

# Share, integrate and resolve conflicts among your heterogeneous models

Speaker: Théo Giraudet (PhD Student)

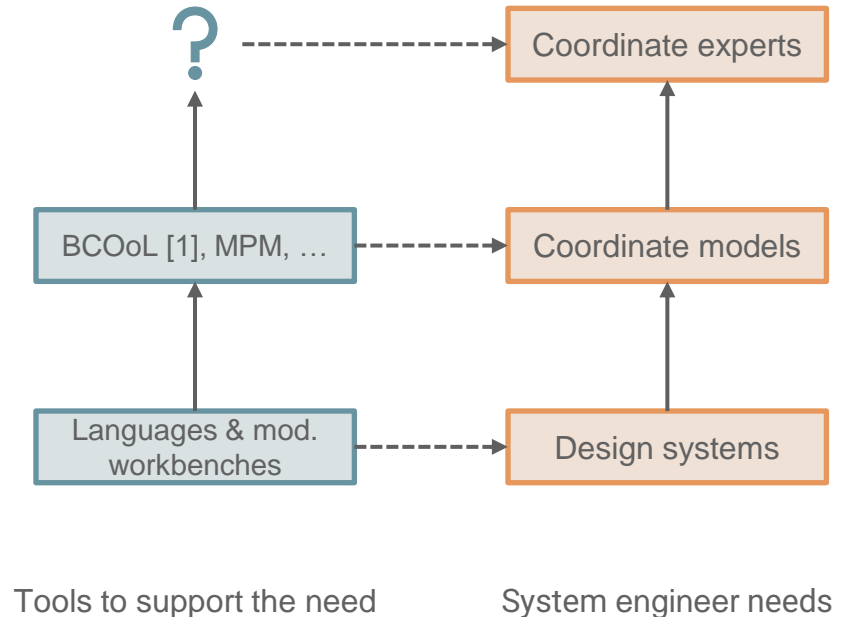
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# Introduction

- > MDE increases the abstraction level to facilitate the design of the systems thanks to DSLs
- > Domain experts can use these DSLs to model their own concerns
- > In heterogeneous modeling domains, new needs are emerging: coordination between models and between experts



# Introduction

> Need to **coordinate experts** (social collaboration)

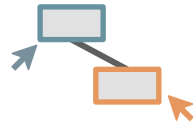
## Intra model



Model elements  
locking



Viewpoint



Transparent  
interactions

## Between models



Versioning



Integration



Contradictory  
injunctions

# Motivation

CAMEO  
SYSTEMS MODELER™

sysML

UNIFIED  
MODELING  
LANGUAGE™  
UML

BPMN

Capella



## System architects

Design the global system

Modelica

SIMULINK



NumPy



## Simulation engineers

Design the different simulation models and their validity range

## Integrators

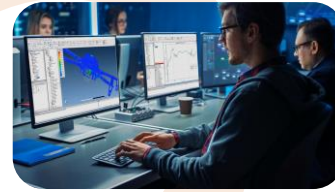
Integrate the simulation models together

# Motivation

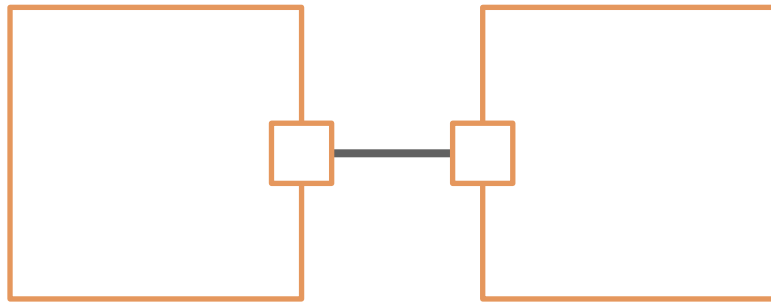
poorly tooled collaboration: source of conflict



System architects



Simulation engineers



Propeller

Tube

Geometry  
sim. model



Thermo  
sim. model

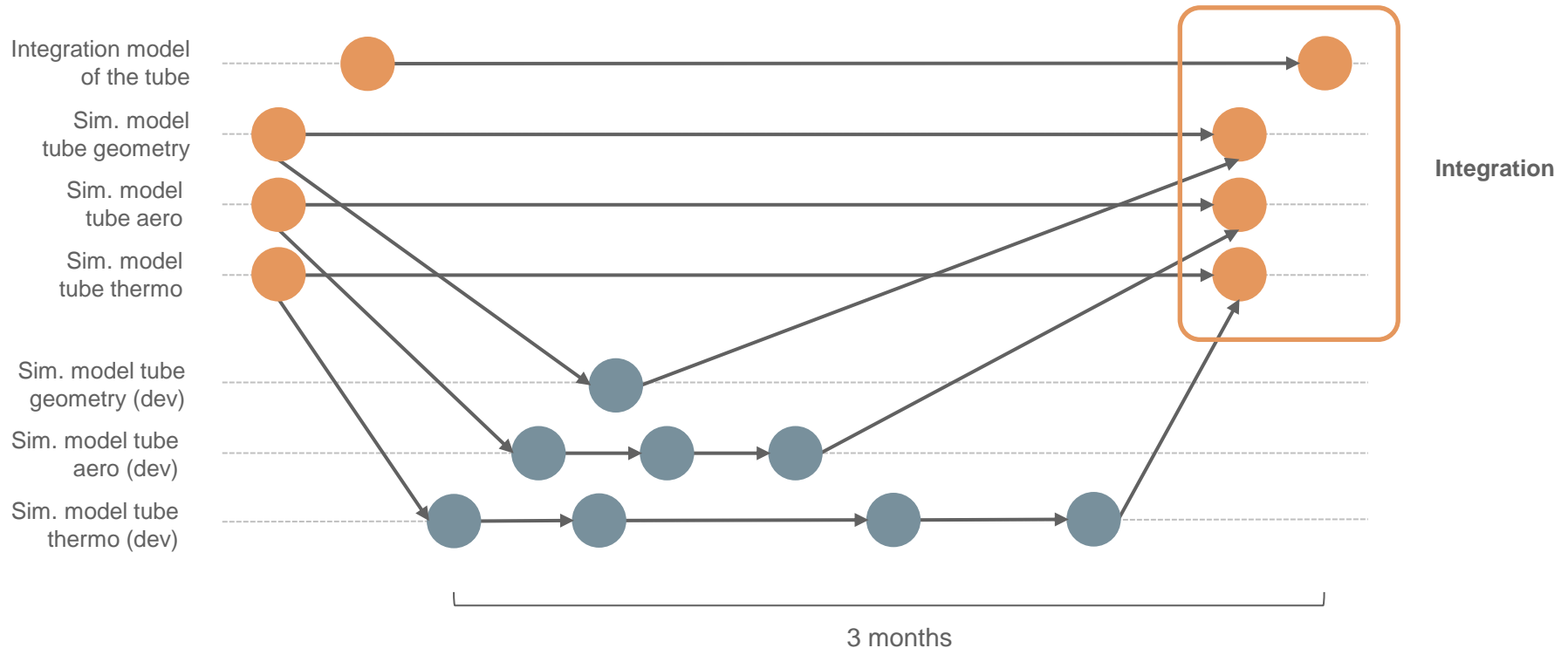


Aero  
sim. model

Integrators

# Motivation

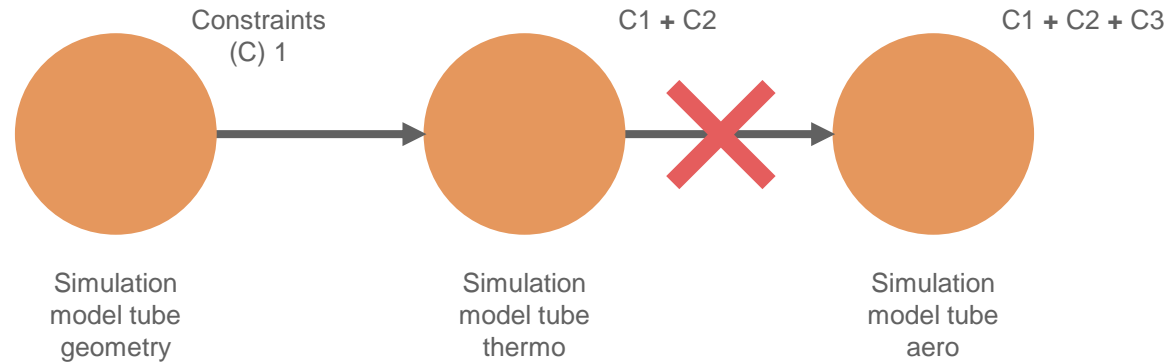
- Integration only at the end of long iterations → being confronted with contradictory injunctions at the last minute, especially if the constraints changed during the iteration



# Motivation

> Sequential integration

> First model that contradicts previous constraints must be adapted to resolve them, even if the optimal solution is maybe to modify a previous integrated model



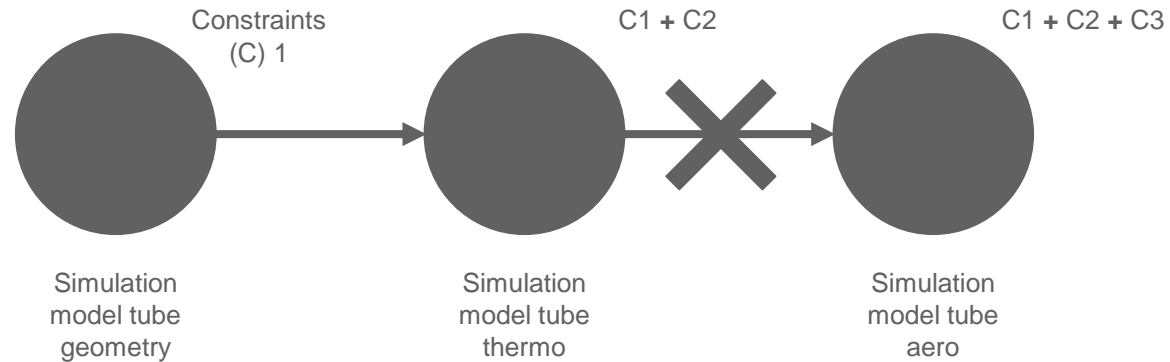
Integration process

# Motivation

➤ Sequential integration

➤ First model that contradicts previous constraints must be adapted to resolve them, even if the optimal solution is maybe to modify a previous integrated model

## CI PIPELINE

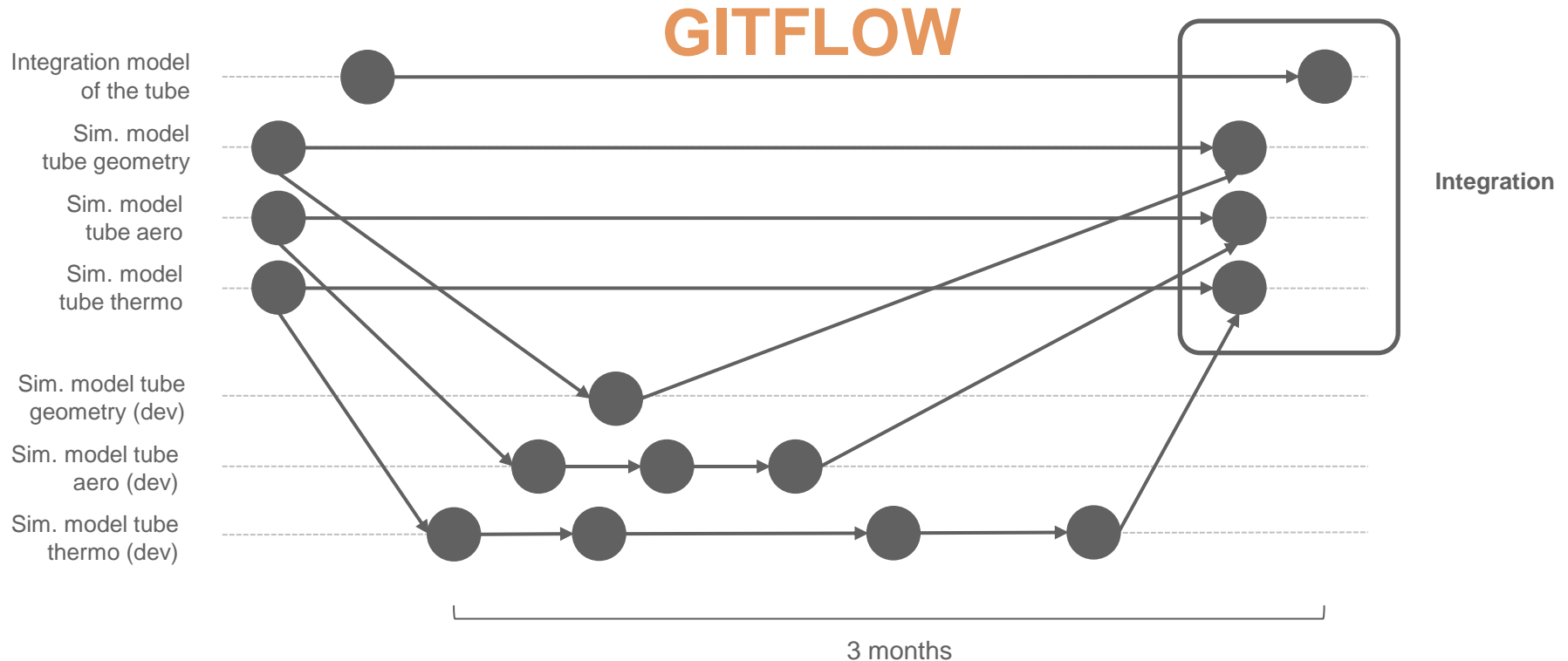


Integration process



# Motivation

- Integration only at the end of long iterations → being confronted with contradictory injunctions at the last minute, especially if the constraints changed during the iteration



# Motivation

poorly tooled collaboration : source of conflict

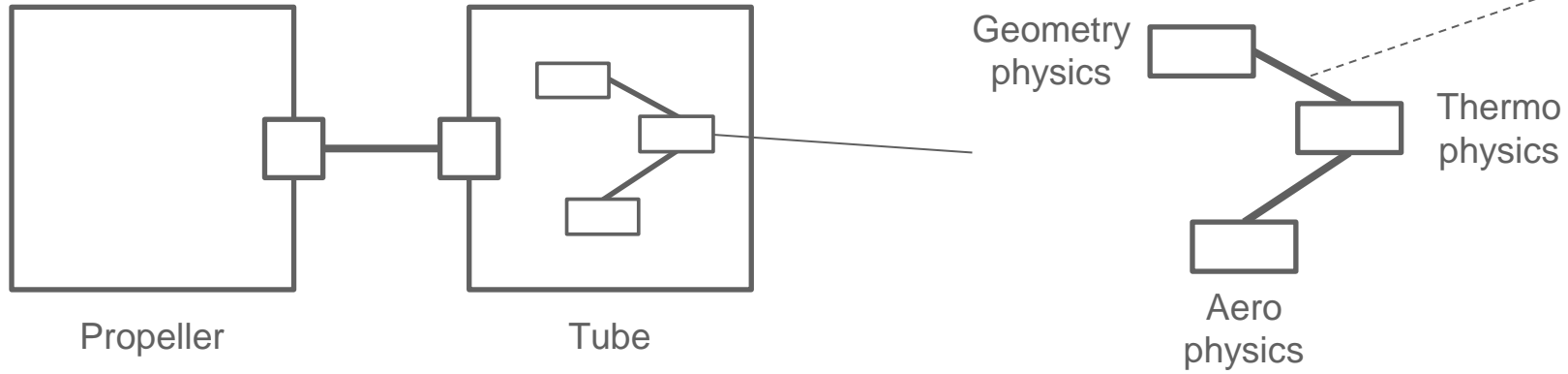


System architects



Simulation engineers

Integrators



## DEVOPS, AGILE METHODS

# Research questions

➤ How to model the collaboration between experts?

➤ How to report this collaboration through a tool support?

# How to model the way the experts work together?

➤ Currently, we identified three workflows:



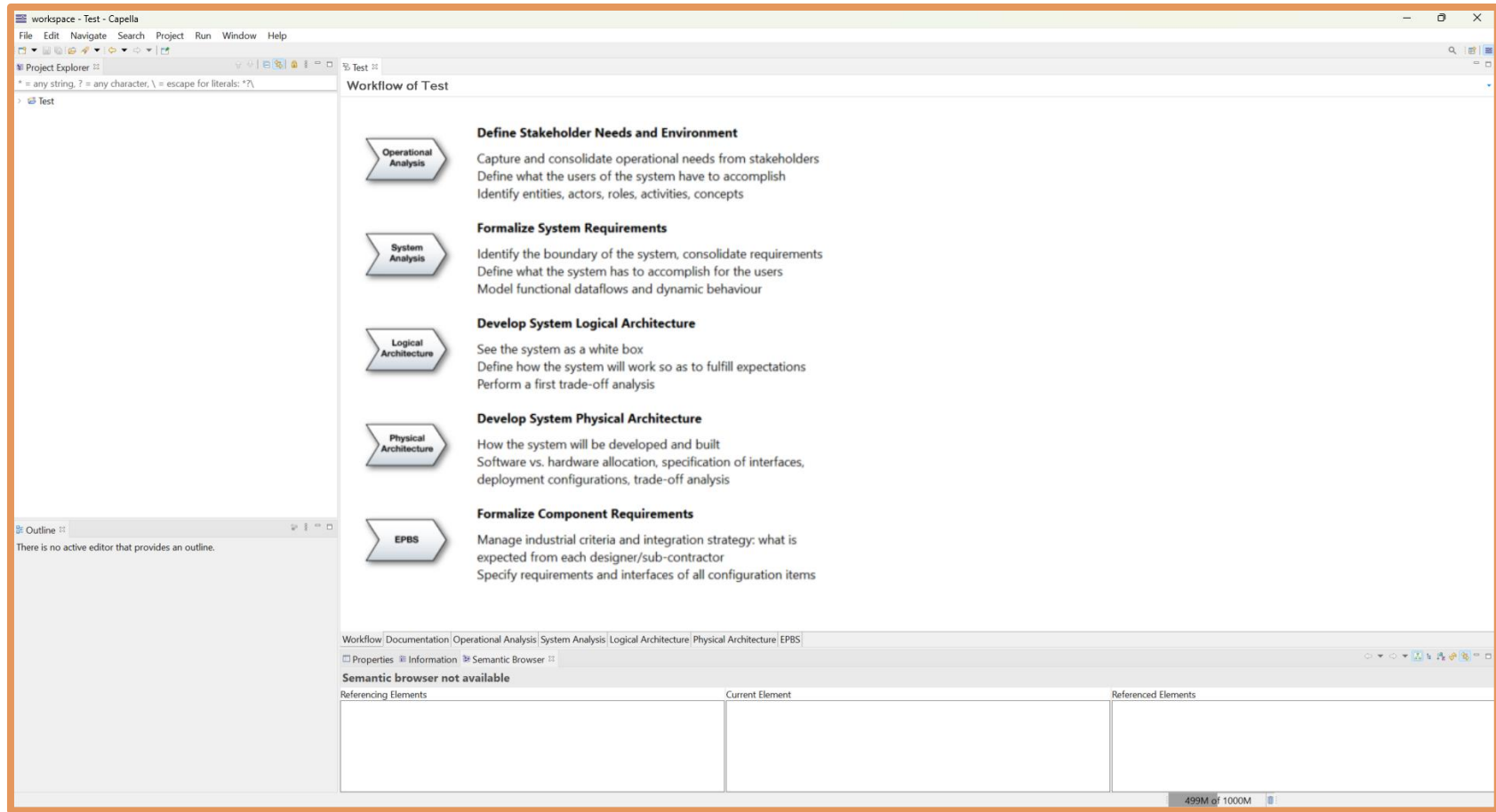
Design workflow



Contribution workflow  
(*gitflow*)



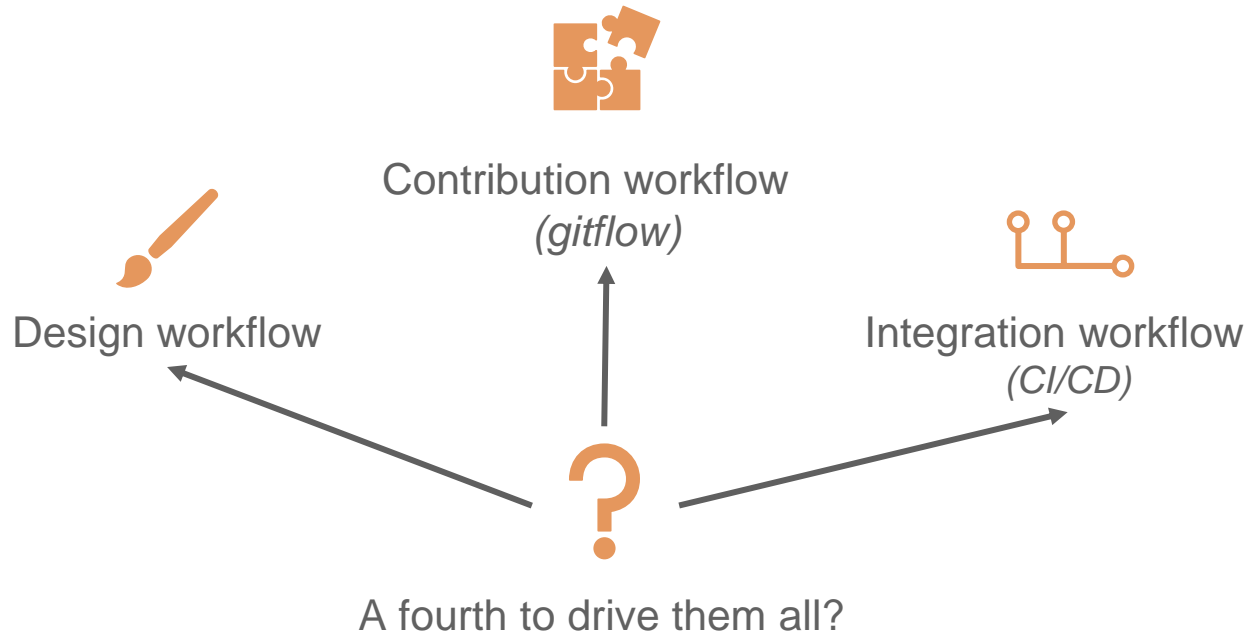
Integration workflow  
(*CI/CD*)



Screenshot of the design workflow in the modeling workbench Capella

# How to model the way the experts work together?

➤ Currently, we identified three workflows:



# How to model the way the experts work together?

- For the contribution and integration workflows, we have two main goals:
  - Evaluate automatically the impact of local changes on the whole system and propagate the information to the stakeholders
  - In case of contradictory injunctions when integrating local changes, report them and trigger discussions between the experts involved

# How to report this collaboration through a tool support?

- The goal is to adapt all the tooling to the different workflows
  - Tooling: Notification system, maybe (part of) the modeling workbench itself?
- Currently, we started to work on the adaptation of interactive tools for modeling workbenches through a DSL
- Ultimately, we want to design this DSL for the forge itself, we think we have common concepts between these two orthogonal approaches
- The two approaches may be linked by the fourth workflow, for instance, to trigger a notification directly inside the modeling environment



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## Research questions

**How to model the way the experts work together?**

- Evaluate automatically the impact of local changes on the whole system
- Report these and trigger discussion between the experts involved

**How to report this collaboration through a tool support?**

- Adapt all the tooling to the different workflows
- The modeling workbench could be considered as a part of the tooling