Embedded Networking Solutions

Twincomm

Safety communication over Industrial Ethernet

for embedded systems

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Twincomm

About Twincomm

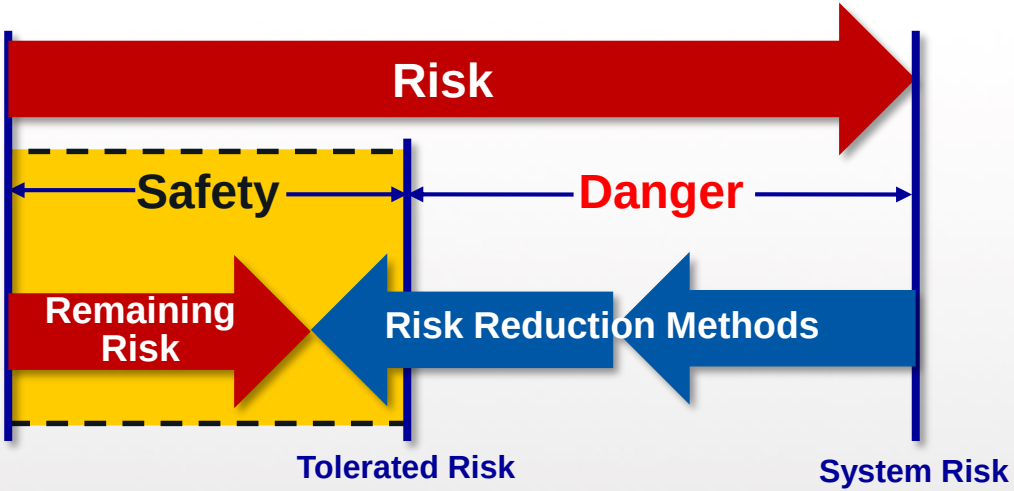
Embedded Networking Solutions

Our products and services enable embedded communication in machines, to systems and between components

PROFIBUS · EtherCAT · EtherNet/IP · ETHERNET POWERLINK · Modbus · sercos the automation bus · CC-Link · BACnet · PROFINET

CANopen · SAE J1939 · DeviceNet · ControlNet · lin · FlexRay · CAN · CAN FD

Safety - Some basics



Risk = Chance of a damaging event **x** Expected damage

Safety = Reduction of dangers for people and environment

Safety - Some basics

Safety Integrity Level (SIL - EN 61508), Chance of a Danger Situation

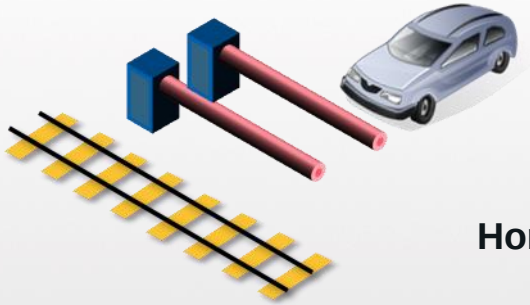
SIL	Danger failure per hour[1]	Assessment
1	≥ 10^{-6} to < 10^{-5}	Independent Person
2	≥ 10^{-7} to < 10^{-6}	Independent Departement
3	≥ 10^{-8} to < 10^{-7}	Independent Organisation

One failure in ~1100 years

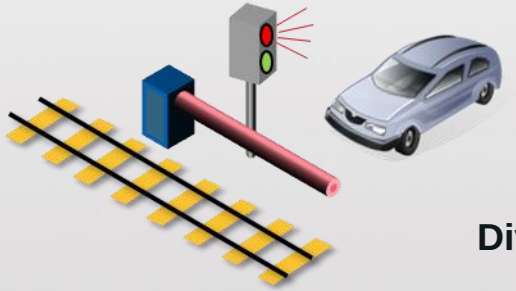
[1] High demand or continuous mode

Safety - Some basics

Redundancy

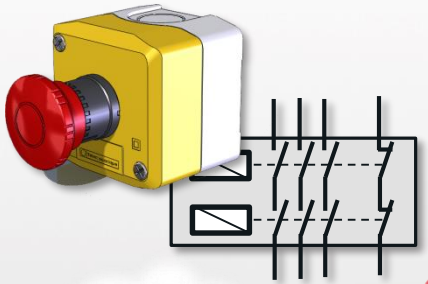


Homogeneous



Divers

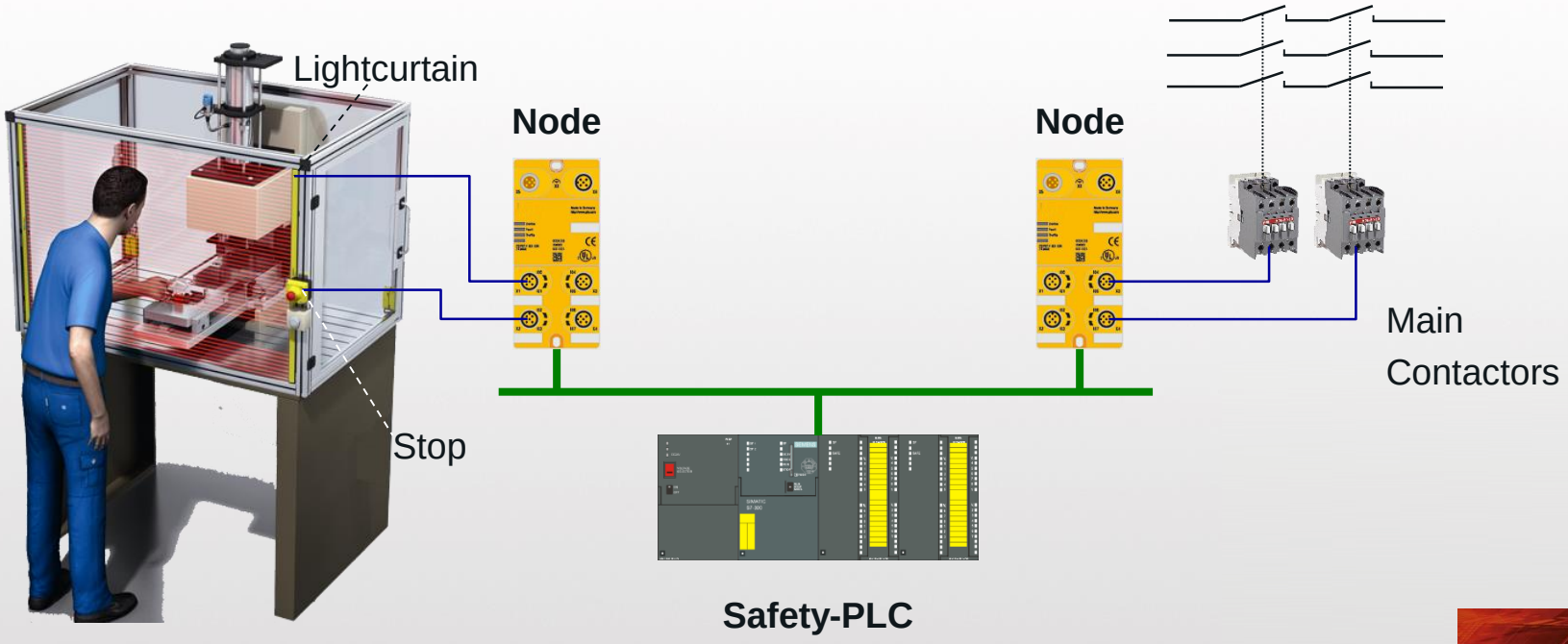
Safe State



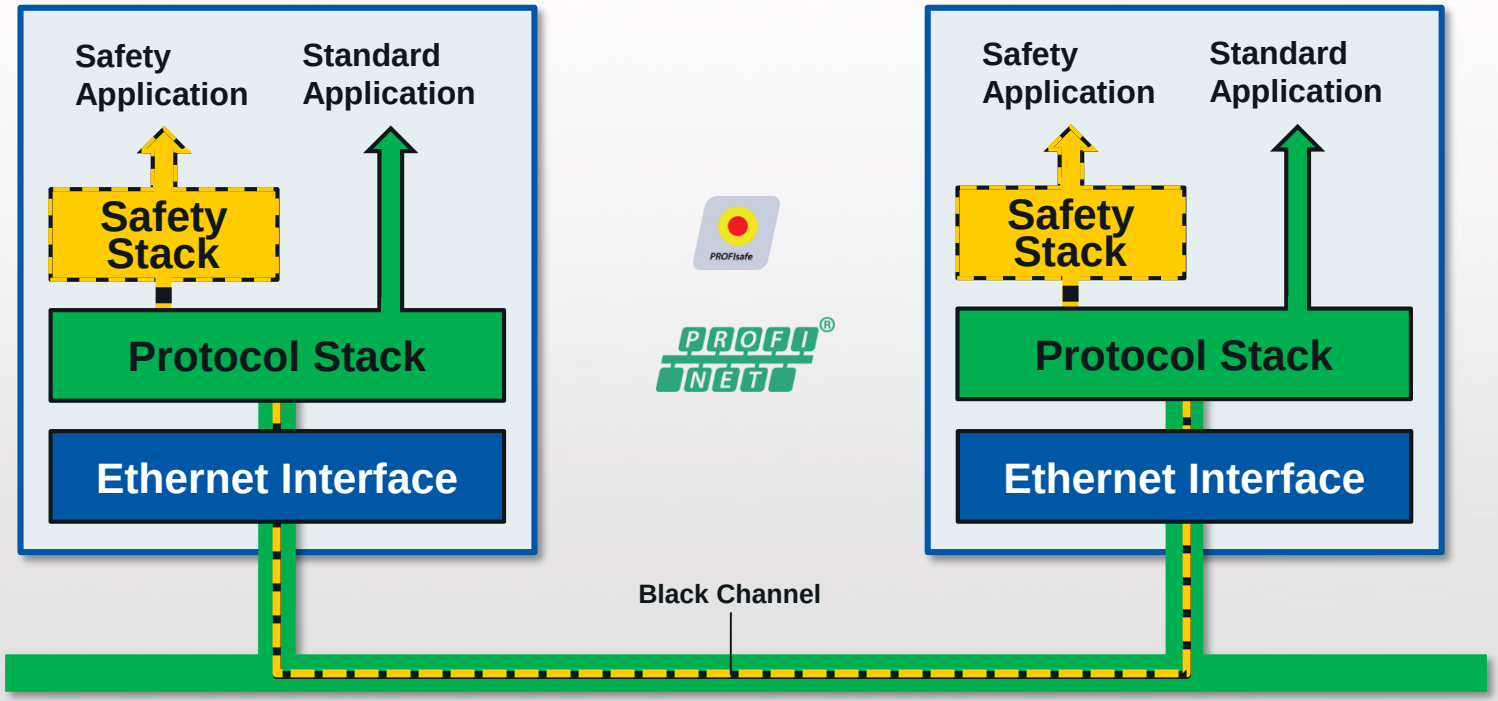
Power interrupt

Safe operation

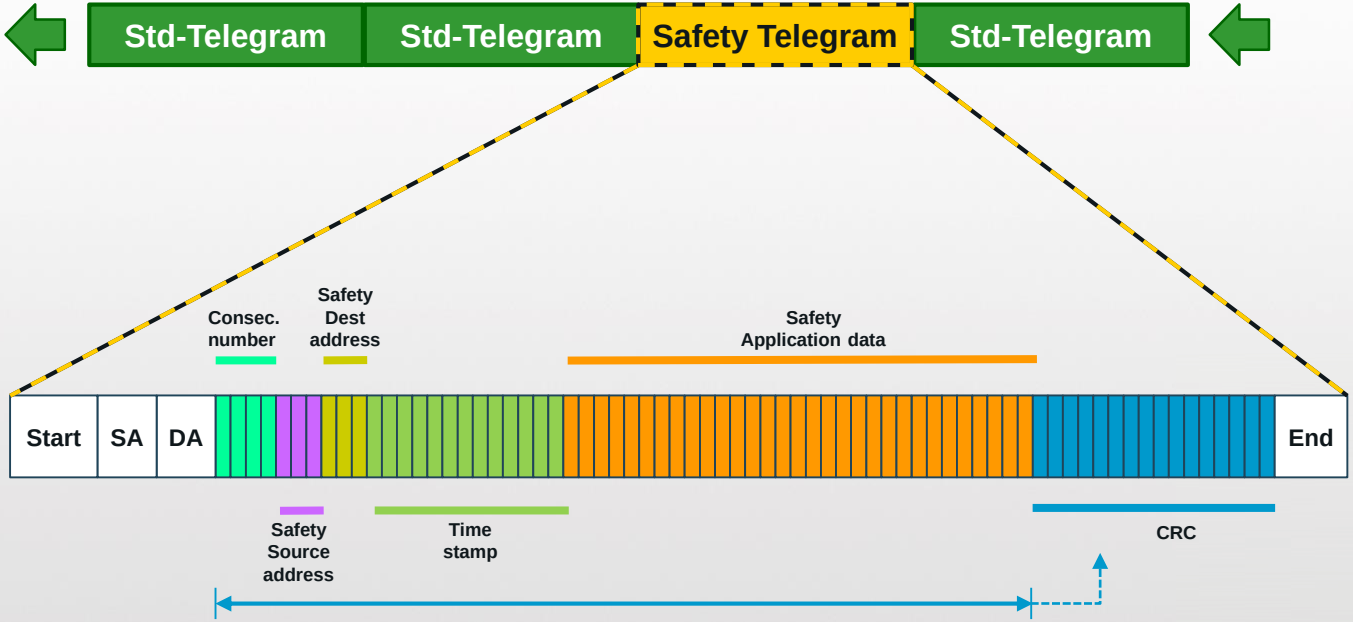
Example



Safe communication ≠ Always available



Mixed mode: Safety Telegram between Standard telegrams



Safety communication - Protocols

Safety protocols on top of communication protocols

PROFINET®

PROFIBUS®

Safety over EtherCAT®

EtherCAT®

sercos

ControlNet™

DeviceNet™

EtherNet/IP™

CC-Link Safety™

CC-Link

open SAFETY

PROFINET®

EtherNet/IP™

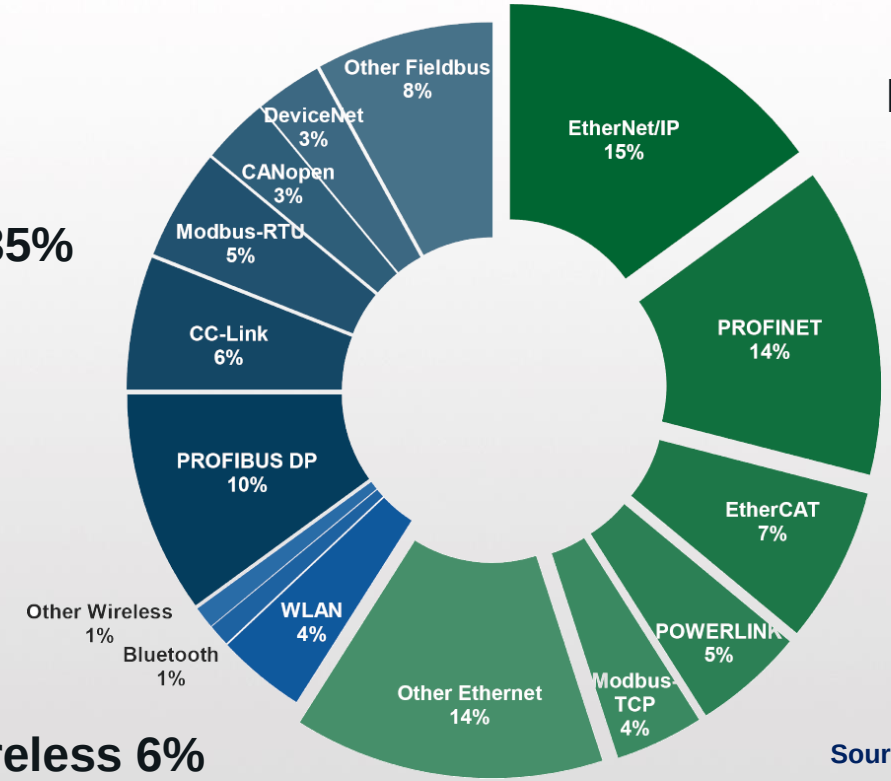
Modbus

ETHERNET POWERLINK

sercos

Safety communication – Protocol shares

Industrial network shares 2019



Industrial Ethernet 59%

Fieldbus 35%

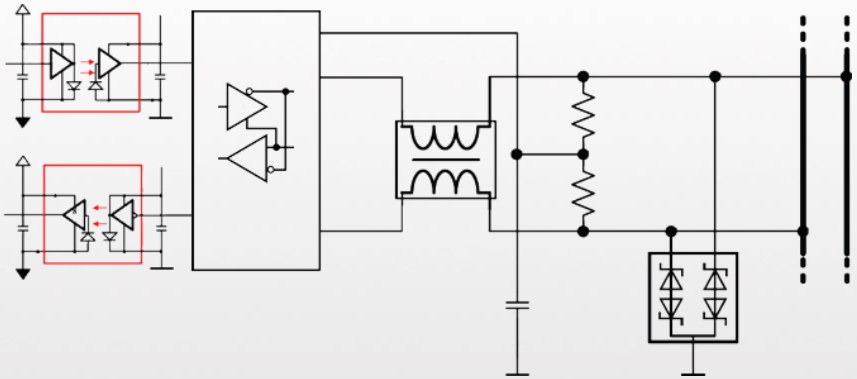
Wireless 6%

Source: HMS

Embedded design-in - Communication

Hardware

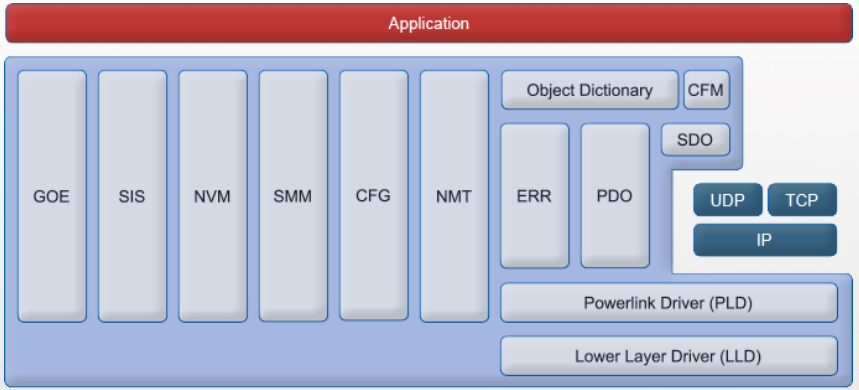
Understanding physical communication



- Every protocol has different physics
- Protection at the right level
- Development time and effort
- Certification

Software

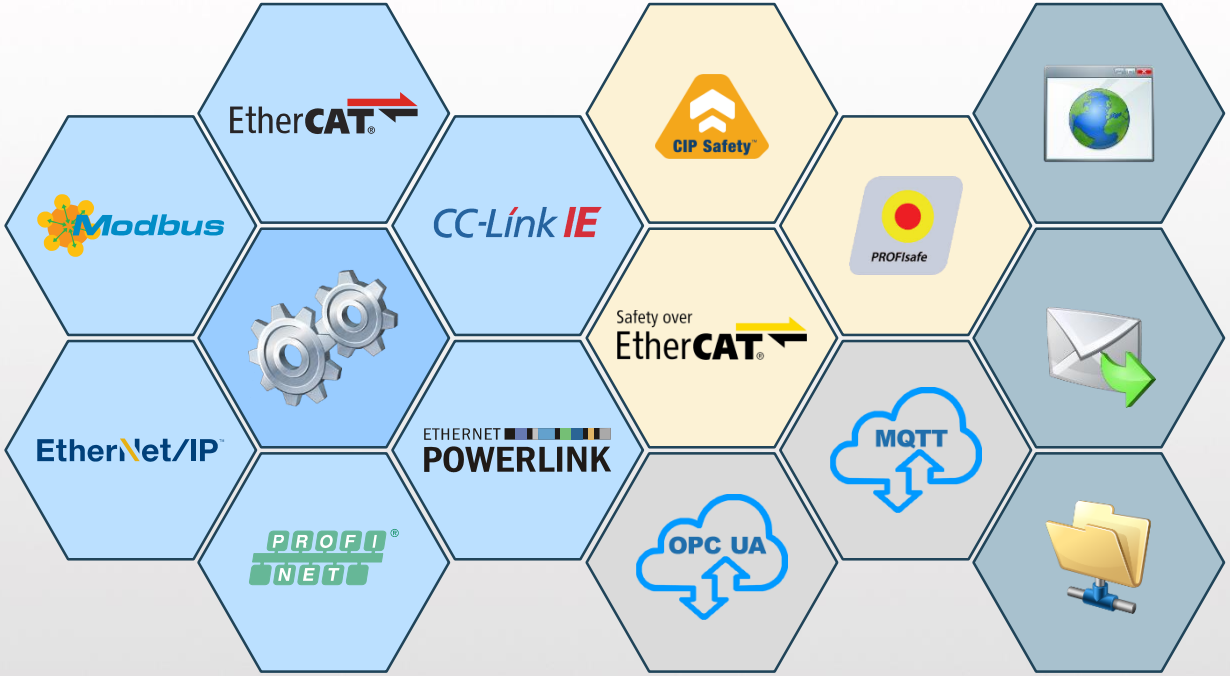
Understanding the protocol



- Protocol Stack + Server, E-mail, FTP, …
- Develop, Buy or Open Source
- Licences
- Certification

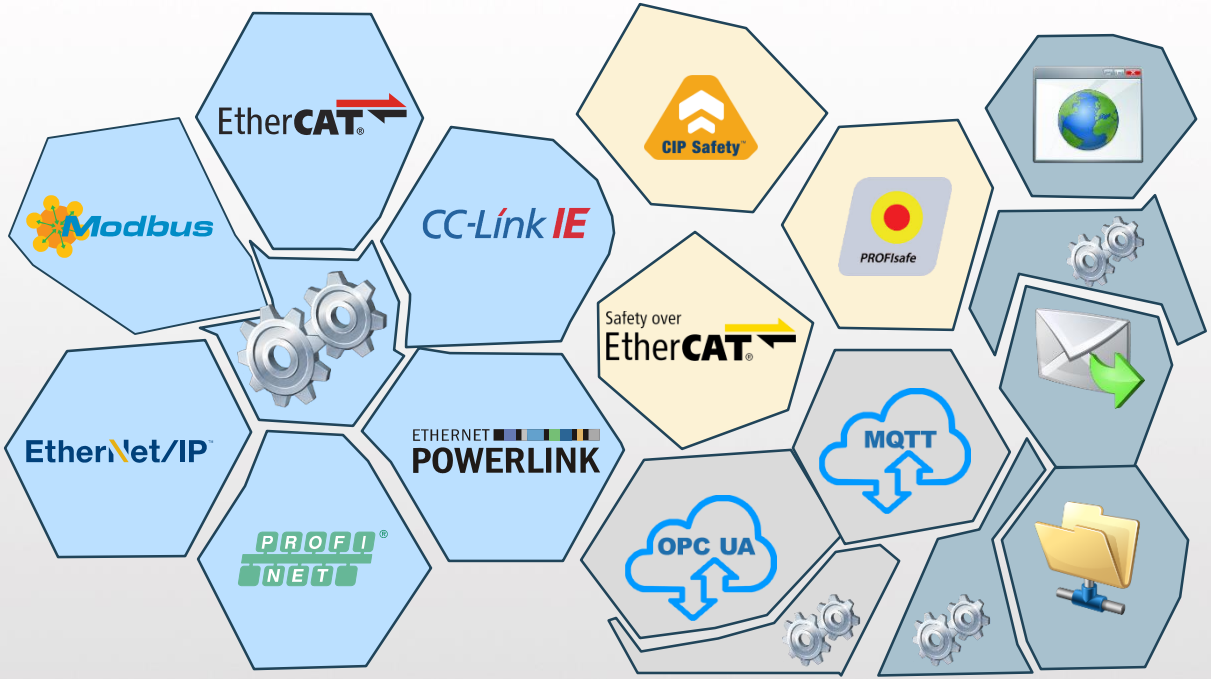
Embedded design-in - Communication

Multiple-protocol - Software stacks



Embedded design-in - Communication

Multiple-protocol - Software stacks



Software is not standardized

- Different vendors
- Different structures
- Different interfaces
- Different drivers
- Different releases

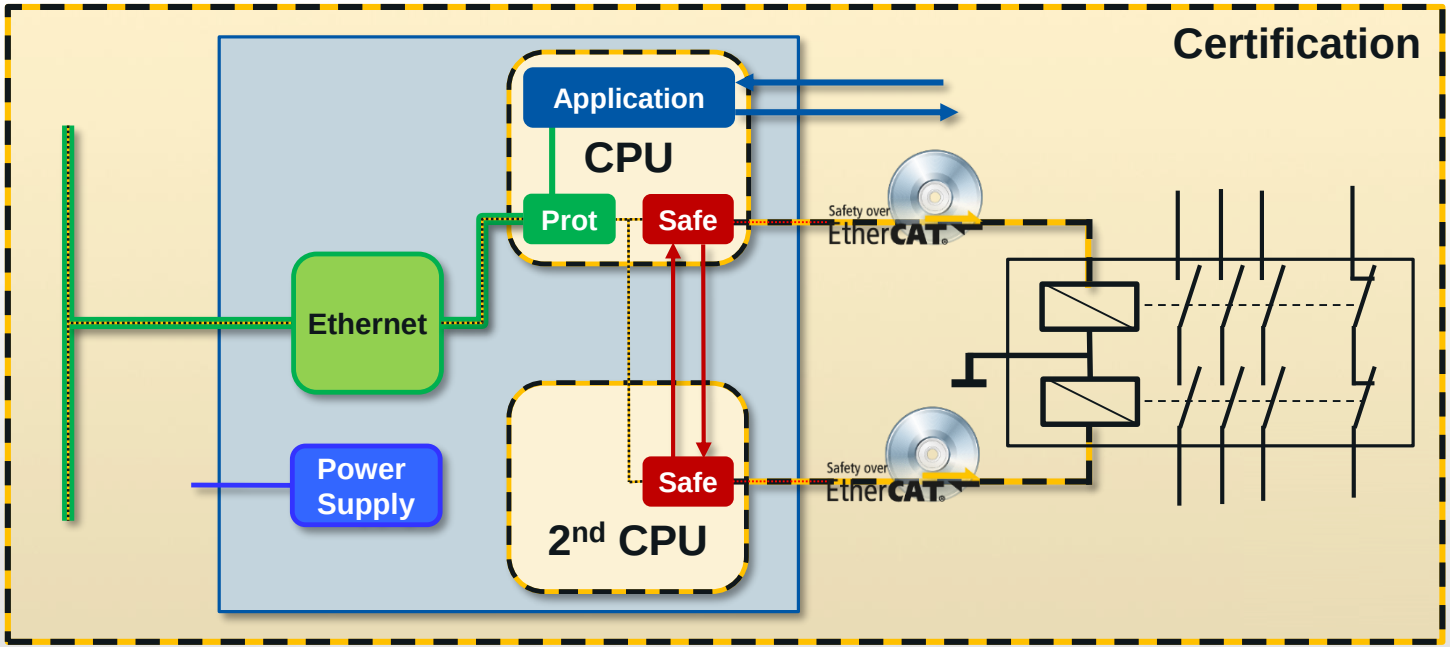
Special attention

- Non-TCP/IP protocols
- Real-time priority
- Software interference

Multi-protocol software-development is a complex task!

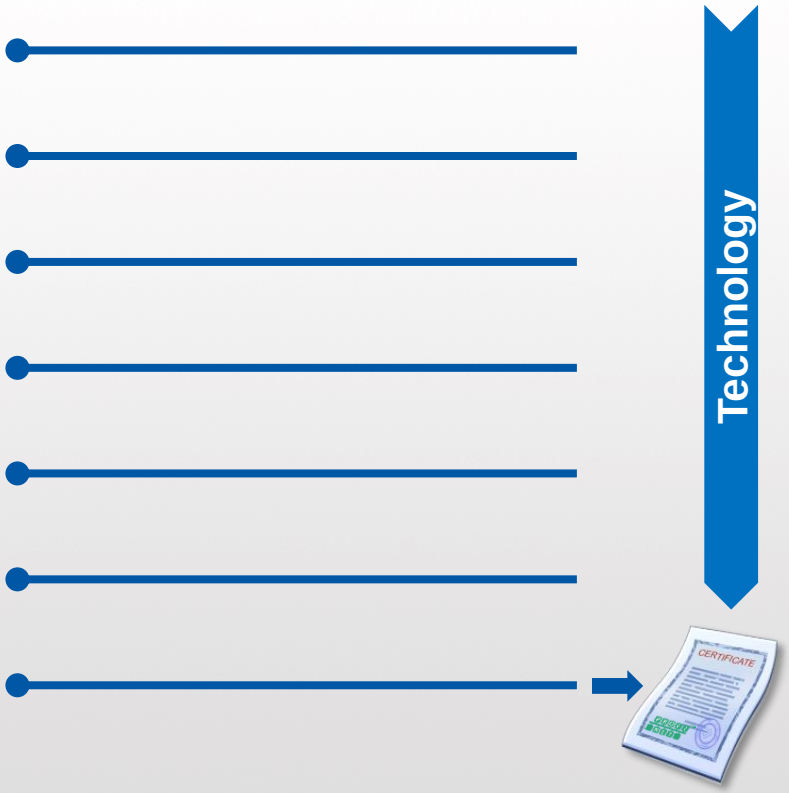
Embedded design-in - Principle

Safety design

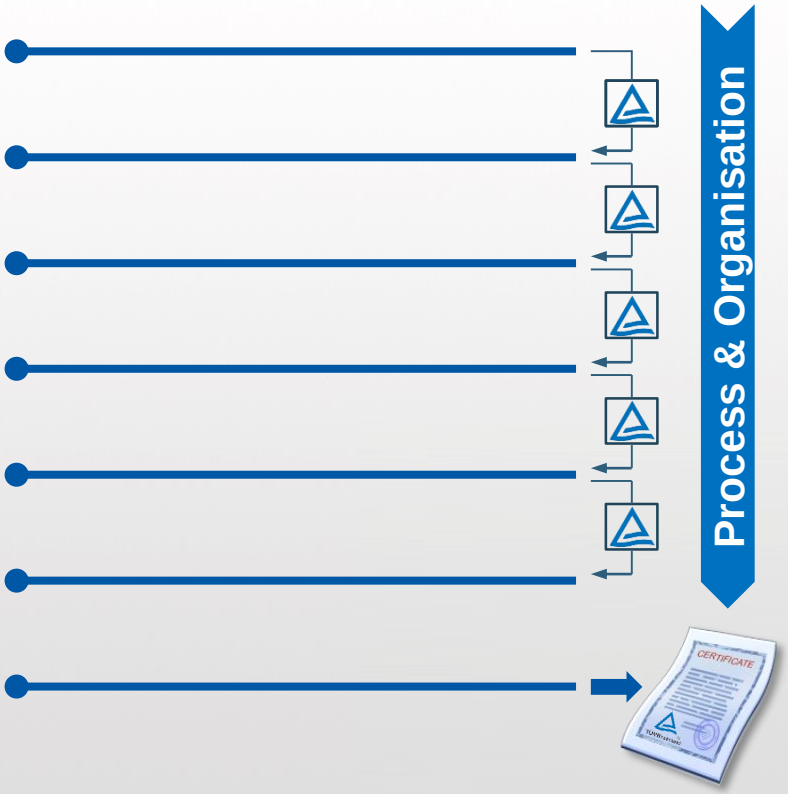


Embedded design-in – Safety process

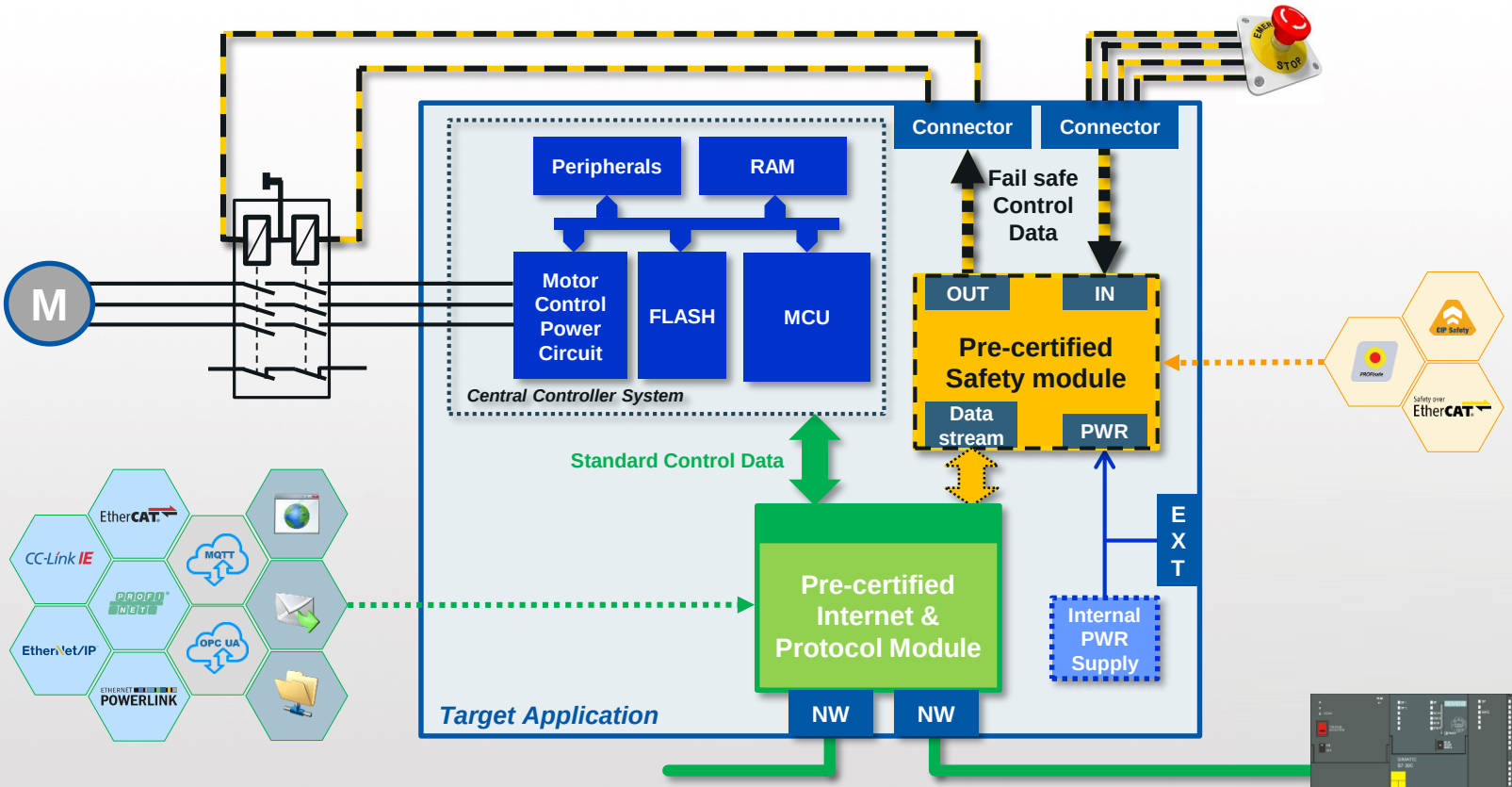
Protocol certification



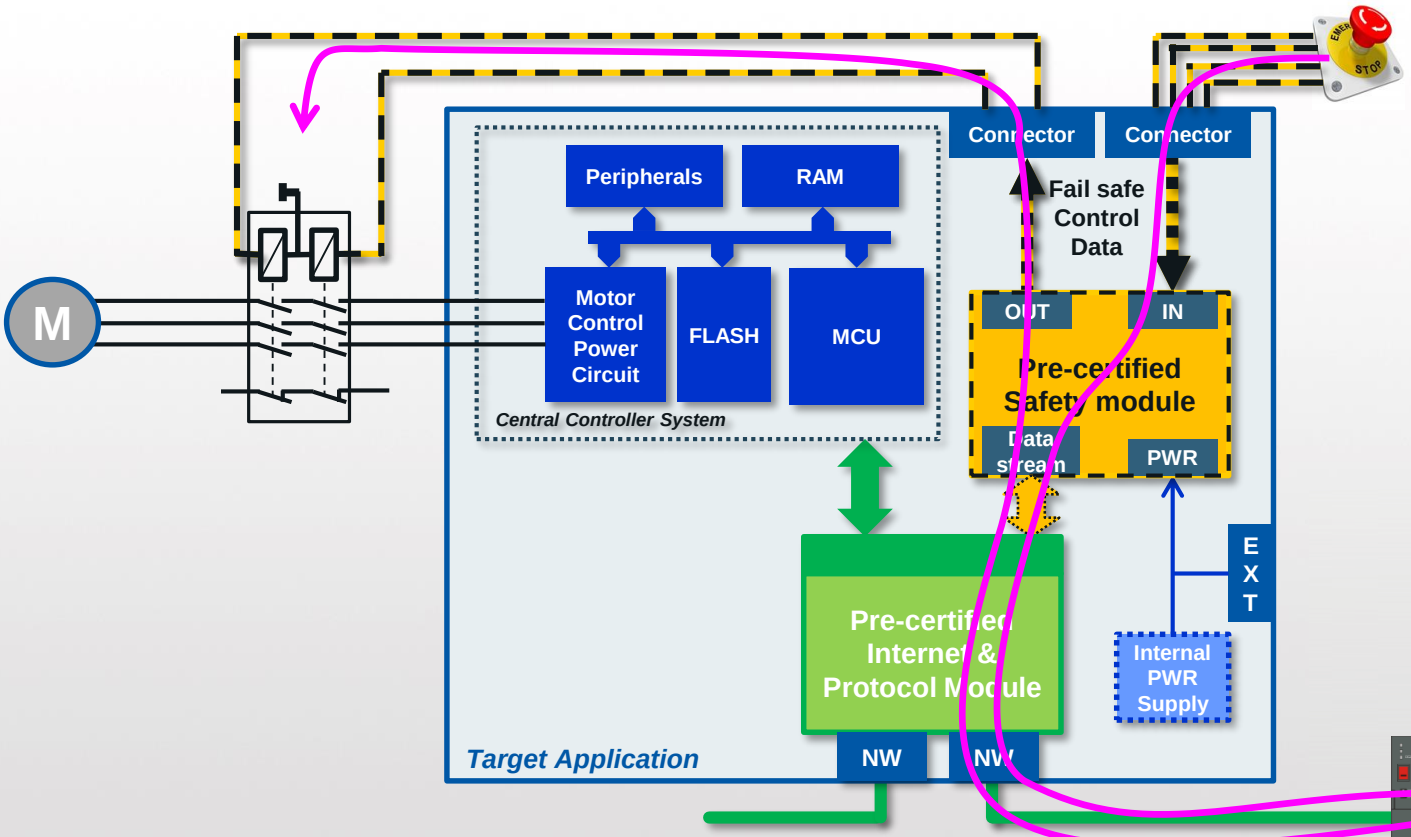
Safety certification



Modular Safety Design-in



Modular Safety Design-in



Modular Safety Design-in

Integration & Certification

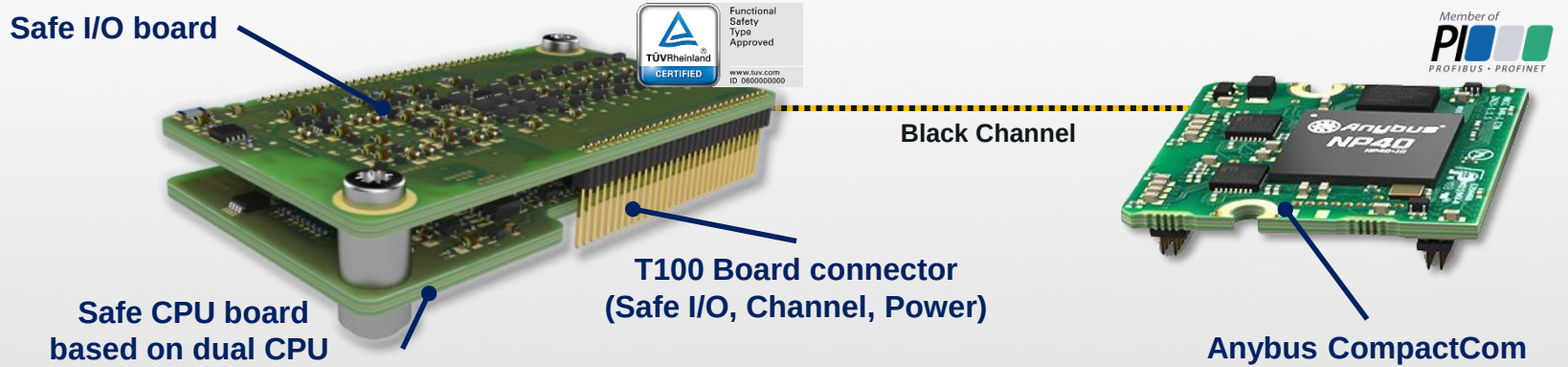
- **Technical design-in**
  - Power Supply (SELV/PELV): Logic and Safe I/O
  - Environmental operating conditions (EMC, temperature, humidity)
  - Routing of safe I/O signals to external connectors
  - Mechanical dimensions and clearances
  - Electrical connection to non-safe communication controller
  - Shielding and housing to achieve enhanced EMC requirements
- **Functional and technical testing**
- **Adapt/provide *Device Description*-file *& Product Safety Manual***
- **Product Validation**
- **Product Safety Approval e.g. by TÜV**

IXXAT Safe T100 Module

Components

Ixxat® BY HMS NETWORKS

Anybus® BY HMS NETWORKS



PROFIsafe

PROFINET®

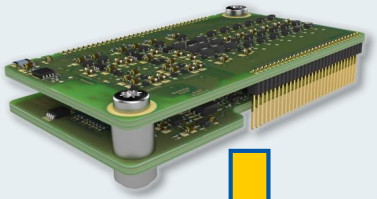
8 OKT ← D&E event 2019
VAN DER VALK HOTEL EINDHOVEN

IXXAT Safe T100 Module

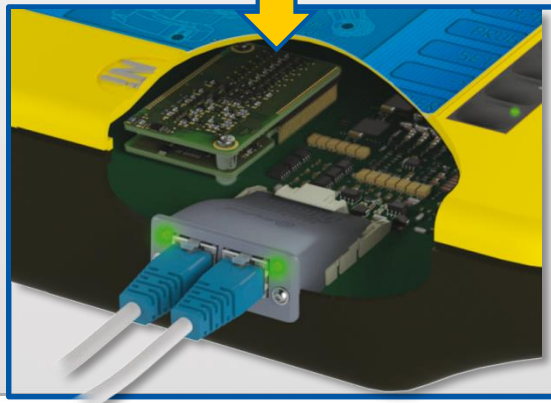
Twincomm

Design-in and Certification Steps

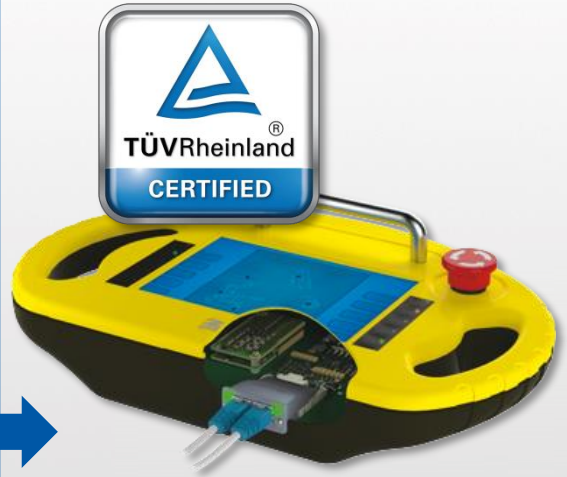
IXXAT Safe T100



Pre-Certified



Ixxat®
BY HMS NETWORKS



Outsourcing Projectwise

Use pre-certificate communication modules

- Common hard- & software design
- Do support all major protocol functionalities
- Fully compatible with all Safety-PLC’s
- Multi network-protocol support within one development

Project with communication modules

- Focus on information exchange instead of data communication
- Reduce development time up to 80% when carefully planned
- Planning all desired protocols ahead
- Fast design-in but total lead-time depending on certification

Thanks for your attention!

Please visit out booth

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