MIRoN
QoS Metrics-In-the-Loop for better Robot Navigation

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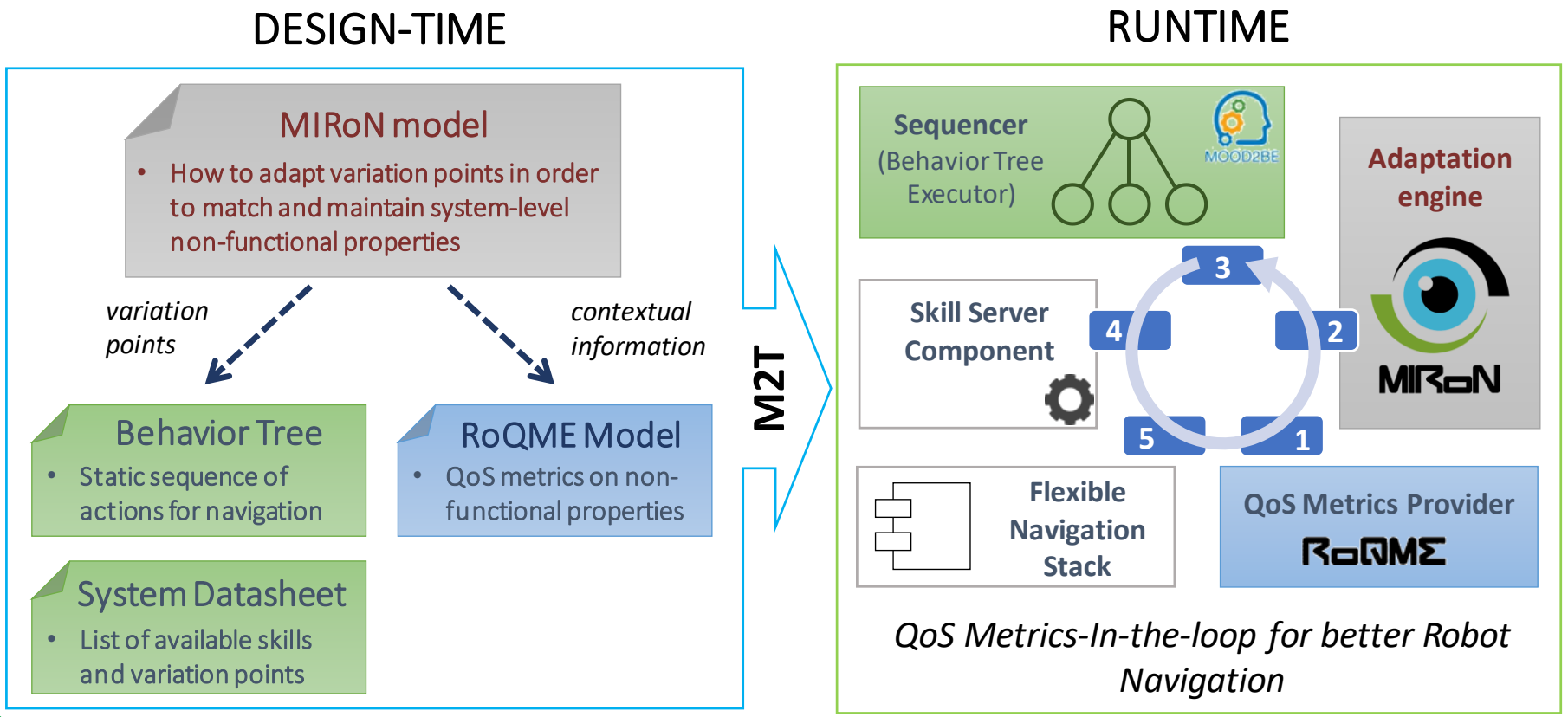
What is the MIRoN ITP about?

MIRoN wants to contribute to RobMoSys a framework for dealing with adaptive robot navigation based on the systematic use of models for dynamically reconfiguring the robot behavior, defined in terms of Behavior Trees (BT), according to the runtime prediction and estimation of QoS metrics defined on NFPs.

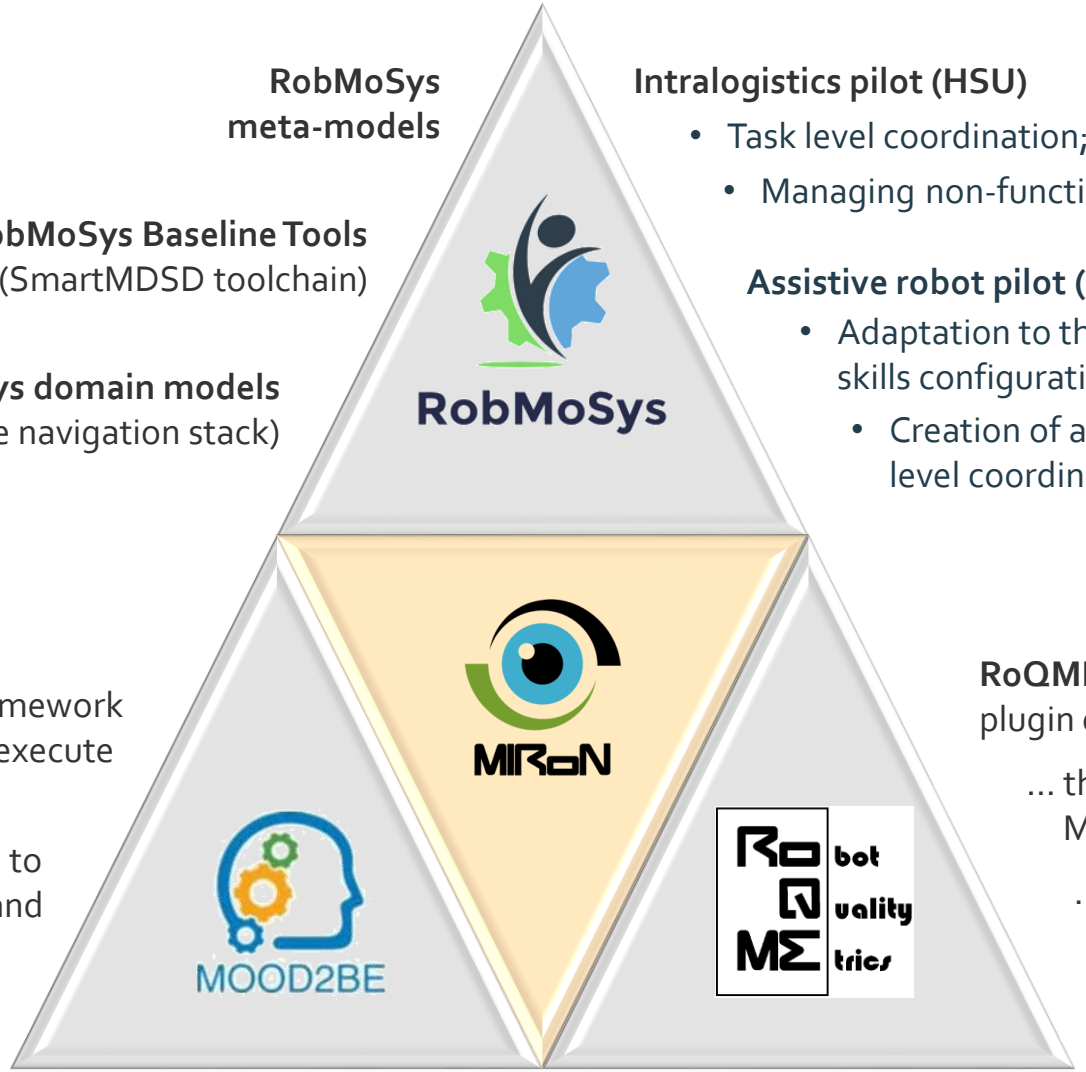


The MIRoN ITP builds on…

RobMoSys meta-models

RobMoSys Baseline Tools
(SmartMDSD toolchain)

RobMoSys domain models
(e.g., Flexible navigation stack)



Intralogistics pilot (HSU)

- Task level coordination; skills; robotic behavior.
- Managing non-functional properties.

Assistive robot pilot (PAL)

- Adaptation to the environment through skills configuration.
- Creation of ad-hoc applications using task level coordination (robotic behavior) .

BehaviorTree: C++ framework and toolset to create, execute and debug BTs.

Groot: a graphical IDE to create, edit, monitor and analyze BTs.

RoQME Toolchain. Eclipse plugin enabling…

… the modeling of QoS Metrics defined on NFP;

… the runtime estimation of the previous metrics based on context changes

Current status and next steps

By the end of March 2020 (first half of the project), the following "artifacts" will be ready…

- ✓ The **MIRoN meta-model**, some of which modeling concepts are linked to those included in the RoQME and the MOOD2BE meta-models.
- ✓ A model transformation enabling the **generation of BT models extended with variability management capabilities**. This transformation takes a MIRoN model as an input and extends the nominal BT by weaving the behavior variants (subtrees) in the corresponding variation points (nodes in the nominal BT).
- ✓ A **model transformation generating the MIRoN Engine**, which embeds the adaptation logic described in the MIRoN model. The MIRoN Engine is in charge of monitoring the contextual information provided by the *RoQME QoS Metrics Provider Component* and, when requested by the *BT Executor*, provide it with the best configuration possible for all variation points.
- ✓ The **Infrastructure required to connect the BT Executor, the RoQME QoS Metrics Provider Component and the SystemMIRoNTiago Navigation in SmartMDSD**. This infrastructure uses the advanced robot simulation software, based on Webots, developed by the AROSYS ITP.

During the second half of the project we will focus on the demonstrators, in the context of…

- ✓ The intralogistics Industry 4.0 Robot Fleet Pilot (HSU)
- ✓ The assistive mobile manipulation pilot (PAL)

Thanks!

We  forward to this new challenge

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https://www.researchgate.net/project/MIRoN-ITP

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