ARCHITECTURAL CONCEPTS FOR FEDERATED EMBEDDED SYSTEMS

Jakob Axelsson & Avenir Kobetski
(with contributions from Eilert Johansson, Ze Ni, Shuzhou Zhang,
Efi Papatheocharous, Emmanuel Frécon, and >10 industrial partners)
Swedish Institute of Computer Science (SICS)
FEDERATED EMBEDDED SYSTEMS (FES)
FES APPLICATION EXAMPLE
TWO ARCHITECTURES

RQ1: Product architecture to enable federations

RQ2: Federation service architecture

Embedded system
Product A

Server

Embedded system
Product B
CONCERNS

Federation service

- Composability
- Maintainability
- Assurability
- Variability
- Portability
- Resource usage

Embedded system
Product A

Flexible
Openness
Security

Server

Product B

Federation service architecture to enable federations
FEDERATION FUNCTIONS

- Discover
- Join
- Leave
- Participate
- Address

Formation and dissolution

- Supervision
- Fault handling
- Security protection
- Conflict handling

Management
INSTANTIATION

Trusted server

Federation server

Product
CONCLUSIONS

Reference architecture

Federation architecture

Product architecture

Reference architecture

Federation examples

Experimental platform

Empirical evaluation