



**REDES INDUSTRIAIS**



# O papel das redes industriais na convergência digital de IT/OT








Atualmente  
tudo está  
conectado ...





# Conectividade é palavra do momento



## Everything is **connected**




My  tells my  to open the garage and start my 

My  tells a  to dispatch a  to my location

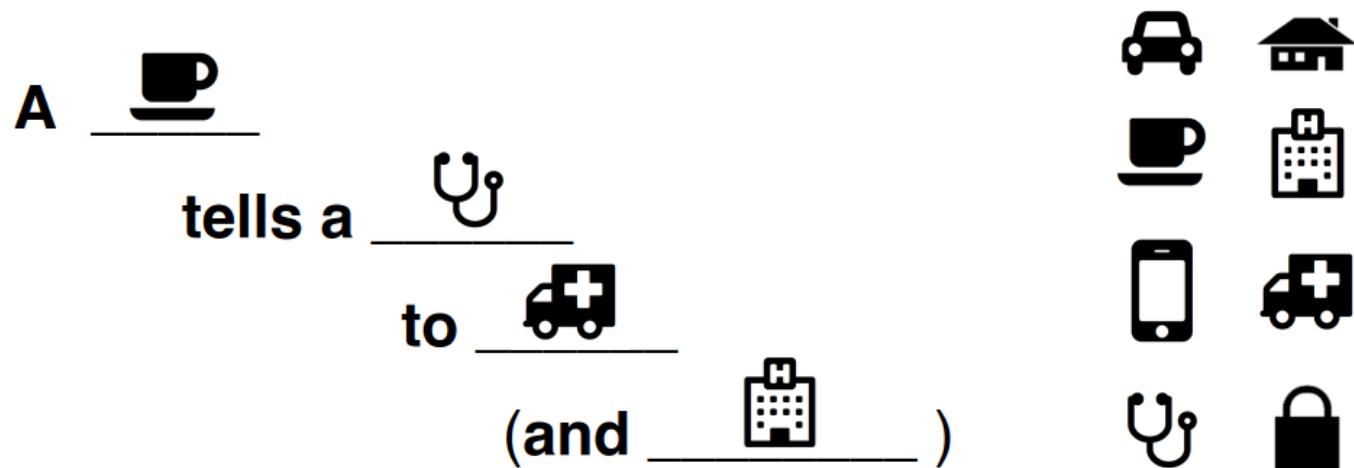
My  tells my  that an intruder has entered

A  tells my  to tell my  that a package has arrived

My  tells my  that I am following my treatment plan

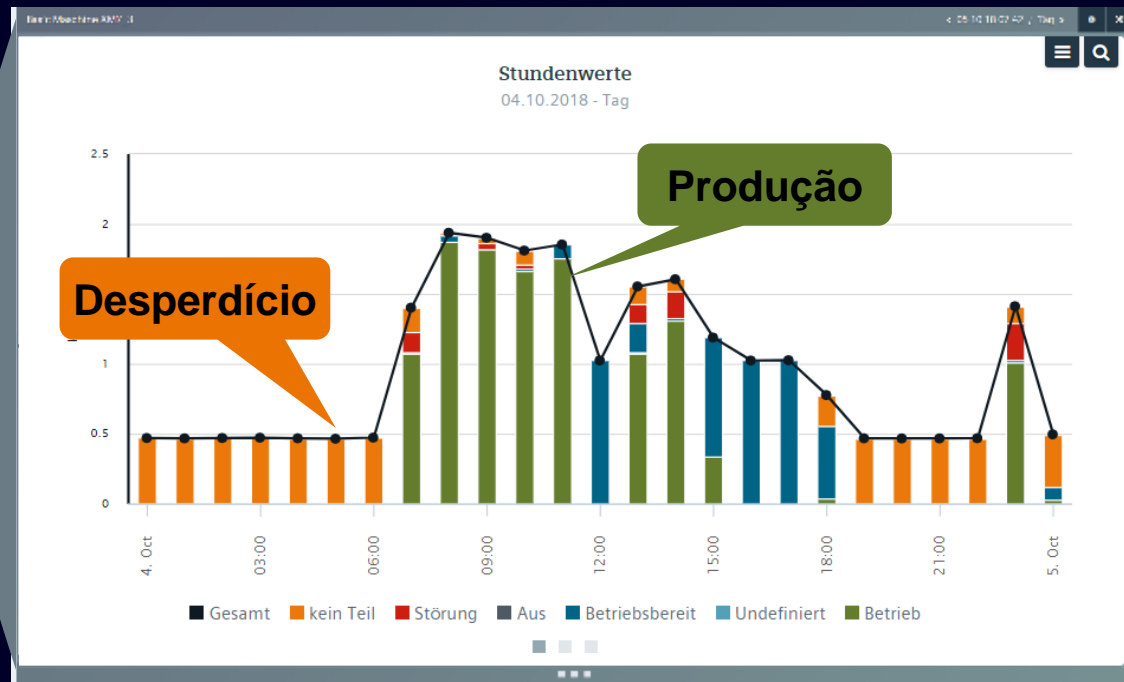
My  tells my  that they are too far from the 

# Mas como extrair o máximo dessa conectividade?

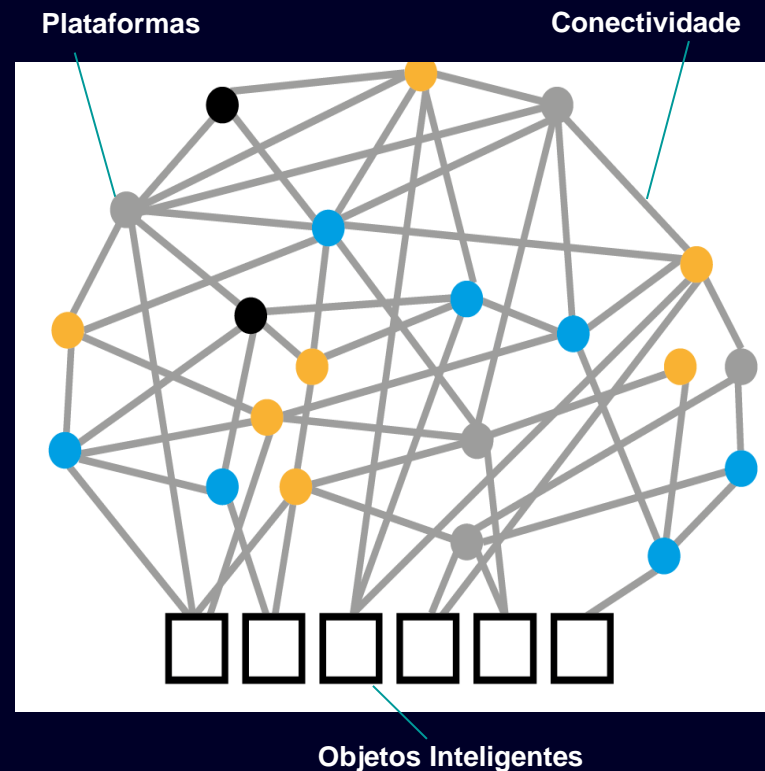
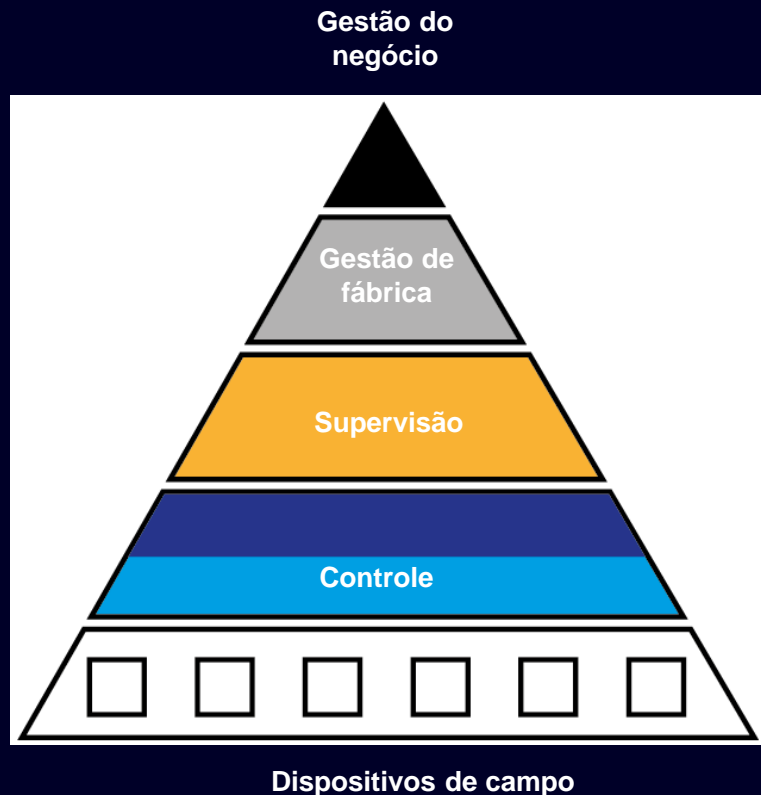


My **connected coffee cup** tells my **doctor** to **send an ambulance** and **take me to the hospital** because I've had dangerous amounts of caffeine...

# Você consegue identificar seus desperdícios?

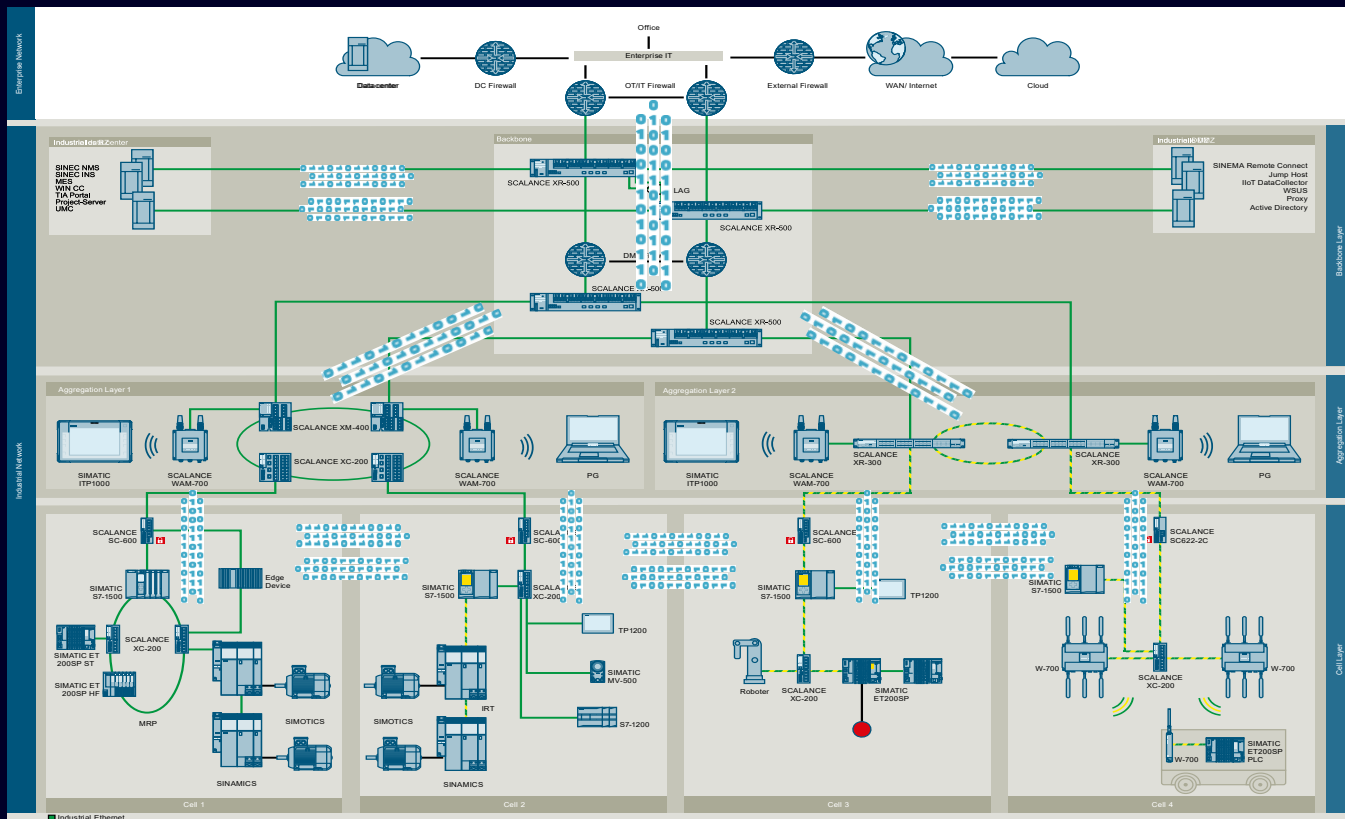


# Disrupção do modelo piramidal de comunicação



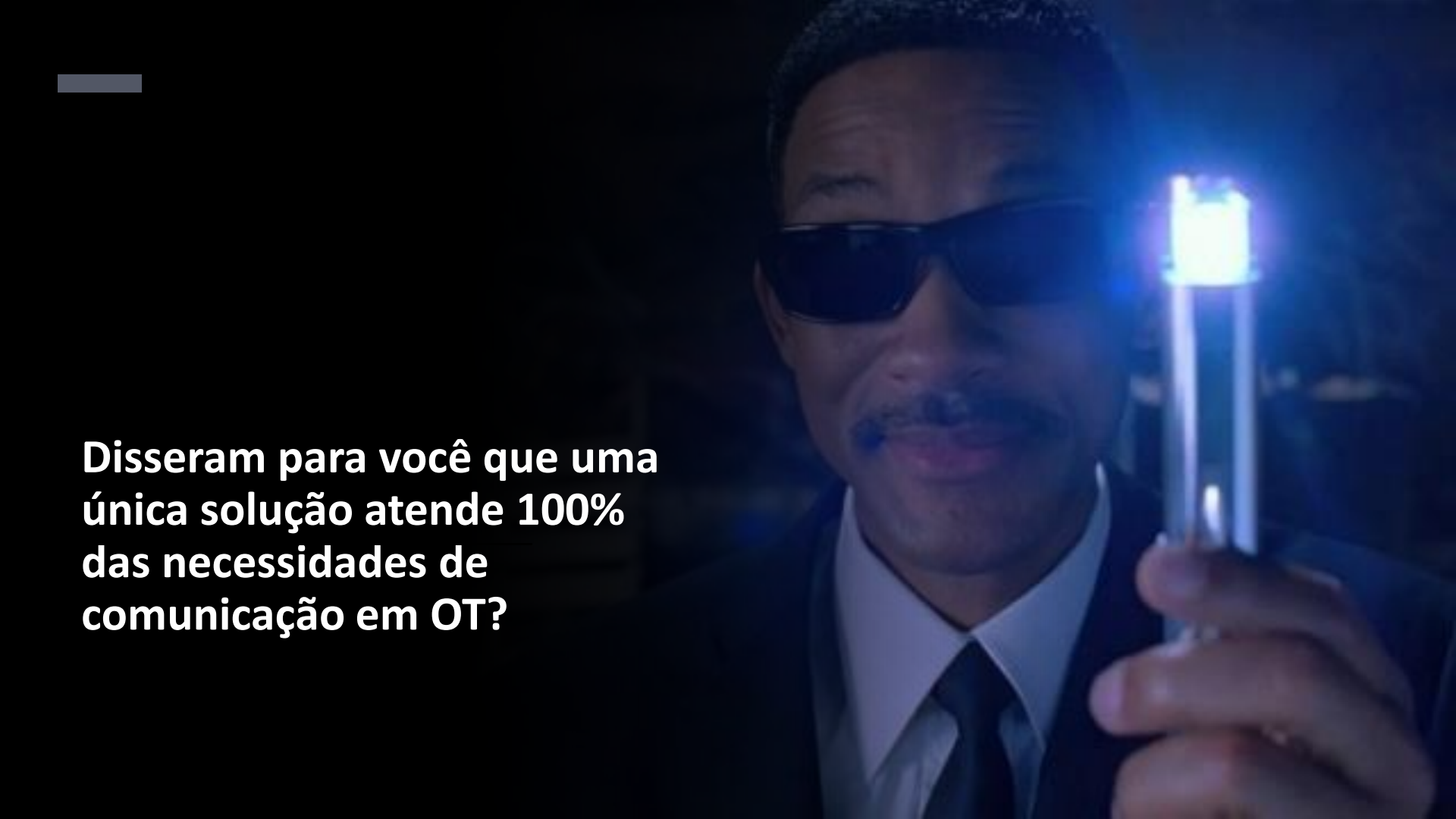
**Integração IT/OT  
Comunicações Horizontais e  
Verticais**

# Comunicações horizontais e verticais em OT



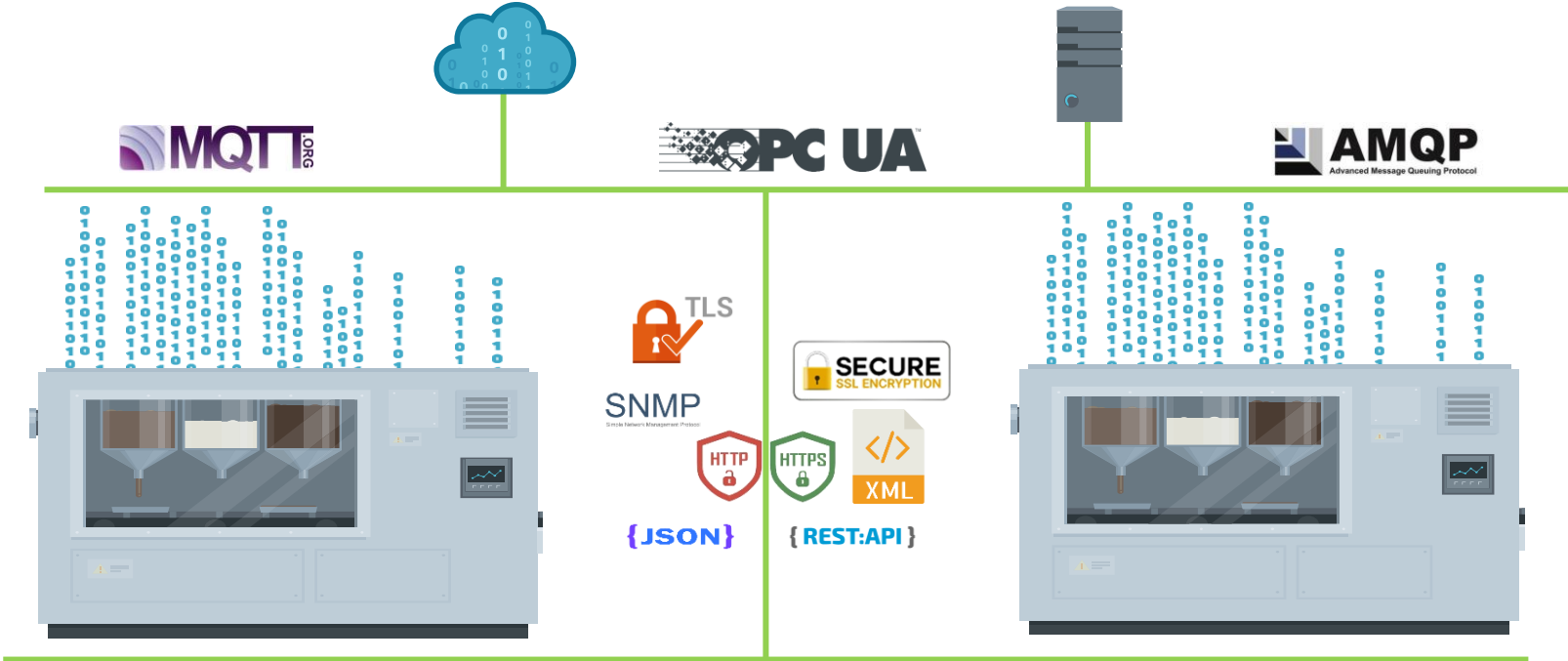
<b>Corporativo</b>	
<b>Core OT</b>	
<b>Distribuição OT</b>	
<b>Célula OT</b>	



A man in a dark suit, white shirt, and dark tie, wearing dark sunglasses, is holding a glowing blue device in his right hand. The device has a bright blue light at the top and a smaller, dimmer light below it. The background is dark and blurry, suggesting an outdoor night setting. The overall lighting is dim, with the primary light source being the device he is holding.

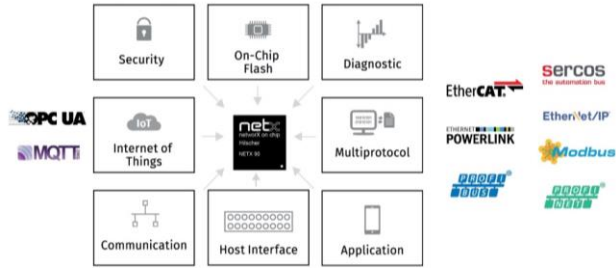
**Disseram para você que uma  
única solução atende 100%  
das necessidades de  
comunicação em OT?**

# Ecossistema de comunicações em OT

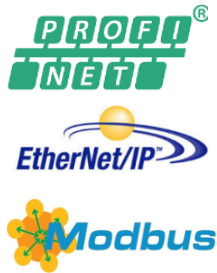


# Coexistência VS Convergência das redes de OT

## Coexistência tecnológica



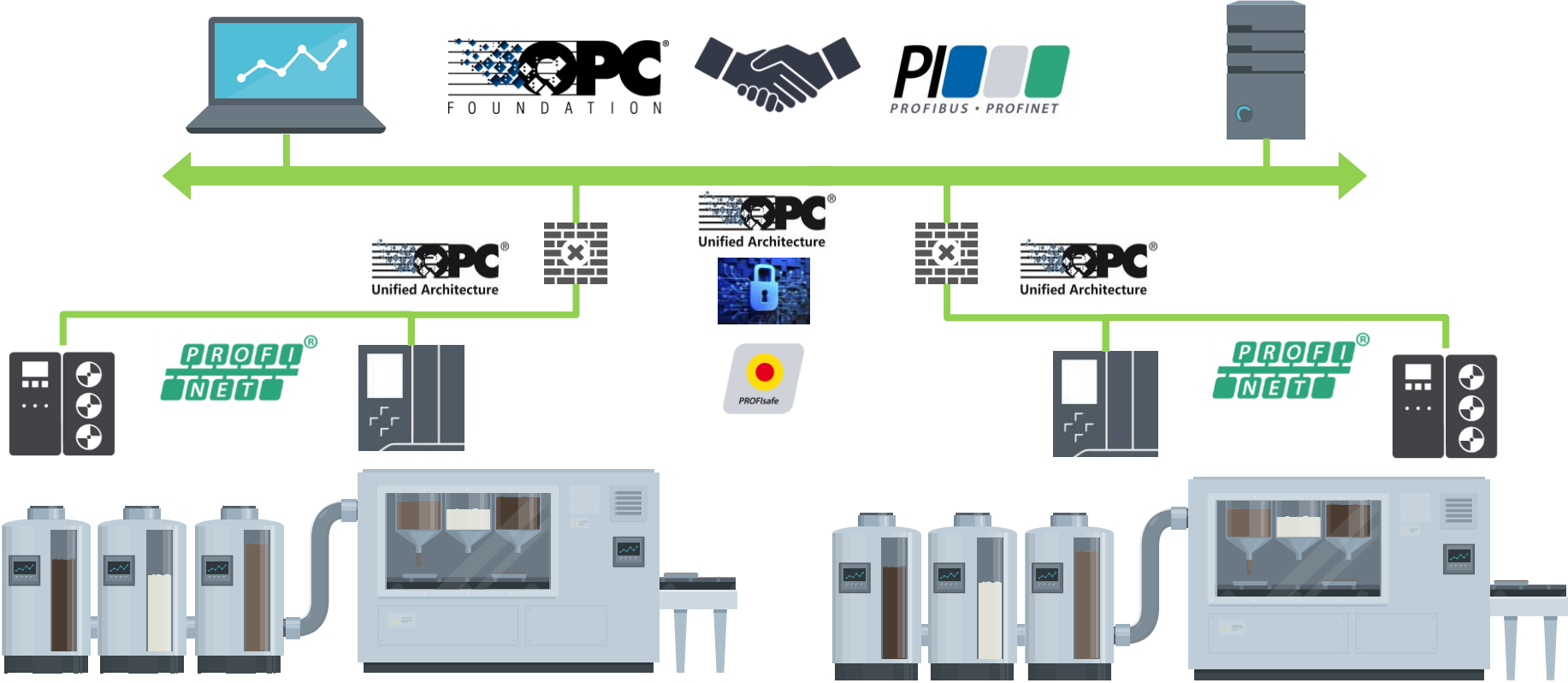
One chip. All protocols. Your application.



## Convergência tecnológica



# Exemplo perfeito de convergência em redes de OT



**Como controlar a explosão de dados  
não padronizados?**

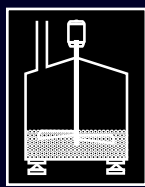
# Os desafios dos dados não padronizados

Sistema de Controle e Supervisão da Planta

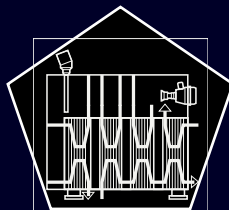
Interface de comunicação



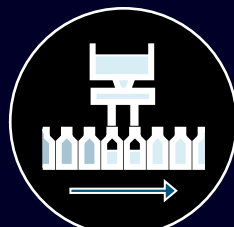
Centrífuga



Reator



Filtro



Linha de envase

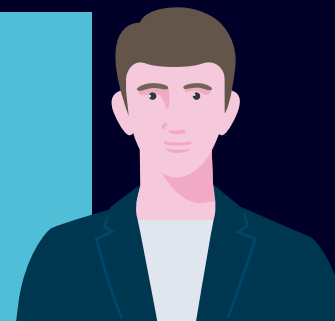


Centrífuga 2

Dados incompatíveis

Esforço para realizar o startup

Adaptações consomem muitas horas de desenvolvimento

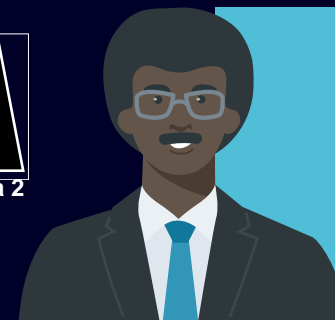


Cliente Final

Limitação das tecnologias

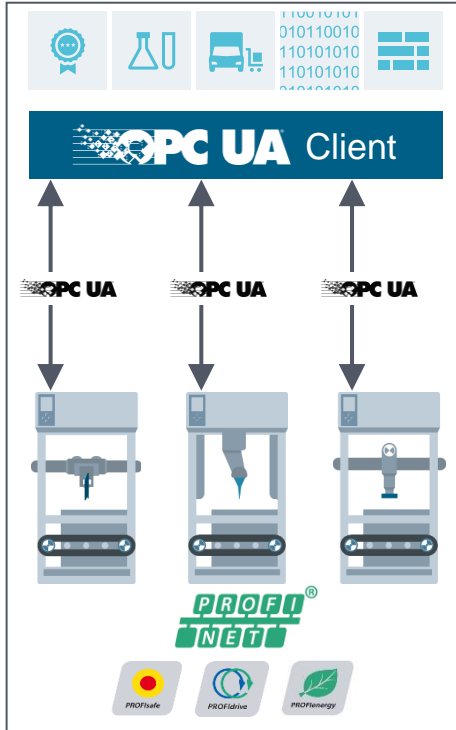
Interesses comerciais

Defesa de base instalada



Fornecedores

# Padronização de dados estruturados com OPC UA



## OPC UA

IT	Industries	Process automation	IO level	Factory automation	Energy	Consortia	Engineering

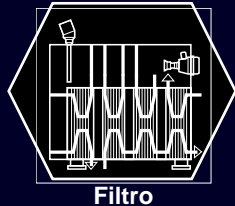
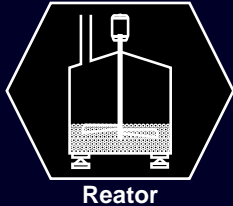
### Collaboration domain specific information models

The OPC foundation closely cooperates with organizations and associations from various branches. Specific information models of the standardization organizations are mapped onto OPC UA and thus become portable.

# Padronização de projetos através de MTP

Sistema de Controle e Supervisão da Planta  
(Orquestrador)

Interface de comunicação



Interoperabilidade de dados e plataformas

Startup e comissionamento Plug & Produce

Redução de custos no OPEX e no CAPEX

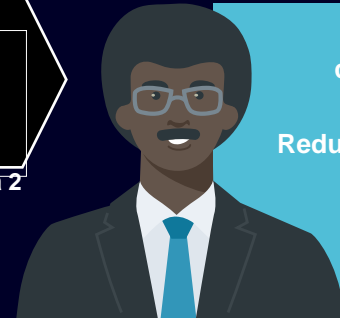


**Cliente Final**

Aumento da competitividade

Redução nos custos de engenharia

Agilidade no startup



**Fornecedores**

**MTP = Modular Type Package**

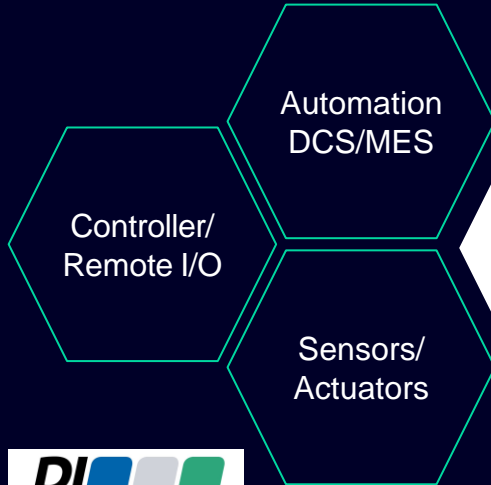
**SIEMENS**



# Normatização global do MTP

## IEC63280

Global International Standard for MTP<sup>1)</sup>



## ZVEI

German Electrical and Electronic Manufacturers' Association



Profibus & Profinet International

<sup>1)</sup> in progress



## NAMUR

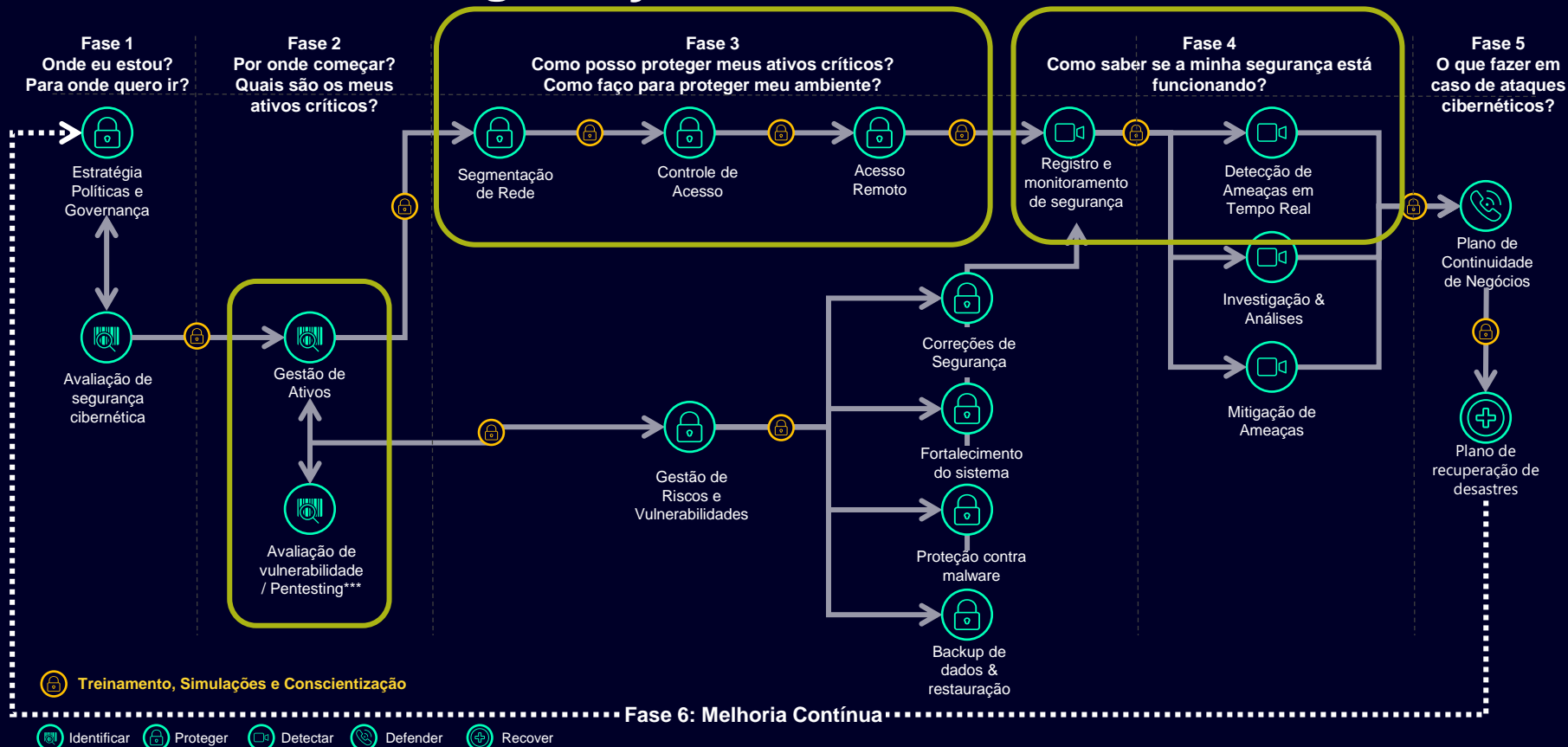
User Association of Automation Technology in Process Industries

**Como configurar, monitorar e proteger  
redes de OT?**

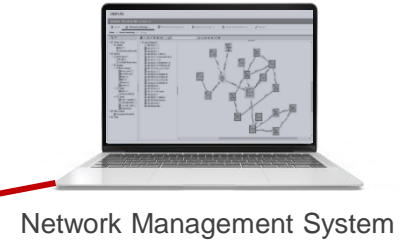
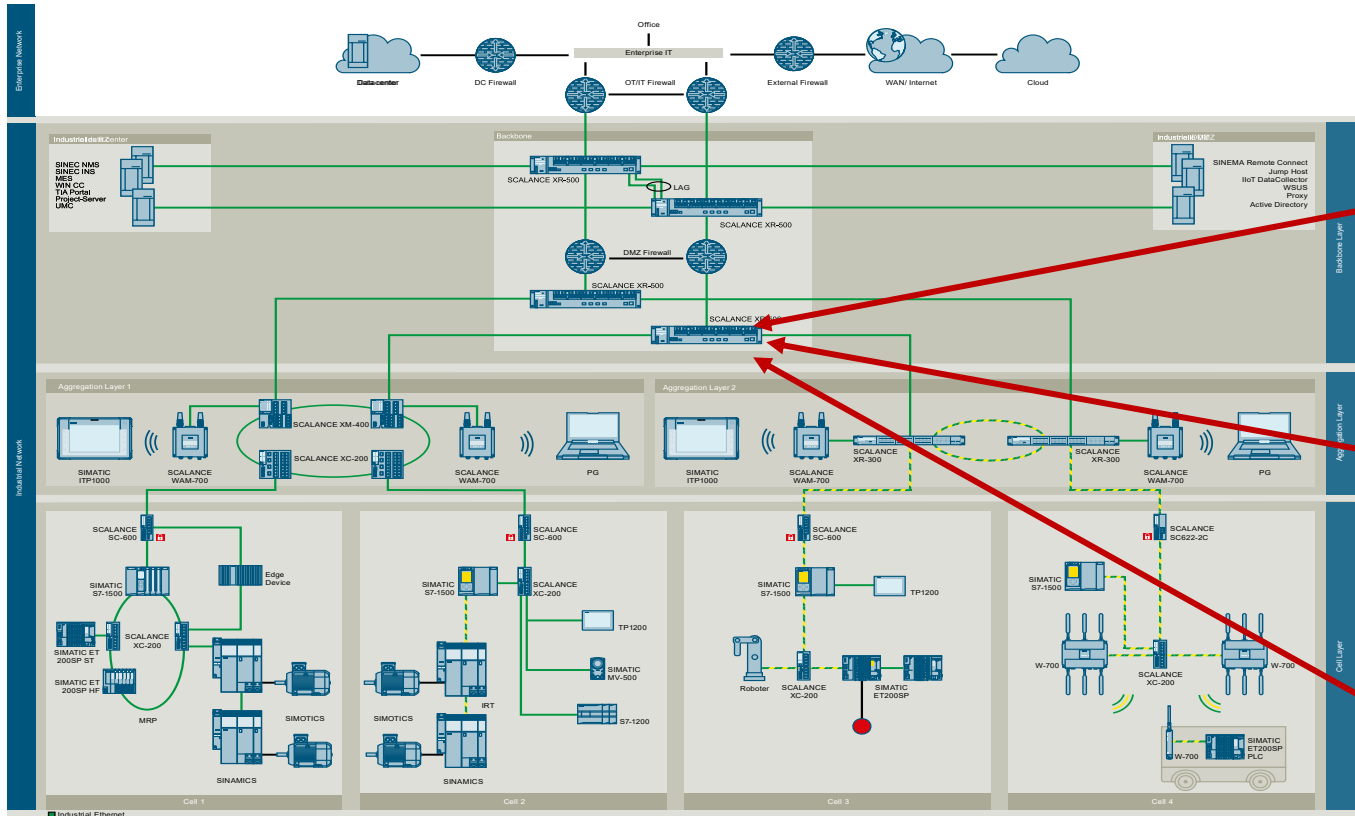
# Foco demasiado nas tecnologias de Cibersegurança



# Jornada de Cibersegurança nos ambientes de OT

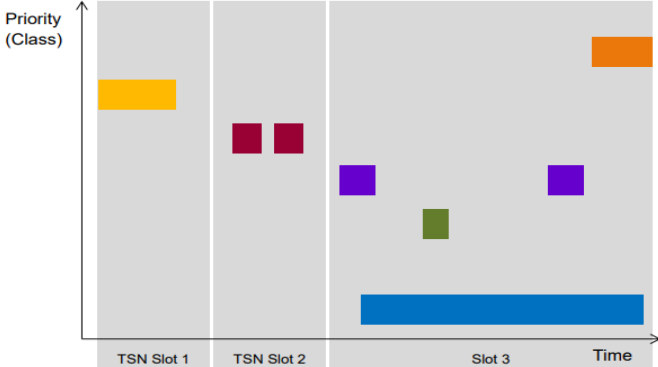
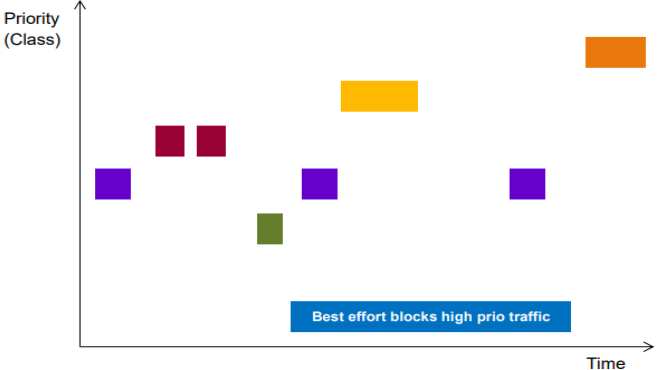


# Governança e Cibersegurança das redes de OT

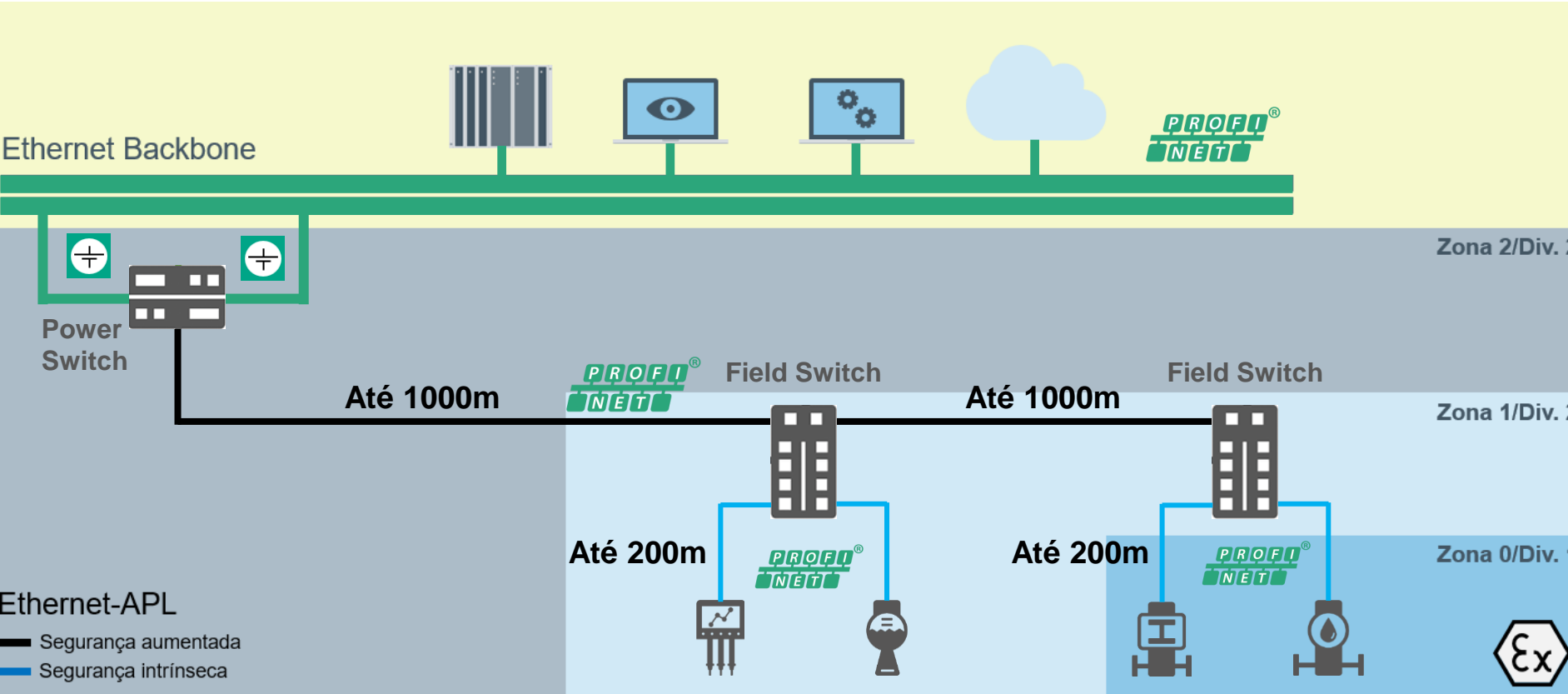


**Novos padrões para redes de OT  
cabeadas**

# Maximizando as redes de OT com Ethernet TSN

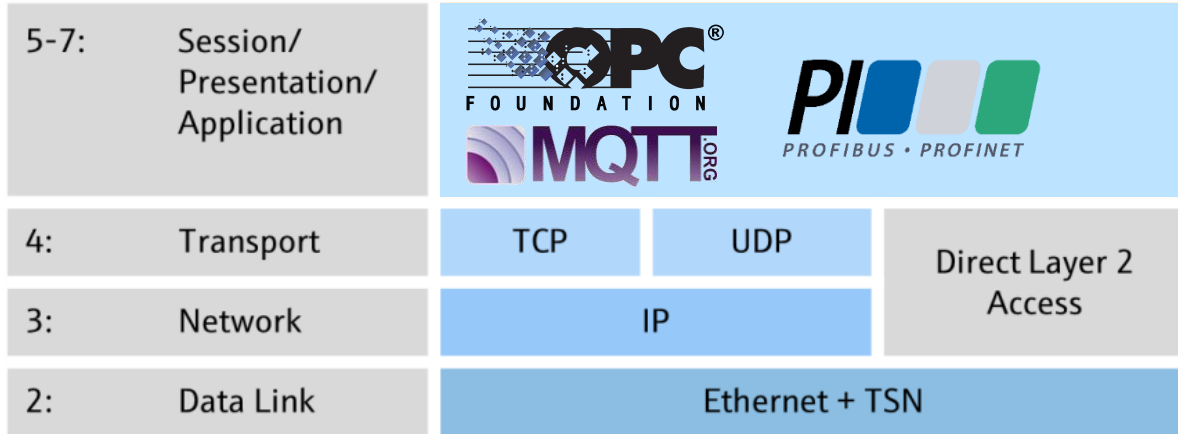


# Redes de processo através de Ethernet APL

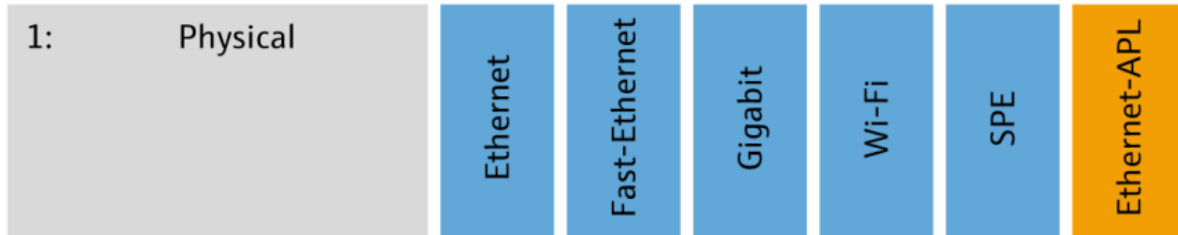




# Redes Ethernet TSN e APL em ambientes de OT



- As redes Ethernet TSN e APL transportam dados de OT e IT
- Elas podem ser utilizadas tanto para comunicações L2 quanto L3



- Ethernet TSN tem foco na indústrias de manufatura
- Ethernet APL tem foco na indústrias de processo

**Novos padrões para redes de OT sem  
fio e móveis**

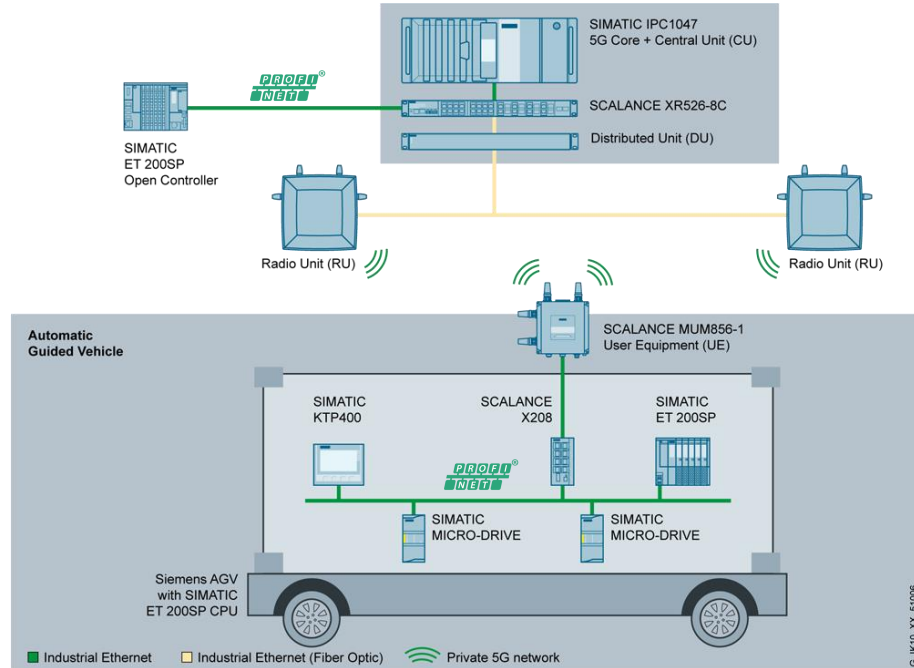
# Uso de 5G Industrial em ambientes de OT

## 5G Industrial A rede sem fio do futuro

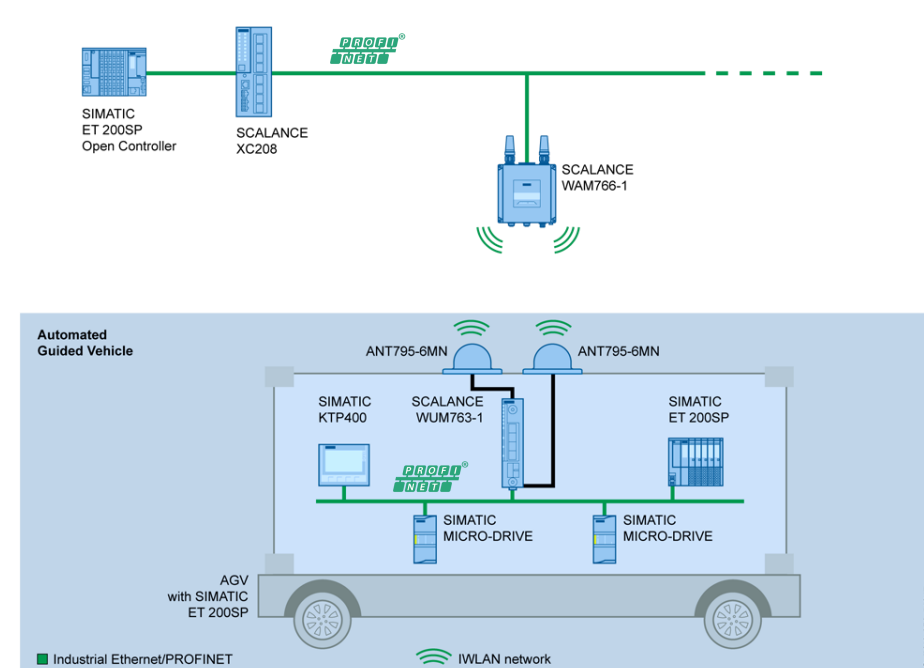


# 5G Industrial e WiFi6 Industrial em OT

## Controle de AGV com 5G Industrial Privado

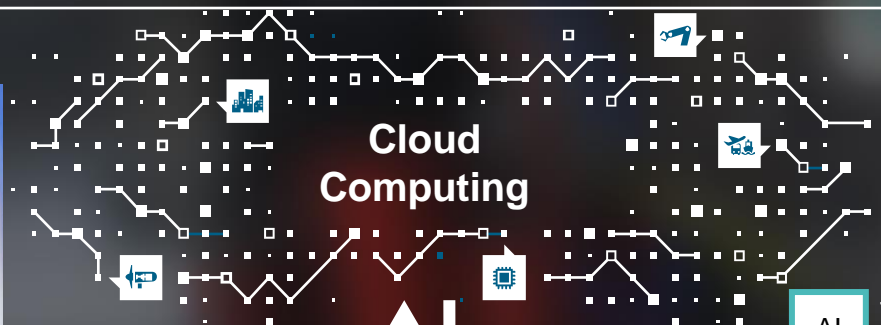
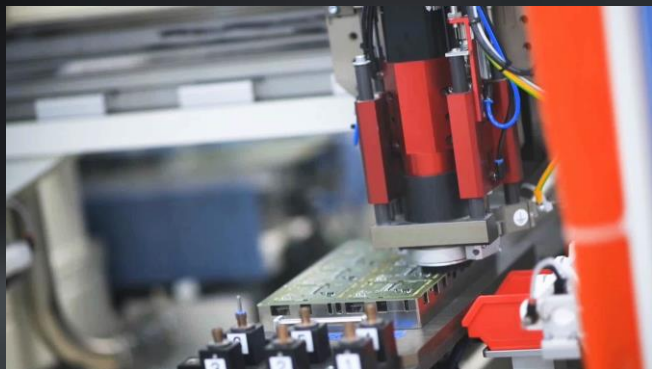


## Controle de AGV com WiFi6 Industrial



**Processamento de dados na  
borda(Edge) e na nuvem (Cloud)**

Internet



AI Treinamento do algoritmo



Produção

Detecção de anomalia para manutenção preventiva



Edge Computing

PROFI<sup>®</sup>  
NET

Dados de Máquina

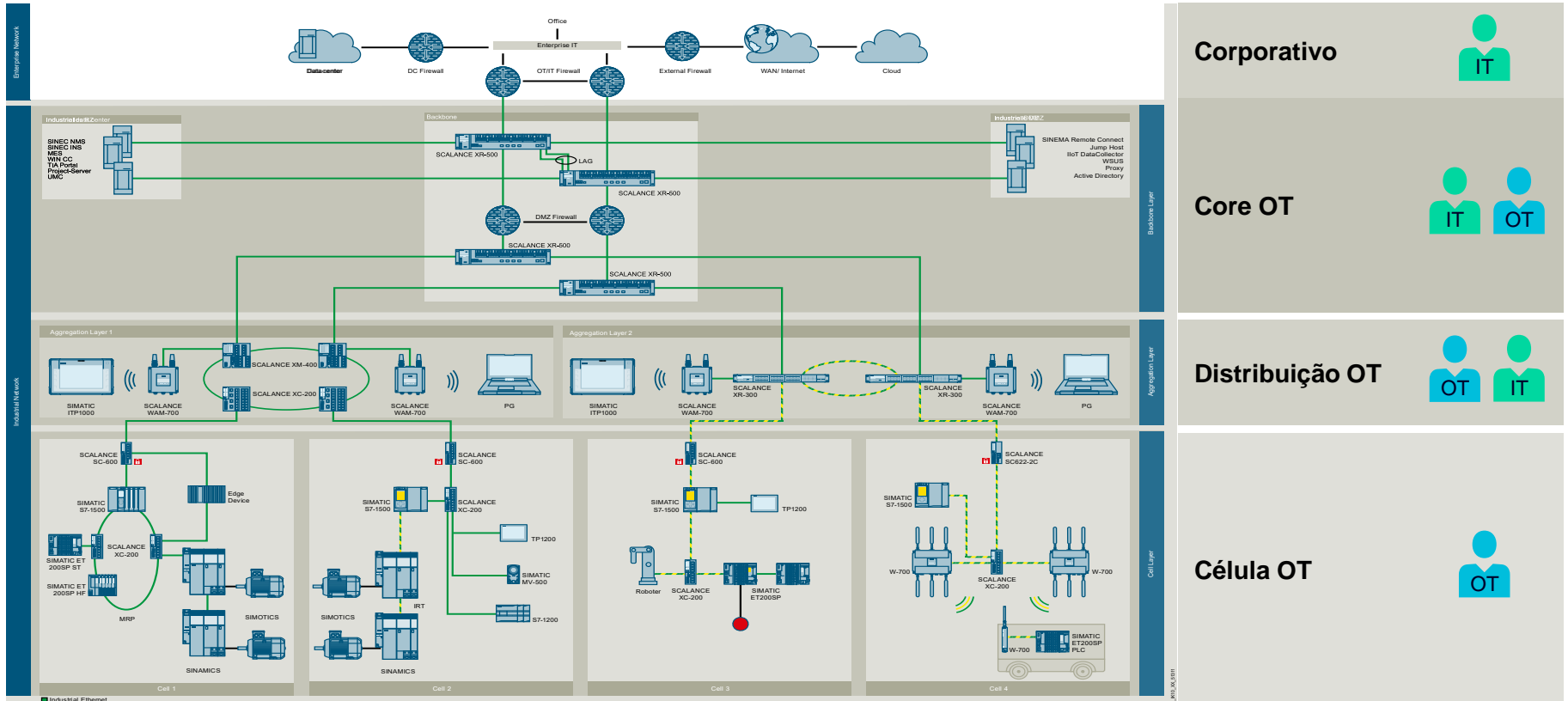


Máquina de Corte PCB

Resumindo (ufa!!!)



# O presente e o futuro das redes de OT



Corporativo



Core OT



Distribuição OT



Célula OT





# Soluções SIEMENS para Conectividade Industrial

## Ethernet Industrial



## Aplicações críticas e militares



## Cibersegurança



## Acesso remoto e Telecontrole



## Redes Móveis (WiFi4/5/6, WiMax e 3G/4G/5G)



## CPs, Profinet e Profibus



## Softwares



## Cabos e conectores



# Vamos ficar conectados



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