

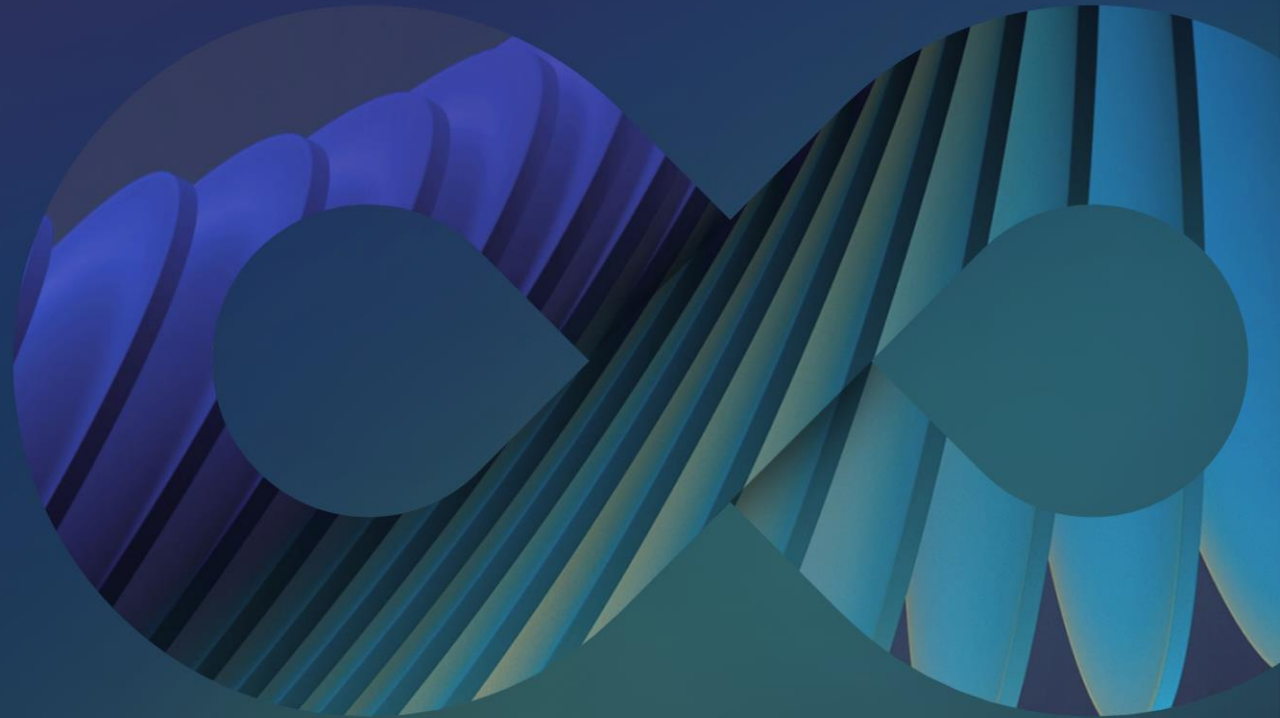
From chaos to clarity: ROS 2 meets AsyncAPI

Florian Gramß, Siemens AG

Amparo Sancho Arellano, Siemens AG

Shubhankar Ashwinikumar Riswadkar, Siemens AG

Anna-Katharina Naetscher, Siemens AG

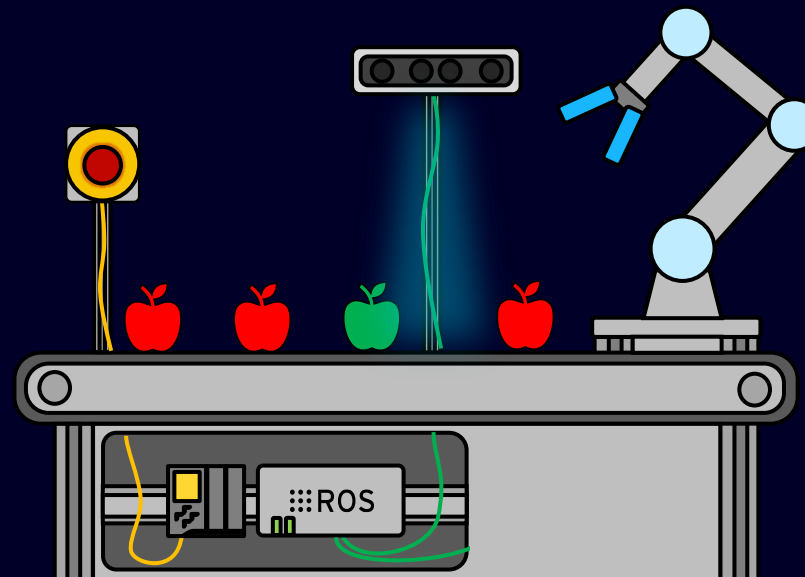


It is John Jr. again, the Owner of an Apple Sorting Company

Our Hybrid-OT machine now works successfully with ROS + PLC in the field!



John Jr.



New Challenges

We need to handle bad apples differently!



No worries,
I will help you for
this new "skill"!



OT Expert

OT Solution

Just add another robot arm
for the new bad apple
handling skill.

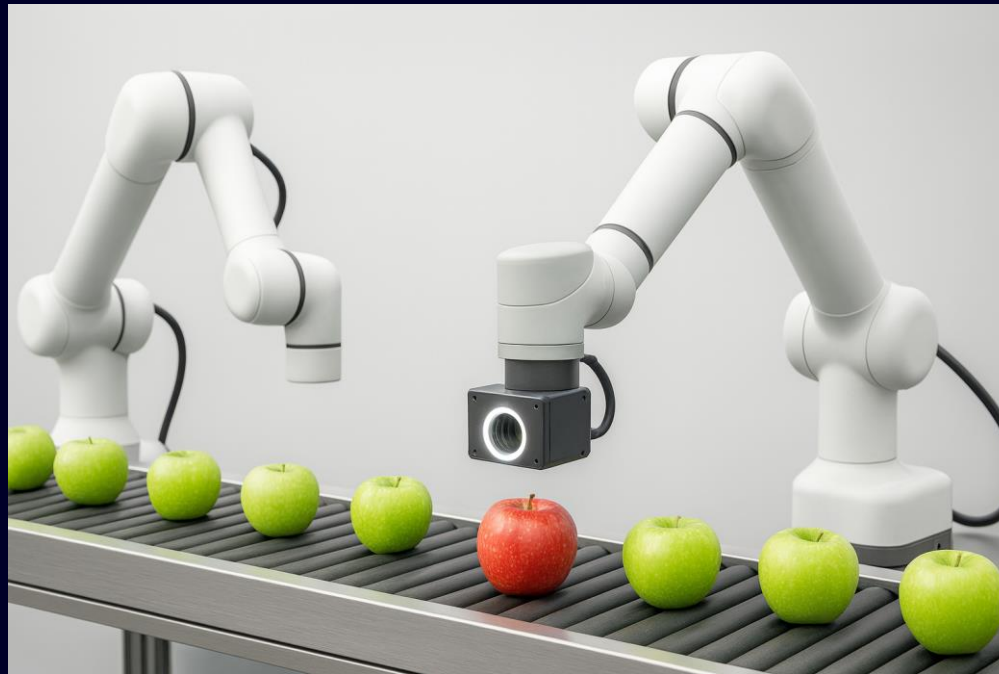


OT Expert

That is way too
expensive!



John Jr.



How do I tackle the problem as an engineer?



OT Expert

How do I add pick
and replace of bad
apples then?

What about
using an
orchestrator?



IT Expert

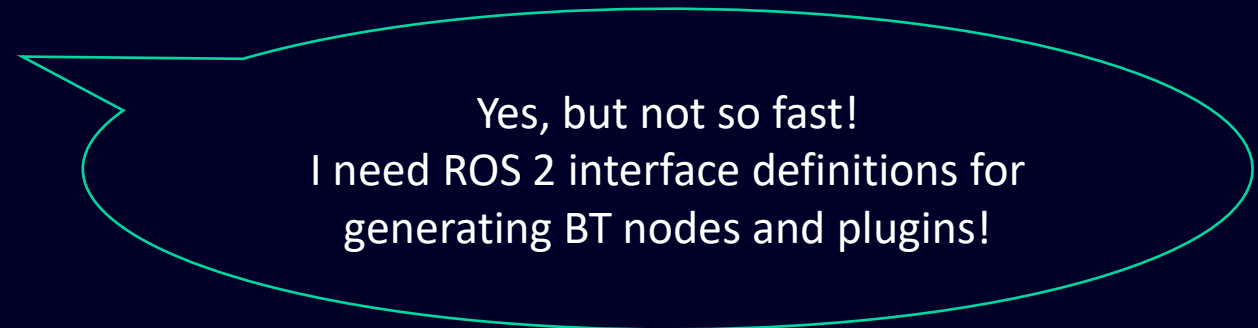
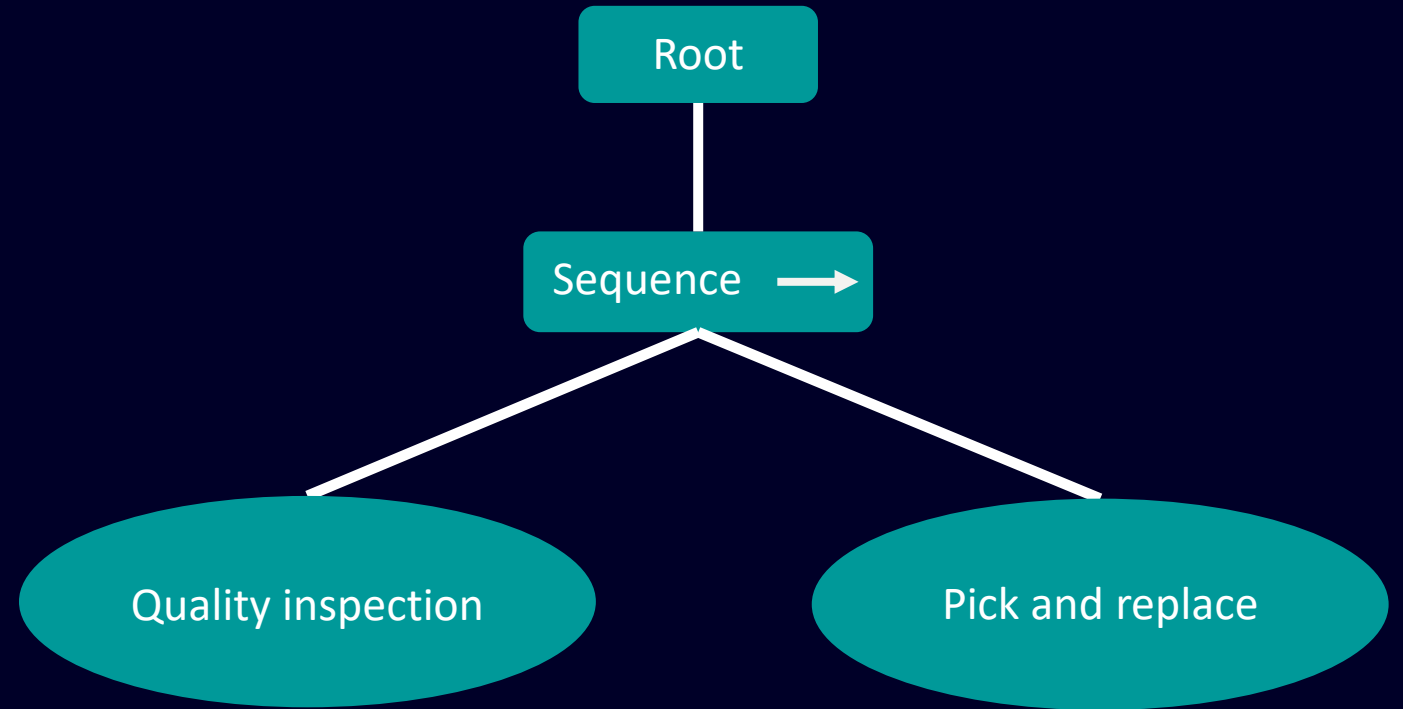
SIEMENS

TIA Portal

- Hard to program skill directly in PLC code
- Can break existing code easily



Behavior Trees as the Orchestrator



Extract interface definitions from the existing software stack



OT Expert

How do I document all the interfaces in my implementation?

Maybe use AsyncAPI



IT Expert

ROS 2 interface



EXAMPLE

ROS 2 interface



ROS 2 interface





AsyncAPI



Smart extraction and documentation



OT Expert

Will I have to do
manual extraction
from Excle?

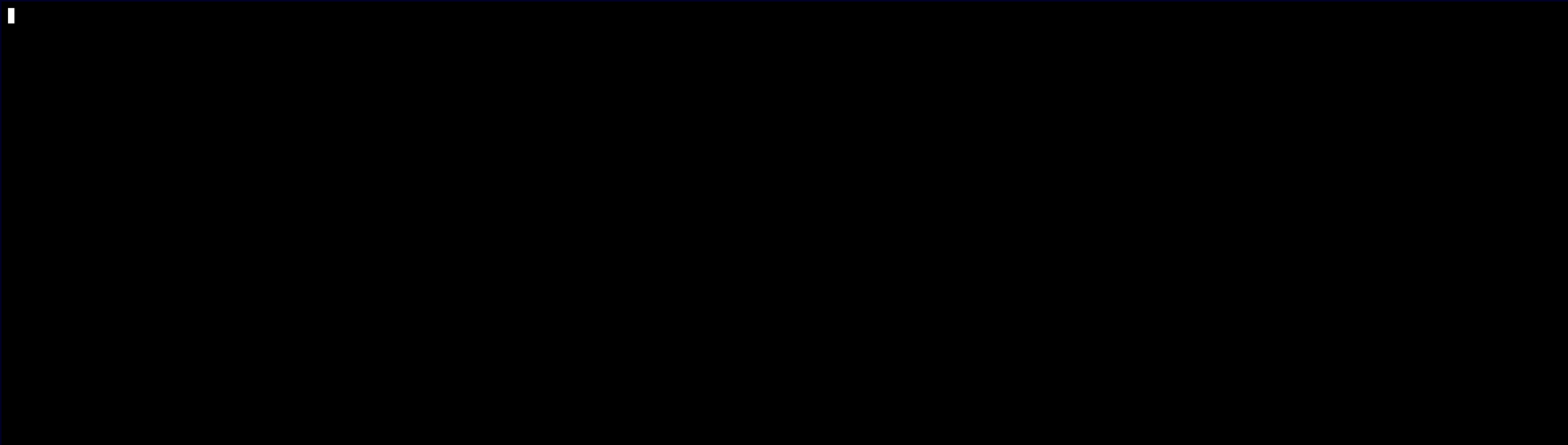
How about using
ROXSITA?



IT Expert

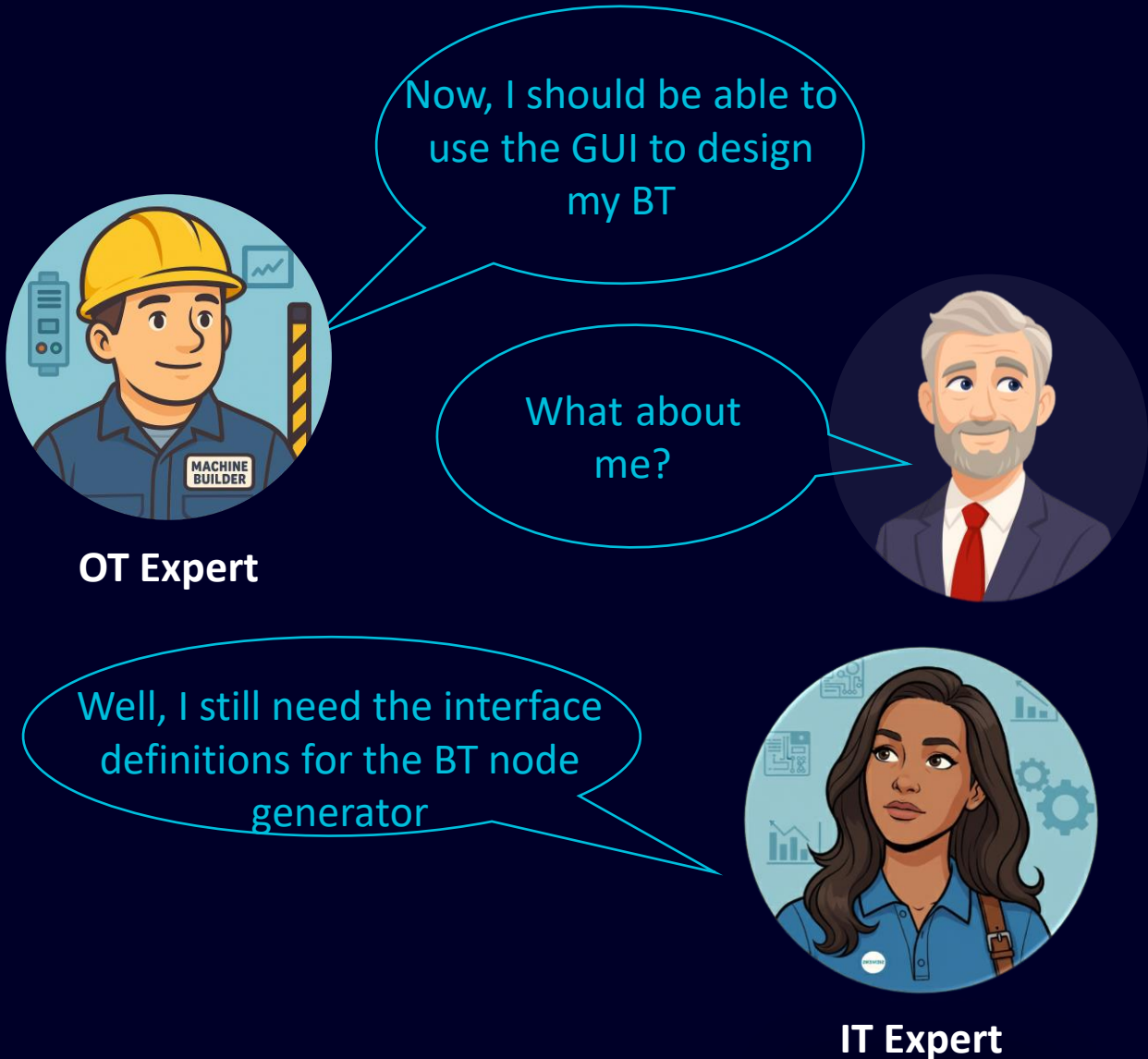


Github ROXSITA
<https://github.com/siemens/roxsita>



ASYNCAPI

Recap, What do we have and what's missing?



Already achieved:

- Skills selected
- Interface Documentation

Still missing:

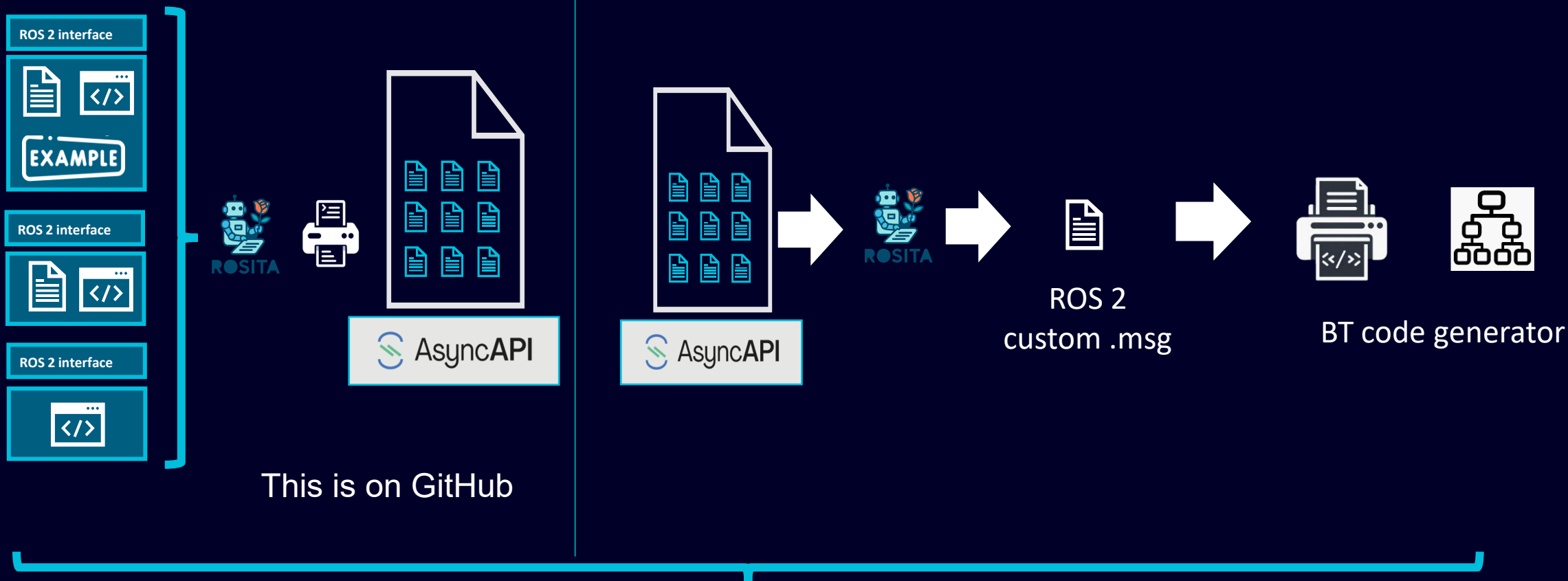
- ROS 2 .msgs definitions
- BT plugins

Recap, the entire workflow

Automated interface extraction
and documentation generation

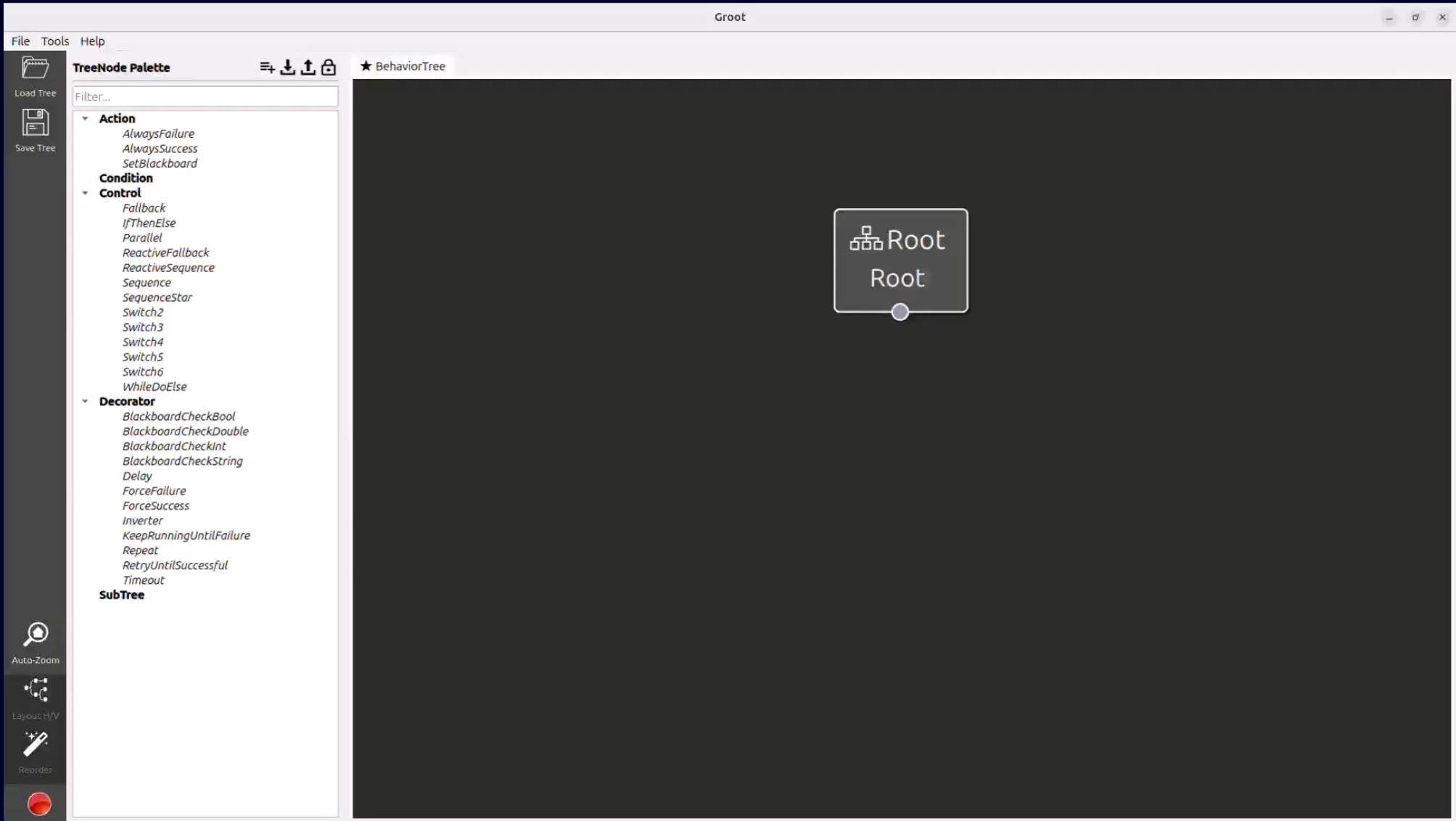
Automated interface extraction
and documentation generation

Generating BT leaf nodes

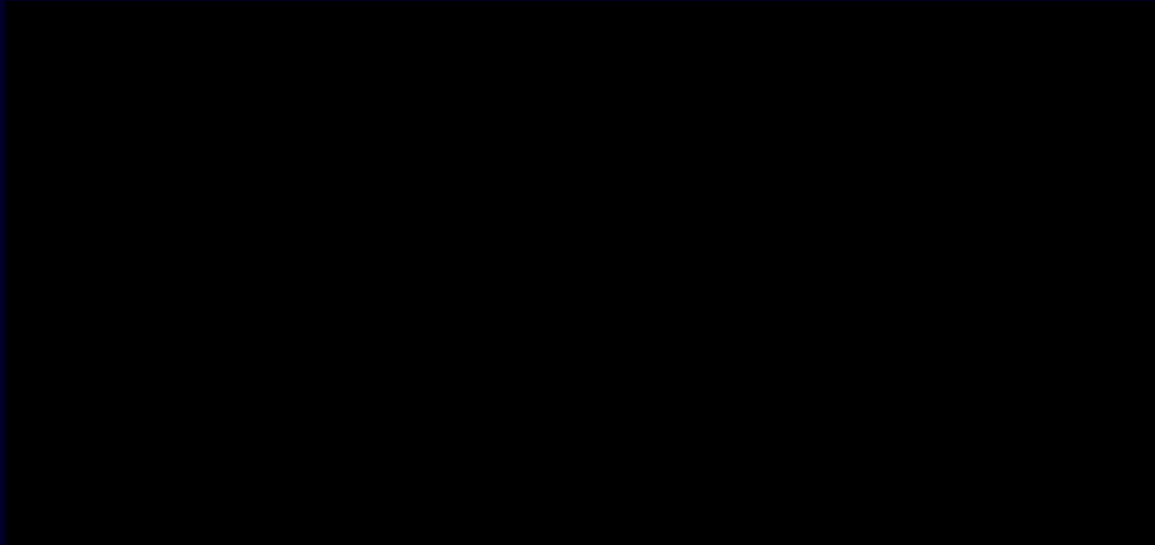


ROXSITA

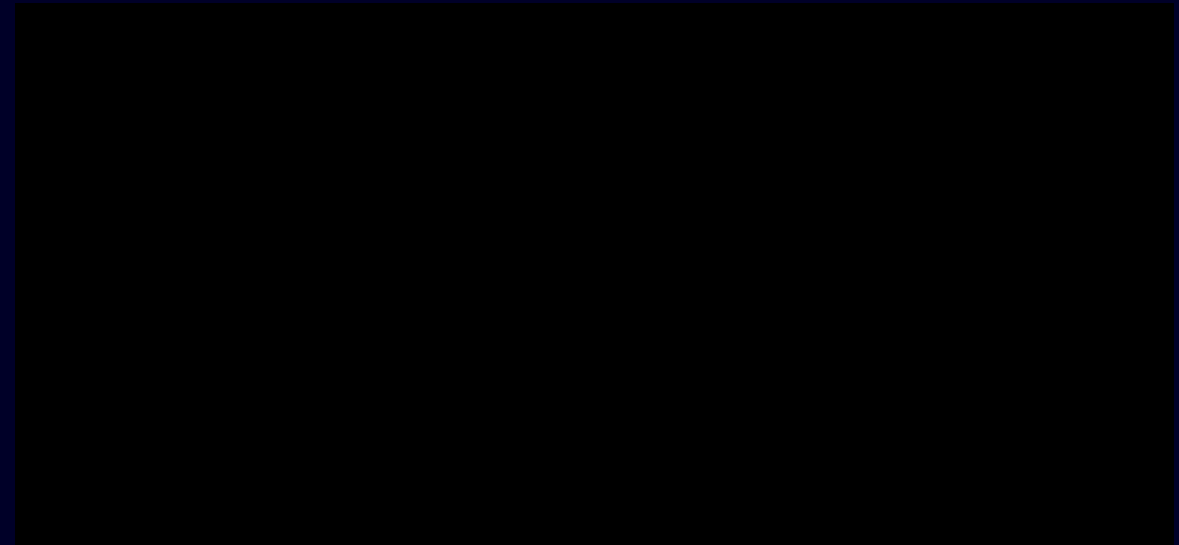
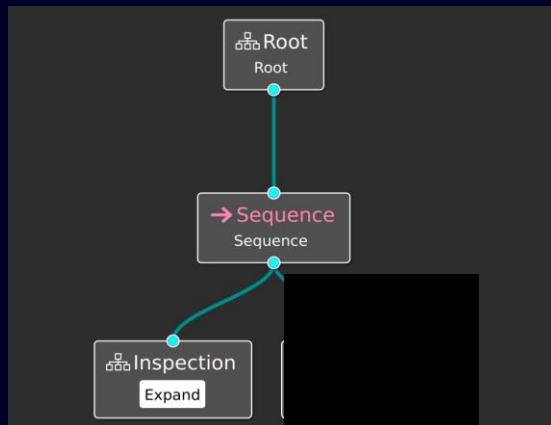
Generating the missing Behavior Tree nodes



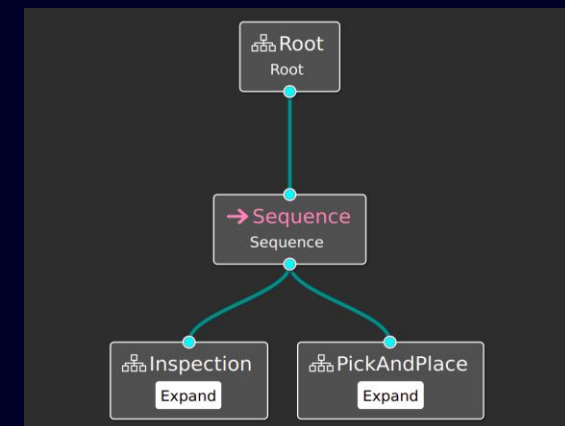
BT execution



Black box executing an inspection task



BT executing inspection and pick and place skill



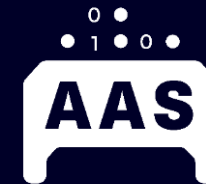
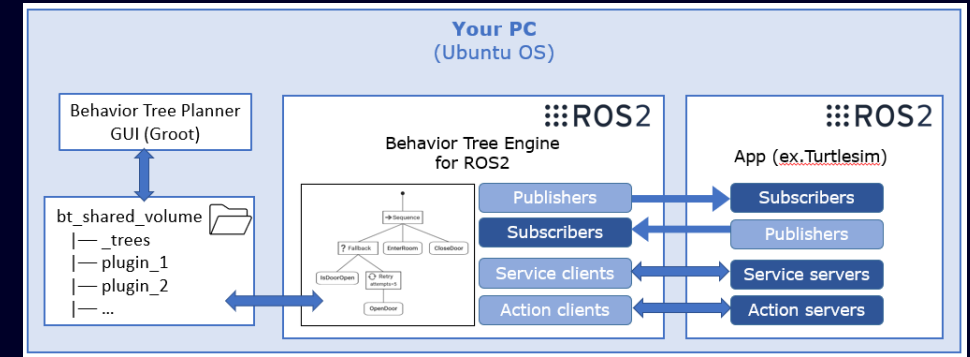
How do we deploy it now?

BT code deployment

Interface definitions



Generated plugins



Asset Administration Shell



Credits, master thesis:
Anna-Katharina Nätscher

Recap

Industrial Automation meets Behavior Trees

- PLC – Already Low Code
- ROS: Delivery of State Machines in Binary / Scripts ... OT ☹️
- BT + Groot Graphically Accessible change a machine
- Writing BT Nodes is cumbersome.. That's why we automated it!



John Jr.



OT Expert





What Industrial Automation Needs from ROS

ROSCon FR & DE
Strasbourg *2025*

IT meets OT: Guidelines for Efficient, Scalable
Hybrid Solutions in Industry

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Are you interested to learn more? Contact us!