Microworlds for Industry 4.0

Digital Twins and IoT for learning purposes

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Snap*!*Con 2023

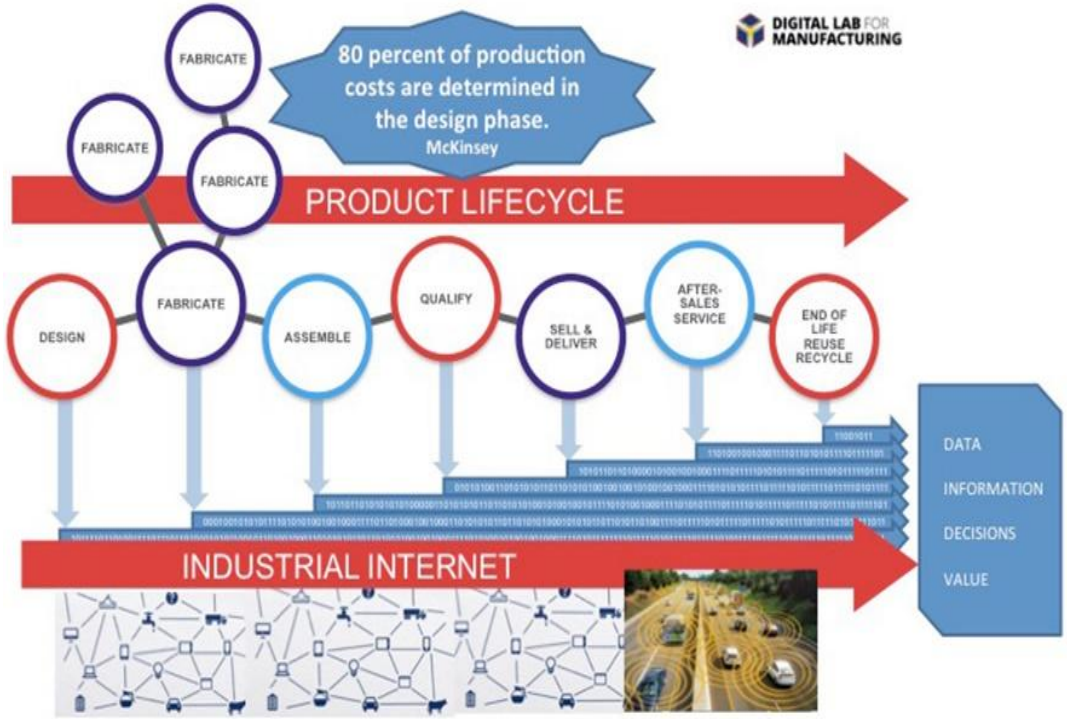
The IT/OT Convergence Challenge

- Discovered in 2007 by Rockwell Automation
- Still a hot topic in Hannover Messe 2023

IT

OT

IT/OT Convergence and Digital Twins



RAMI 4.0 (Reference Architecture Model Industry 4.0)
IEC/PAS 63088

Digital Twins

Digitalized Physical Assets

https://www.controleng.com/articles/benefits-suggested-with-convergence-of-it-controls

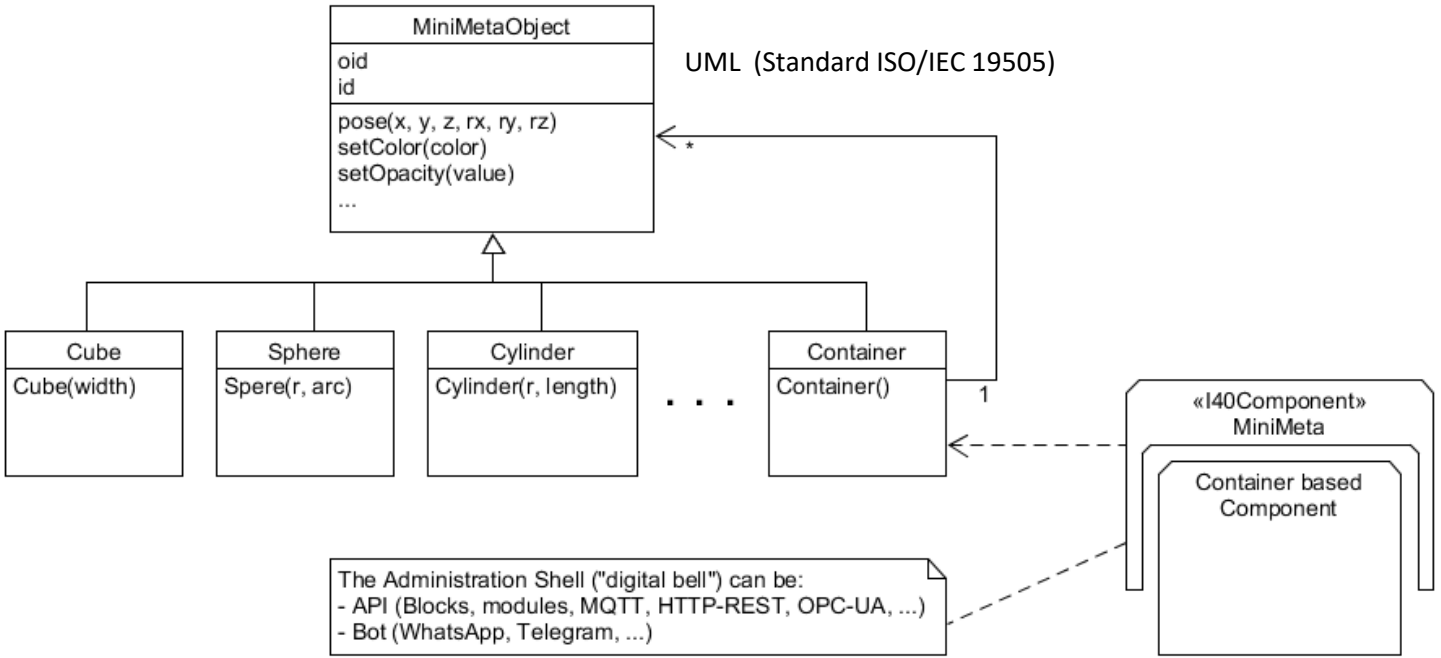
Experience in Postgraduate Courses

- Many engineers have forgotten programming and are afraid of it, in the same way as Differential Calculus, Linear Algebra.Still a hot topic in Hannover Messe 2023
- We used Python at the beginning, and later we switched to Snap*!*

Example 1

- https://pixavier.github.io/snap/snap.html#open:pyret/minimeta/meta.xml

I4.0 Component and Composite Pattern



RAMI 4.0 (Standard IEC PAS 63088)

Example 2

- http://vps656540.ovh.net/sdl4snap/pendulum.html
- http://vps656540.ovh.net/snap/snap.html#open:../../ejemplos/modelo_continuo.xml

Experience in Engineering Associations

- Snap*!* learning curve is short but not immediate
- https://pixavier.github.io/snap/pyret/minimeta/inline.html

- Example 3
- https://pixavier.github.io/snap/pyret/fan00.html

Recap

- According to the general industrial framework ISA 95 (IEC 62264), systems are classified into discrete, continuous, and batch (hybrid)
- For discrete systems, sdl4snap was presented at Snap*!*Con 2021 (https://github.com/pixavier/sdl4snap)
- Microworlds can connect to external systems such as Digital Twins via MQTT or HTTP

Thank you !

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