



A Framework for Implementing Process Applications using CIP Technologies

Abstract

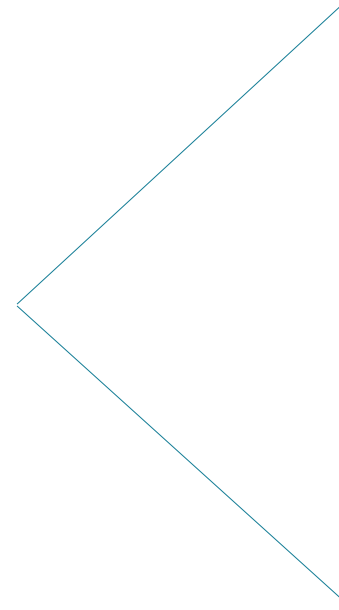
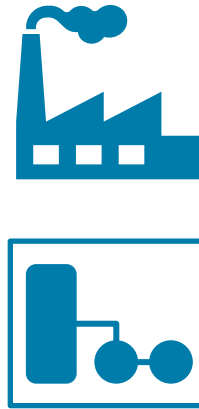
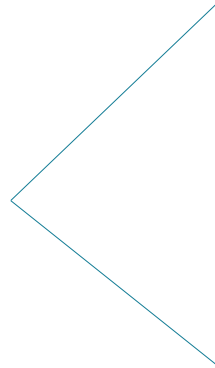
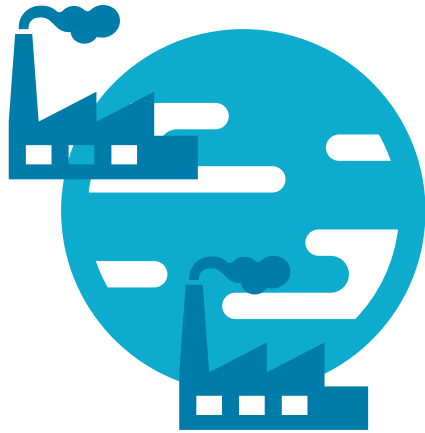


Recent initiatives within ODVA have facilitated the means by which a Process application can be realized.

Enhancements to the technology have allowed the development of solutions to address use-cases such as device interoperability, connectivity into hazardous environments, the presentation of diagnostic information aligned to user specifications and the integration of legacy technologies.

This paper will provide an overview of which of scenarios can now be met whilst highlighting areas where further development is needed in order to facilitate the further adoption of the CIP technologies in process applications

Process application



-  Oil & Gas
-  Food & Beverage
-  Water and Wastewater
-  Chemical
-  Life Sciences

Personas



Isabelle

Instrument Technician



Cassie

Control Systems Engineer



Sam

Security Architect



Edward

Instrument Engineer



Ned

Network Engineer

Process Industry needs

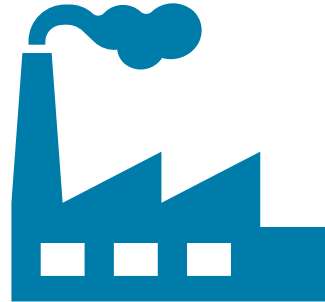
Safety

Hazardous area

24/7 Uptime

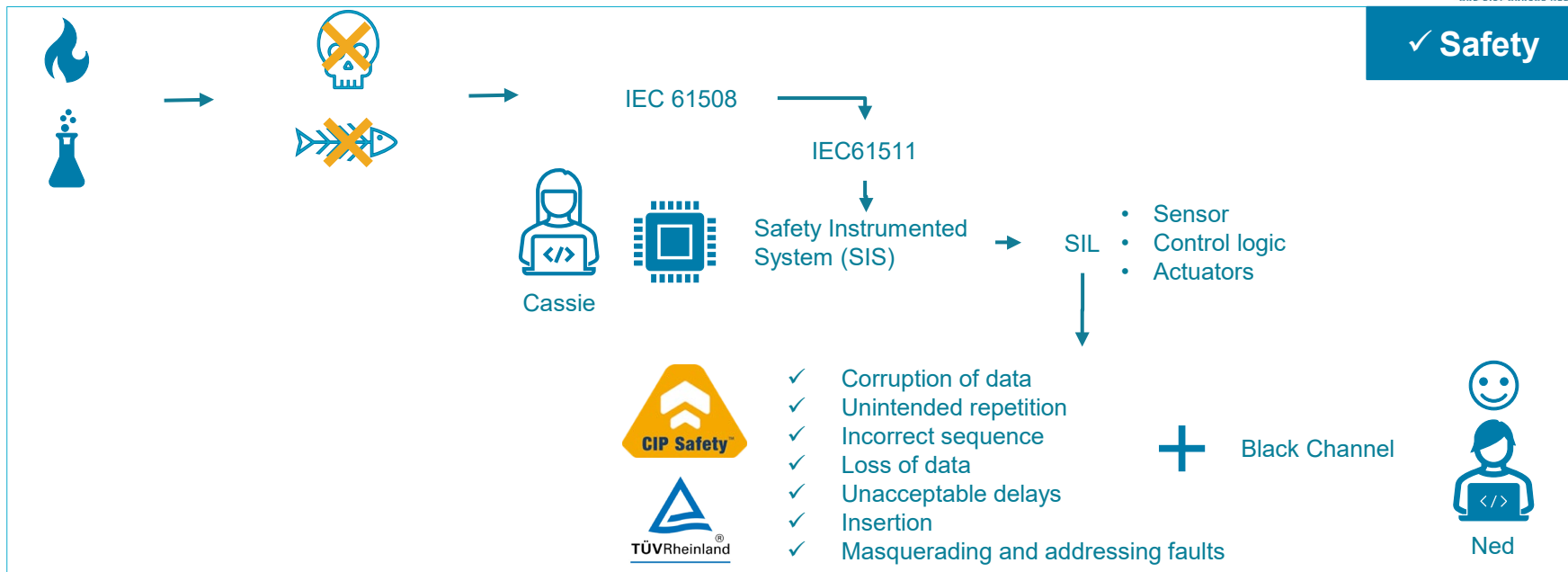
Configuration

Secure remote access



Process improvement

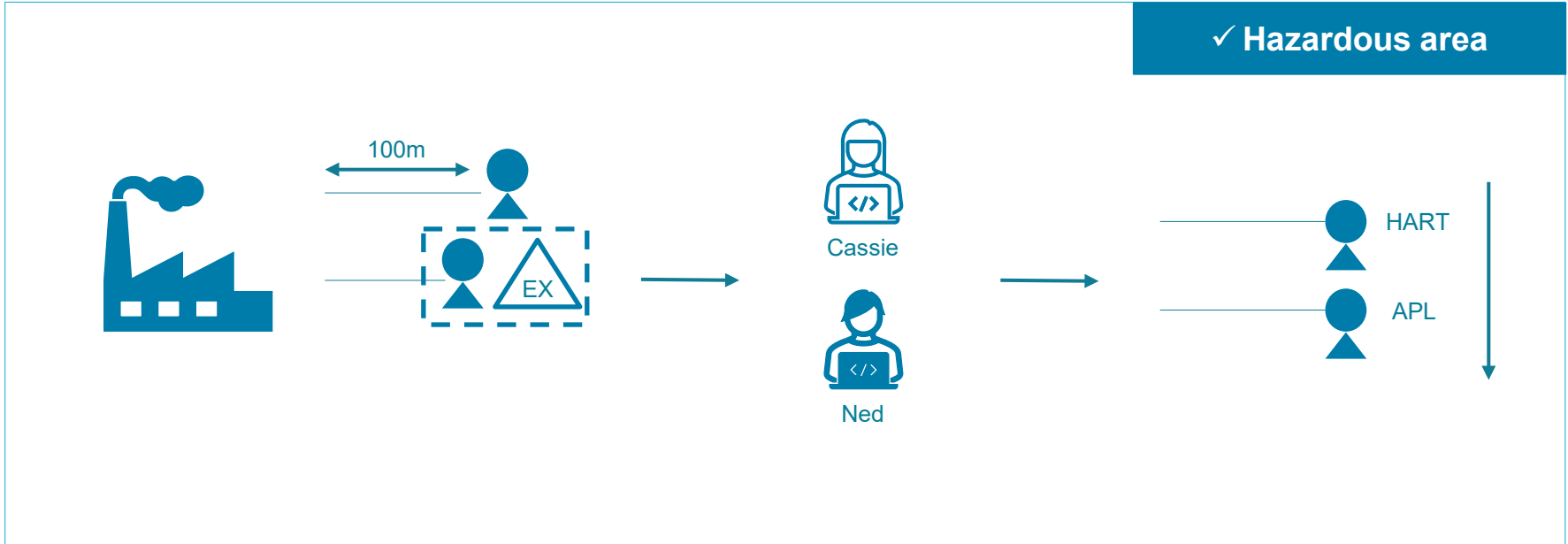
Meeting Safety Requirements



Need:

- Guidelines on how CIP Technologies can help meet IEC61511

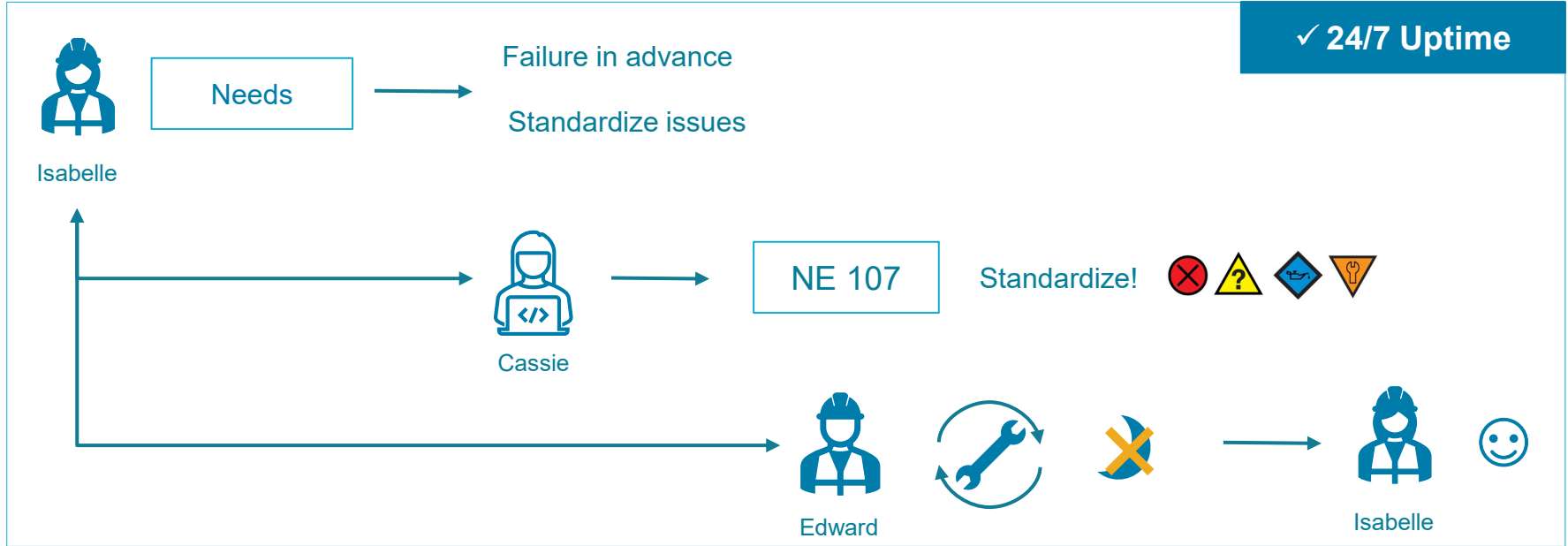
Long Cable Runs and Connectivity to Hazardous Areas



Needs:

- Adoption of HART translator
- Availability of APL Switches and Devices

Device Maintenance in Use

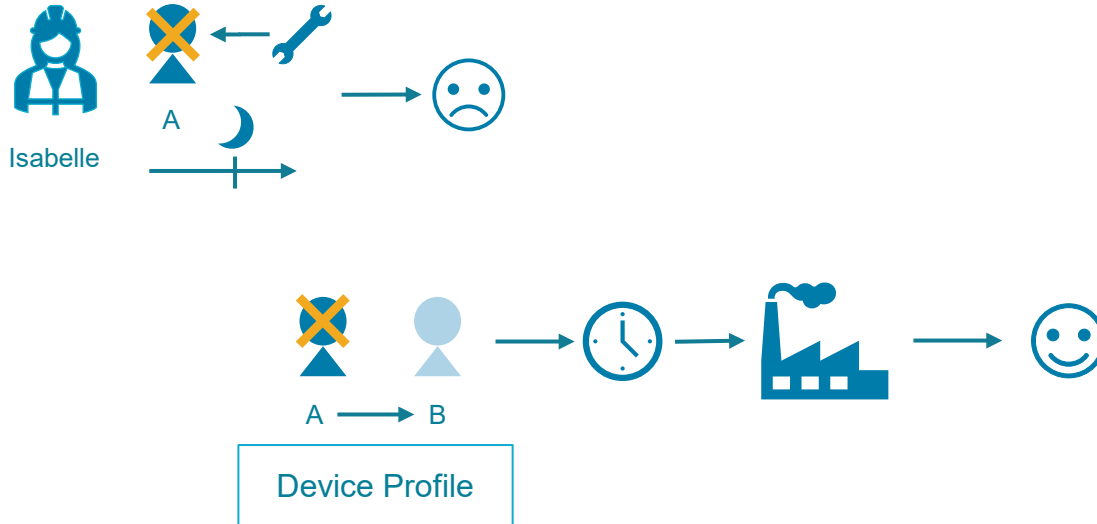


Need:

- Availability of devices with the NE107 Diagnostic Object

Device Replacement & Interchangeability

✓ 24/7 Uptime



Need:

- Expand range of profiles
- Availability of Devices supporting Profiles

Commissioning and Integration

✓ Configuration



Cassie



Edward

Controller



Operations



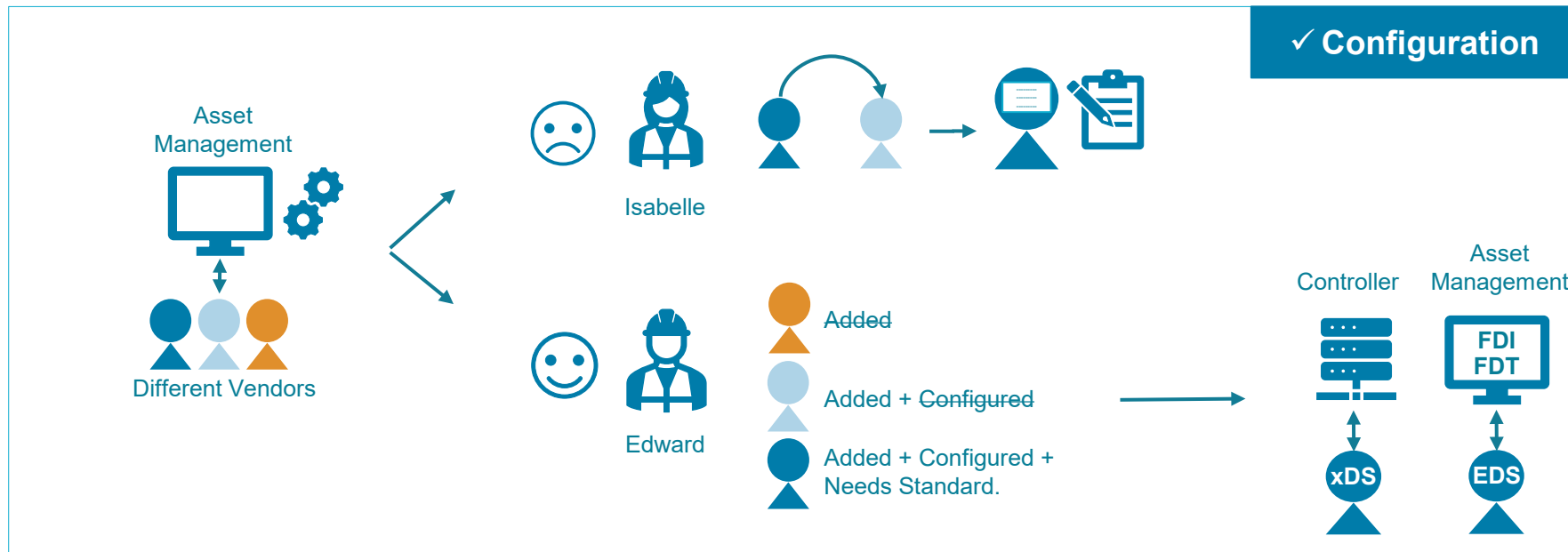
Asset Management



Need:

- **Availability of Devices supporting Profiles**

Device Configuration and Management

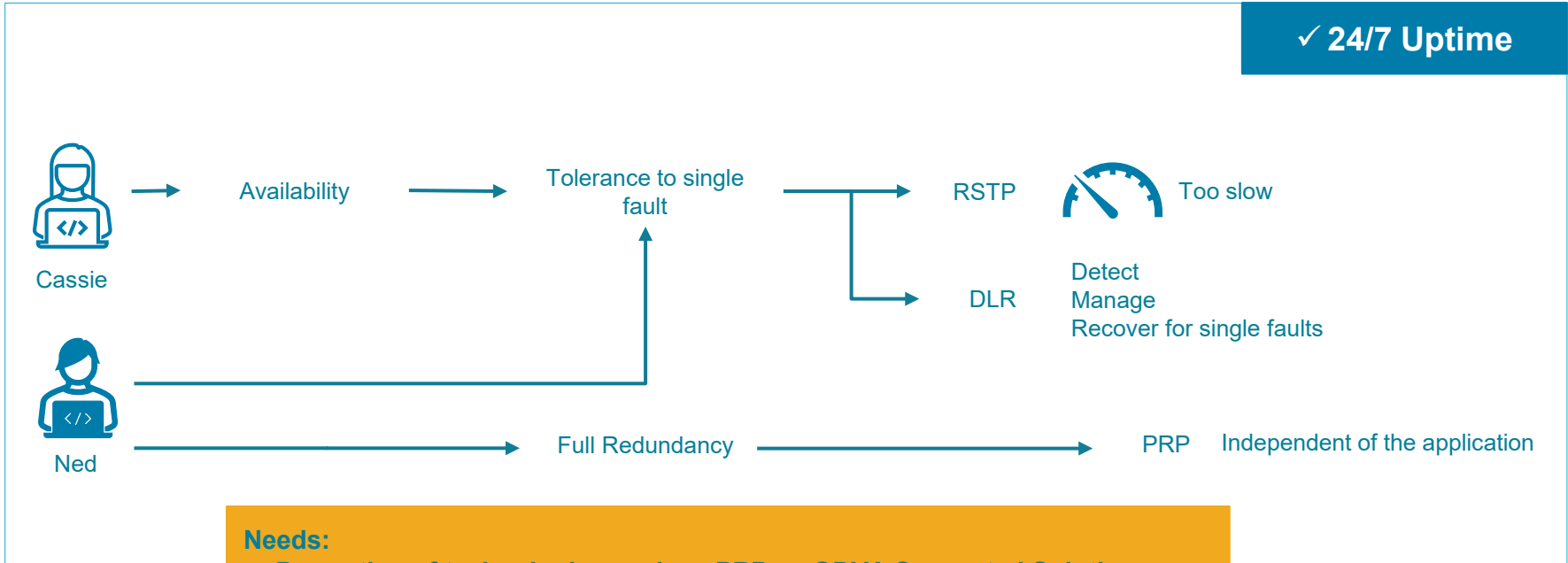


Needs:

- Complete Specification for xDS
- Complete FDI & FDT CIP Annex Specification

High Availability and Media Redundancy

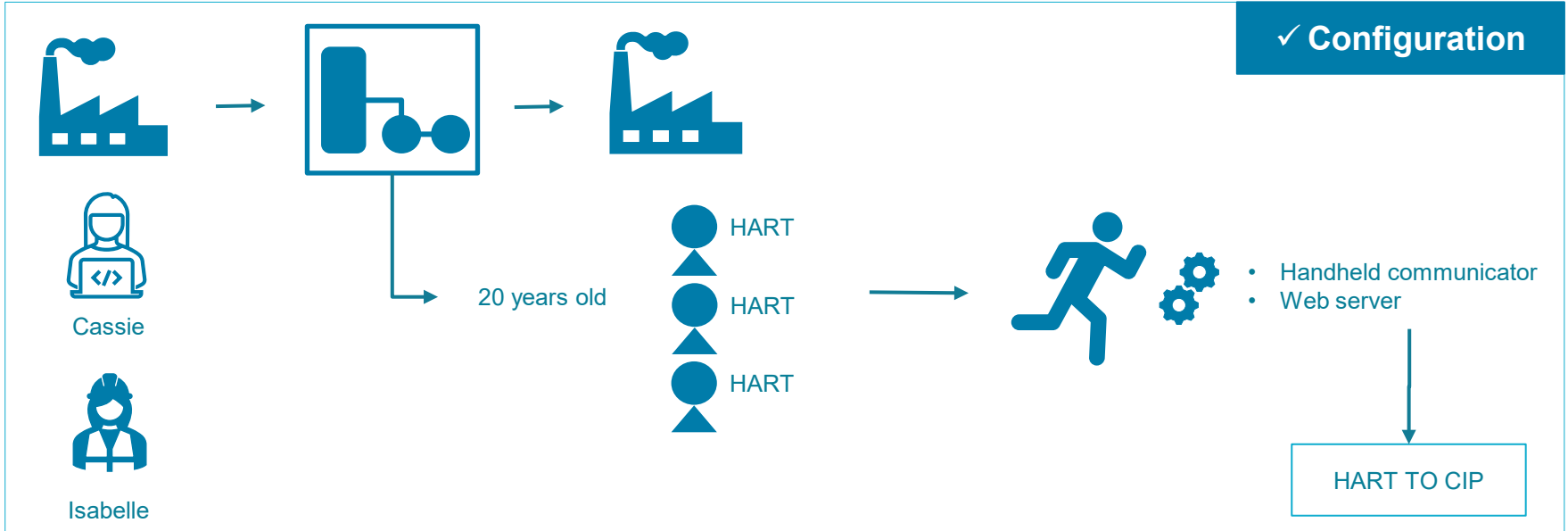
✓ 24/7 Uptime



Needs:

- Promotion of technologies such as PRP as ODVA Supported Solutions
- Redundancy Solutions for APL

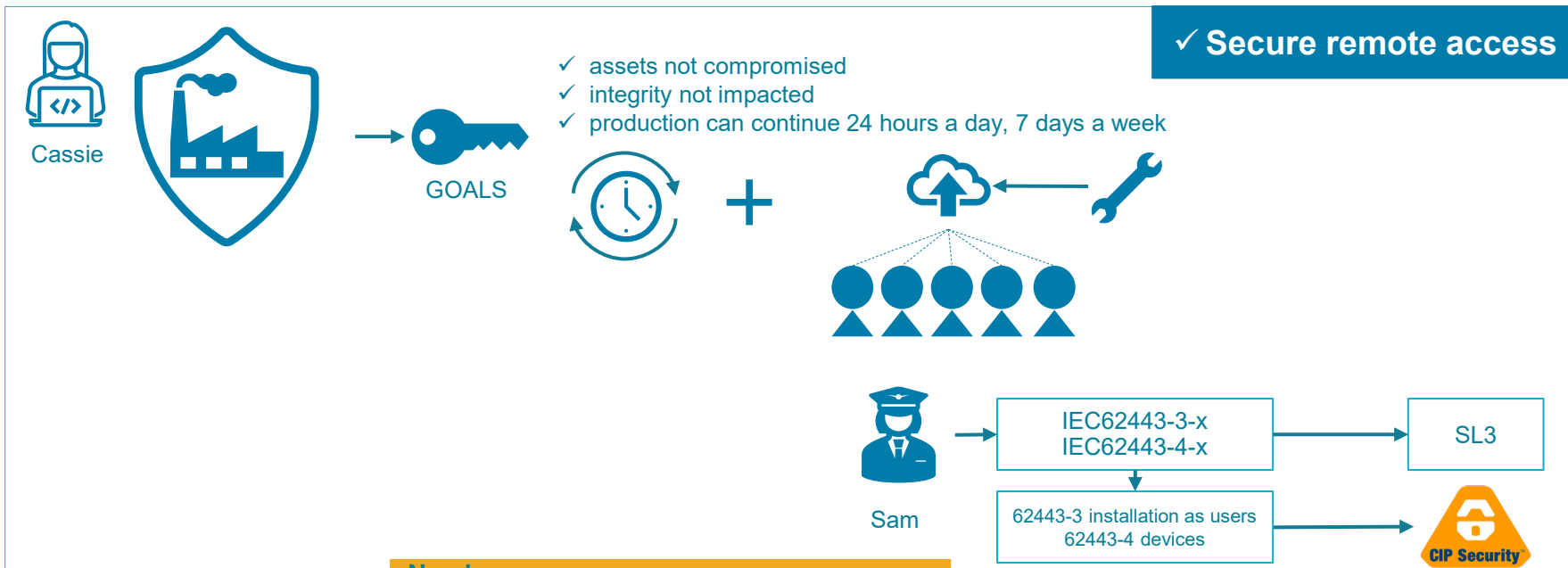
Connecting to Legacy Technologies



Need:

- Adoption of HART on CIP Specification

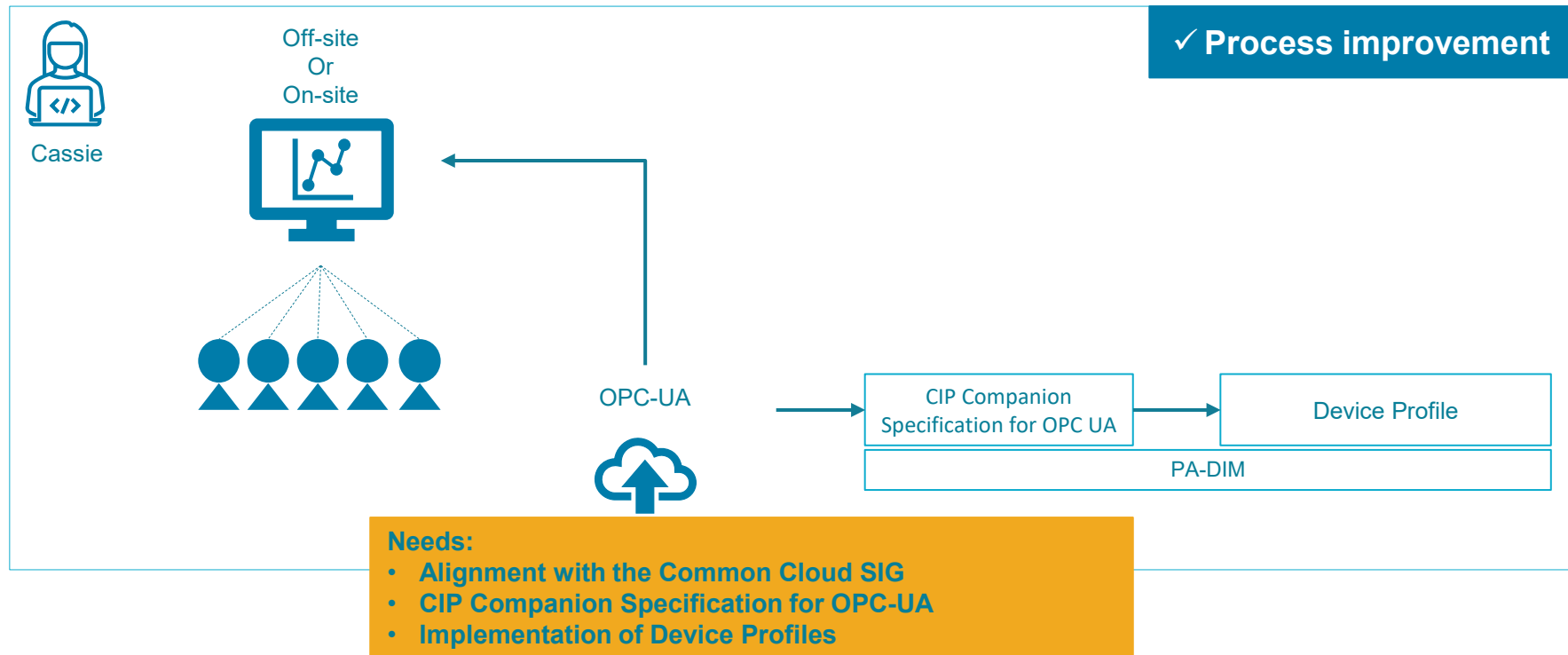
Security



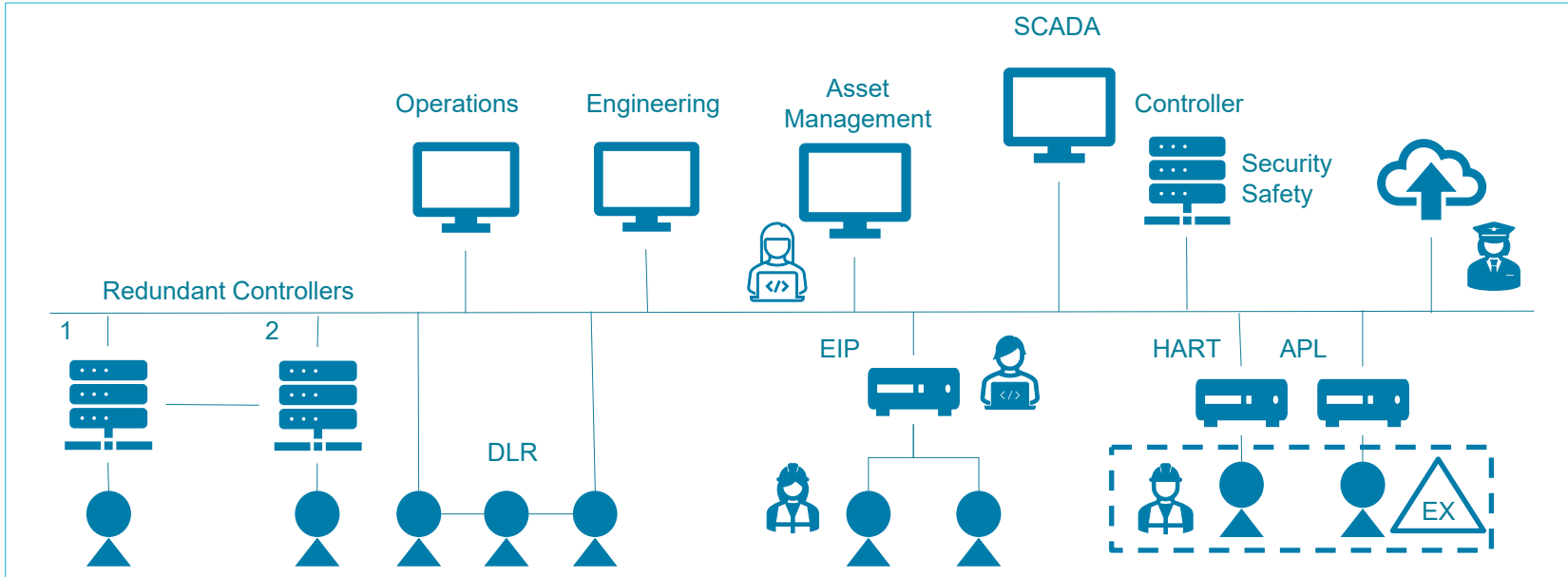
Needs:

- Guidance on how to meet IEC62443
- CIP Security Adoption

Compute and Cloud Connectivity



Controller & Device Redundancy



Need:

- Standardized mechanism for changeover

Summary



Feature / Need	Current Status	Future Need
Integration	EDS with limited standardization xDS and device profile development in progress	Greater standardization of interfaces More complete device descriptions
Replacement	Coriolis flow instruments	New classes of device
Diagnostics	NE107 diagnostic object	Broader adoption of the NE107 diagnostic object
High Availability	Available through DLR & other protocols	No specific needs
Media Redundancy	Available through PRP & other protocols	Native support of layer 2 redundancy protocols in devices such as PRP in devices
Device Redundancy	Available using solutions that use proprietary technology	Need to standardize mechanisms for changeover
Hazardous environments	Available through the use of APL	Broader adoption and a wide range of devices with APL connectivity
Security	Architecture guidelines available. Communication protection available using CIP Security	Ability to help users and developers meet IEC62443 compliance. Broader adoption of CIP Security
Safety	CIP Safety focus on discrete applications	Guidance: how CIP devices - IEC61511
Device Configuration & Asset Management	Configuration: EDS or vendor-specific tools → limited information → limits scope No user interface definitions available driving vendors towards FDT DTM's, FDI Packages	Specifications: CIP devices map to FDT DTM's and FDI Packages. Better defined information → xDS.
Legacy device integration	Available using ODVA's HART on CIP definition	No specific needs

Conclusion

ODVA Technology is ideally suited for many aspects of a process application.

The fundamental function of exchanging information between sensors, controllers and actuators can be achieved using EtherNet/IP.

Features exist that facilitate high availability topologies, full system redundancy, deployment of devices over long distances, installation of equipment in hazardous environments – all with a feature set that aligns with industry best practices – and is proven in use.

In addition, the integration of older technologies into a CIP based architecture can be achieved with ease. In use, there are means by which diagnostic information can be presented in a standardized way and there is a move towards facilitating the exchange of devices without having to make changes to the control application.

There are however some areas where more work is needed, specifically in terms of providing guidance on achieving process safety, further clarity regarding the use of CIP Security to meet industry standards, defining a standard way for managing redundancy and in enhancing the way in which EtherNet/IP devices are configured and managed.



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