Ageing of Industrial Control Systems (ICS)

Challenges with ageing of industrial information and control systems – compatibility/obsolescence



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Agenda - Ageing of Industrial Control Systems (ICS)

- What do we mean with ICS?
- Setting the scene main concerns
- Different types of ageing
- Physical ageing within ICS? Future threat?
- What separates the different levels regarding ageing, where is ageing most critical?
- Procurement challenges
- Conclusions



Industrial Control Systems (ICS)

- ICS are IT-based systems that are used to control and monitor physical processes and systems in real time.
 - Ranging from field equipment/instrumentation such as sensors etc via Programmable Logic Controllers (PLC) and Distributed Control Systems (DCS) to information management and monitoring systems such as SCADA etc.
- PLC:s modular devices with inputs and outputs (I/O).
- SCADA systems Supervisory Control And Data Acquisition.



Simplified model describing ICS



Source – Swaling, V. H., Andersson, F. M., Mork, J. C., (2016), NCS3 – Gammal är inte äldst, ISSN 1650-1942, FOI-R-4292-SE, MSB 2015-6559.

Setting the scene

- "The further from Microsoft you can get, the longer the stuff can stay."
- "You have to ask how many can give support? Maybe only 4 or 5 retirees. Is that support? One has to get to the bottom of what we mean by support quality."
- Main concerns



Different types of ageing

- Relatively aging technological aging
 - Claim Context i.e. inadequate properties relatively new requirements.
 - Support Context i.e. the properties change because the support context changes.
 - Entity relatively i.e. less good properties than (often a newer) comparison object.
- Absolute aging
 - Time
 - Property physical or functional ageing.



County Administrative Board of Norrbotten Physical aging within ICS? Future threat?

- Physical degeneration: mechanical wear, fatigue, corrosion.
- Not a major problem.
- Lifetime of physical objects, generally considered to be long:
 - PLC designed for 30-40 year service life
 - I/O card 20 years
- Importance of spare part availability.
- In the future physical ageing could be a threat.

 - Technical upgrades place very high demands on the organisation.

What separates the different levels regarding aging? Where is aging most critical?



- On the level of information, adaptation to the new requirements occurs quickly and moderately unhindered.
- On the level of automation, though, it seems that the demands for change are countered by the demand for stability, which creates complexity.



Procurement challenges

- Functionality vs Price
- "Soft" parameters
 - Support quality
 - Support access
 - System compatibility
- Price
- Major risk One is stuck with a patchwork of parts that have varying degrees of compatibility.



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Conclusions

- The main challenge is ageing in relation to contextual demands, primarily imposed by the rapidly evolving area of information, supervision and data acquisition.
 - New automation equipment is very soon considered obsolete.
 - The boundaries are set by the ever-shorter support horizons of suppliers.
- Major challenge with recruiting engineers.



Conclusions, continued

• ICS is approaching IT.

- Opportunities and challenges:
 - Online and cheap, but with increased exposure to the Internet.
- Trend towards off-the-shelf instead of customer solutions:
 - Less knowledge about how systems actually work.
- Procurement issues.
- Vulnerabilities in form of "black boxes" and "patchworks" of solutions.

