Institute for Advanced Manufacturing

The University of Nottingham

UNITED KINGDOM · CHINA · MALAYSIA

Evolvable Assembly Systems

## Towards Open, Adaptable and Context Aware Equipment and Systems

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- Vision: *A new platform for open, adaptable, context-aware and cost effective production* based on *multi-agent swarm intelligence* and *self-adaptation*.

- Some of the key research questions:
  - What is the <u>optimum manufacturing system morphology</u>?
  - How can we support <u>distributed hierarchical decision-making</u>?
  - How can we achieve <u>resilience, robustness and adaptability</u>?
  - How will the human operators participate in <u>hybrid decision-making</u>?
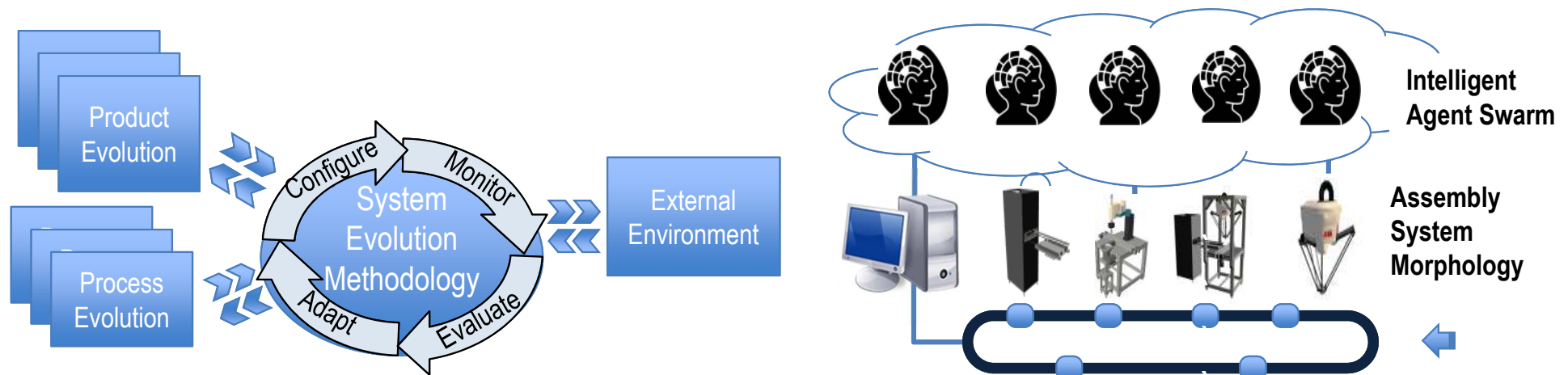
- A generic architecture and semantic model for future evolvable systems.

- Resource object-based morphology

- Swarm intelligence behaviour model and real-time awareness methodology

- Initial model instantiations at fixture, device, and workstation levels
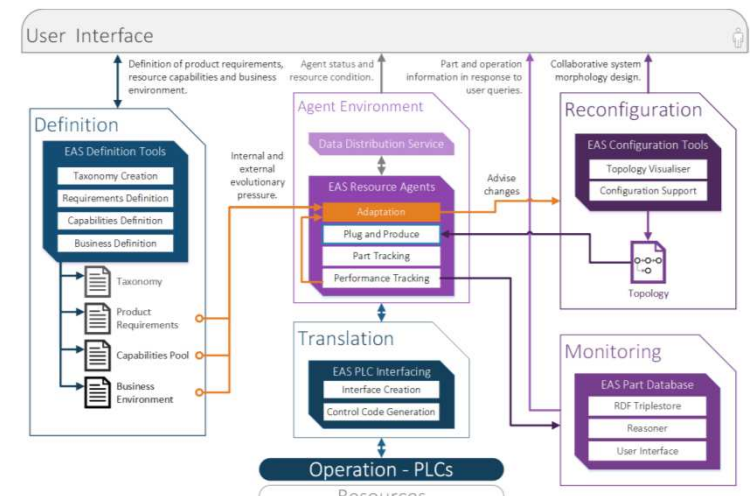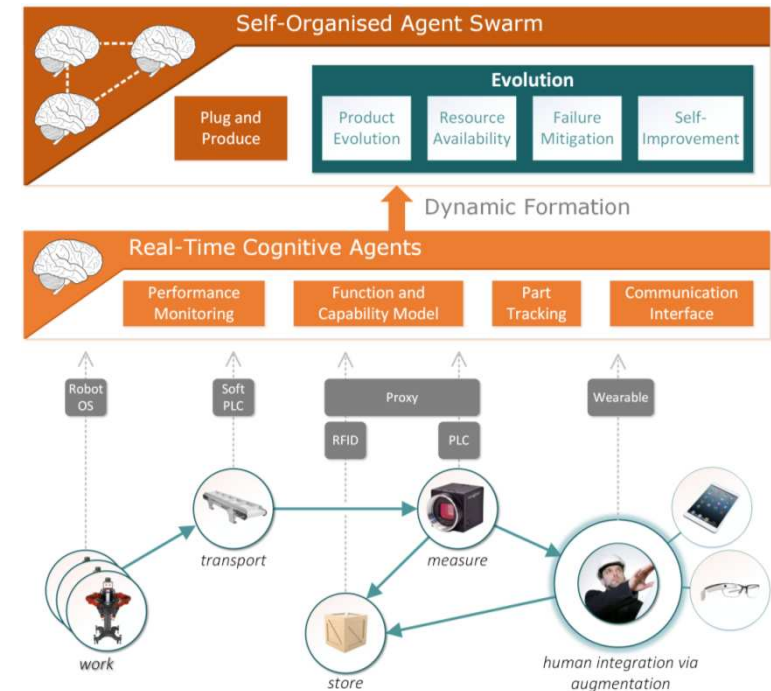
Evolvable Assembly Systems
Experimental testbeds
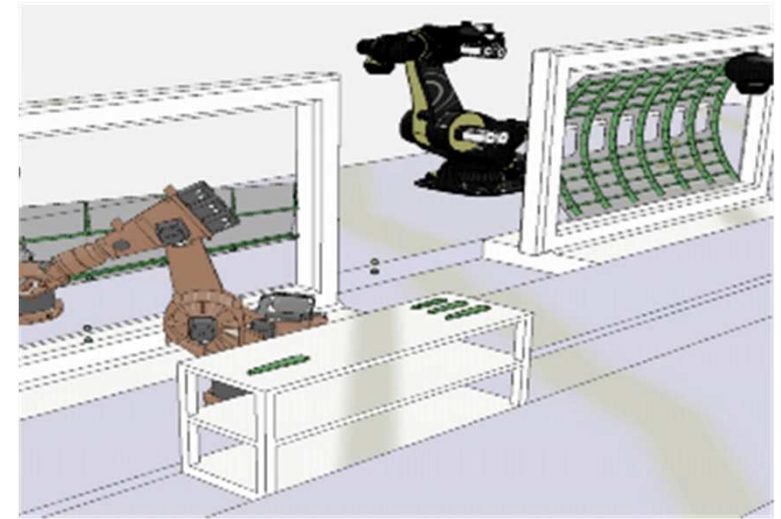
Plug and Produce Assembly Cell	**SMART Demonstrator**	**FA³D**

- o Plug and Produce hot-swap modularity
- o Twin-Robot setup for resource failure testing
- o Remote access to simulate lights-out operation

- o Complete assembly demonstrator: feeding, transport, testing, storage, labelling, packing, palletisation.
- o Agent communication environment.

- o Data-driven: networked resources, intelligent agent control, RFID tagging.
- o Uncertainty aware fixturing.
- o Rapid reconfiguration.
- o Smart working.

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