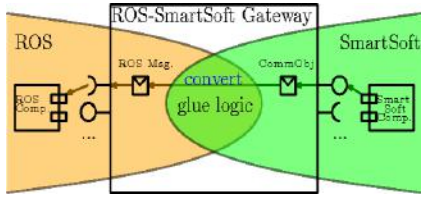
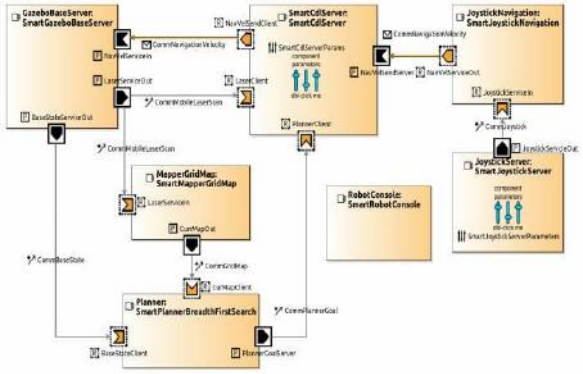
Software modularity in Robotics: the RobMoSys approach

#ERF2020 Workshop: 3rd Workshop on Modular Concepts for Assembly and Handling





RobMoSys

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European Robotics Forum (Malaga, 2020)

PAL Robotics in a nutshell

Making service robots from 2004

PAL ROBOTICS

Robotic challenges

- Deploy consistent robot applications in
  - unstructured environments
  - dynamic environments
- Allow non-robotics experts
  - exploit robot capabilities
  - adapt to new scenarios reusing existing software
- Allow roboticists
  - assimilate application domain knowledge e.g. healthcare

From traditional to RobMoSys platforms

Legacy Robotics		Future Robotics
Well defined	*Environment*	Dynamic
Proprietary	*Frameworks*	Open
Quite difficult	*Reuse of components*	Work In Progress
Big [Manufacturing]	*Potential*	Huge [Future Robotics]

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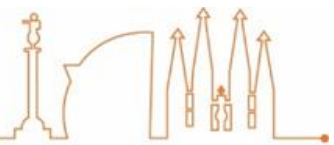
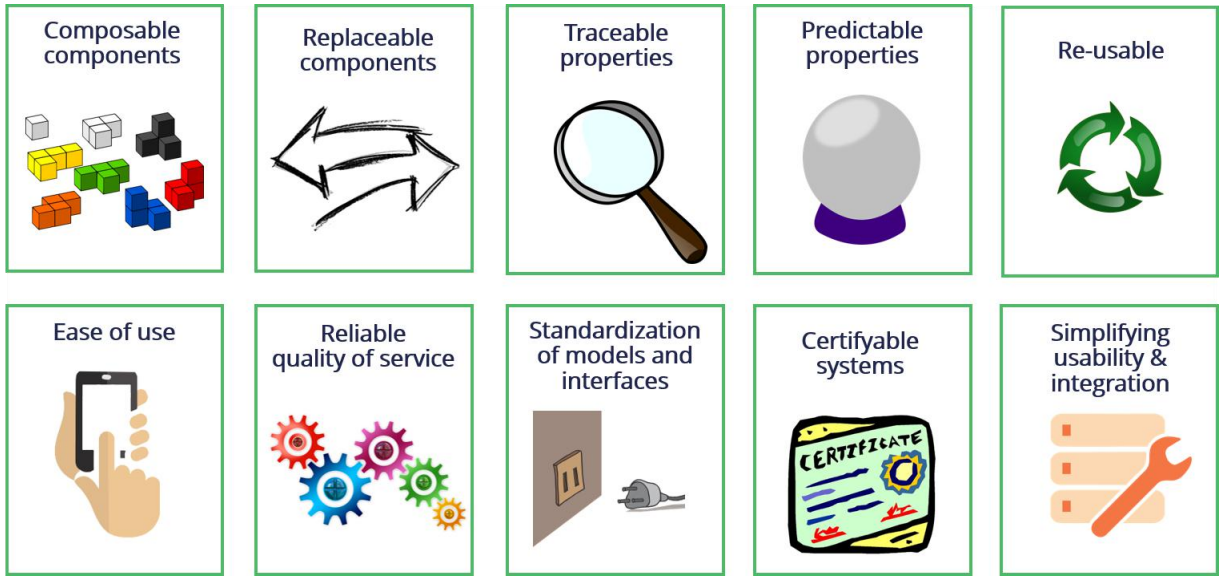


RobMosys: Technical benefits for a robotic company



- **Robotic domain models** (navigation, manipulation, perception, world model) that describe exactly what the components provide (functionality) and how (interfaces)
- **Model-driven tooling** to design and deploy robotic applications
- A set of **ready-to-use robotic components** and a **data sheet** containing the information needed to be used without knowing the internal implementation

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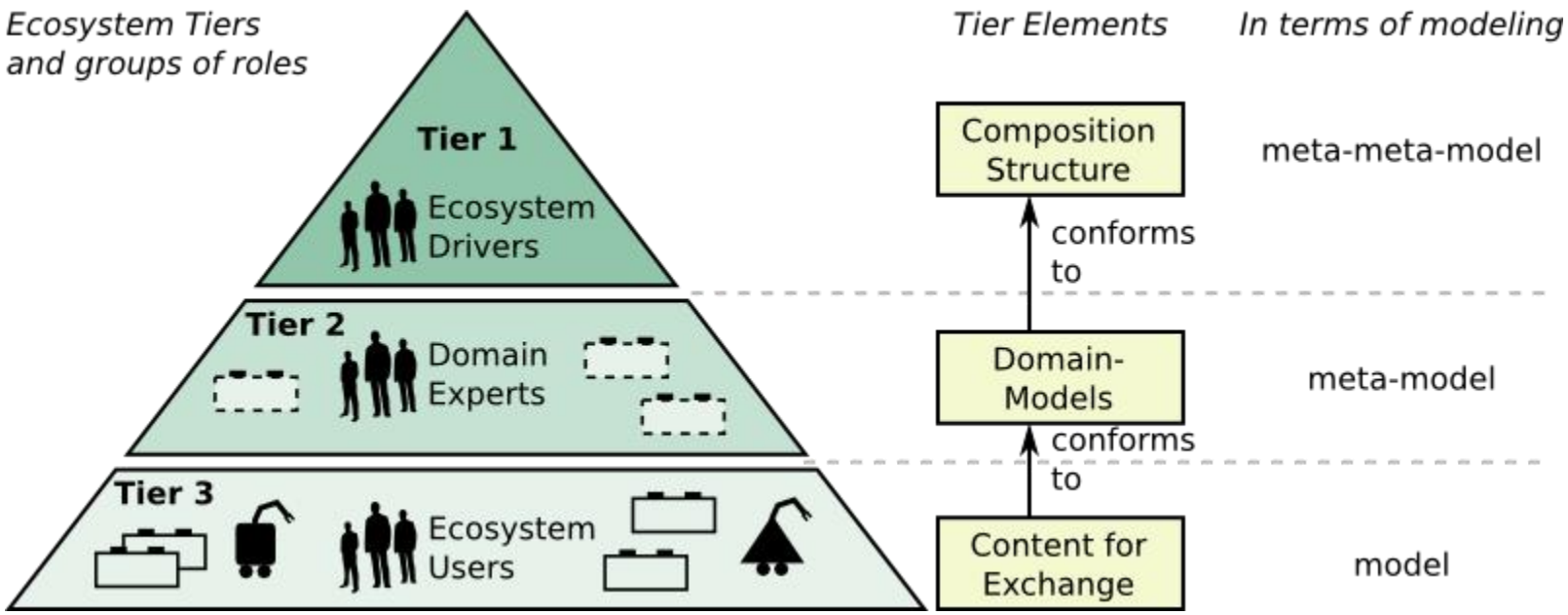
RobMosys approach: Ecosystem Organization



- **Tier 1** structures the ecosystem in general for robotics, independent of the sub-domains.
- **Tier 2** conforms to these foundations, structuring the particular domains within robotics (ex. SLAM, ...).
- **Tier 3** conforms to the domain-structures of Tier 2 to supply and to use content.

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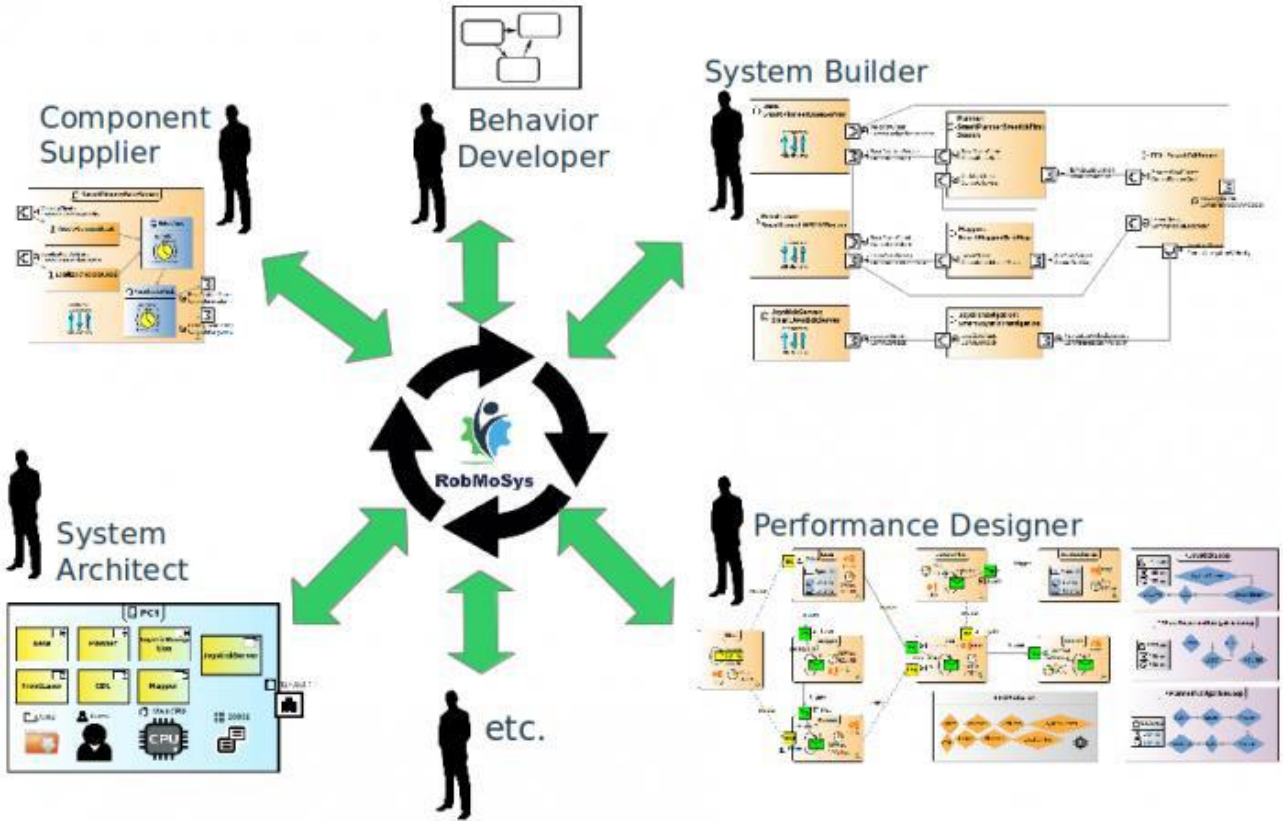
RobMosys approach: Roles in the Ecosystem



- The participants in the ecosystem take one or several “**roles**” to use and supply building blocks.
- Each role uses dedicated **views**.

TIAGo real example: replacement of components

- **Requirement**

  Given an already available Navigation stack of SmartSoft toolchain, I would like to use it with the TIAGo real robot.

- **Setup**

  I don’t know the implementation, but I do know what are the responsibilities of the components and the interaction points (ports) between them.

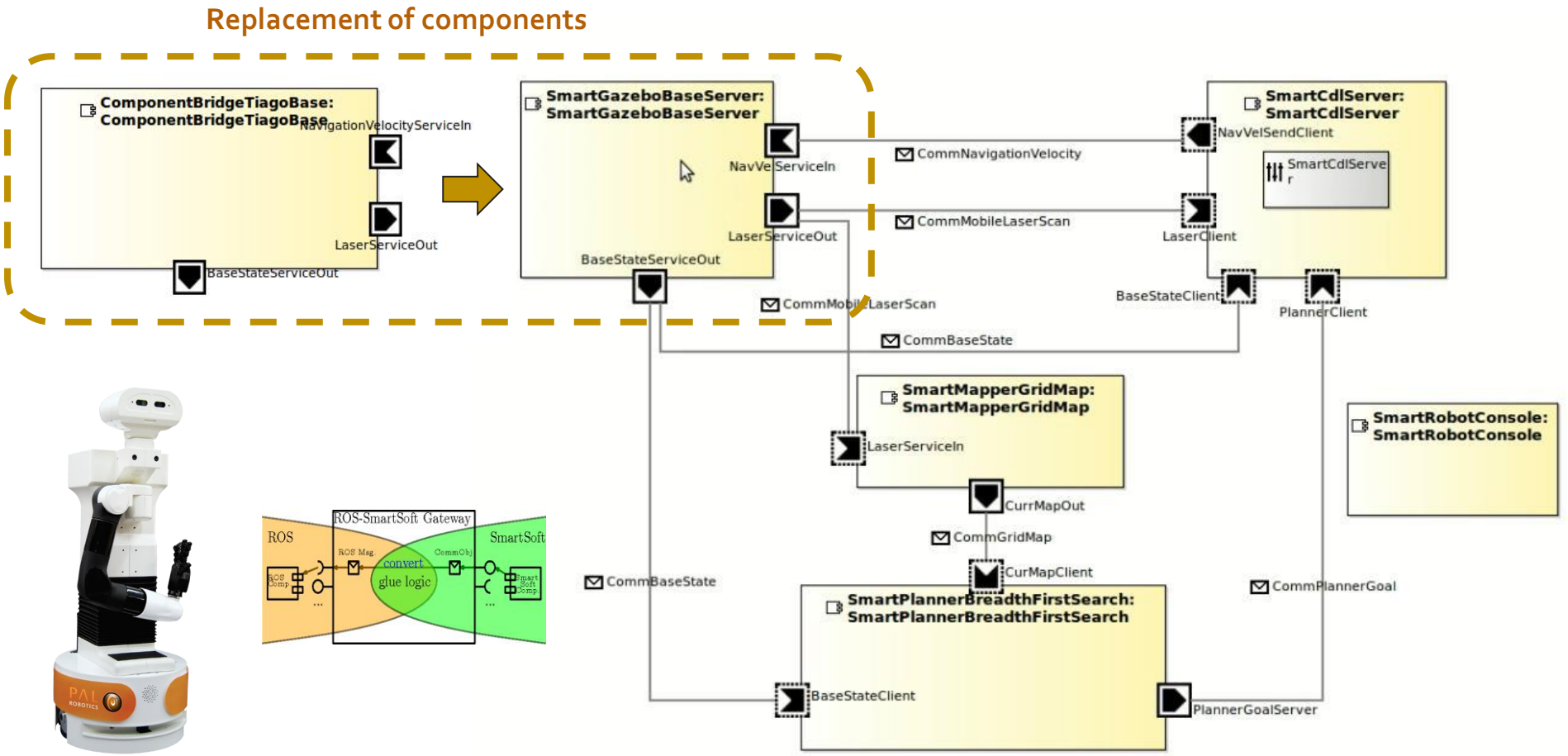
- **Design**

  I replace a component in the model by a new one and I establish the communication ports.

- **Deployment**

  After modification, the system is deployed and navigation is executed.

RobMoSys Navigation Architecture modification



RobMoSys example via SmartSoft

More info: https://robmosys.eu

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