ITEA PO Days 2024

AIToC

Artificial Intelligence supported Tool Chain in Manufacturing Engineering 2020-2024

ITEA Award of Excellence 2024 ceremony
10 September 2024
Kristofer Bengtsson, Volvo Group

ITEA 4

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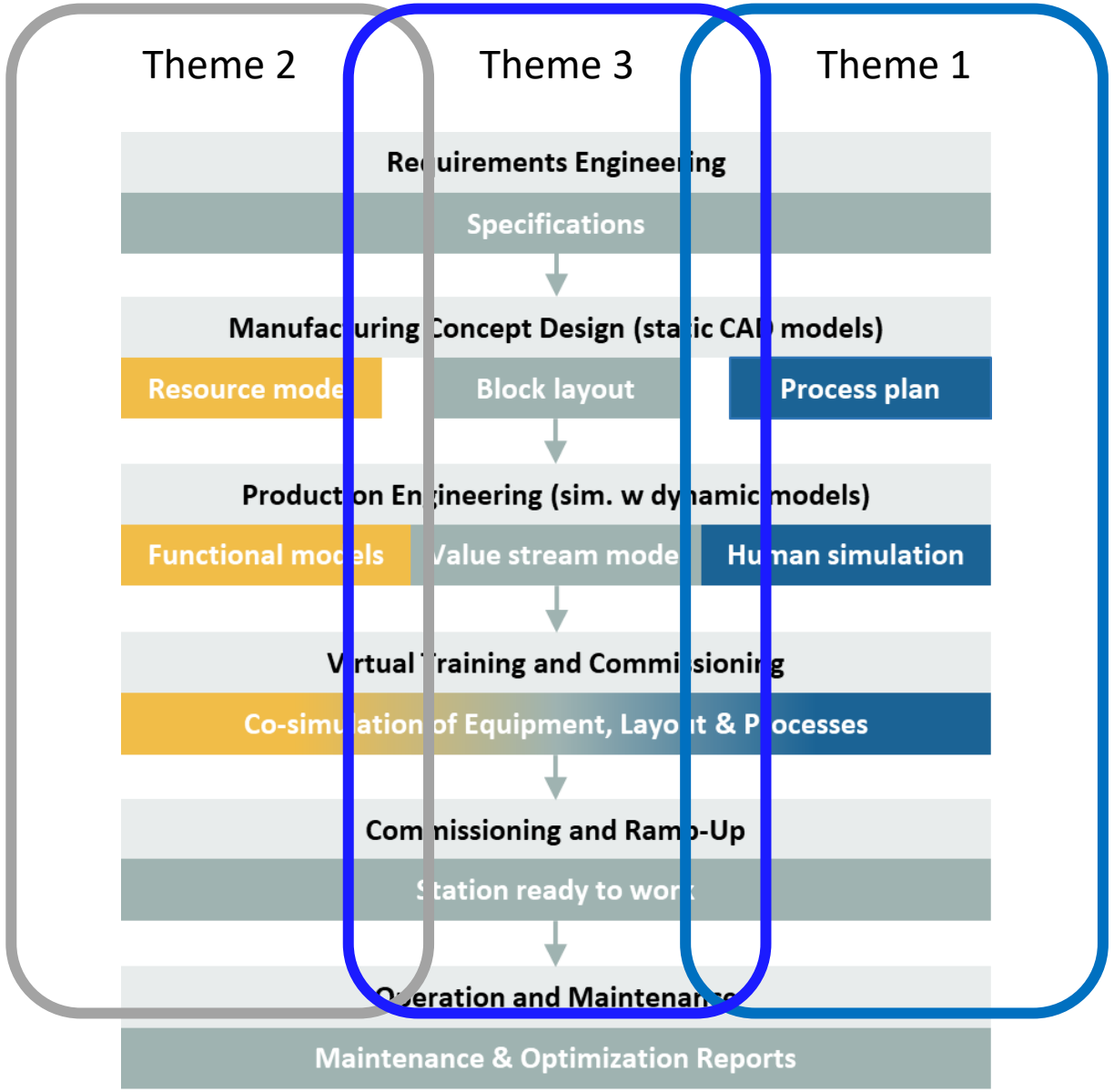
MANUFACTURING ENGINEERING TOOLCHAIN

ArtWork

2024-2026

AIToC
Project consortium



3 Themes

- Theme 1: AI-based assistance in generation of process plans and instructions
- Theme 2: AI-generated models and support for co-simulation of humans and machines
- Theme 3: Systematic layout generation and AI-based logistics planning

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Use cases

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Major project outcomes

- Exploitation
  - More than 50 exploitable results.
  - Many of these results: automate the engineering preparation work when developing and updating the manufacturing systems
- Standardization
  - Contribution to open-source standards:
    - many of the project results have been created in the form of open-source code.
  - Proposal to include MMUs (Manikin Mockup Units) in the FMI-standard.
- Dissemination
  - Several result videos at https://aitoc.eu/
  - 20+ publications, including several PhD, master and bachelor thesis
  - 20+ conference / event presentations

Some example results from AIToC

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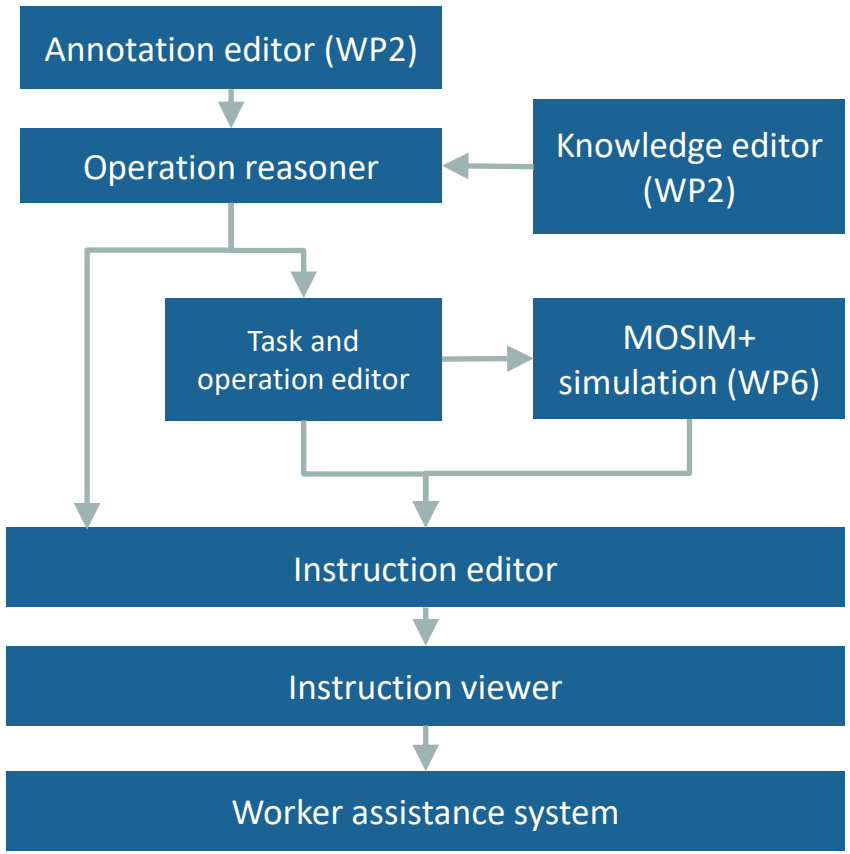
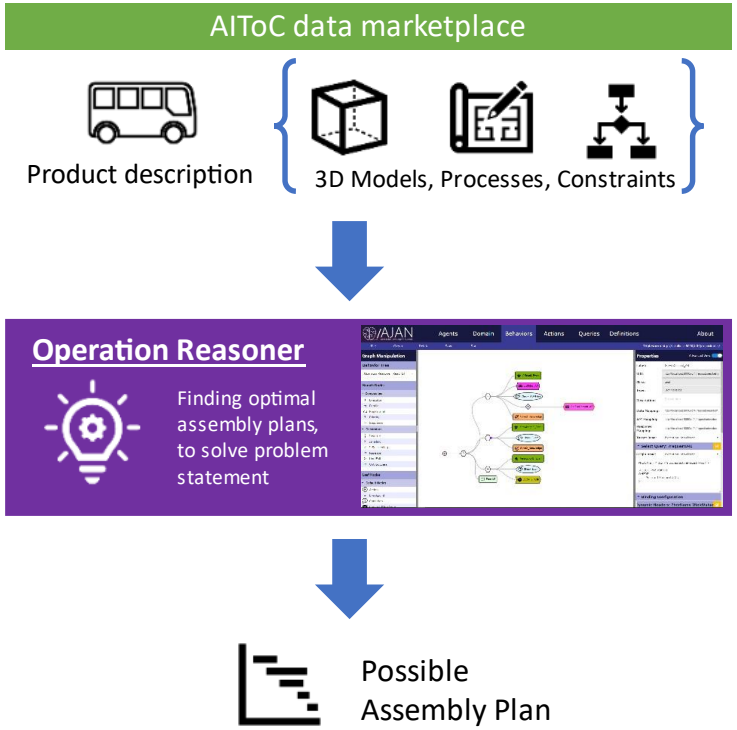
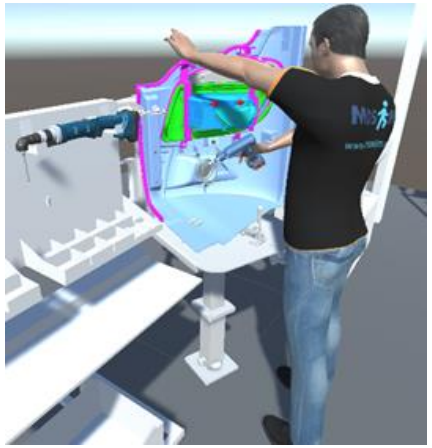
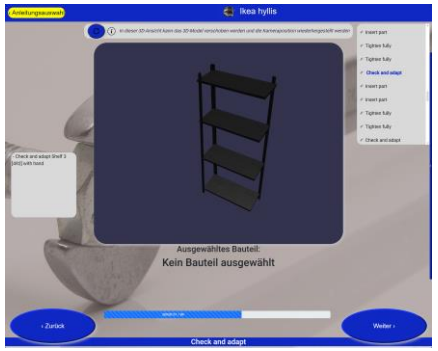








BRICK Bundles

CORE

Math

Quaternions	Vectors	Trigonometry
Matrices	...	

Physics

Kinematics	Interaction	Material
Transformation	Deformation	Density
Velocity	Friction	Texture
...	...	...
Geometry	**Inertia**	**Signals**
Primitives	...	...
Mesh		

Physics3D

Interactions	Bodies	Geometry
Hinge	RigidBody	Box
Prismatic	FlexibleBody	Cylinder
Damping	...	...
Deformation		
Surface Contact		
...		

SPECIALIZATIONS

Drivetrain

Motors	Shafts	Gears

Hydraulics

Pumps	Pistons	Pipes

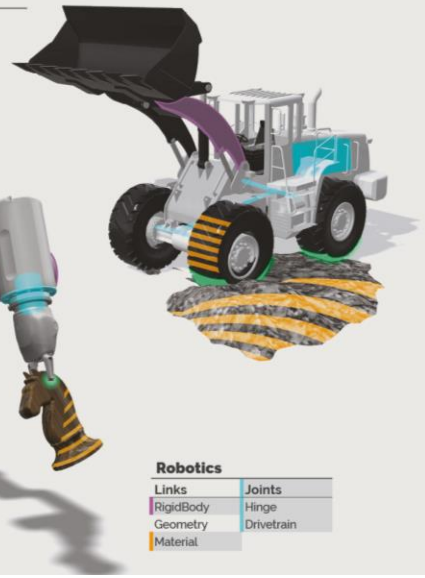
DOMAIN SPECIFIC

Heavy Machines

Rigidbody	Drivetrain	Tire
Autonomy	Hydraulics	CAD

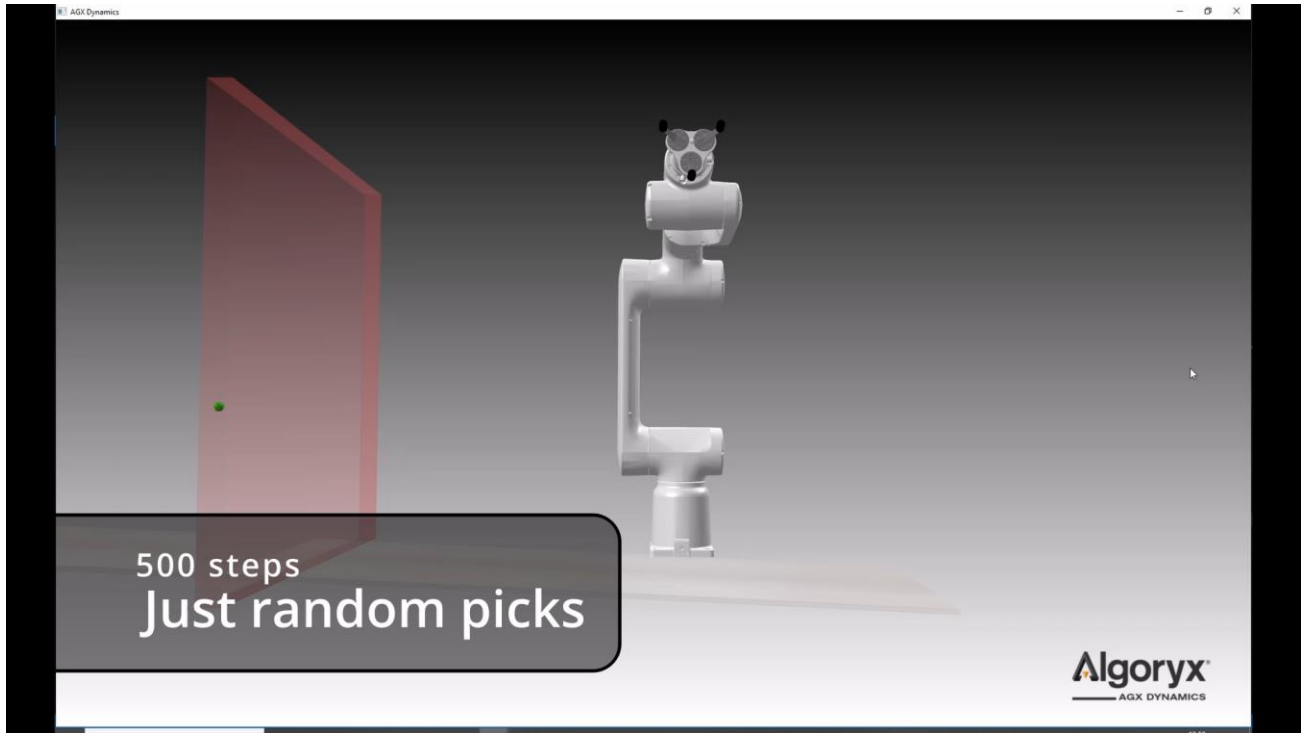
Deformable Terrain

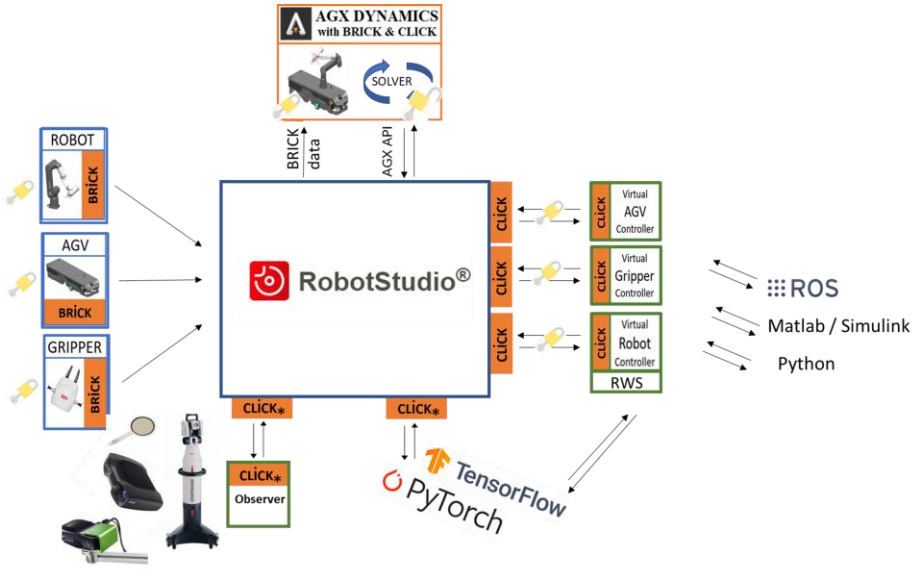
Material
Deformation



Robotics

Links	Joints
RigidBody	Hinge
Geometry	Drivetrain
Material	





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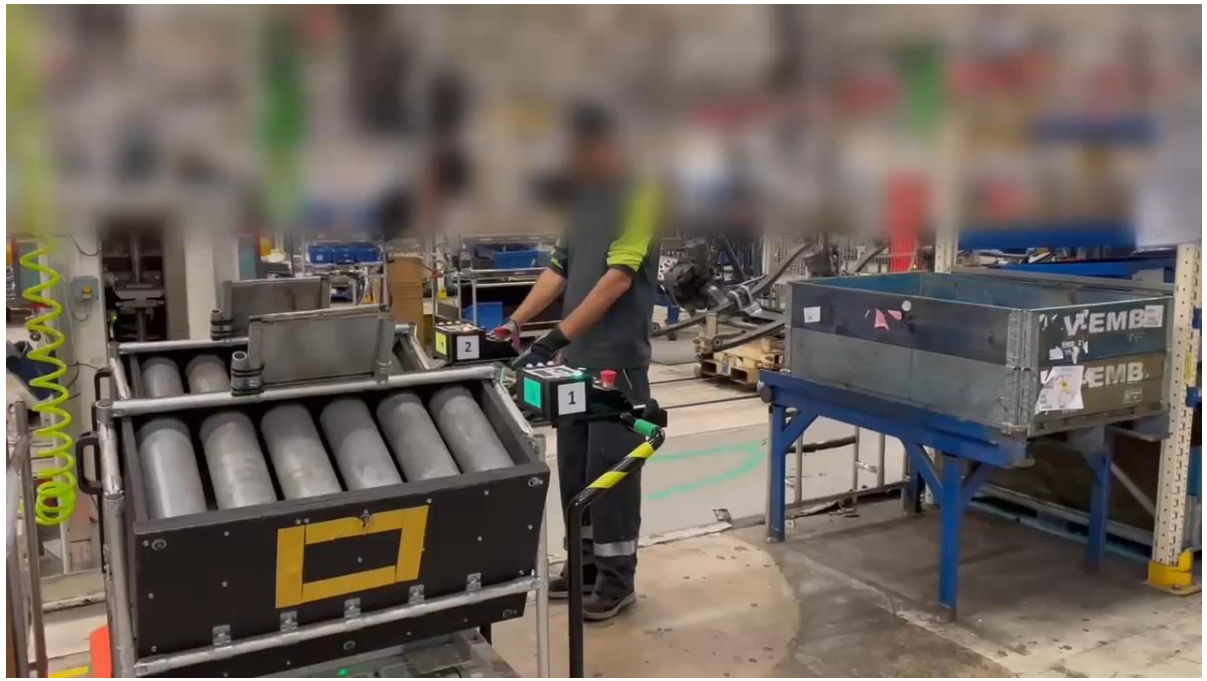
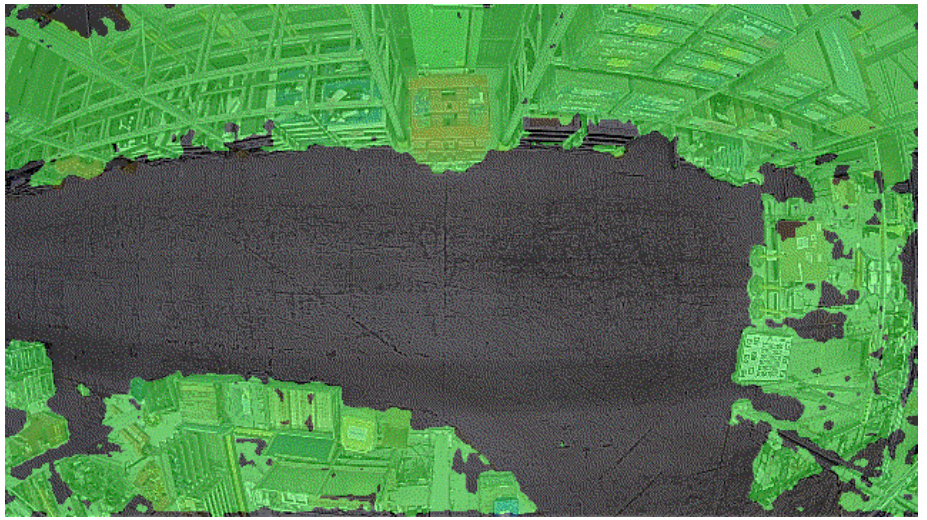
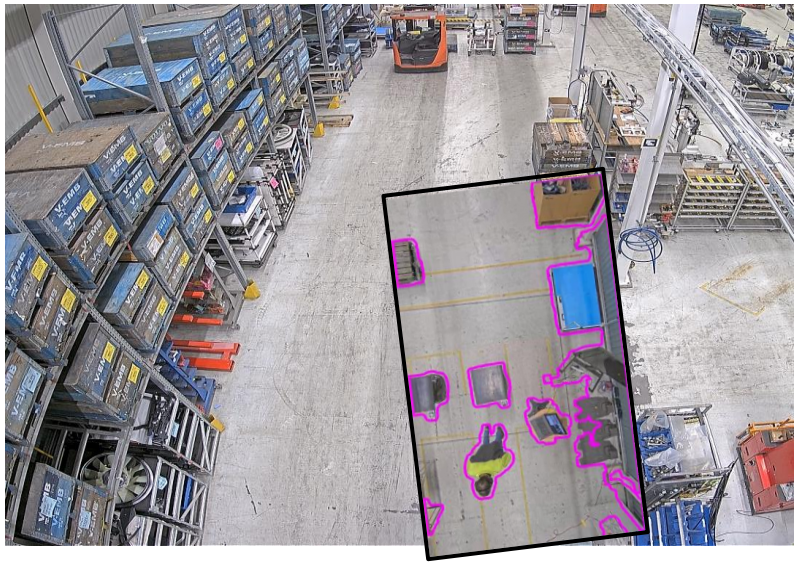
GPSS – Volvo **G**eneric **P**hoto-based **S**ensor **S**ystem







Major Challenges and opportunities

- Large consortium
  - Important that each partner are highly motivated and has a clear contribution
- Slow start
  - Important to meet F2F as soon as possible
  - Do not talk to much about definitions and what everyone should work on together
  - Start working on various task in parallel and start merging based on the results
- KPIs and tracking progress
  - Measuring the progress during the project?
  - What do we plan to do vs what we have achieved?
  - Hard to measure the final impact during the project

Making an Impact

- Plan exploitation early in the project
- Clear target user for each result
- Many iterations
- Demonstrations
- Use the ITEA progress reports and review meetings to have clear deadline for all partners

Exploitation plan

Commercialization	**Business integration**
Academic dissemination	**Open-source result**

Standardization plan

Partner standard	**Open-source**
Standardization organization	

Thank you