Share, integrate and resolve conflicts among your heterogeneous models

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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



Tools to support the need System engineer needs

[1] M. E. Vara Larsen, J. DeAntoni, B. Combemale, et F. Mallet, « A Behavioral Coordination Operator Language (BCOoL) », in 2015 ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS), Ottawa, ON, Canada: IEEE, sept. 2015, p.186-195. doi: <u>10.1109/MODELS.2015.7338249</u>.





Need to coordinate experts (social collaboration)



Between models





Integration



Contradictory injunctions



System architects

Design the global system

Simulation engineers

Design the different simulation models and their validity range

Integrators

Integrate the simulation models together

poorly tooled collaboration: source of conflict





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





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

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



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poorly tooled collaboration : source of conflict



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:





Contribution workflow (gitflow)



Integration workflow (CI/CD)

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> # Text > # Text	Operational Analysis System Analysis	Define Stakeholder Needs and Environme Capture and consolidate operational needs fi Define what the users of the system have to Identify entities, actors, roles, activities, conce Formalize System Requirements Identify the boundary of the system, consolit Define what the system has to accomplish fo Model functional dataflows and dynamic ber Develop System Logical Architecture	nt rom stakeholders accomplish epts date requirements or the users haviour				
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Screenshot of the design workflow in the modeling workbench Capella

How to model the way the experts work together?



Currently, we identified three workflows:





A fourth to drive them all?

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