

Agent-based Computing



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Politechnika Warszawska

Holonic Multi-Agent Systems

Author: Paweł Olesiuk

Holon

- Holon (from the Greek holos, "whole") is something that is simultaneously a whole and a part
- The term was coined by Arthur Koestler *The Ghost in the Machine* (1967)
- In multiagent systems the modelling of holonic agents can be realised by commitments of the subagents to cooperate and work towards a common goal in a corporated way (e.g. ant colonies)

Holonic Manufacturing Systems: Some Scenarios and Issues

Martyn Fletcher
Agent Oriented Software Ltd, Cambridge

Problems of manufacturing business

- The need to support mass customization, i.e. make-to-order rather than make-to-stock
- The requirement to cope with a hybrid combination of production variety and volume within a single shop floor
- The demand from people to have their customer-specific products presented into the market with short order-to-delivery times
- The need to have tightly integrated supply chains and hold minimal reserve stocks

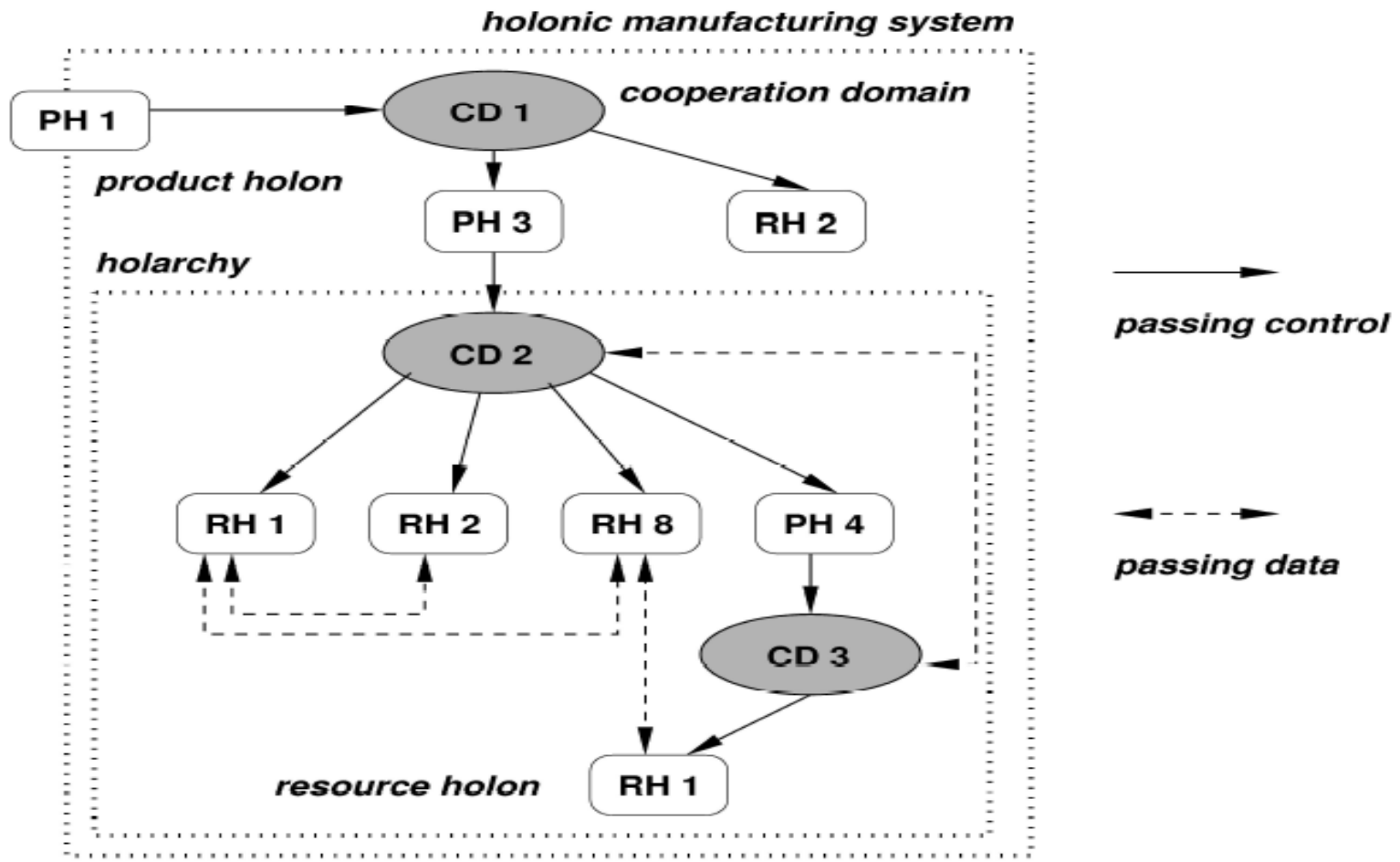
Holonic

- Holonics is not just a new technology, but rather it is a system-wide philosophy for developing, configuring, running and managing the next generation of manufacturing business where flexibility is paramount in order to transform, transport, store and/or validate information as well as physical objects

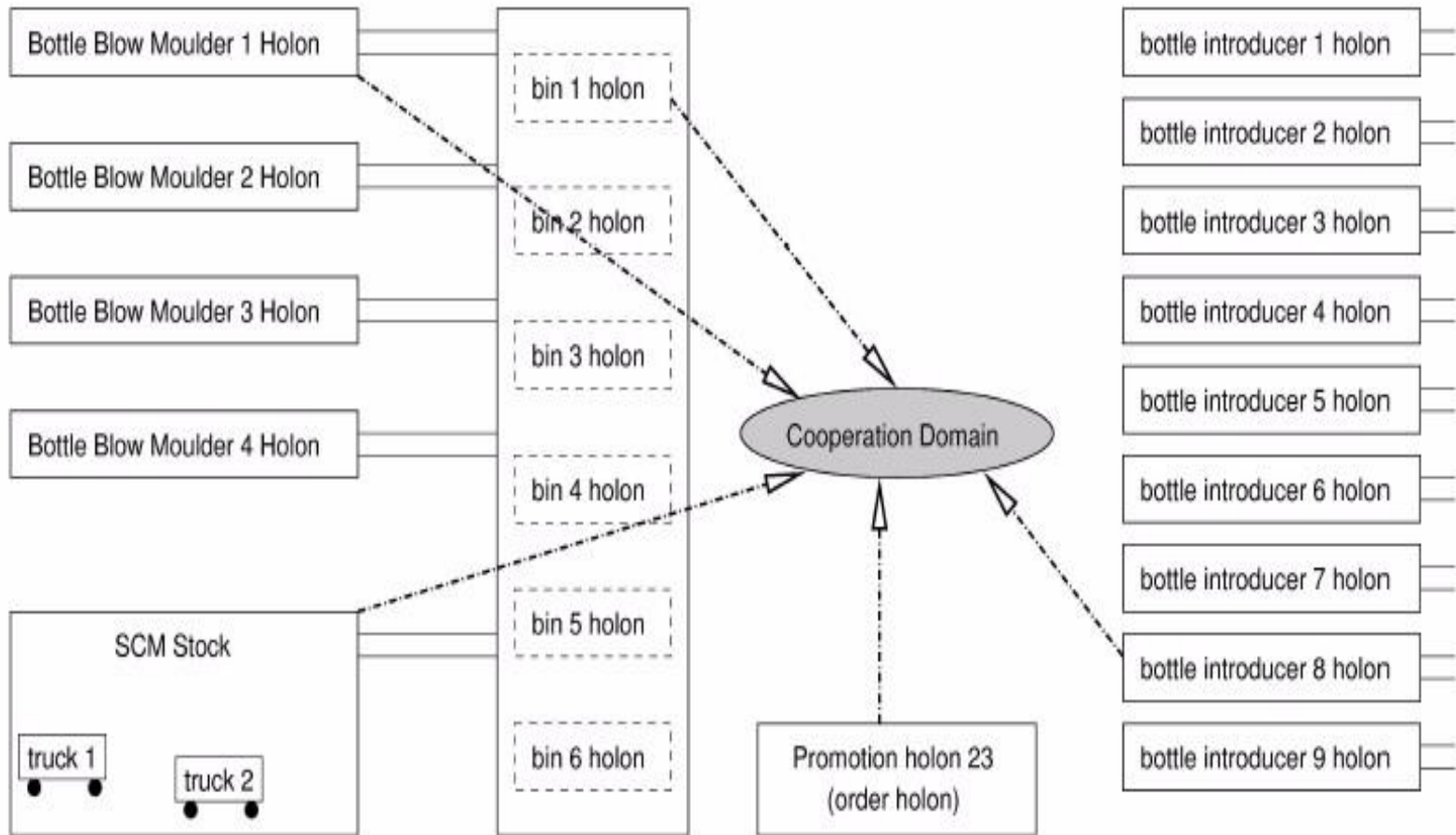
Holon types in Holonic Manufacturing System:

- Resource holons
- Product holons

Cooperation domains and Holons



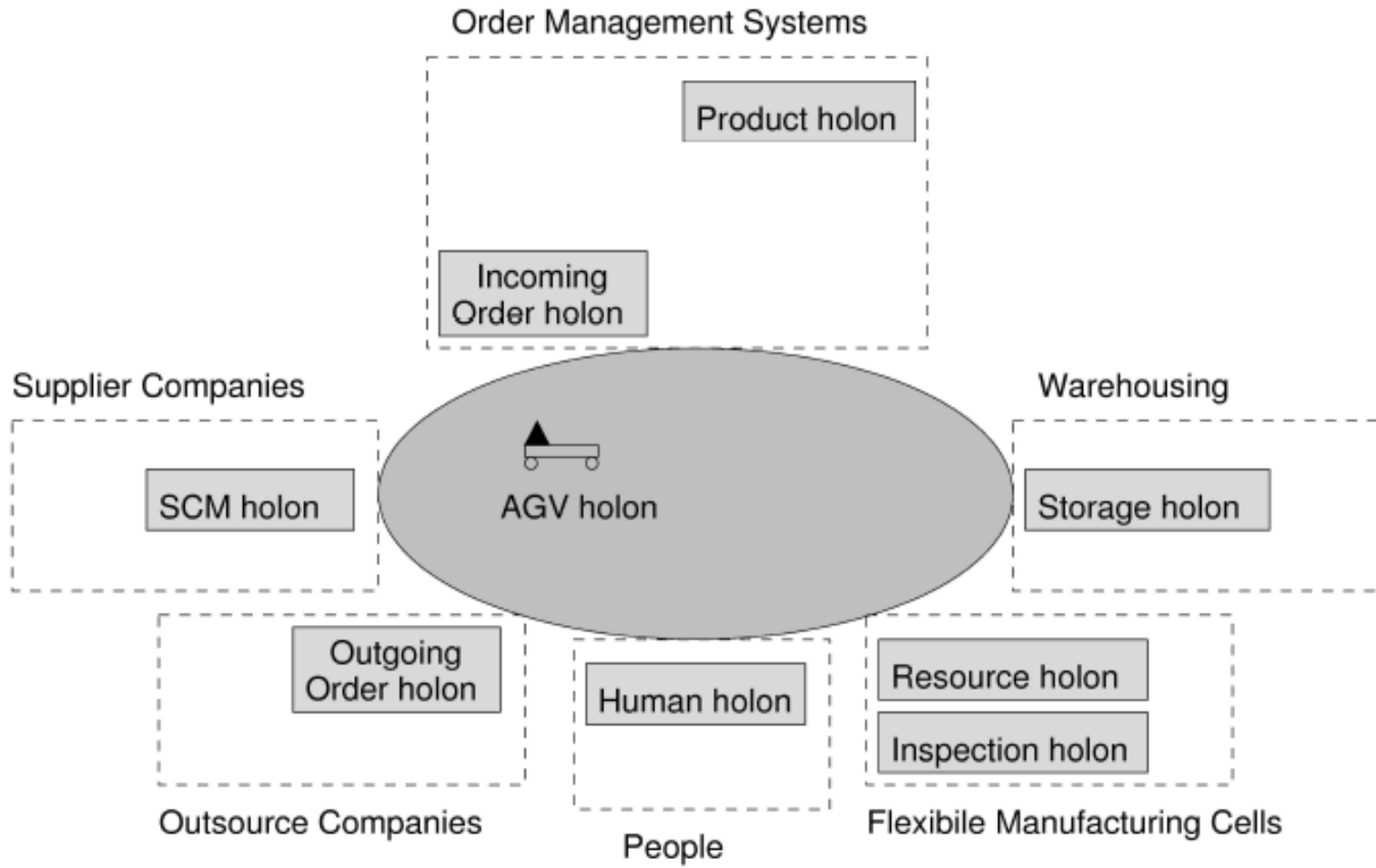
First Holonic Scenario: Tightly Integrated Supply Chains



First Holonic Scenario: Tightly Integrated Supply Chains

- The system is proactive in trying to identify optimal combination of manufacturing its products in-house and outsourcing some production
- Its makes maximal utilization of available resources
- It uses standard protocols and open interfaces to support cooperation
- The system is highly reactive to changing demnads

Second Holonic Scenario: High Degree of Agility and Reconfiguration



Second Holonic Scenario: High Degree of Agility and Reconfiguration

- Changing number and facilities of resource holons (i.e. machine)
- May dynamically choose to outsource some production
- Multiple and changing ways to make a product
- Can regularly add, remove or reconfigure machines

Benefits of Holonic Manufacturing Systems

- The HMS treats alterations in machine configurations, orders, personnel and production schedules
- The HMS reacts to machine breakdowns, as well as introduction of new machines, product recipes and information management facilities
- The HMS helps the business to make maximal use of available personnel, manufacturing capacity, resources and assets to satisfy current demand for its products

The End

Thank you for your attention