

Functional Safety in Today's Connected World

Process Safety Conference, Dordrecht 2019

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VP R&D and Product Management



SMART
SAFETY.

Potential Impact of IoT in 2025



Settings	Size in 2025	billion, adjusted to 2015 dollars total = 3.9 trillion-11.1trillion	Major applications
Human 	 170–1,590		Monitoring and managing illness, improving wellness
Home 	 200–350		Energy management, safety and security, chore automation, usage-based design of appliances
Retail environment 	 410–1,160		Automated checkout, layout optimization, smart CRM, in-store personalized promotions, inventory shrinkage prevention
Offices 	 70–150		Organizational redesign and worker monitoring, augmented reality for training, energy monitoring, building security
Factories 	 1,210–3,700		Operations optimization, predictive maintenance, inventory optimization, health and safety
Worksites 	 160–930		Operations optimization, equipment maintenance, health and safety, IoT-enabled R&D
Vehicles 	 210–740		Condition-based maintenance, reduced insurance
Cities 	 930–1,660		Public safety and health, traffic control, resource management
Outside 	 560–850		Logistics routing, autonomous cars and trucks, navigation

 Low estimate  High estimate

Will the Digital Transformation Disrupt the Process Industry?



Such massive concentration
needs massive connection.

Availability

Reliability

Efficiency

Hazardous areas

Functional safety

Explosion protection



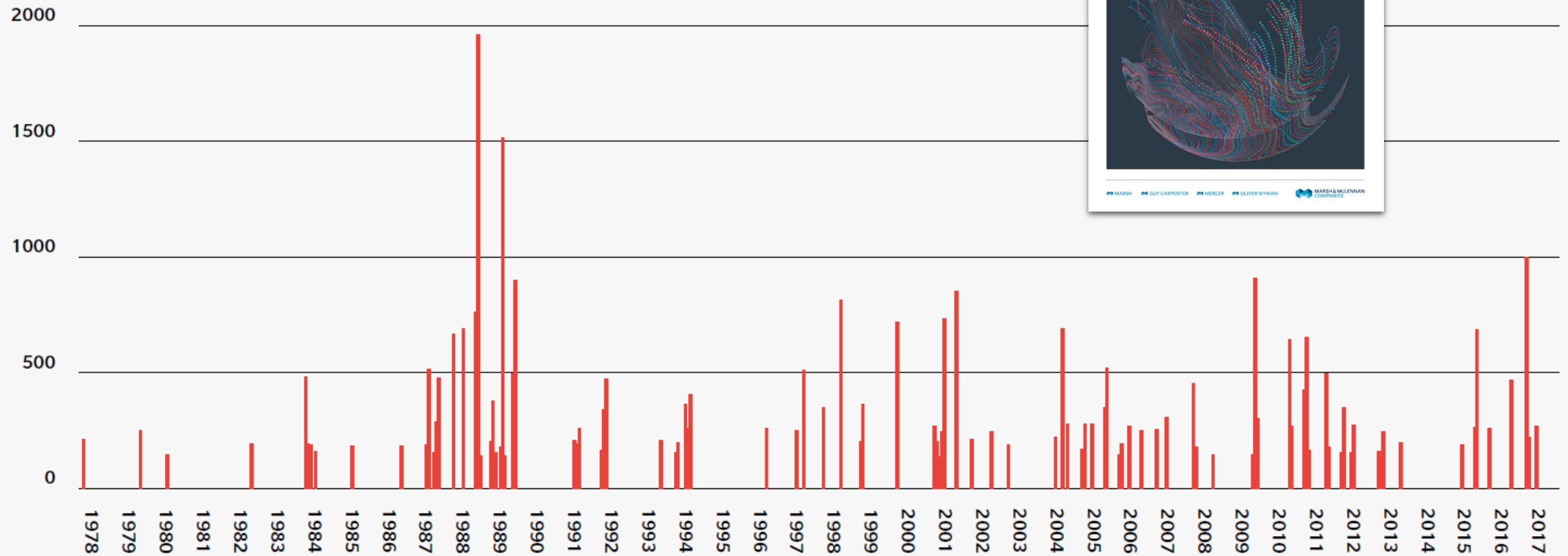
This is not the only answer.

- Modular, open automation
- Seamless integration
- Automation of Automation
- Use data for dependable plants (reliability, availability, maintainability, safety)

Consumer data \neq Process data

Safety must remain #1 concern

Value of upstream losses (MUSD)



www.marshmercamexico.com

Security: Main future safety threat

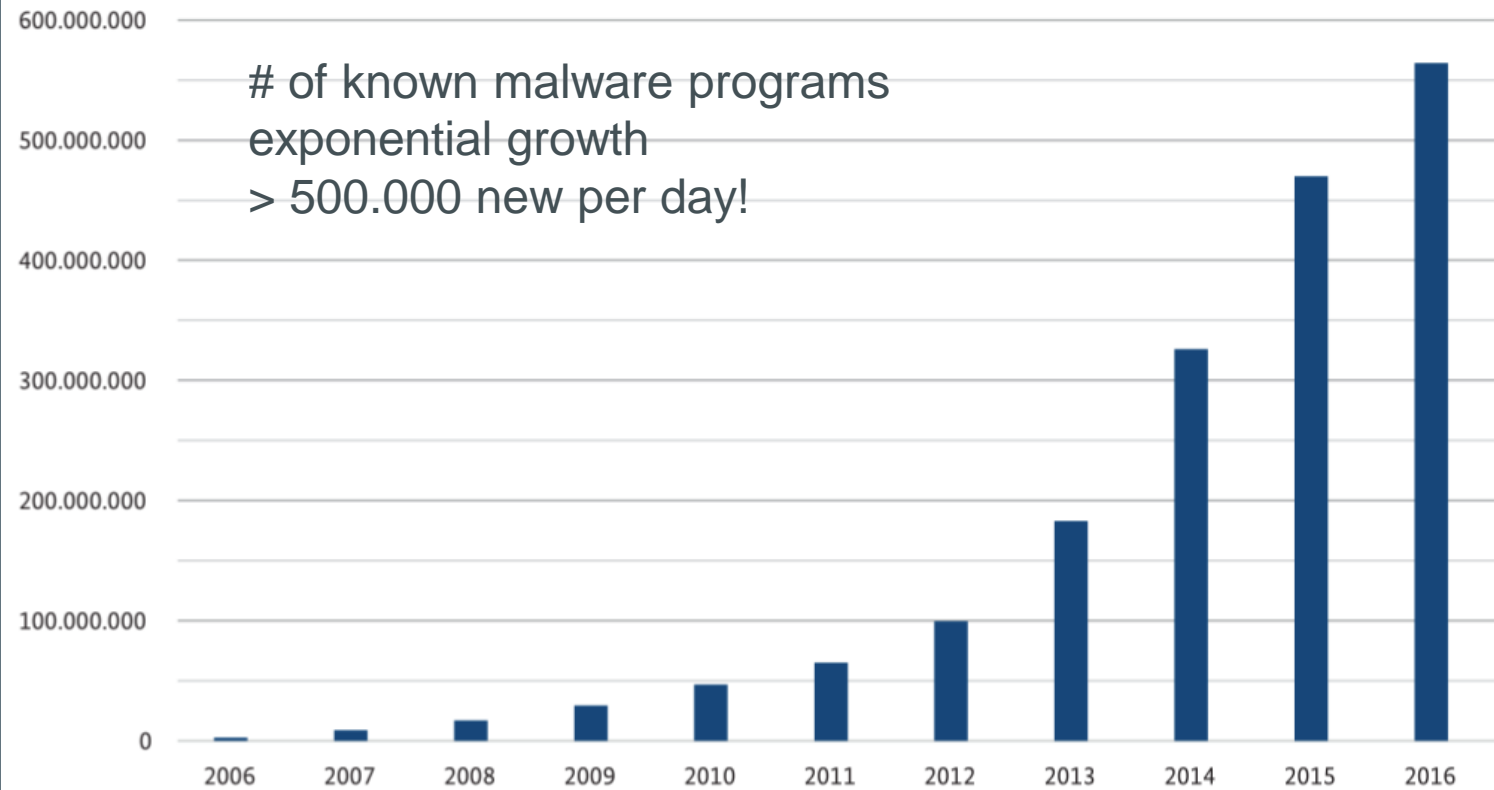


Abbildung 5: Bekannte Schadprogramme (2016 bis August), Quelle: AV-TEST GmbH



Big Data and Artificial Intelligence: Blessing or Curse?



data is the new oil

Data is NOT the new oil



Literally: No.

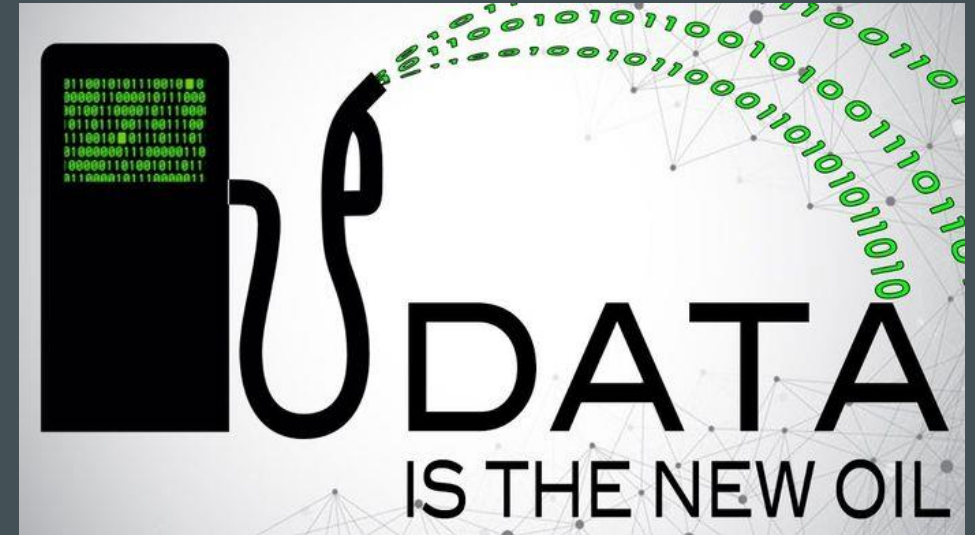
- Data does not heat your home.
- Data does not bring you from A to B.
- Data does not earn money, advertising does.

Economically? Not sure.

- Remember Saudi-Aramcos annual profit?

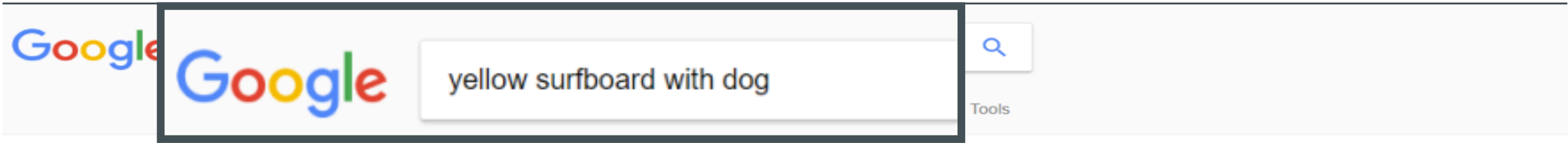
What we should do with data

- Don't panic.
 - Companies paid huge amounts to store data - since decades. („Turn data into gold“)
 - The data was not used much – more or less.
 - Today, data is stored in clouds. Again at high cost.
 - Do we know what to do with it?
-
- Remember: Data has to be used and refined!
 - What is the problem that data shall solve?



Michael Palmer (2006): “Data is just like crude. It’s valuable, but if unrefined it cannot really be used. It has to be changed into gas, plastic, chemicals, etc., to create a valuable entity that drives profitable activity; so must data be broken down, analyzed for it to have value.”

http://ana.blogs.com/maestros/2006/11/data_is_the_new.html



Google

Google

yellow surfboard with dog



Tools

wearing sunglasses

cartoon

dog surfing

beach

chihuahua

vacation

chihuahua dog

surfboard wearing

summer

vector cartoon

sur





Image recognition using AI



Visual trick fools AI into thinking a turtle is really a rifle





An aerial photograph of a port area. In the center, a barge is loaded with numerous colorful shipping containers in shades of red, blue, yellow, and white. The barge is situated in a narrow waterway between a dark teal shore on the left and a grey, textured shore on the right. The water shows some ripples and reflections.

Digitalisation is different in each industry.

Speed, time and degree of change are different.

Each company in each industry needs to find its own way.

Digitalisation means first of all a significant investment.

The benefit will not be immediate and carries risk.

Security in Functional Safety Systems



Security for Field Devices

Identification of

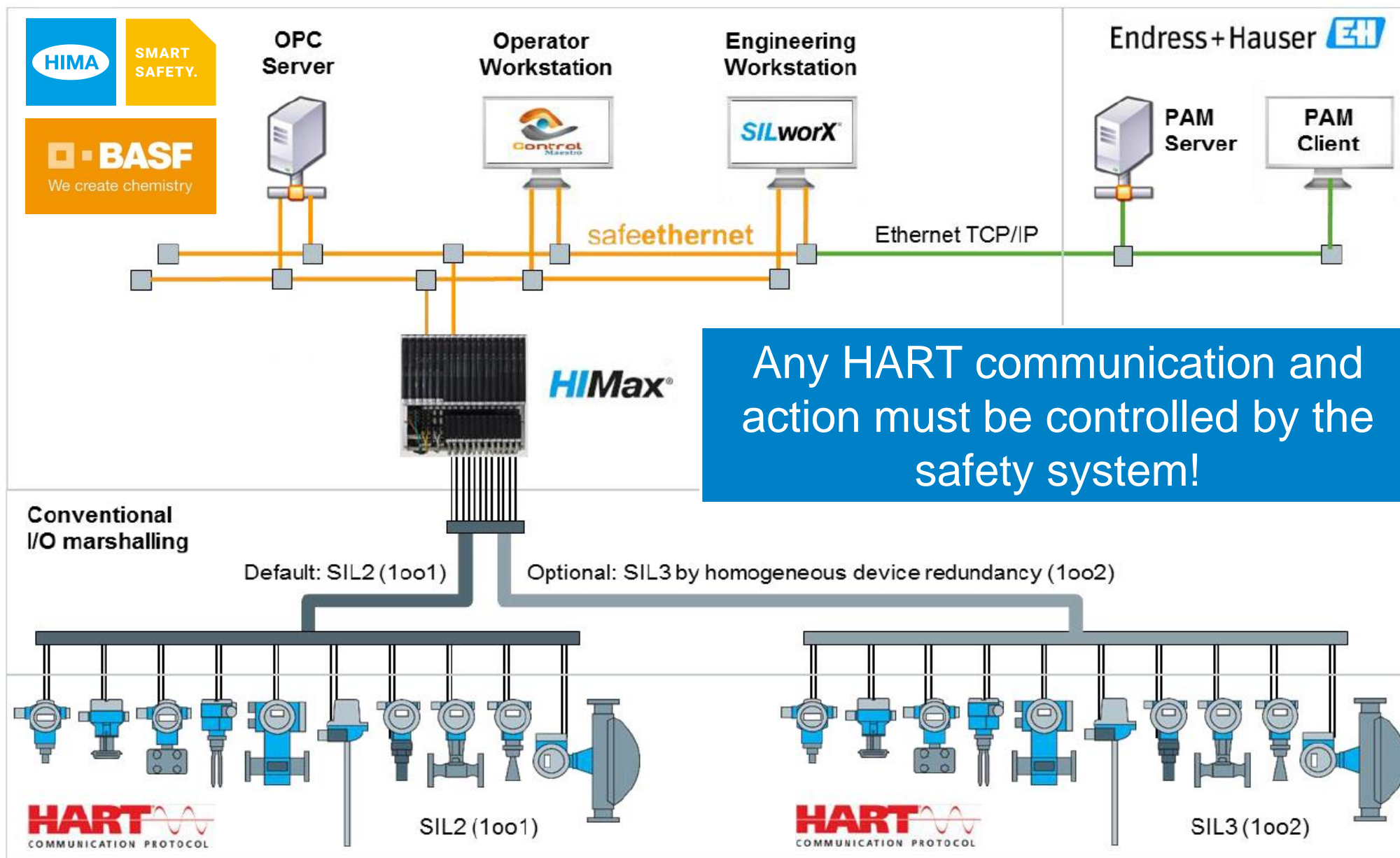
- Wrong parametrization
- Manipulation of field devices

Device Information: HART Data

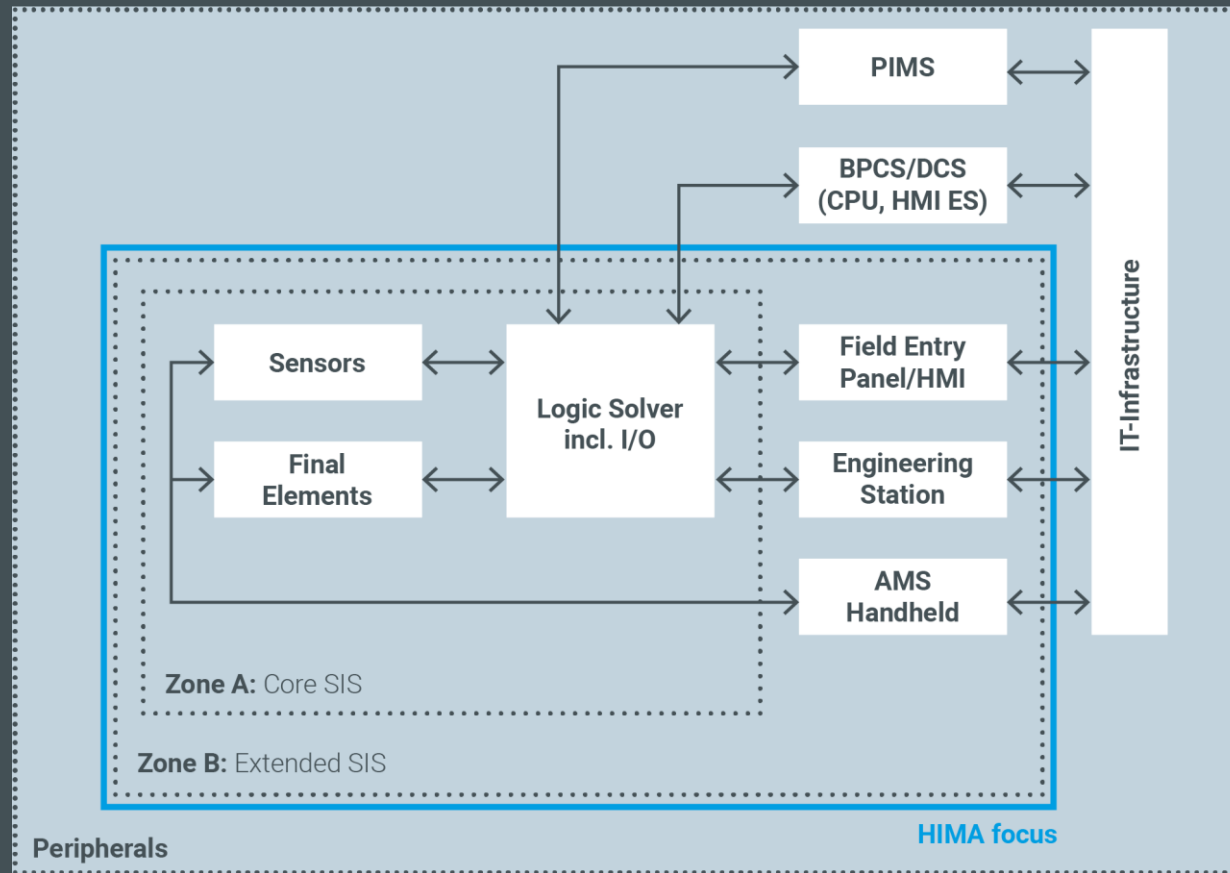
- Delivers device information
- Enables changes in the device



Connection to field devices must
not jeopardize plant safety!



Security in Safety Instrumented Systems



Clear definition of **compartments** and **conduits** leads to clear **requirements** for each zone.

Automation components and infrastructure need to comply with these requirements.

Source: NAMUR NA 163

Security Solutions



Safety-System with built-in Security philosophy

e.g. strict separation of CPU and communication modules

High Resistance Firewall:

High-quality firewall for secure separation of zones according to Common Criteria* (CC) EAL 4+

Engineering Station:

Secure Windows environment including monitoring, hardening, encapsulation and connection control

Encryption:

Secure data exchange by use of Virtual Private Networks (VPN)

Remote Access:

Extremely secure remote-access to any location, including monitoring and tracking

Demilitarised Zone (DMZ):

Zone separation of highest quality by building a so-called demilitarized zone

Datalock:

Secure lock-in and lock-out of approved and free-of-malware data

Network Analysis:

System monitoring and analysis of the available OT-network (operation technology)

Network Segmentation:

Segmentation of the OT-network (Zones & Conduits acc. to IEC 62443)

Anomaly Detection, Monitoring and SIEM:

Recording and assessment of network activity

Managed Services:

Patching, Update and Monitoring as a Service

Will the Digital Transformation Disrupt the Process Industry?

Closing Thoughts



- Digitalization will not change process automation over night – but it will.
- Automation systems will become more open, standardized and modular.
- Safety systems are treated more conservatively, for good reasons.



Thank You.

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