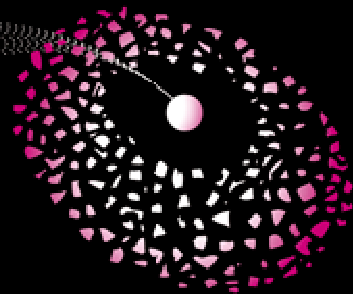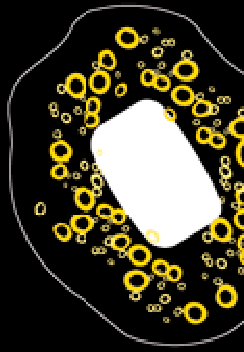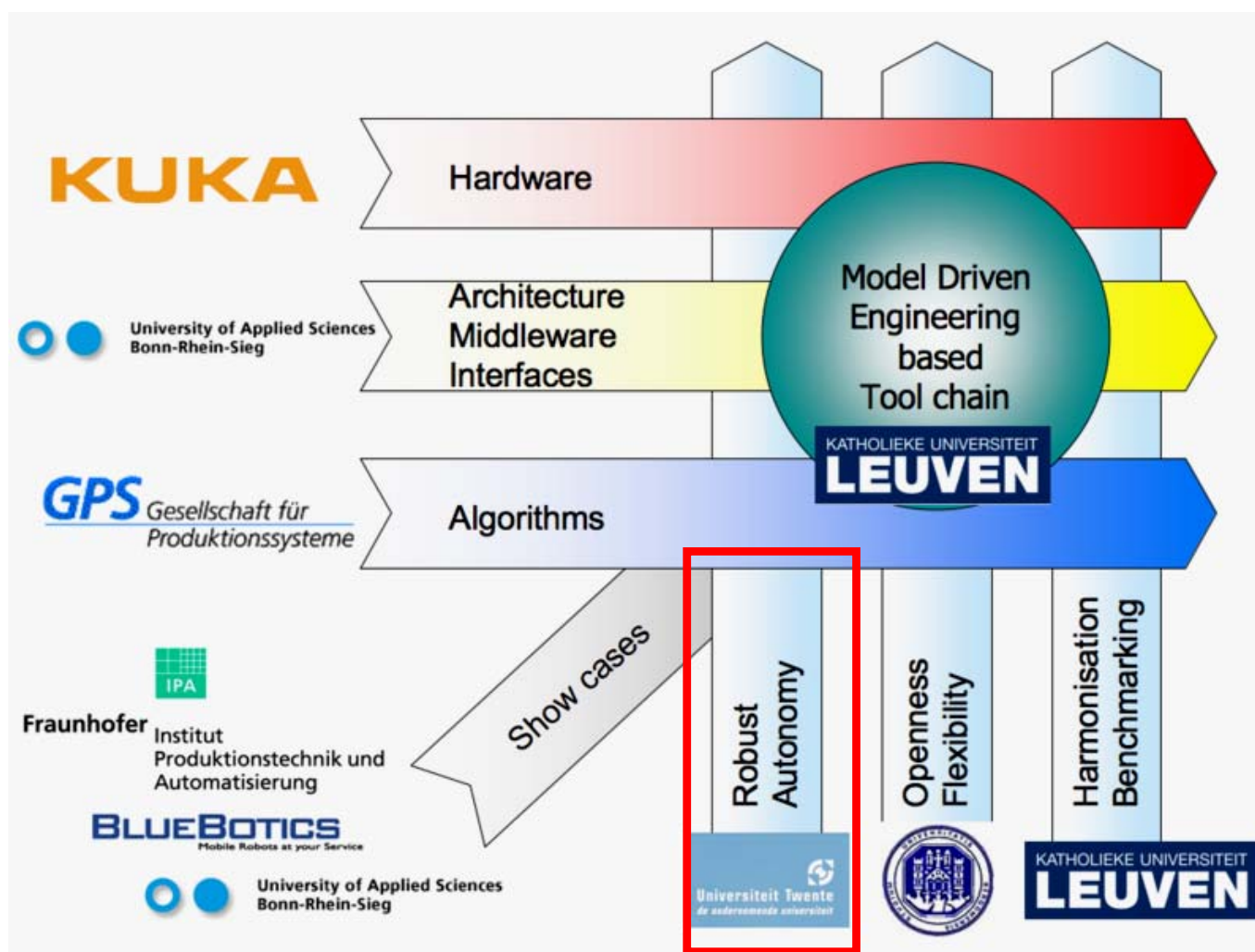# Robust Robot Software using Process Orientation

CPA 2009, Fringe Session

Cagri Yalcin, Jan Broenink

Control Engineering, University of Twente, The Netherlands

- BRICS (Best Practice in Robotics, 2009-2013)

- Work Package 6 (2 PhD Students)

- Autonomy: the potential of an intelligent man-made mechanism to interact with its environment without human intervention in its decisions about this interaction.

- The robustness of robot autonomy: sufficiently safe, accurate, etc. (i.e. within specifications) interaction over a maintenance interval.
  - Physical systems modeling and control point of view
  - Concurrent software point of view

- Translation from software dependability to robotics domain
    - emphasis on uncertainty: partially observable, stochastic environment
- Fault Detection, Identification and Reconfiguration (FDIR)
    - At both hard and soft real-time layers of embedded software

Possible Approaches
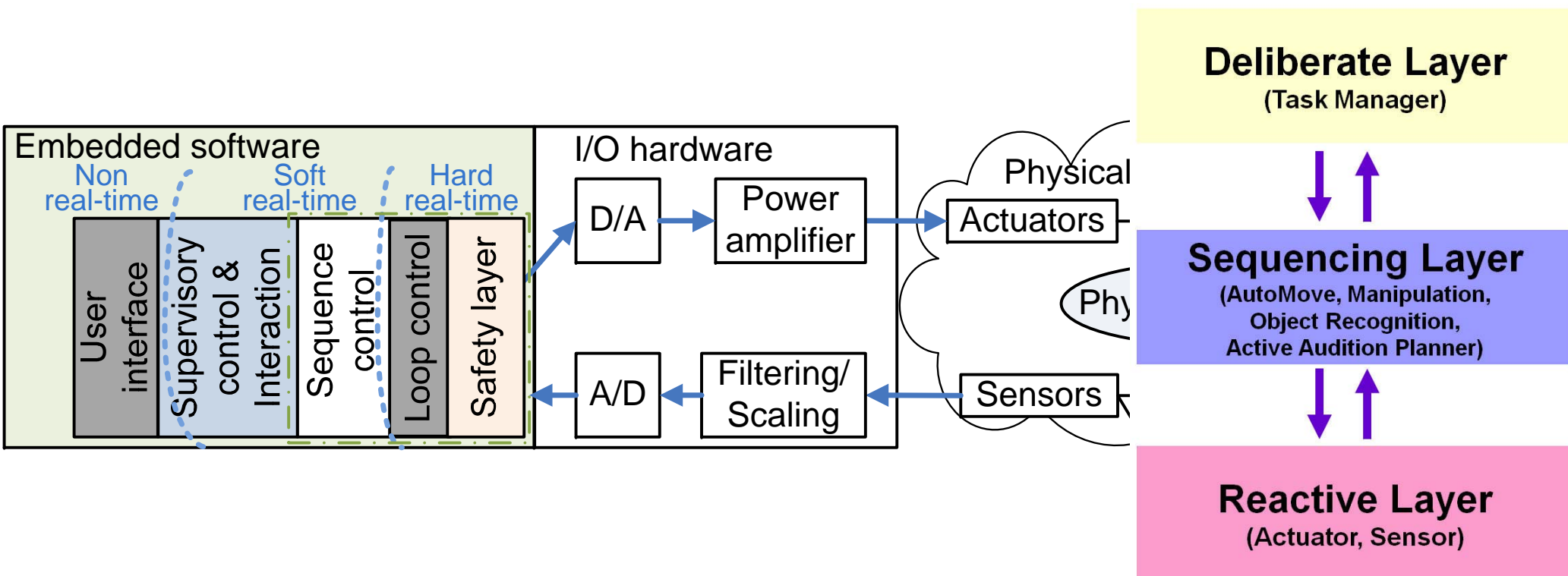
- Providing design criteria for robot software architectures
- Expert systems & ANN
- Probabilistic decision making via particle filters for faulty state estimation

- Process oriented software
  - Able to represent multiple layers of embedded software
  - Able to represent different robot software architectures (e.g. subsumption)
  - Real-time and robust FDIR (exception handling via channel poisoning (Jovanovic, 2005), run-time priority altering, dynamic network creation)