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OT Cybersecurity

Fundamentals

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Introduction to Operational Technology CyberSecurity

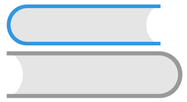
OT Cybersecurity Fundamentals

Contents

IT/OT Gap

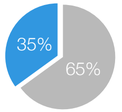
OT Terminology

OT Network



Purdue Reference Model

IT within OT



IT vs OT

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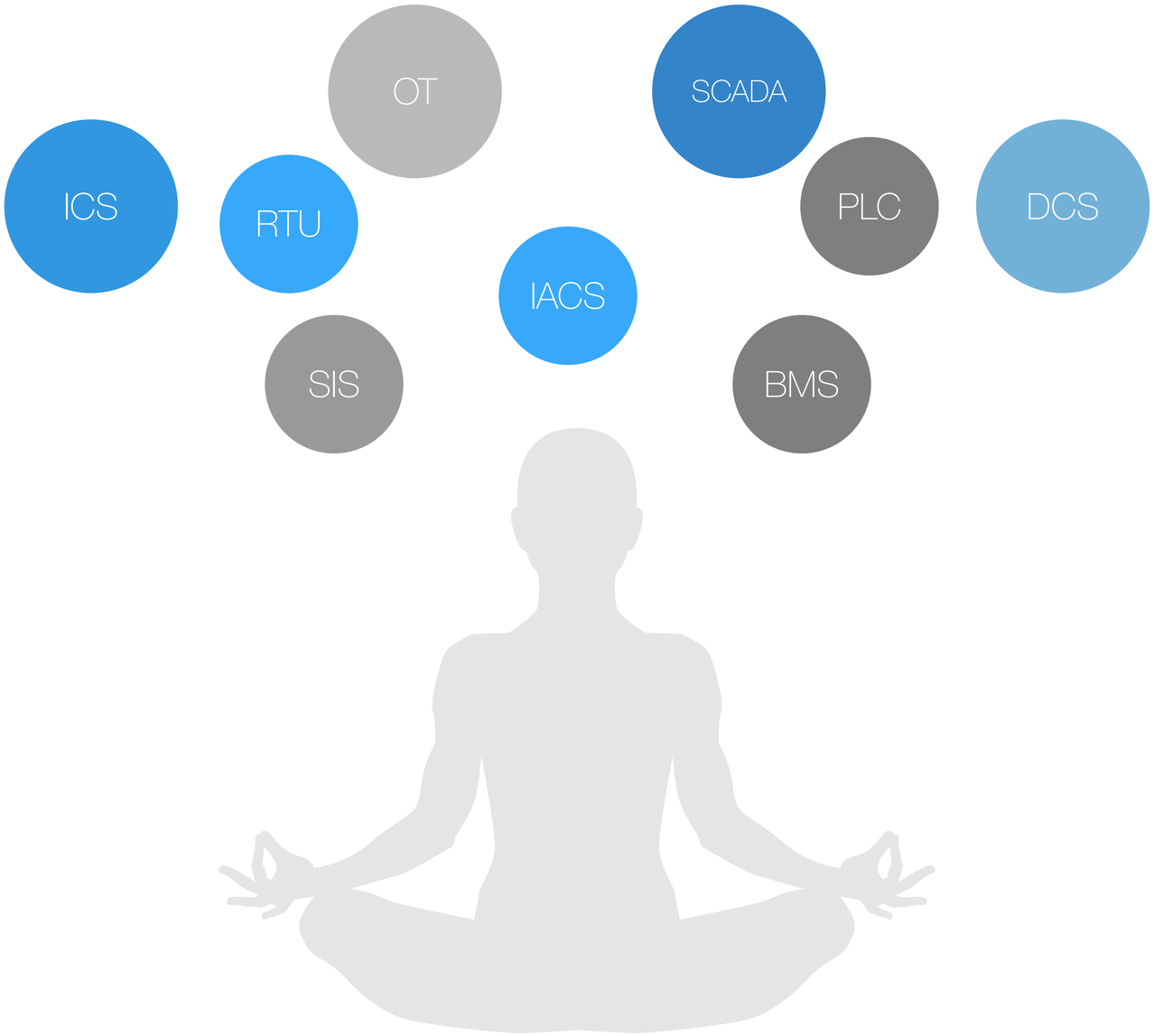
OT Terminology



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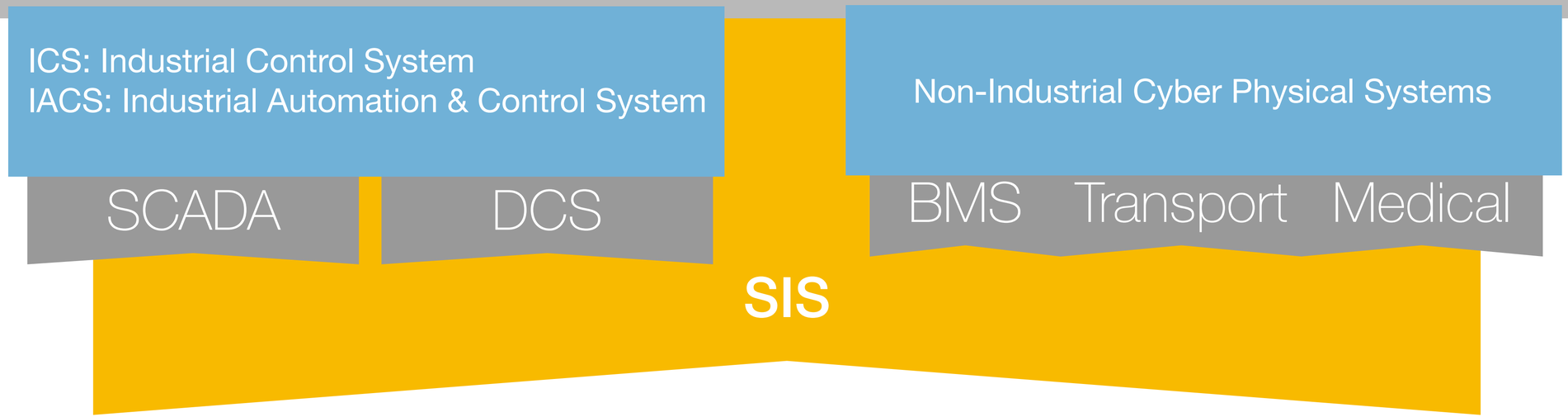
OT Terminology

Operational Technology OT:

Hardware and software that detects or causes a change, through the direct monitoring and/or control of industrial equipment, assets, processes and events.

Industrial Control Systems (ICS) and other “cyber physical systems” – but is also used to describe automation systems that aren’t industrial in nature but use similar technology.



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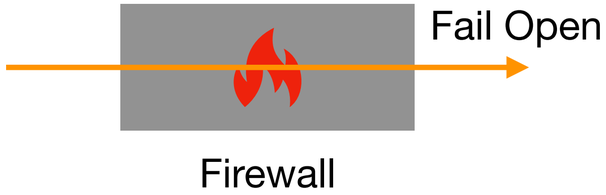
IT / OT Gap

Confidentiality

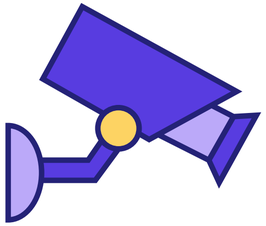


Firewall

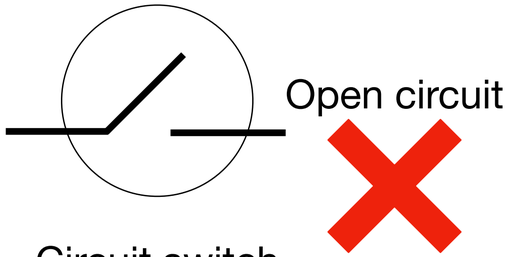
IT

Priority **Different meanings**

OT



Safety



Circuit switch

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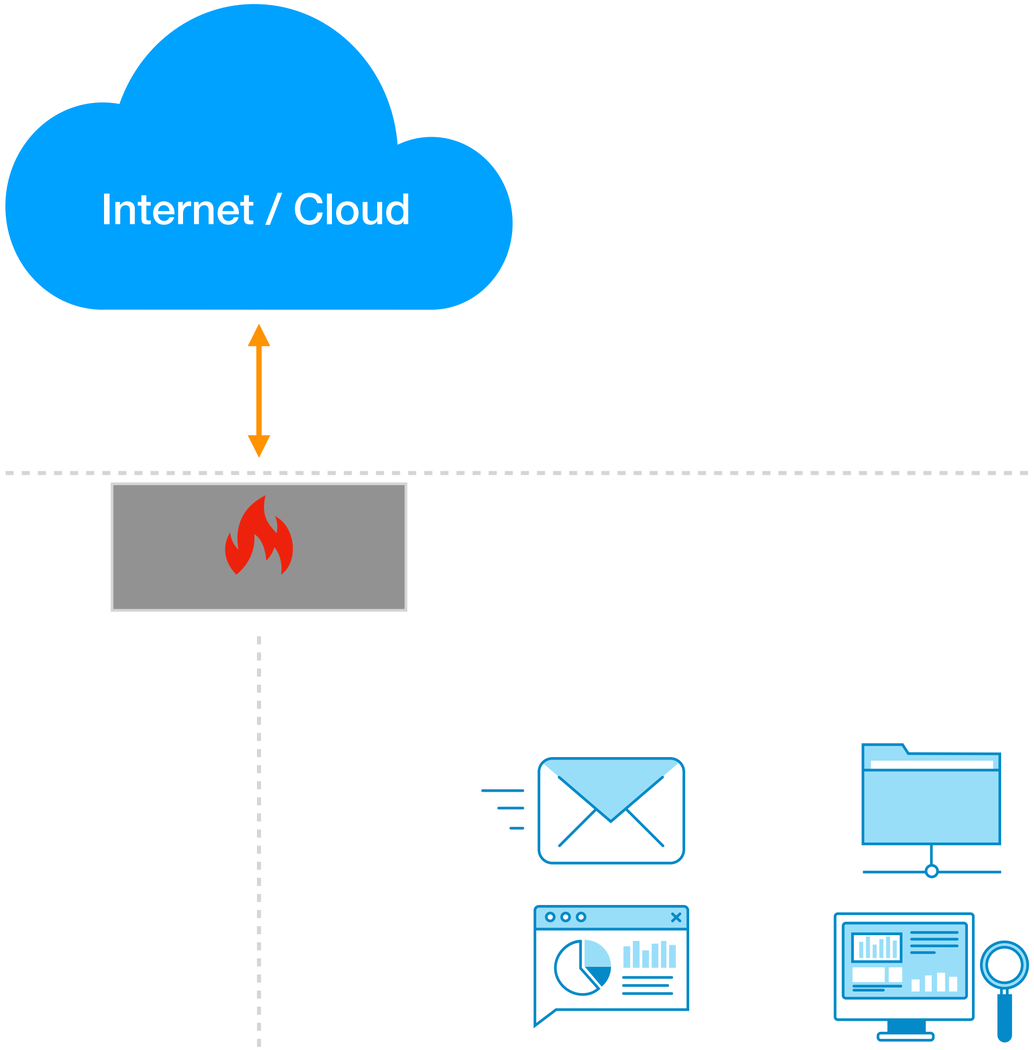
IT Network Design



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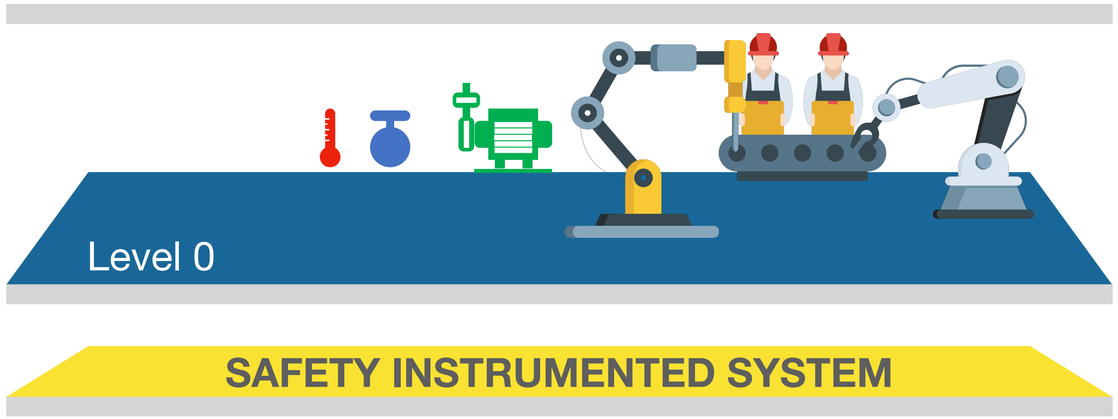
OT Network Design



Process: Field Devices

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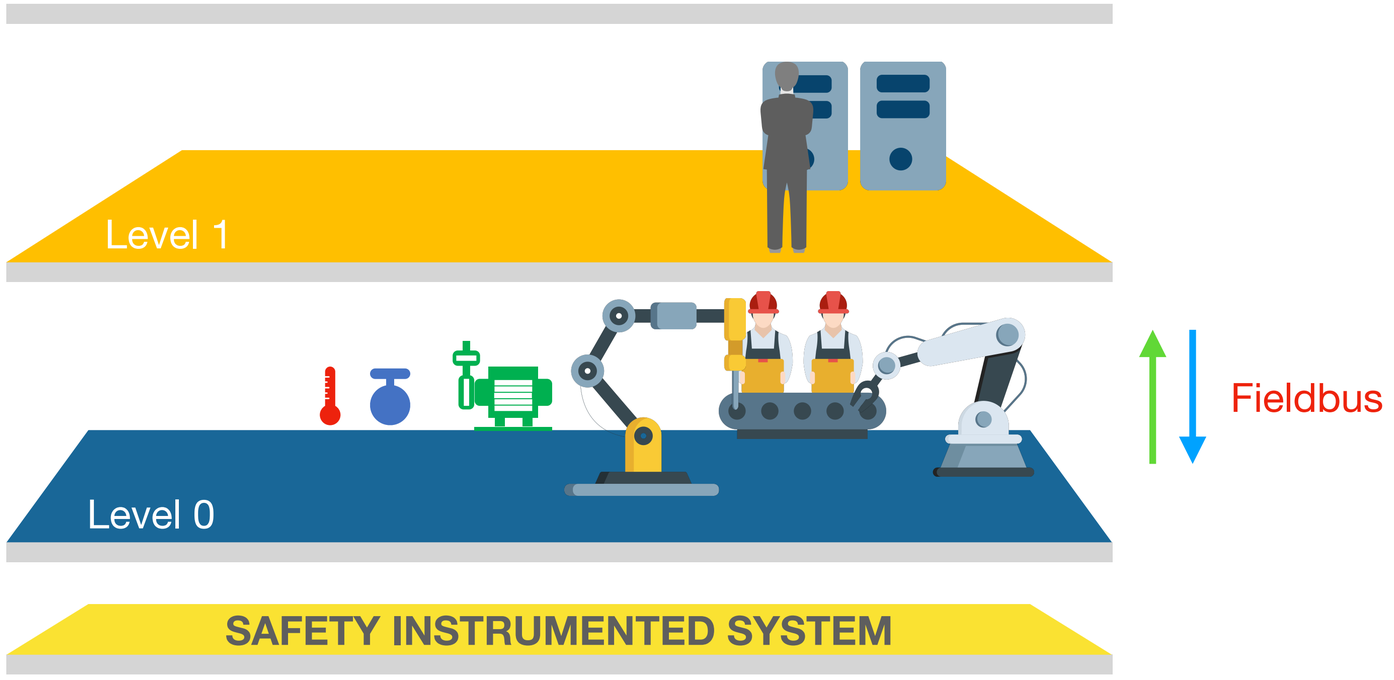
OT Network Design

Control: PLC / RTU / PAC / IED



Process: Field Devices

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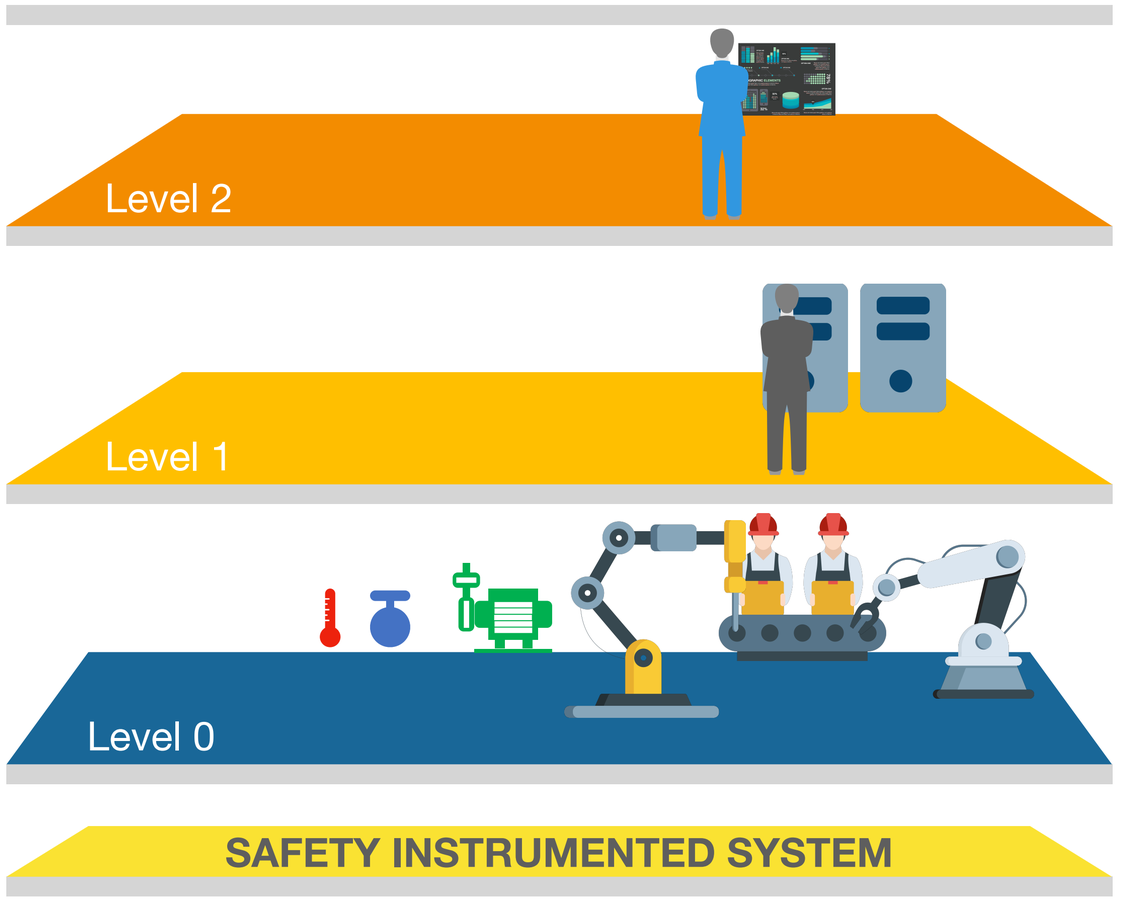
OT Network Design

Supervisory:
HMI / ENG / SCADA / HISTORIAN

Automation: PLC / RTU

Process: Field Devices



Ethernet / Serial

Fieldbus

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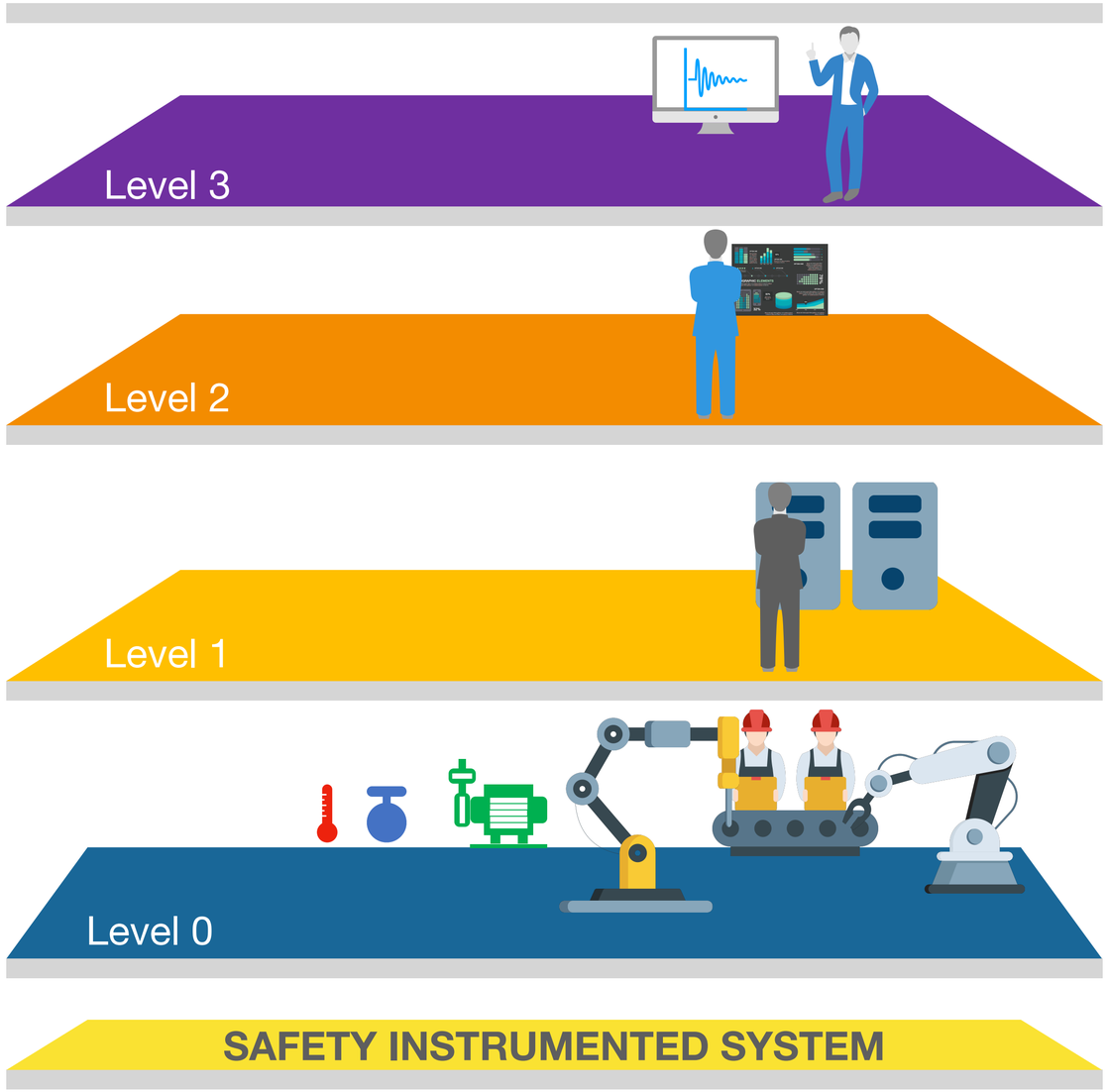
OT Network Design

Planning: MES
(Manufacturing Execution System)

Supervisory:
HMI / ENG / SCADA / HISTORIAN

Automation: PLC / RTU

Process: Field Devices



MES provides full visibility to management over the operation processes, from start to end. Helps in optimizing production and other decisions (Quality / Quantity)

Ethernet

Ethernet / Serial

Fieldbus

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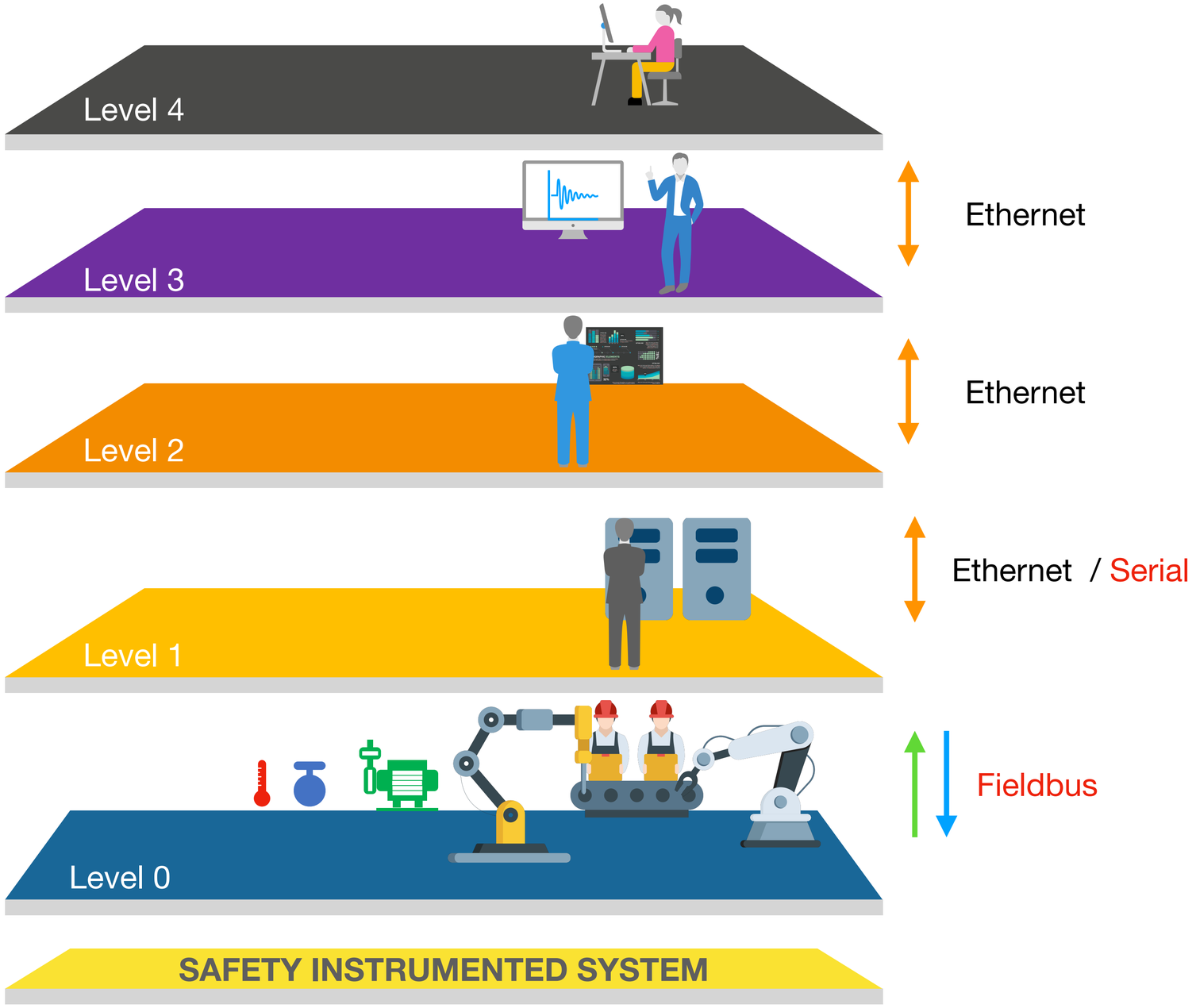
OT Network Design



Management: ERP

Planning: MES

Supervisory:
HMI / ENG / SCADA / HISTORIAN

Automation: PLC / RTU

Process: Field Devices

Ethernet

Ethernet

Ethernet / Serial

Fieldbus

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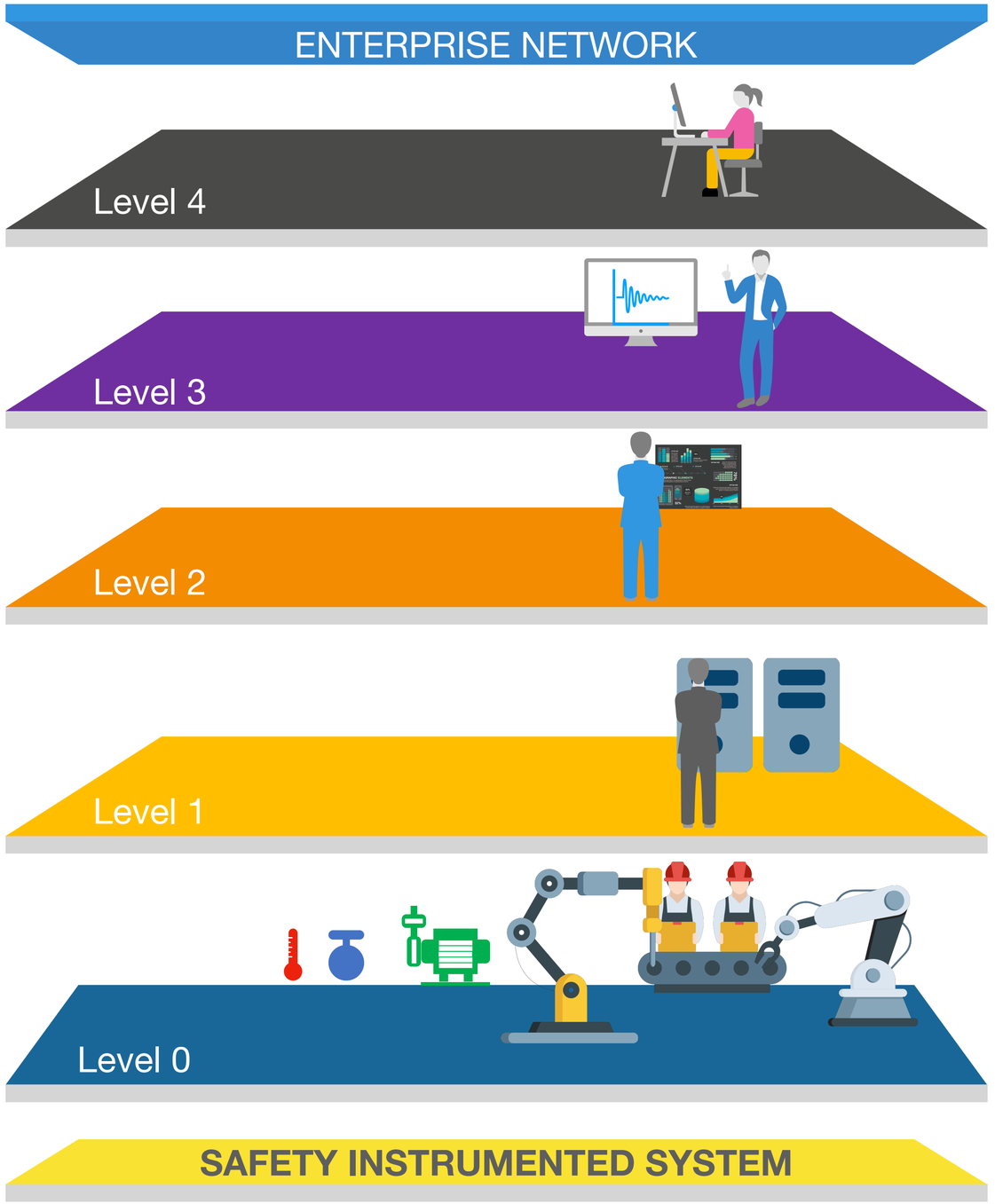
OT Network Design



Management: ERP

Planning: MES

Supervisory:
HMI / ENG / SCADA / HISTORIAN

Control: PLC / RTU

Process: Field Devices

Ethernet

Ethernet

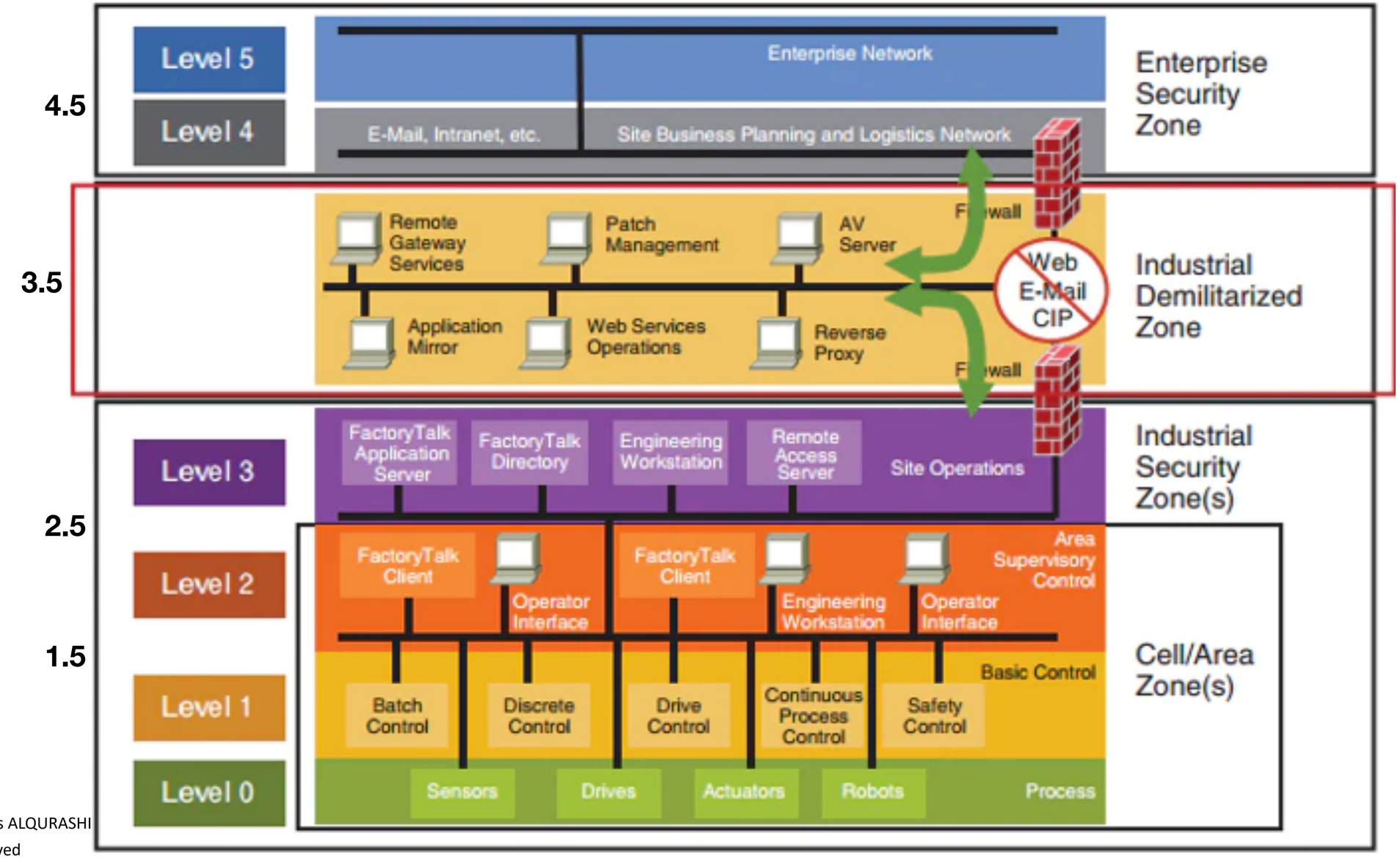
Ethernet

Ethernet / Serial

Fieldbus / Wireless

Purdue Reference Model

IT/OT Convergence vs Segmentation vs Micro Segmentation



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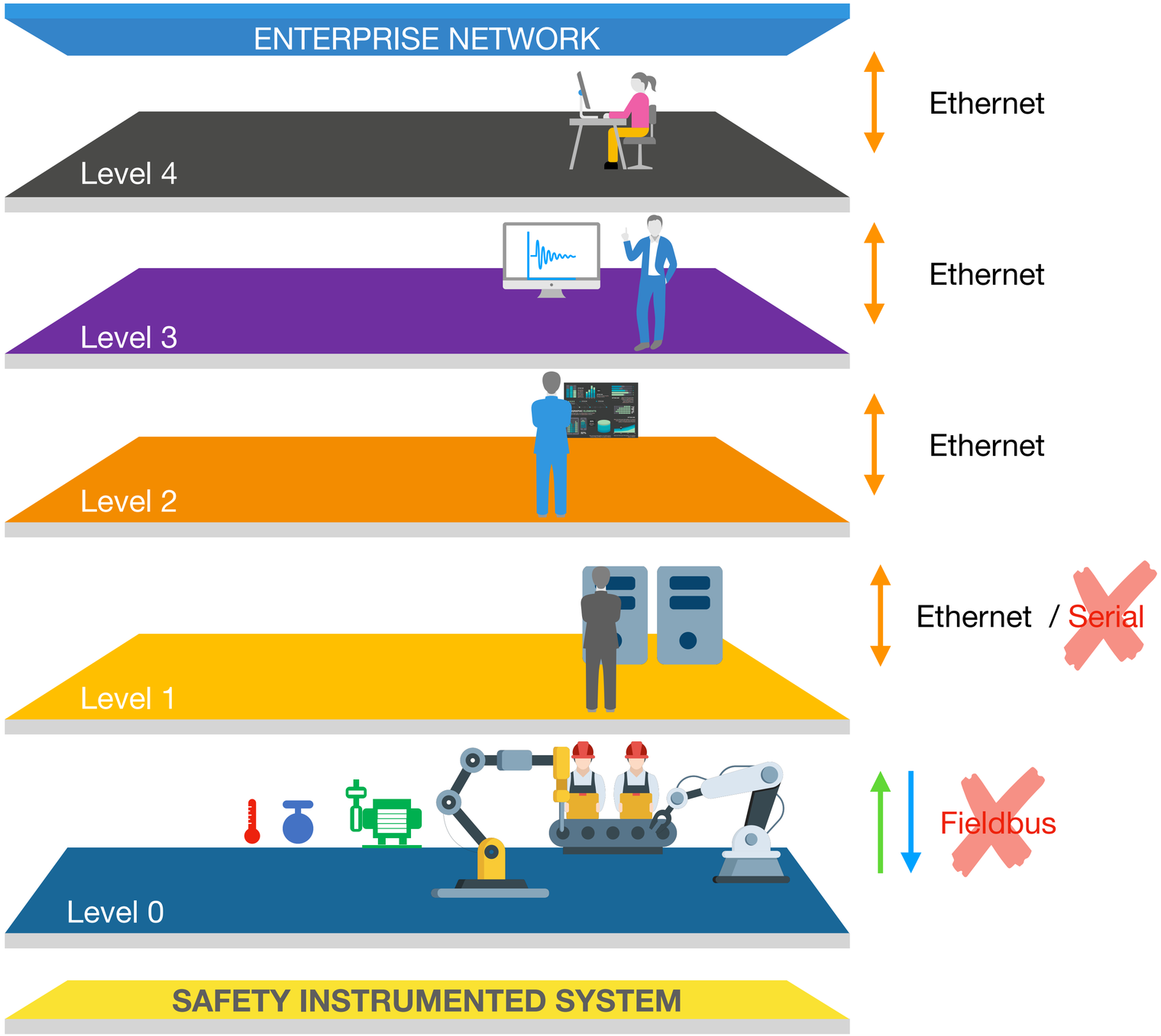
OT Cybersecurity

IT components

Servers
Workstations
Routers
Switches
Firewalls
OS
Software
Antivirus
IT Protocols

None-IT components

PLC / RTU
Industrial Protocols



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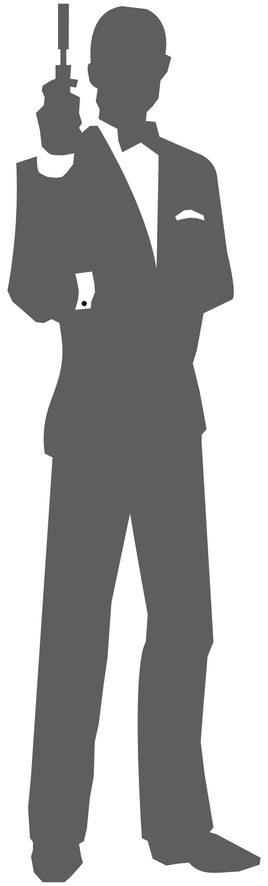
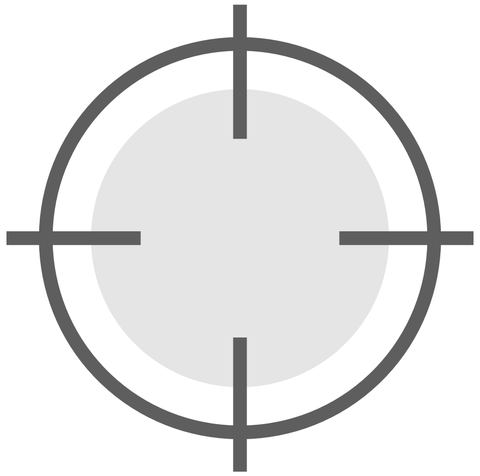
IT vs OT Question?





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IT vs OT Cybersecurity strength

Higher exposure to Internet

Security comes first

IT systems are equipped with security

Mostly Isolated

Safety comes first

OT systems are insecure by design

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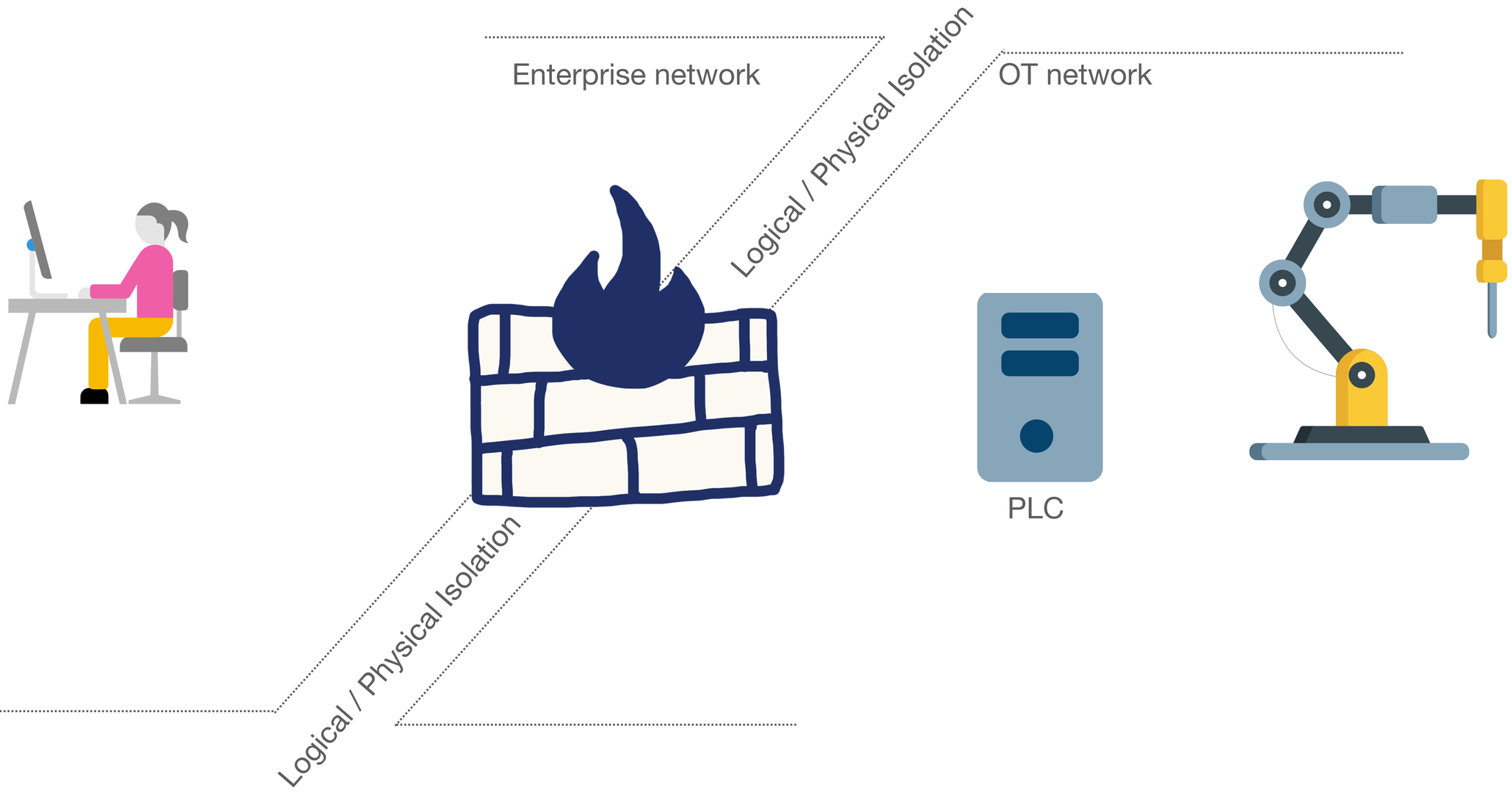
OT is air gapped (offline) networks, is this true?



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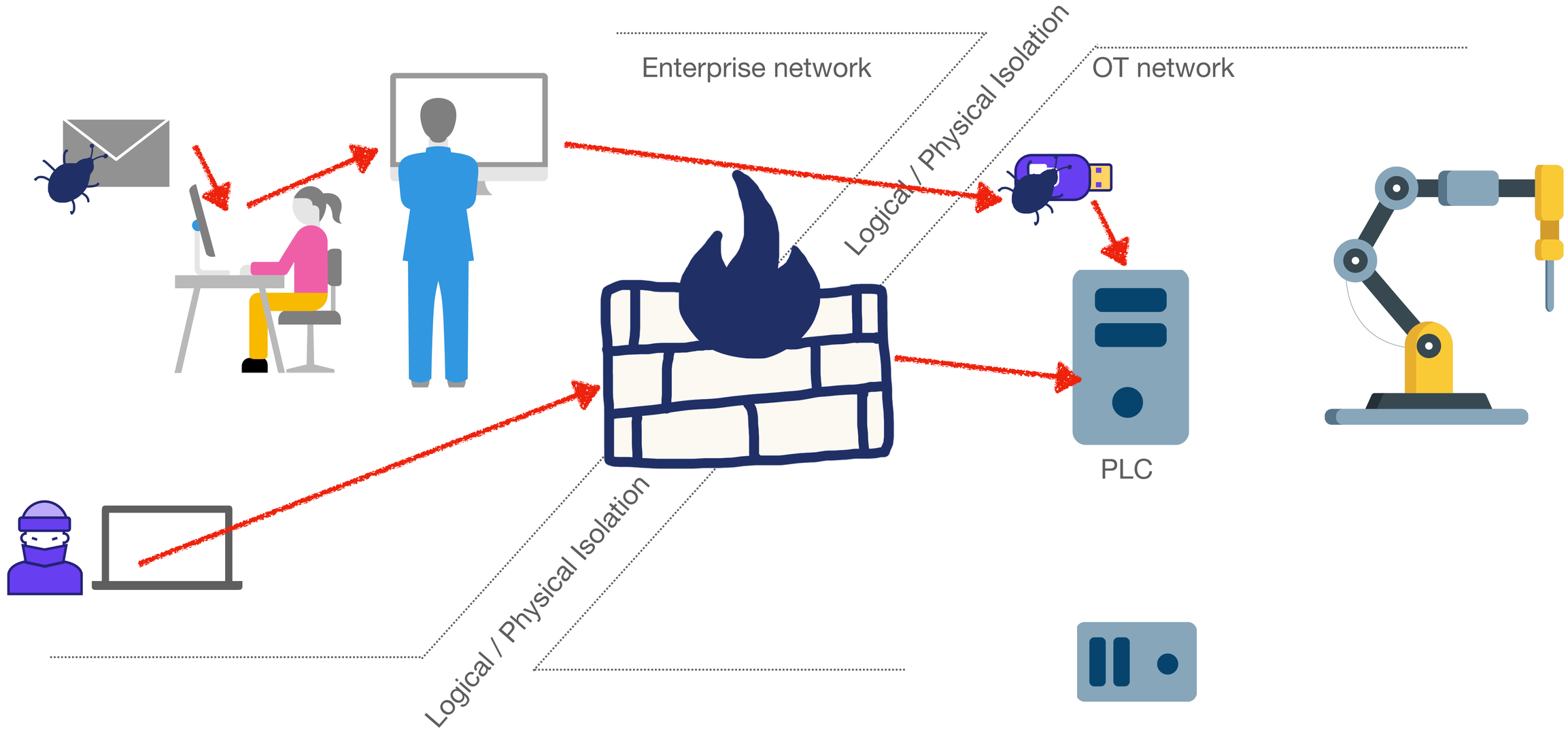
OT is air gapped (offline) networks, is this true?



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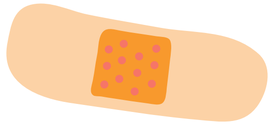
IT vs OT (Cybersecurity)

Encryption: used sometimes or not at all, delays caused by encryption/decryption may impact the operation.

Encryption: Advanced encryption is often used.

Patch Management: Not frequently, Vendors must be involved, impact must be tested offline.

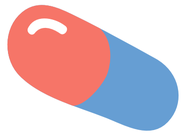


Patch Management: Performed routinely under standard procedures.

Pen-test: Dangerous and performed with cautious in specific timing.

Pen-test: Widely used by ethical hackers to identify vulnerabilities.

Upgrade: Many legacy systems still in use with few changes over years.



Upgrade: Continuously.

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IT vs OT (Cybersecurity)

Cybersecurity Awareness: Low.

Cybersecurity Awareness: Medium-High.

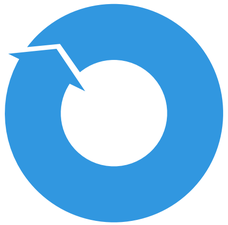
OT

IT

Data Loss: Loss of product and disturb plant process.

Data Loss: Restored from Backups.

Availability: Systems are designed with resilience, as it will have huge impact on plant processes and lives.



Availability: Critical.

Performance: Critical.

Performance: Minor-Major.

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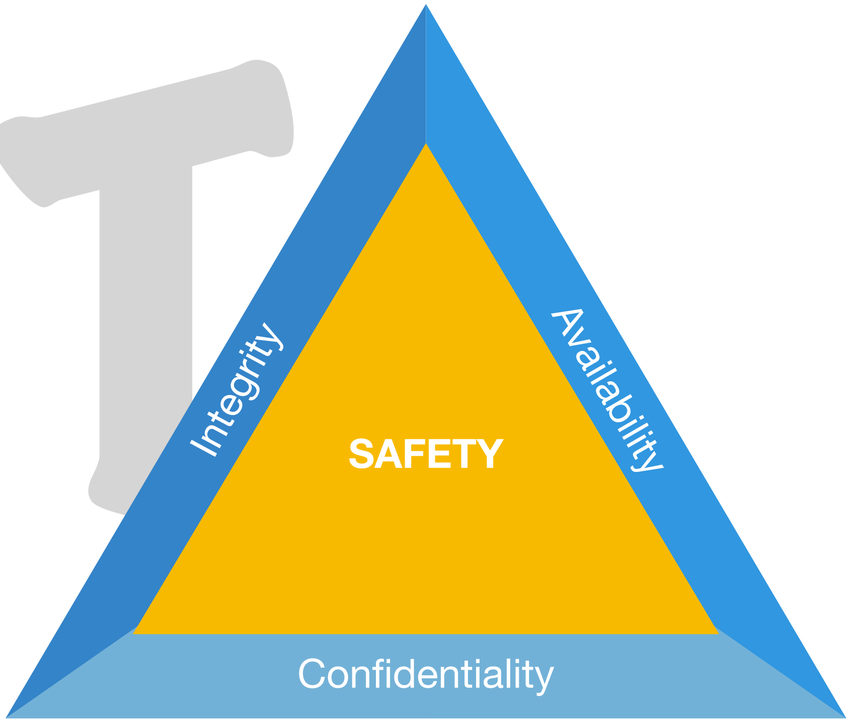
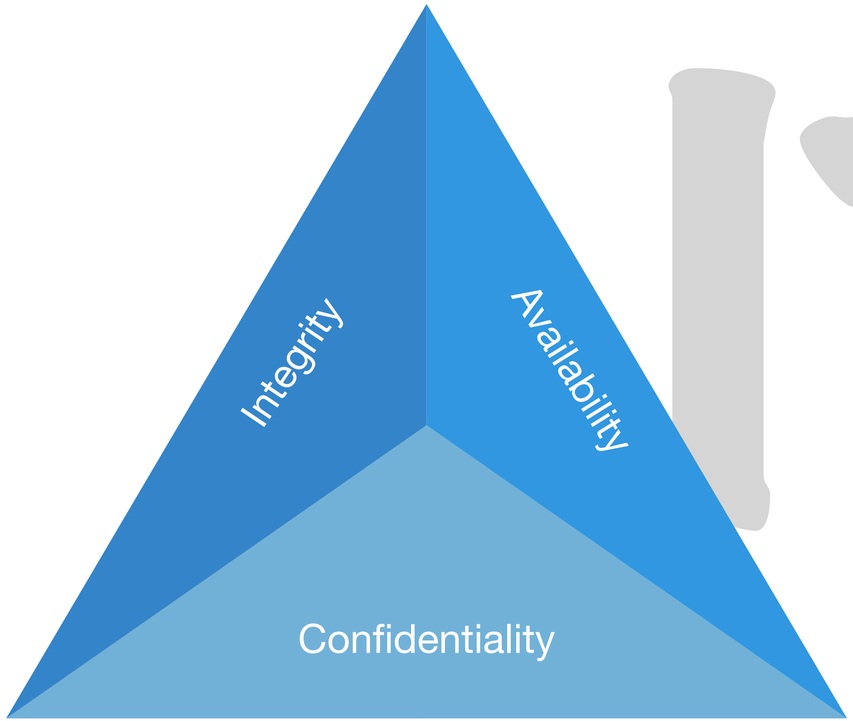
IT vs OT (Cybersecurity)

OT



IT



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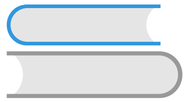
Quick Summary

IT/OT Gap

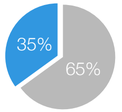
OT Terminology

OT Network



Purdue Reference Model

IT within OT



IT vs OT

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