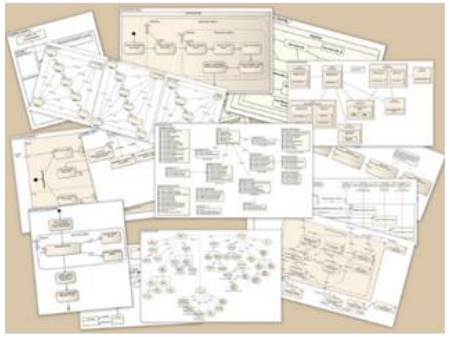

# BabyMOD, a Collaborative Model Editor for Mastering Model Complexity in MBSE

*MBSE 2020 – virtual event*

*September, 2020*

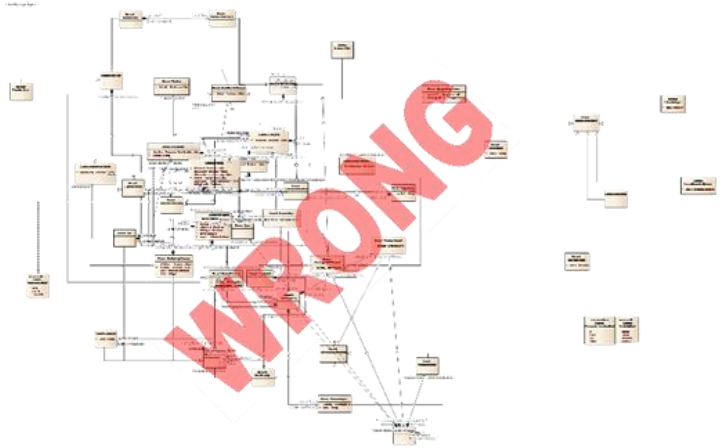
FRENCH INSTITUTES OF TECHNOLOGY

# Context

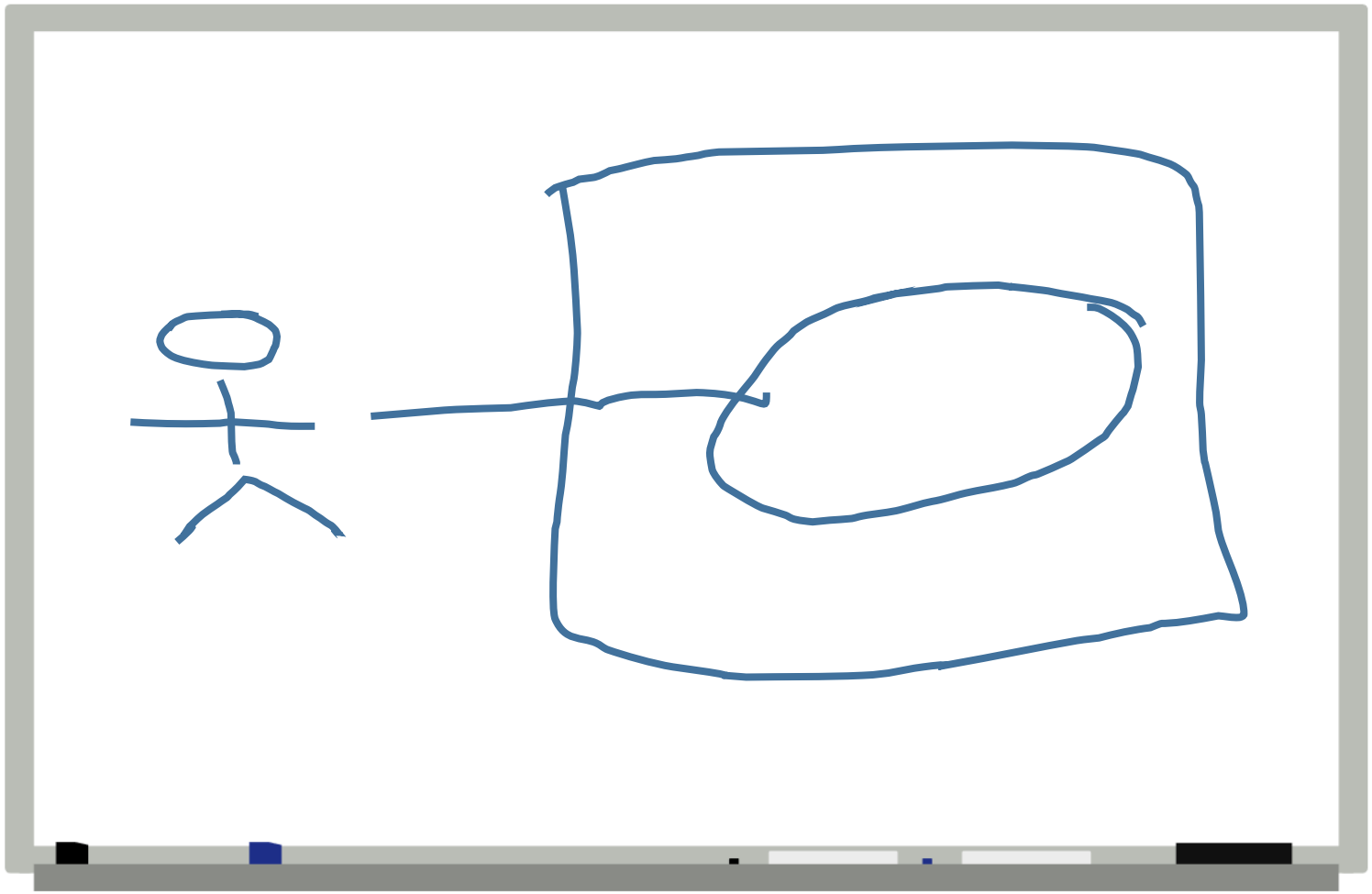


- Weak penetration of modeling techniques in numerous engineering domains
  - Too weak value / effort ratio
  - Creativity limited by formalization

- Main cause: modeling tools that don't match the culture of system engineers
  - Obsolete interfaces
  - Uncomfortable representations
  - Non intuitive constraints
  - Painful modifications
  - Difficult collaboration



# Current Tools: Whiteboards and Pens

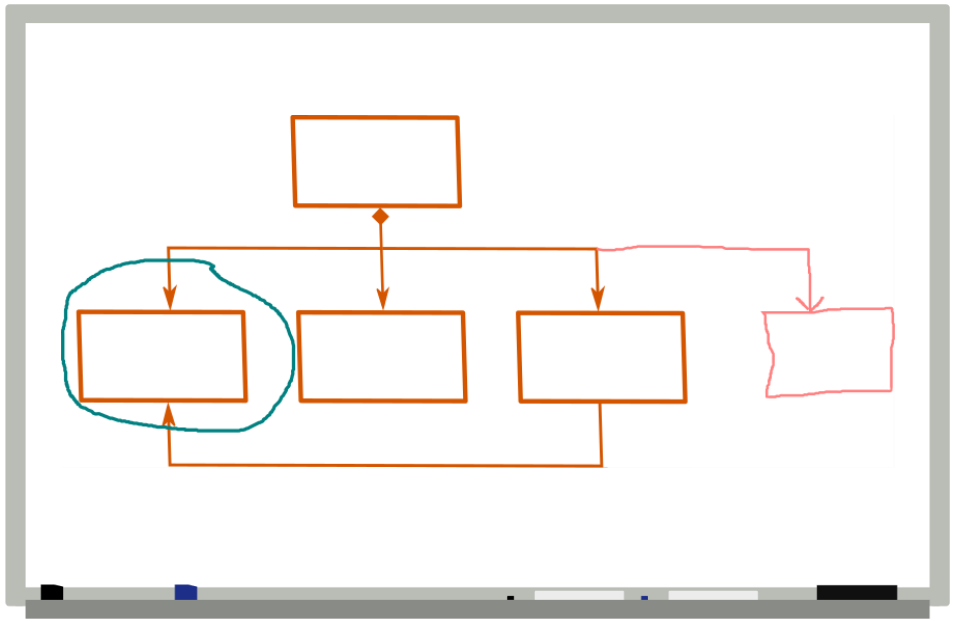


Faster design

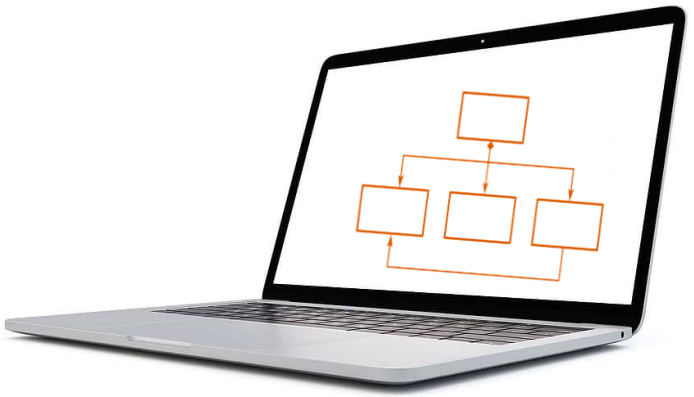
Improve collaboration

How to digitalize?

# Bridging the Gap: Interactive Whiteboards

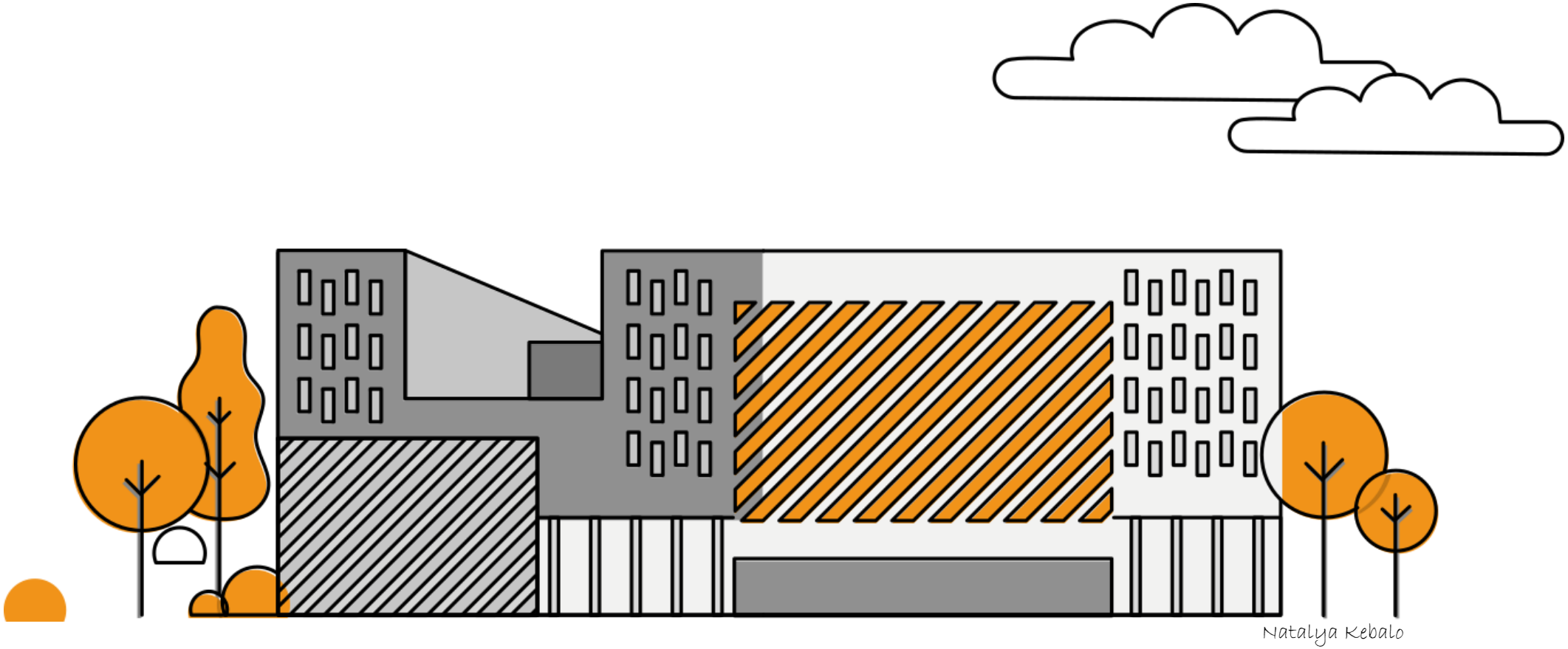


Import capabilities with simplified visualization and auto-layout



Exporting back to existing tools with incremental formalization of sketched elements

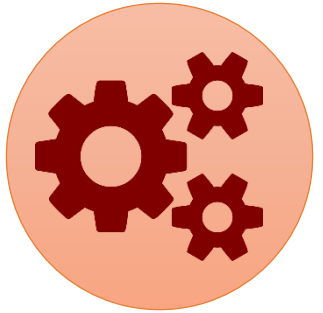
# IRT Saint Exupery in Toulouse



# EasyMOD Proposal and Objectives

Easy MOD

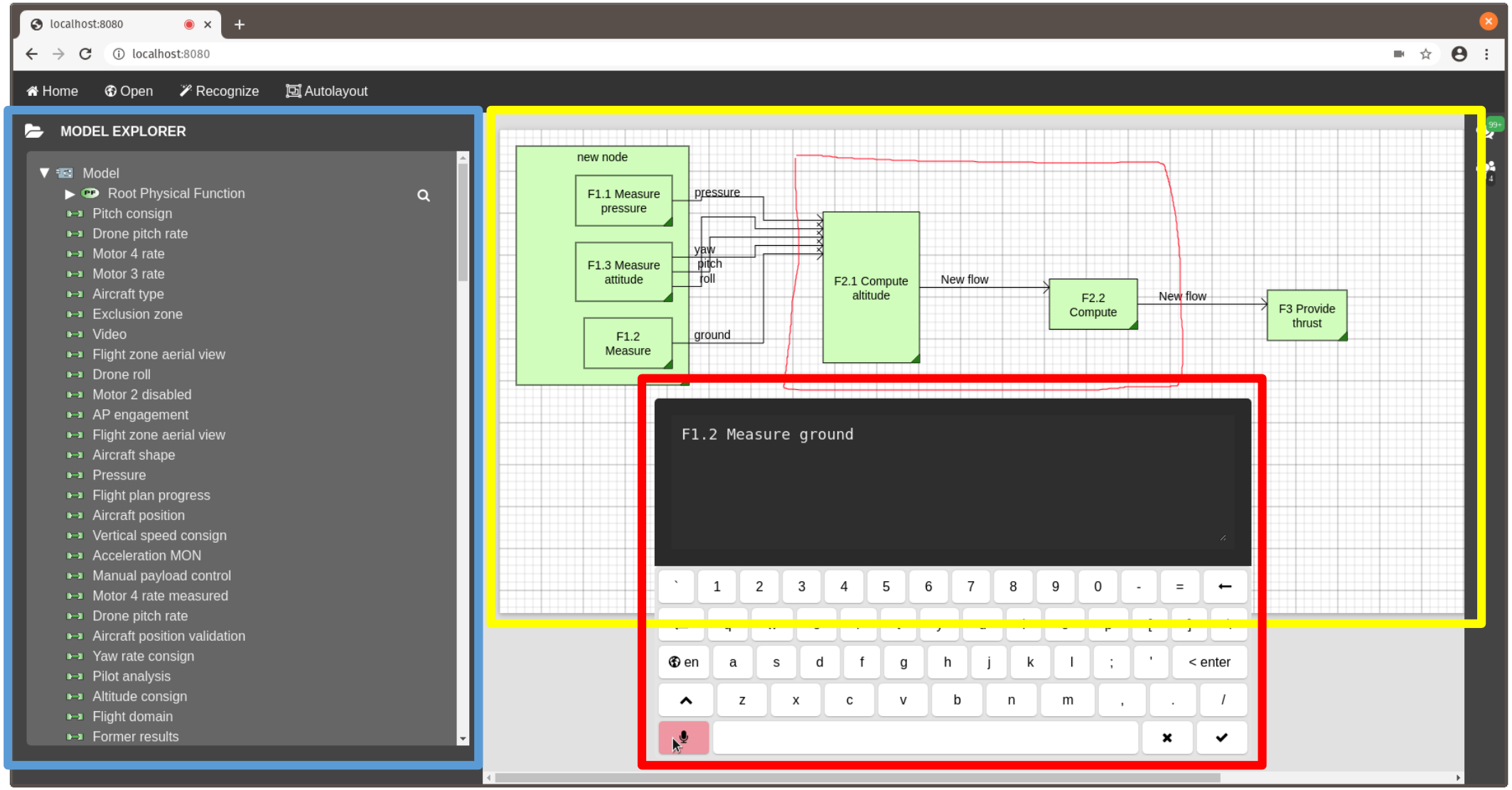
Improve human computer interaction



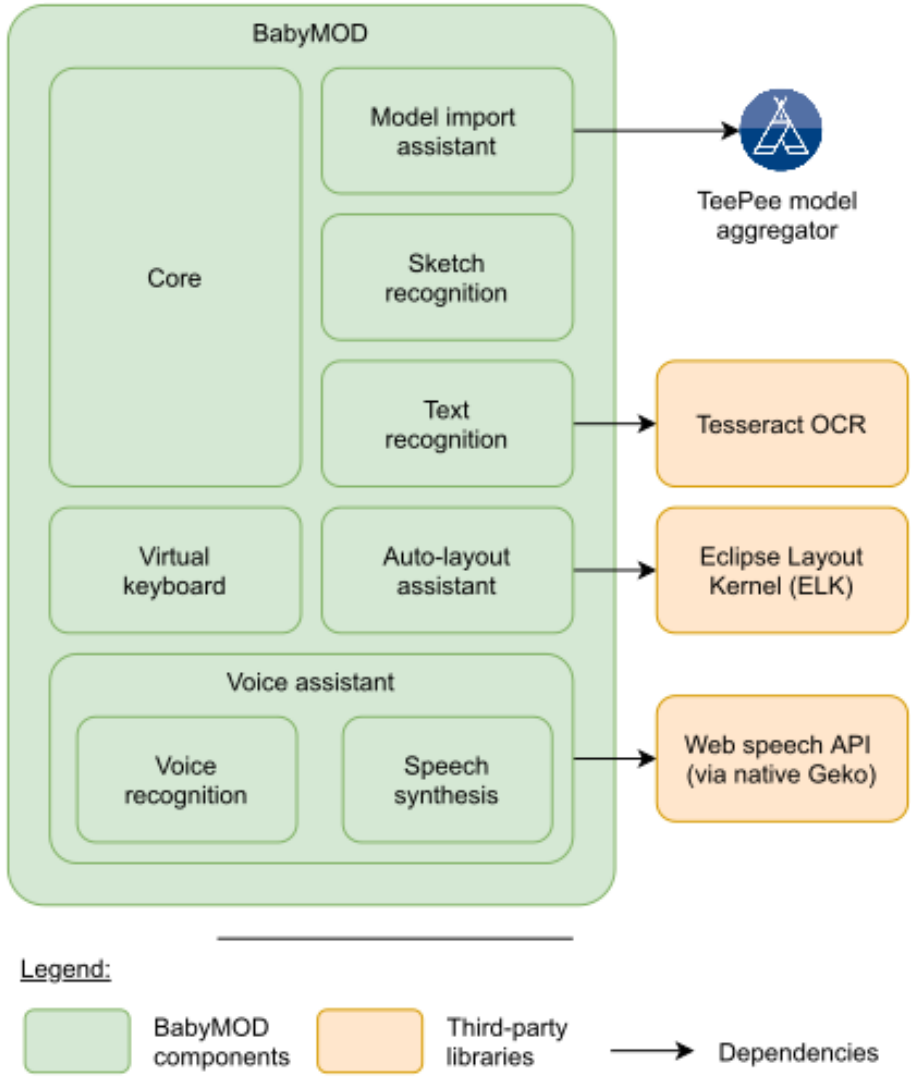
Assist the engineers

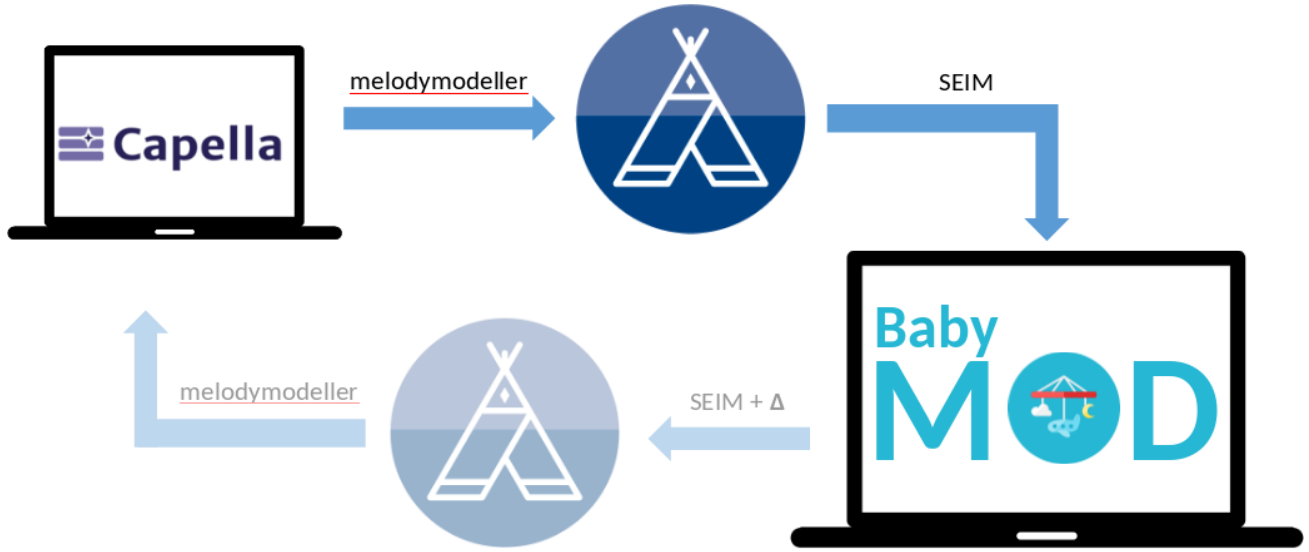
Benefit from the state of the art

# Previous Work: BabyMOD, a Feasability Study



# BabyMOD Architecture Overview




Export and Import capabilities

Support various viewpoints:

- Functional Dataflow
- Basic Mass Viewpoint
- …

# Demo

BabyMOD
IRT Springboard
Sep. 2019 - Mar. 2020

# Smart Sketch Recognition

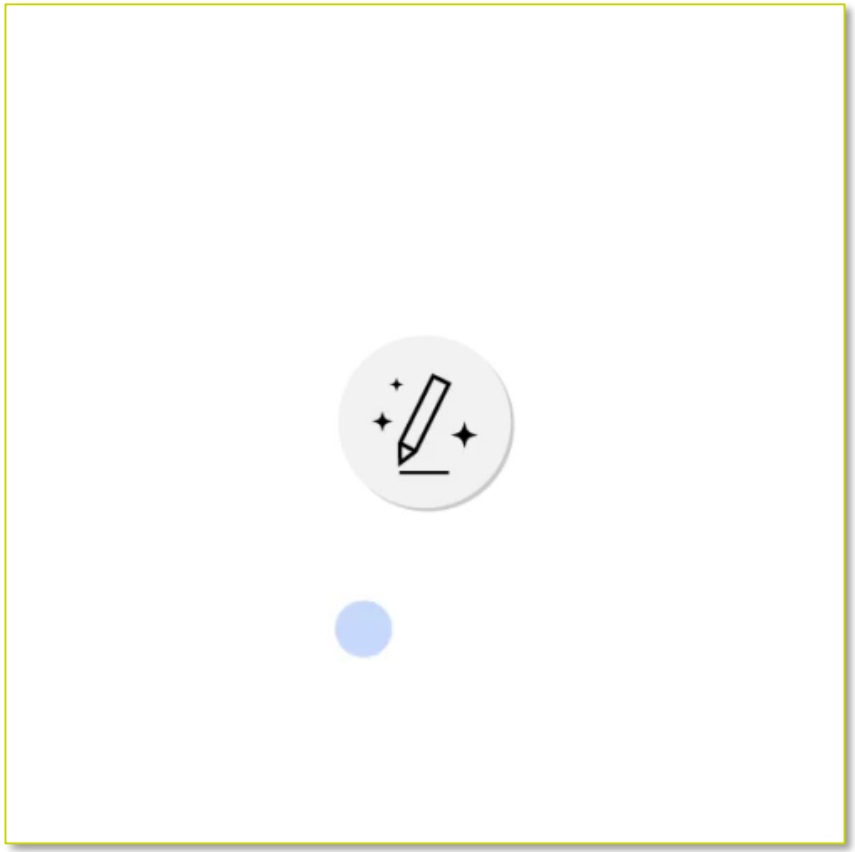
*Using Plan Recognition*





# Sketch Recognition: the Problem

**Something like that**



**User:** I want to draw a bicycle. Let's start with two wheels…

**Marvin:** Do you mean glasses?

**User:** Why do you think I wanna draw glasses?

**Marvin:** *SIGH* Don't know…

**User:** …

# Sketch Recognition: the Complete Picture

**User:** I want to draw a bicycle. Let's start with two wheels…

**Marvin:** Do you mean glasses?

**User:** Why do you think I wanna draw glasses?

**Marvin:** *SIGH* Maybe because I recognize one circular shape at the left side of another circular shape and that it only remains to draw the frame?

**User:** gg…

**Marvin:** *SIGH* I know…

**User:** …

# Explicability

**Marvin:** *SIGH* Maybe because I recognize one circular shape at the left side of another circular shape and that it only remains to draw the frame?

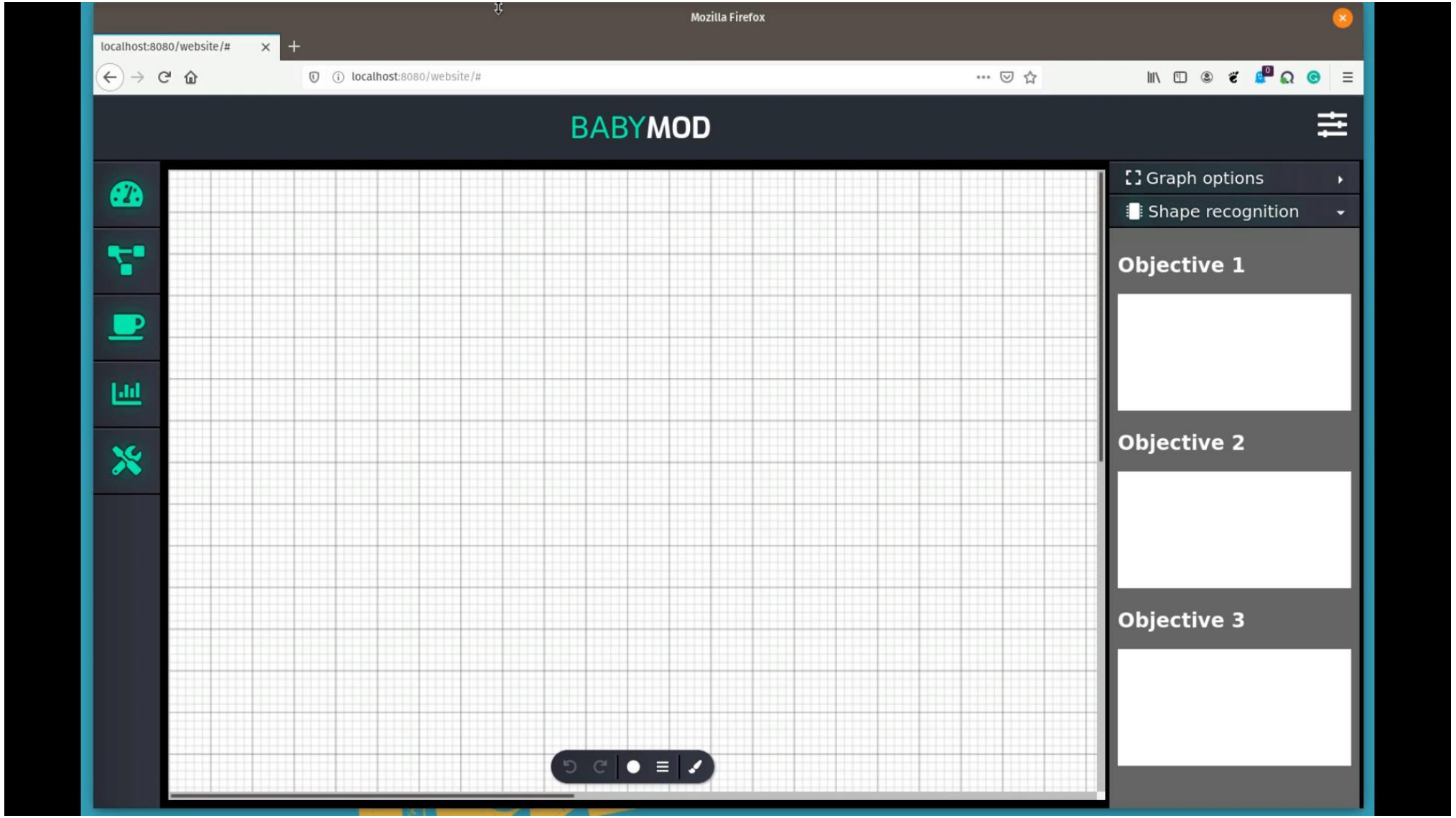
Characterization of elementary shapes

Characterization of the positioning of each elementary shape relative to the others

Hints to terminate the sketch (visual feedback)

For more detail:
*Albore, A. and Hili, N. "From Informal Sketches to System Engineering Models using AI Plan Recognition". Context'2020 AAAI Spring Symposium Series 2020*

# Plan Recognition: Demo



# State of the Art

| | Free form modelling | | | | | Model edition/annotation | | |
|---|---|---|---|---|---|---|---|---|
| | Shape recognition | Text recognition | Incremental formalization | Recognition algorithm | Recognition speed | Internal data model | Collaborative capabilities | Graphical representation |
| **BabyMOD** | ✓ | ✓ (vir. Keyboard, voice recognition, OCR | ✓ | Client-side | Fast | EMF / SEIM / Others | Single device (so far) | Statically defined |
| **IINK** | ✓✓ | ✓✓ (Nebo) | X | Server-side | Long (entire diagram) | X (diagram only) | | |
| **Obeo Cloud Platform / SECollab / Smartfacs** | X (keyboard and mouse) | | | | | EMF (server-side) / EMF (TBC) / ? | Multi-browser | Based on .odesign / Statically defined / Statically defined |
| **OctoUML** | ✓ | ✓ vir. keyboard voice reco. | ✓✓ | Client-side | Fast | Custom data structures | Single device (so far) | Statically defined |
| **FlexiLab** | X (WIMP/Post-WIMP with palette) | | | | | EMF (meta-model tolerant) | Single-device, Multi-devices (prototype) | Statically defined |

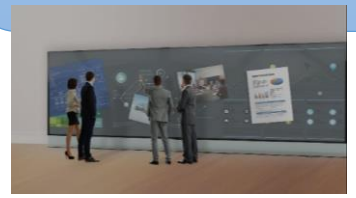

BabyMOD
EasyMOD

# Topics Broached in BabyMOD

## Interaction context

Scenarios
- Model visualization
- Model analysis
- Model review
- Model edition

Collaborative methods
- Single-user multi-device
- Multi-user single-device
- Multi-user multi-device



## Interaction means

Modelling assistants
- Incremental formalization
- Voice recognition
- Auto-layout


Devices
- Traditional devices (laptops/PCs)
- Multi-touch screen
- Individual tablets/Interactive pen displays
- AR/VR, physical devices, motion sensors

## Types of representation

- Graph-based
- Tabular
- Linear (sequences, …)
- Cartesian
- Domain-specific

# Interested in EasyMOD?

- EasyMOD plans to start Q4 2020
- Currently seeking out industrial and academic partners

## Promotional video of EasyMOD:

https://youtu.be/VRSxZr0VjKQ

## Interested in participating? please contact:

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# Thanks for your attention