



# Grace

inteGration of pRocess and quALity  
Control using multi-agEnt technology

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Siemens

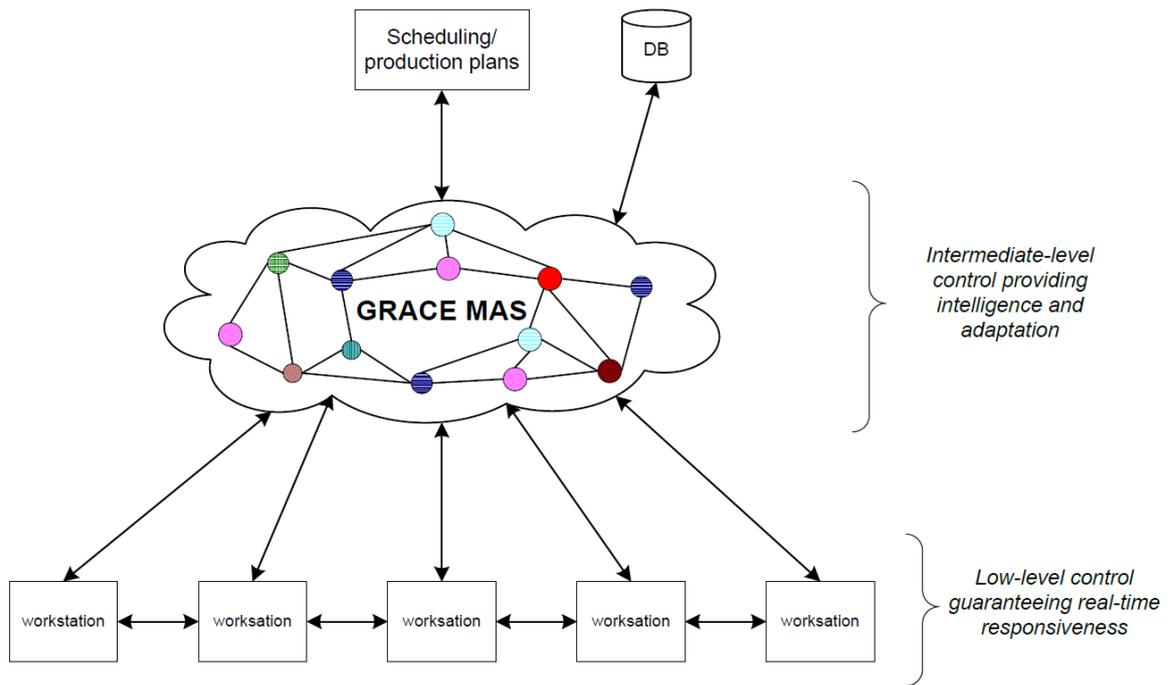


SINTEF



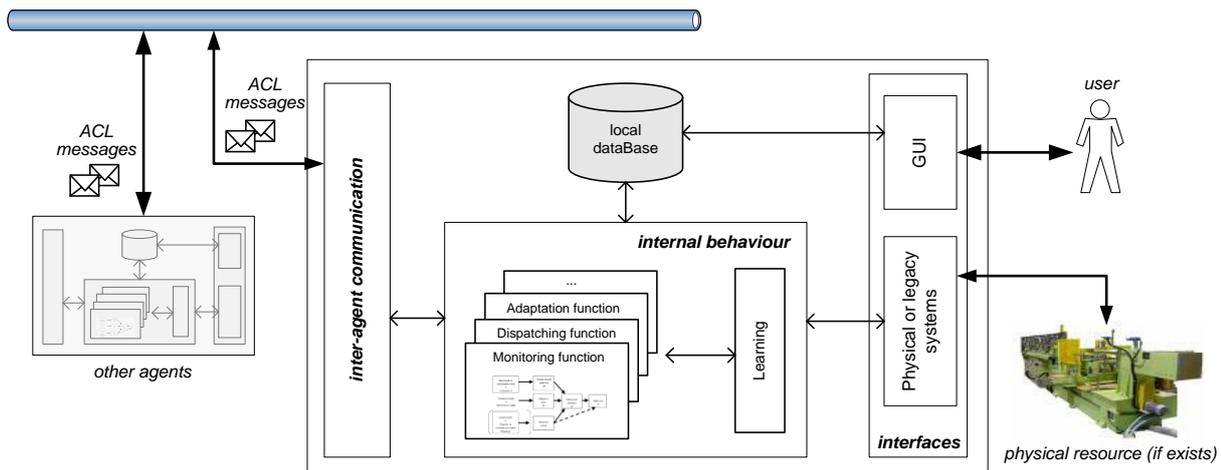
Whirlpool





### Positioning, Scope and Boundaries of the GRACE Multi-agent System

The GRACE multi-agent collaborative system consists of physical electro-mechanical resources (e.g., processing machines, handling machines, conveyors and quality control stations), which have their control embedded (e.g., using IEC 61131 controllers), and intelligent agents acting autonomously on behalf of the resources and representing logical entities, introducing intelligence and cooperating to achieve global production objectives (e.g. preserving an high quality production).



**Conceptual model of a generic agent**

In spite of the particularities of each agent representing different (physical or logical) objects, the conceptual structure for a generic agent of the multi-agent system comprises four main components:

- **Inter-agent communication:** it is responsible for the interaction with other agents, making transparent the data exchanged to support the cooperation among the agents.
- **Internal behaviour:** it is responsible for the several control functions that regulate the agent's behaviour, namely the monitoring, control, adaptation and learning.
- **Local database:** it is used to store the agent's information and knowledge, namely its current status and the historical information about the operation execution.
- **Interfaces:** it is responsible to support the interaction of the agent with the physical equipment (e.g., robots and machines) and/or legacy systems (e.g., factory database), if they exist. This component may also comprise a graphical user interface to support a direct interaction with the user.

