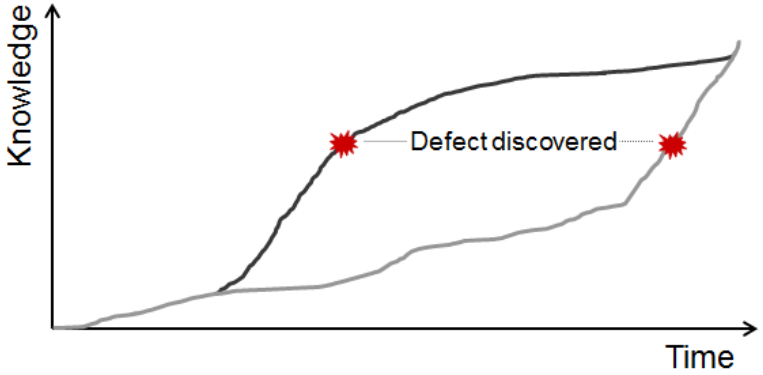
Extremely expensive to find errors late!

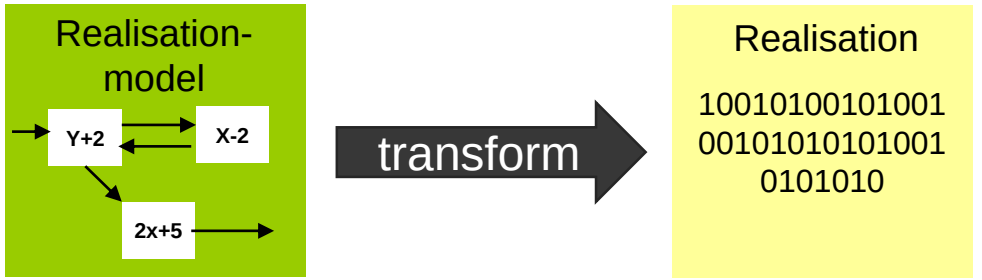
Why using models?

- Early validation – ability to simulate design concepts to increase knowledge
- Improved communication – ability to discuss design alternatives in an objective way
- Improved accuracy – ability to determine and tune performance early in development
- Improved quality – right the (almost) first time
- Improved efficiency – quicker turn-around



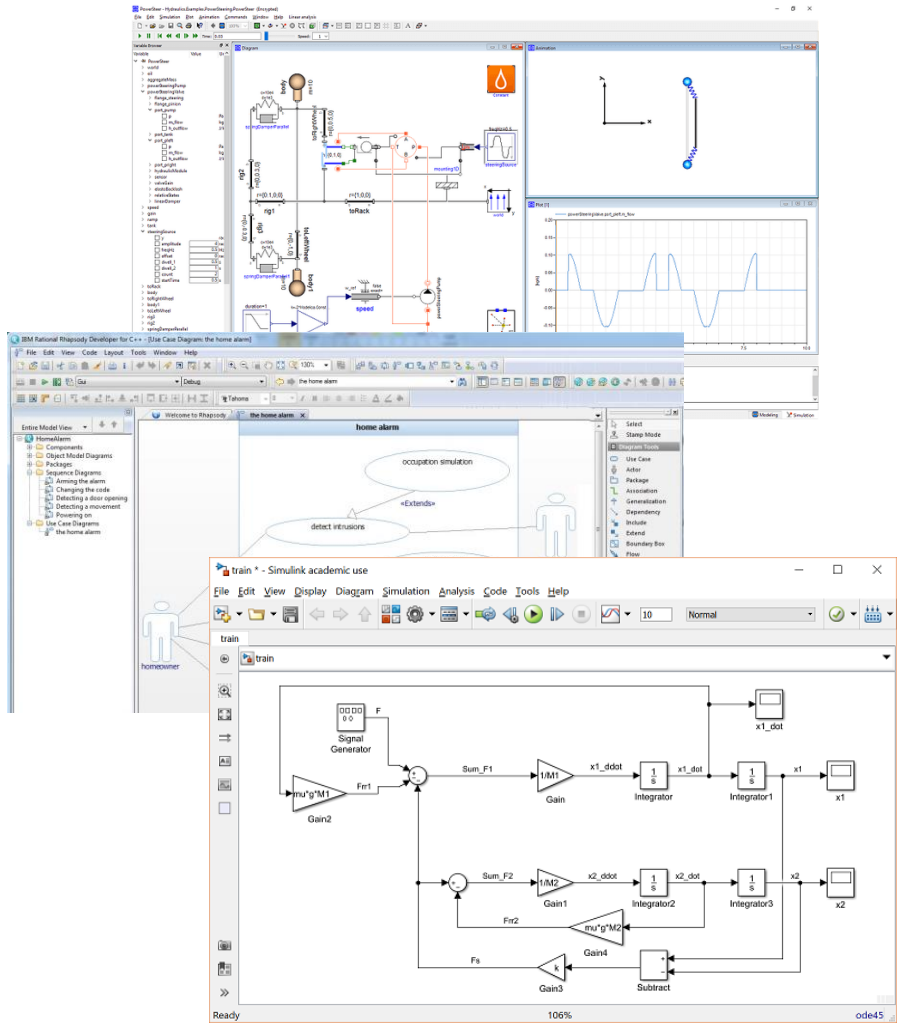






Different kind of models

- Physical models
  - Analysis of system characteristics
- System specification models
  - For example use cases and sequence diagrams
- Design models, for example Simulink
  - Detailed software design
  - Executable models for fast feedback
  - May support automatic code generation



What about code?

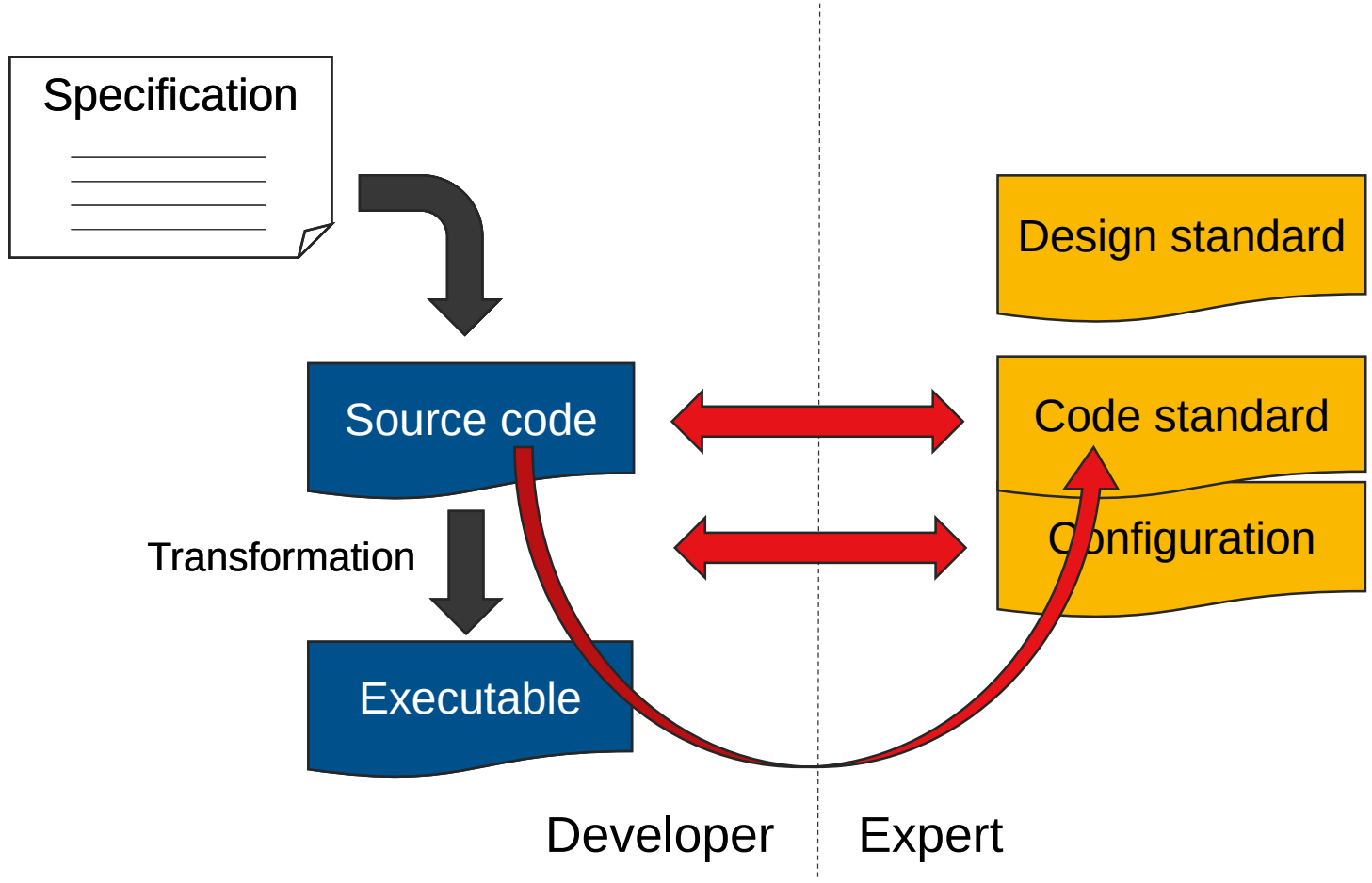
Source code shall

- Function as intended (on target)

and be

- Testable
- Safe and robust
- Maintainable
- Traceable to specification

Training is always needed



Introducing executable design models and automatic code generation

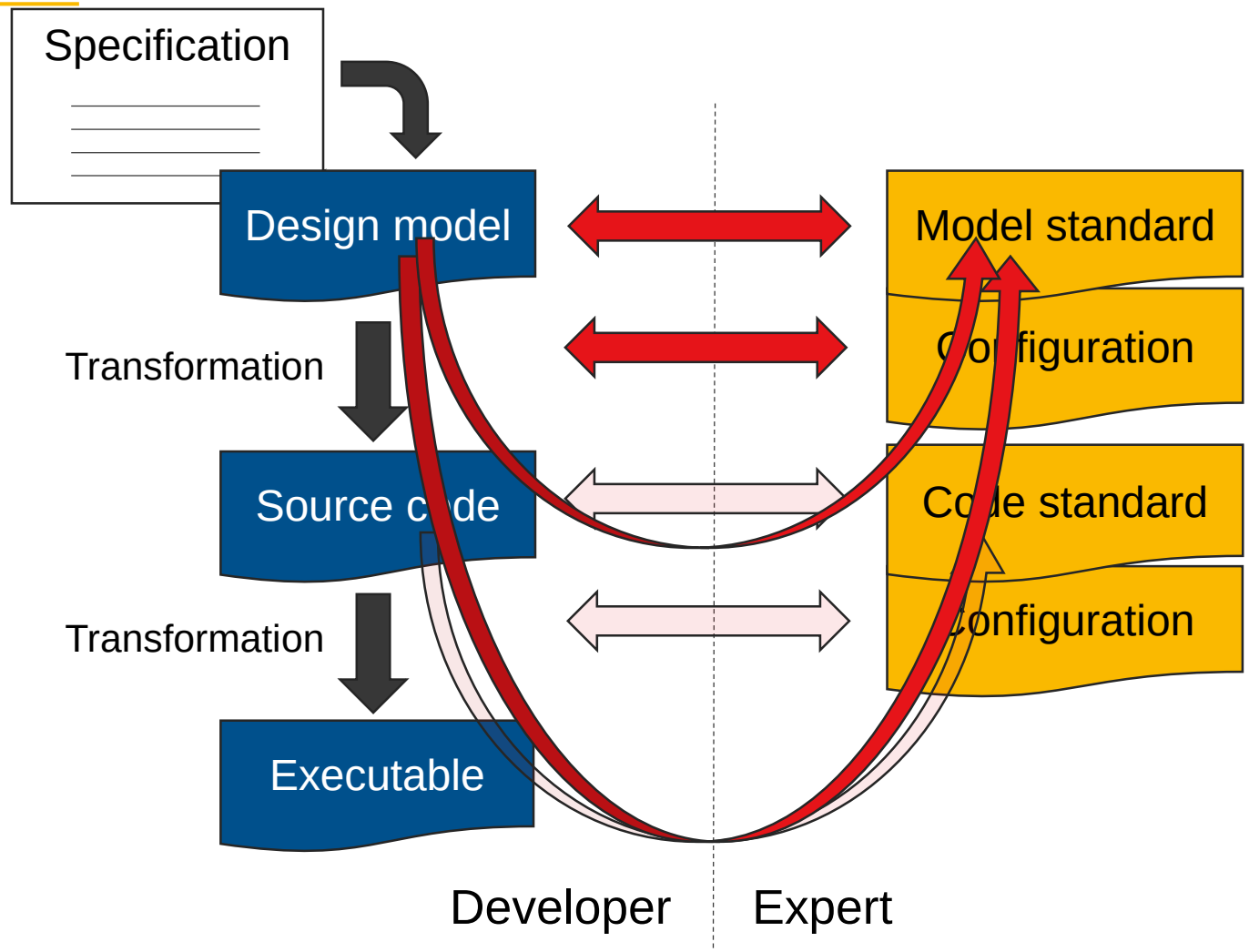
Executable design model shall be

- Functioning as intended
- Testable
- Maintainable
- Traceable to specification

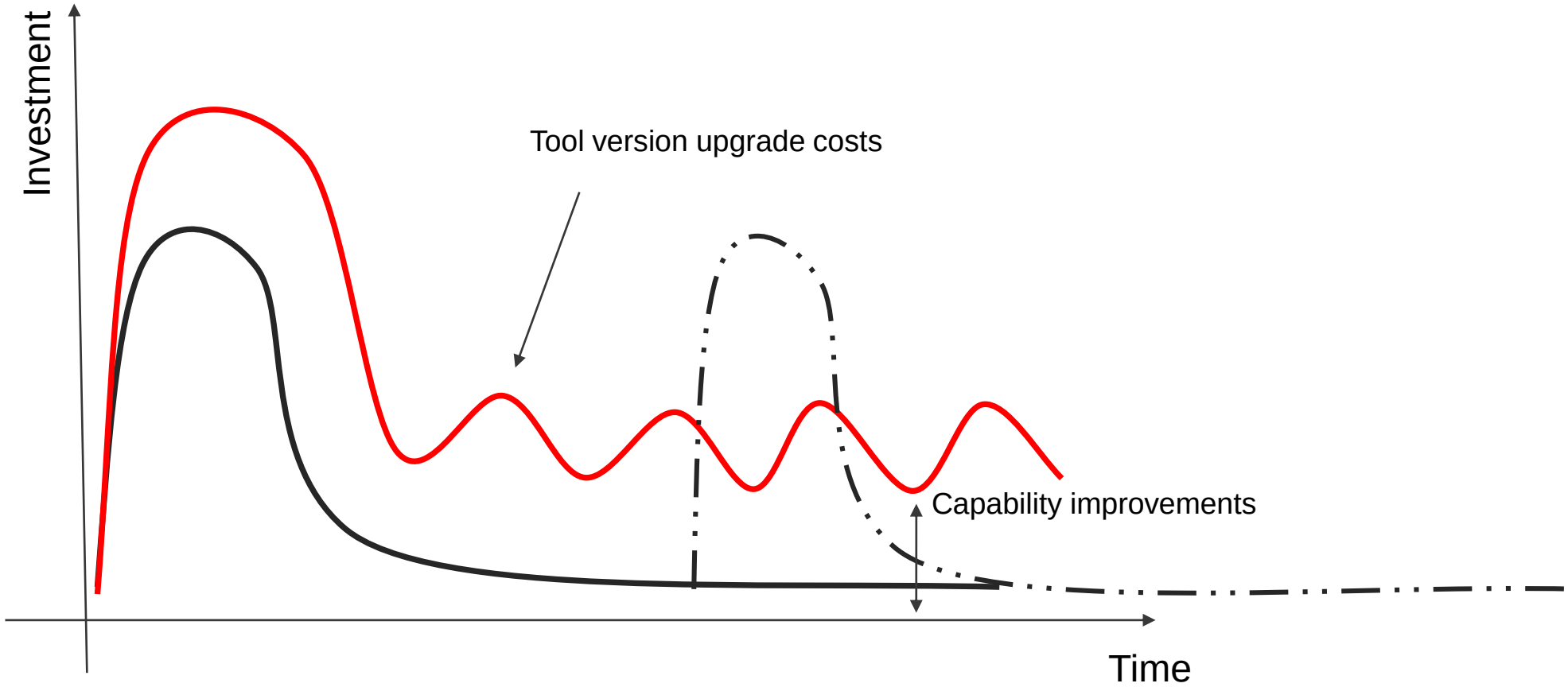
Transformation rules shall ensure that source code still is

- Functioning as intended
- Safe and robust
- Traceable to specification

Different kind of training is needed.



Supporting auto code generation



Summary

- Executable design models enable
  - Fast feedback loop during development
  - Common language and distinct design information
- Automatic code generation facilitates
  - Consistent information between design and realisation
  - Even quality over time
  - Fewer errors
- The benefits mentioned above require
  - Investment in tools and methods
  - Tool supplier competence (to get reasonable cost)
  - Training such that the organization adopts the method

Thank you!