

Safety and Security in Industry

Research Lab „SafeSecLab“

#SafeSecLab

Project 2 Safety and Security Integrated IT/OT Architecture

The PhD2 project is defined to enable a safe and secure integration of the different levels of the automation pyramid. Relevant topics for the project address the integration or embedding of legacy components, network security, hierarchical security architectures (defense in depth), security/safety versus real-time requirements, challenges of limited resources in automation systems, scalability and resilience. To address these issues, a Reference Architecture and recommendations for its prototype implementation is planned to be developed. A Reference Architecture continuously captures stakeholders' needs, receives feedback from the real-world applications, observes unforeseen opportunities emerging from new technologies and uses existing architecture experience and knowledge.

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Education

- B.Sc. (KNTU, Tehran) and
 - M.Sc. (AUT, Tehran)
- both in Electrical Engineering

Experience

- Control Algorithm Design
- Two years of work experience in Automation and Instrumentation industry

Research Interests

- Cyber-physical Systems, Industry 4.0
- Safety and Security Architecture



State-of-the-Art and Methodology

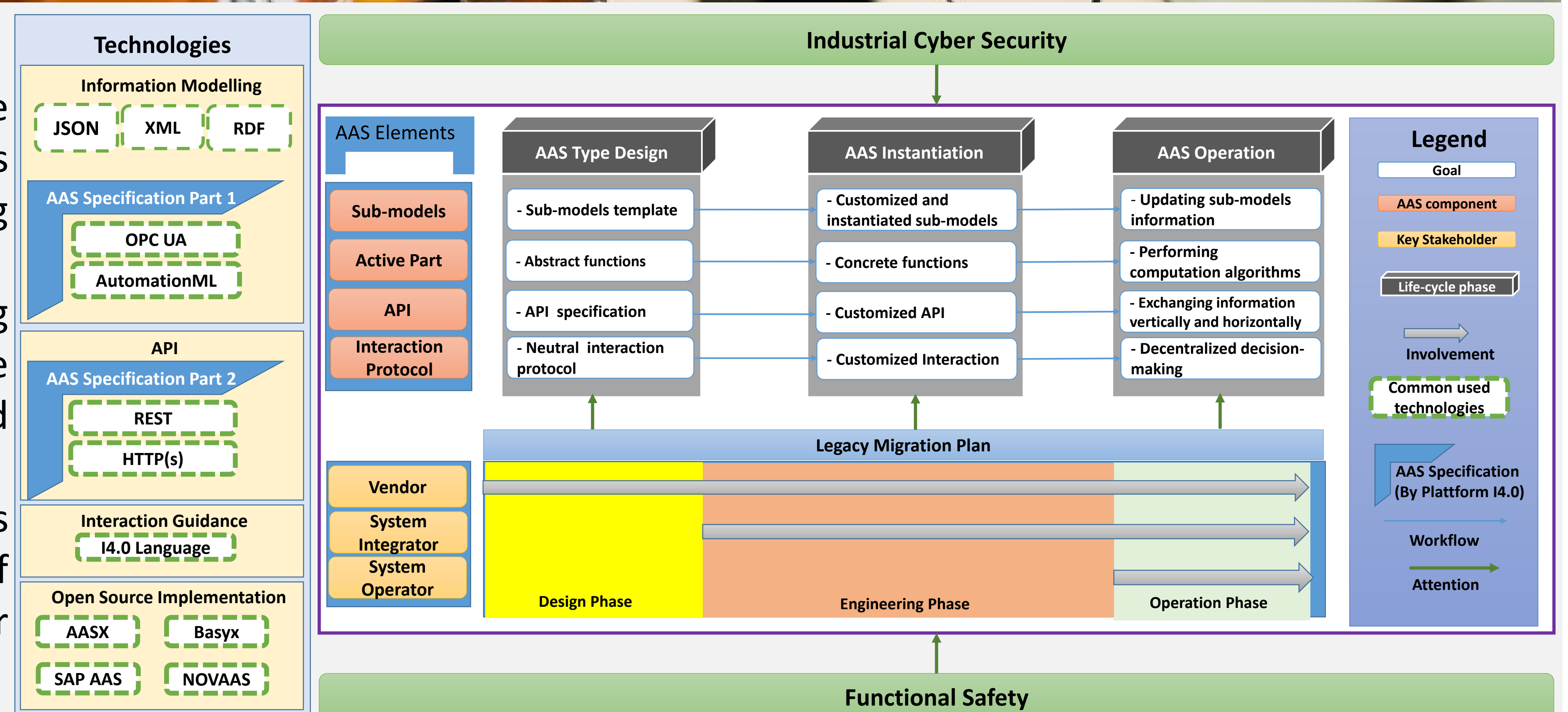
With the introduction of Industry 4.0 (I4.0), manufacturing systems are moving towards digitalization which is one of the principal visions of I4.0. In industrial automation systems, safety and security are fundamental aspects that will gain even more importance in the future, even more so as systems become more interconnected in I4.0. Furthermore, converging Information Technology (IT) and Operational Technology (OT) introduces new challenges in terms of safety and security.

The Reference Architectural Model for Industry 4.0 (RAMI 4.0) is a three-dimensional map demonstrating how to address the topics of I4.0 in a structured fashion. It ensures that all parties involved in I4.0 discussions comprehend each other. In line with RAMI 4.0, the Asset Administration Shell (AAS) is introduced and provides the digital representation of assets, integrating them into the cyber-space. It, therefore, includes all relevant information related to asset characteristics and behaviors. An asset can be everything that has value for the owners ranging from physical components to non-physical entities like software tools.

PhD2 aims to tackle the safety and security challenges by means of providing a common ground for system development called Reference Architecture which will lead to a safe and secure digitalization of future factories in line with RAMI 4.0 and AAS framework.

Reference Architecture

- A common ground for safe and secure development of I4.0 applications that is crucial for interoperability among different stakeholders.
- Providing a common understanding among different involved parties like component vendors, integrators and asset owners.
- Facilitating safety and security analysis before in design time (reduces cost of fixing issues in implementation or operation).



Expected Research Results

- Designing a Reference Architecture for safety and security.
- Providing recommendations for safety and security by design in line with RAMI 4.0 and AAS.
- Providing a safety and security catalogue.
- Validation and assessment of the proposed Reference Architecture via testbed implementation.
- Designing system architectures for AAS-based Digital twin applying a specific use case.

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