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Graphical Programming Language Support for Service Oriented Architecture in Automation

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Graphical Programming Language Support for Service Oriented Architecture in Automation

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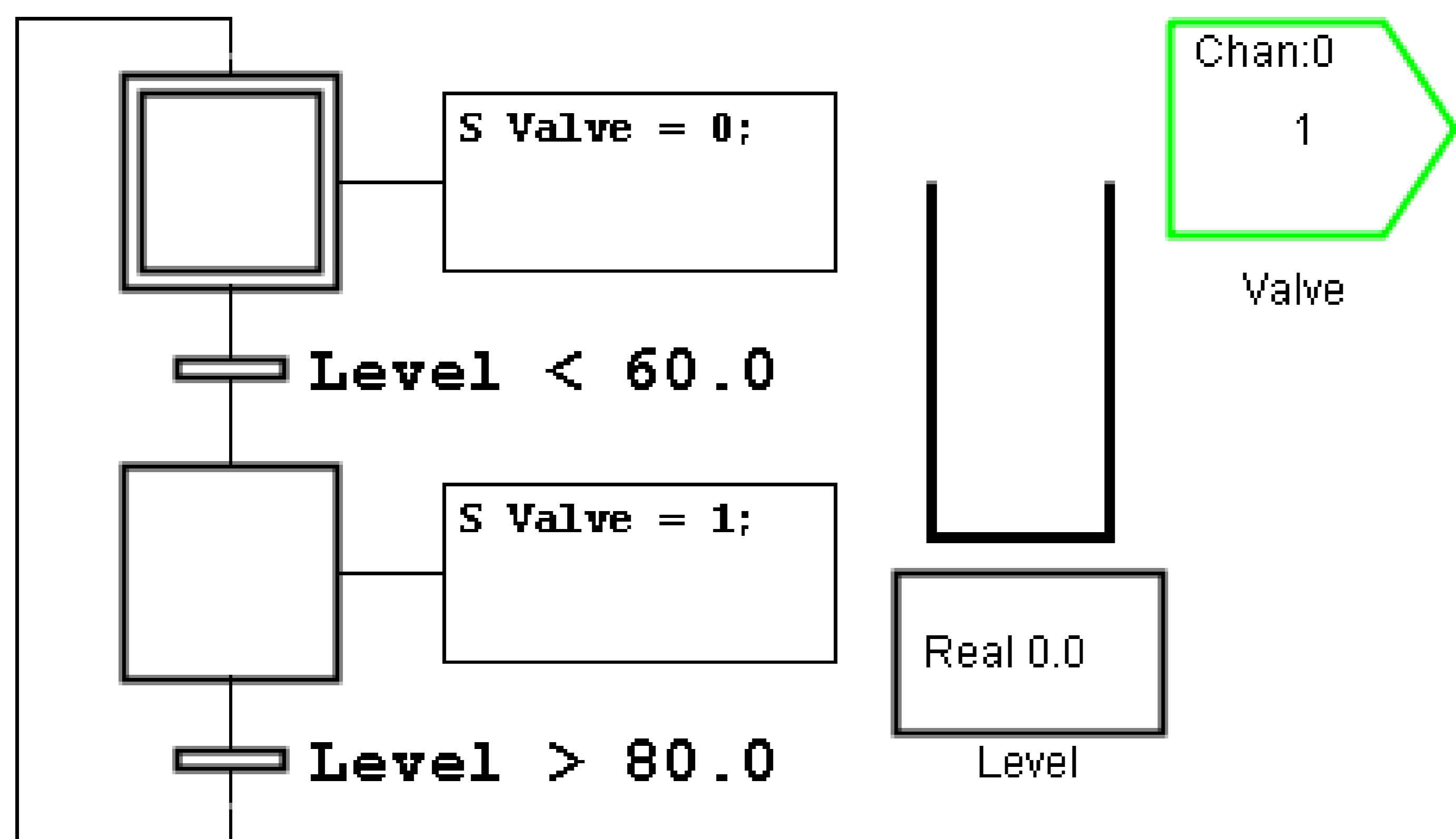charlotta.johnsson@control.lth.se

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Challenges in manufacturing

- Faster set-up
- Faster adaptations
- Customizable products
- Better vertical integration
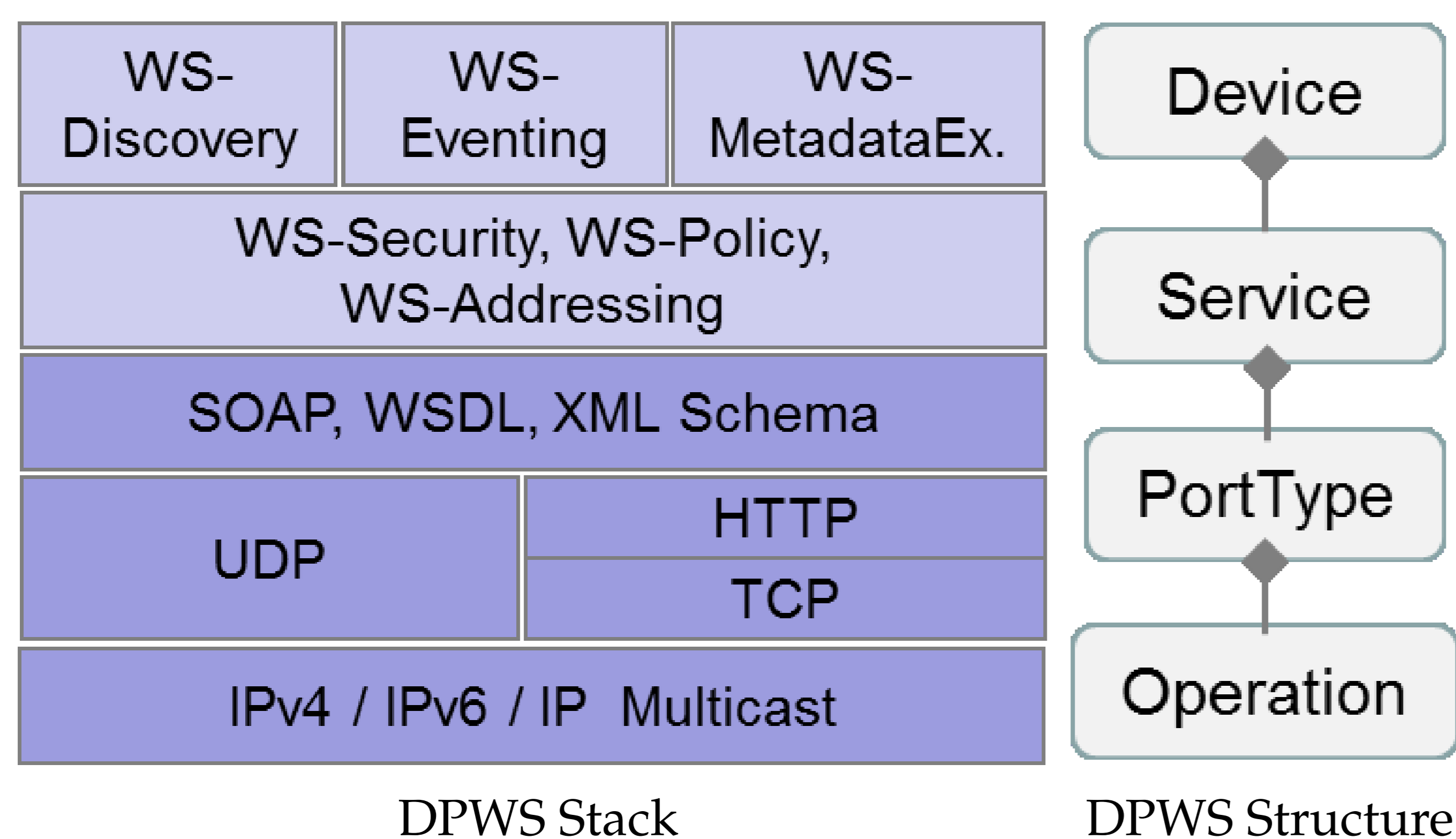- Manufacturing equipment is becoming more complex

Service Oriented Architecture (SOA) is a promising technology to tackle these challenges, e.g. SIRENA [2] and SOCRADES [1][3]. One outcome of SIRENA was a web service profile for embedded devices, i.e., Devices Profile for Web Services (DPWS).

Grafchart

Grafchart is a graphical programming language for sequential control applications. Graphical programming is intuitive as it allows programming that mimics the way people model problems.
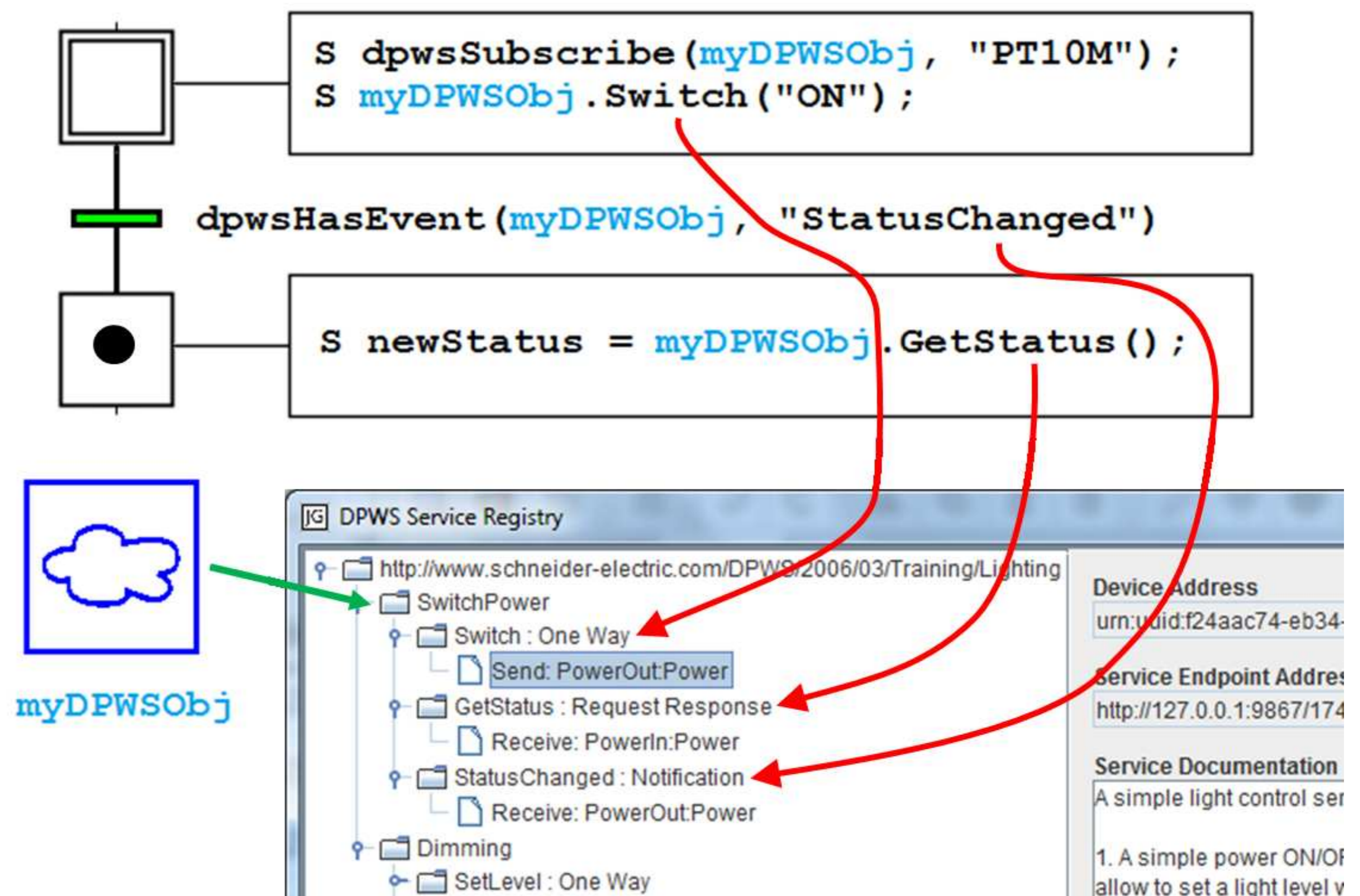
DPWS

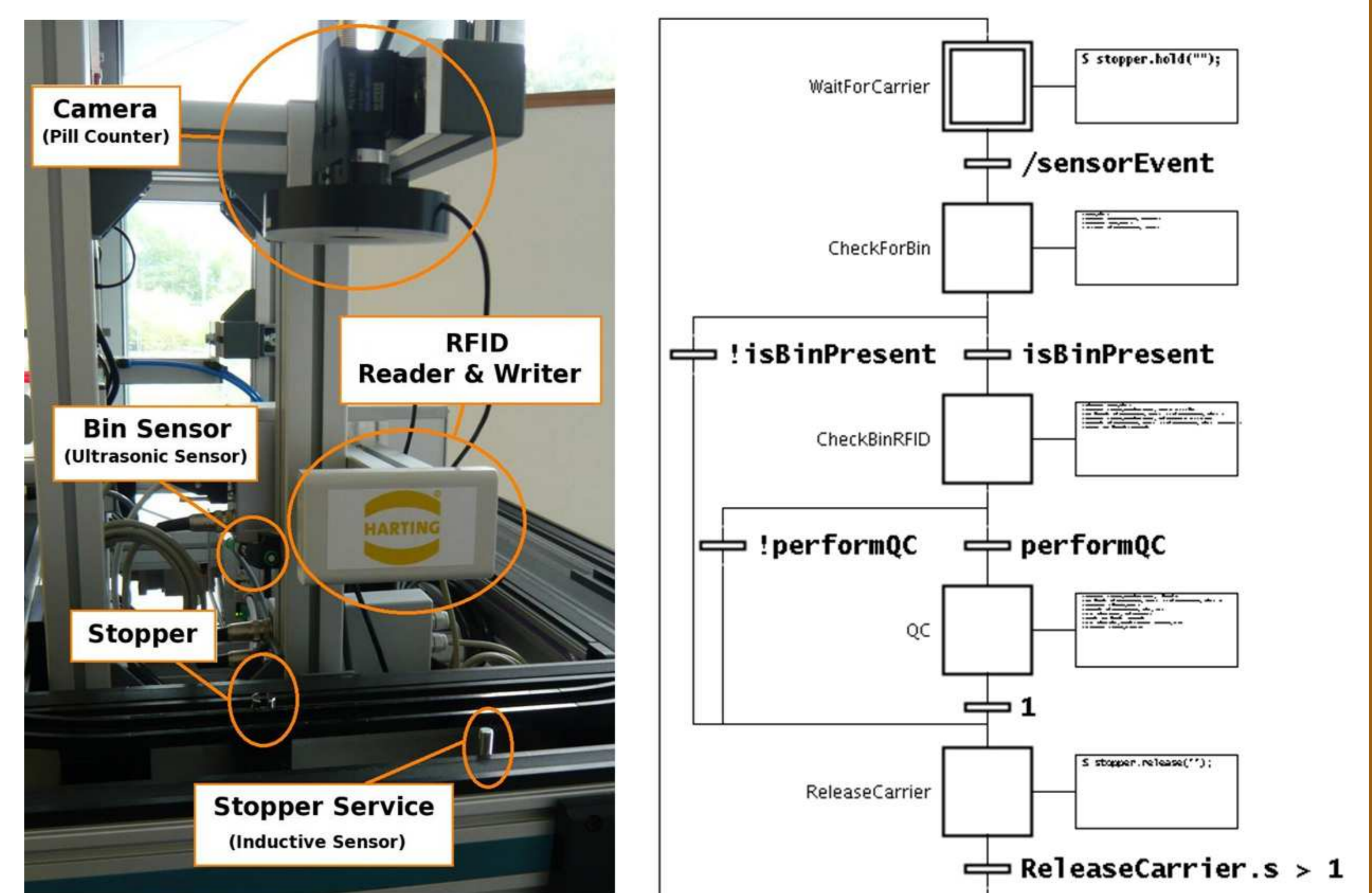DPWS Stack   DPWS Structure

All DPWS devices are discoverable (WS-Discovery) and self-describing (WS-MetadataExchange), meaning that all information required to use a DPWS device can be obtained from the device itself, e.g. its IP-address, operations, and operation signatures.

Grafchart DPWS Integration

Generic DPWS support that is easy to use has been added to Grafchart [4], enabling anyone to try out SOA for automation with minimal effort. Simply create a DPWS Object, bind it to the Port-Type of a DPWS device, and then just call the operations.

SOA Demonstrator

The DPWS implementation in Grafchart was tried out on a quality control station of SmartFactory^{KL}'s SOA demonstrator, checking if bins have been filled with the correct number of pills.

When a carrier arrives, one should check that there is a bin on it, if so the status of the bin should be read, and if it is ready for quality control then it should be executed. Not only was it possible to implement this using DPWS in Grafchart, but the application actually looks like one would model the process conceptually.

Acknowledgements

[1] De Souza, L M S, Spiess, P., Guinard, D., Köhler, M., Karnouskos, S., and Savio, D. *Socrades: A web service based shop floor integration infrastructure* In First Int. Conf. on Internet of Things (IOT), Zurich, Switzerland, March, 2008.

[2] Jammes, F., Mensch, A., and Smit, H. *Service-oriented device communications using the devices profile for web services* In MPAC, 2005.

[3] Kirkham, T., Savio, D., Smit, H., Harrison, R., Monfared, R.P., and Phaithoonbuathong, P. *SOA middleware and automation: Services, applications and architectures* In 6th IEEE Int. Conf. on Industrial Informatics (INDIN), July, 2008.

[4] Theorin, A., Ollinger, L., and Johnsson, C. *Service-oriented Process Control with Grafchart and the Devices Profile for Web Services* In Proc. of the 14th IFAC Symp. on Information Control Problems in Manufacturing (INCOM), Bucharest, Romania, May, 2012.