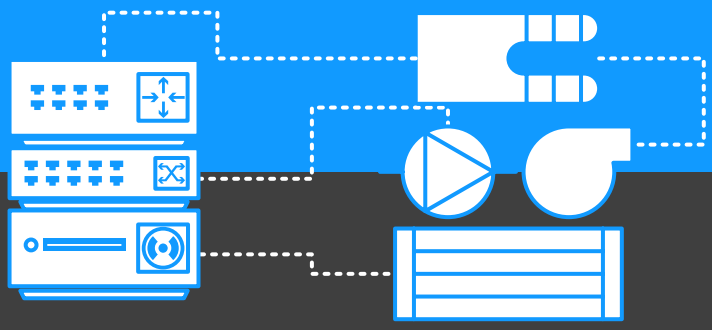
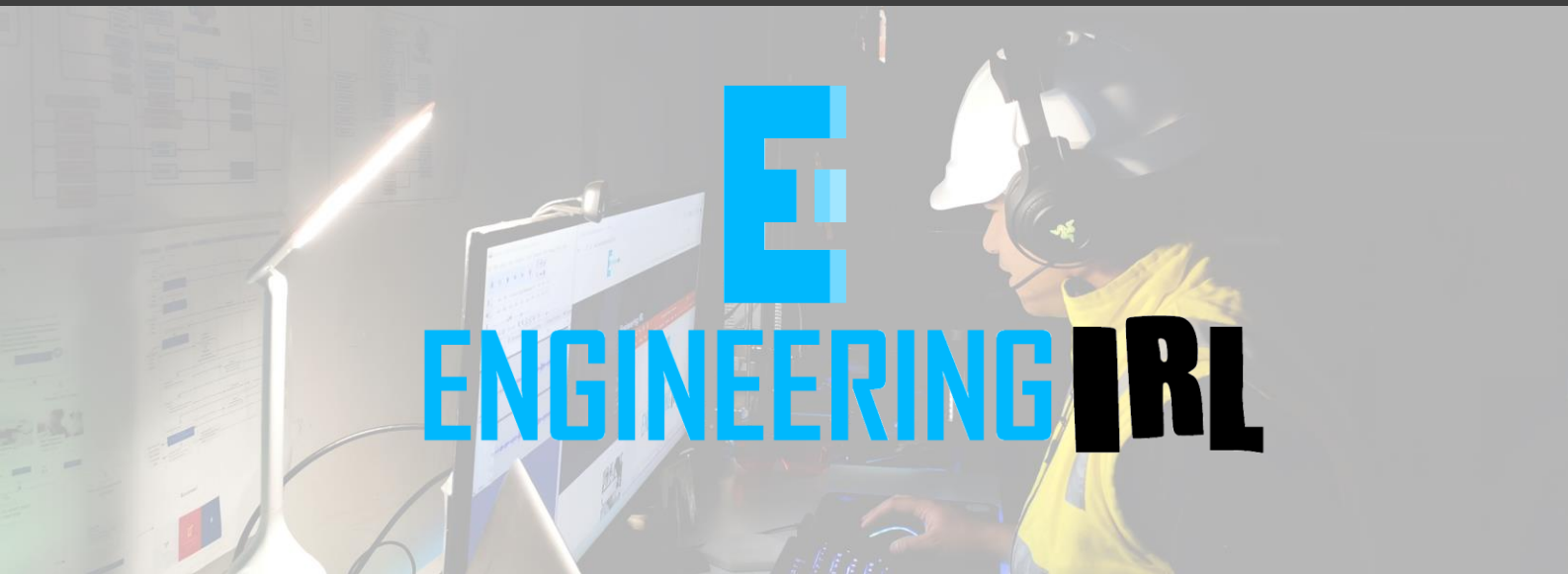
OPERATIONAL TECHNOLOGY



ULTIMATE GUIDE FOR ENGINEERS



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OVERVIEW

Contents

What is Operational Technology?

What's with the term?

Operational Technology is a relatively new term but not a new concept.

The use of the word Operational Technology, OT for short is used to distinguish between Information Technology (IT) and has been more relevant since the advent of IoT.

What is it?

In short, Operational Technology, OT, is the "IT Stuff" for Industrial Computer Systems

It covers the hardware and software that monitors and controls changes in physical devices.

Source:
https://www.engineeringinreallife.com/post/what-is-operational-technology

IT vs. OT and the IT/OT Convergence

IT vs. OT

Information Technology is focused on Information where as Operational Technology is focused on Operations and processes.
Meaning even when using the same technology, the implementation is different to suit priorities.
Similar to distinguishing a race car and a family car. Both have common parts but you design completely differently for their uses.

IT/OT Convergence

Originally OT networks were completely separated from other networks by an “air gap”.
Business needs have changed and to perform operations better, data needs to traverse corporate networks to the industrial networks.
Therefore the worlds of IT and OT are converging.
A challenge presents both IT and OT engineers compromising design to meet both needs.

Source:
https://www.engineeringinreallife.com/post/what-is-operational-technology

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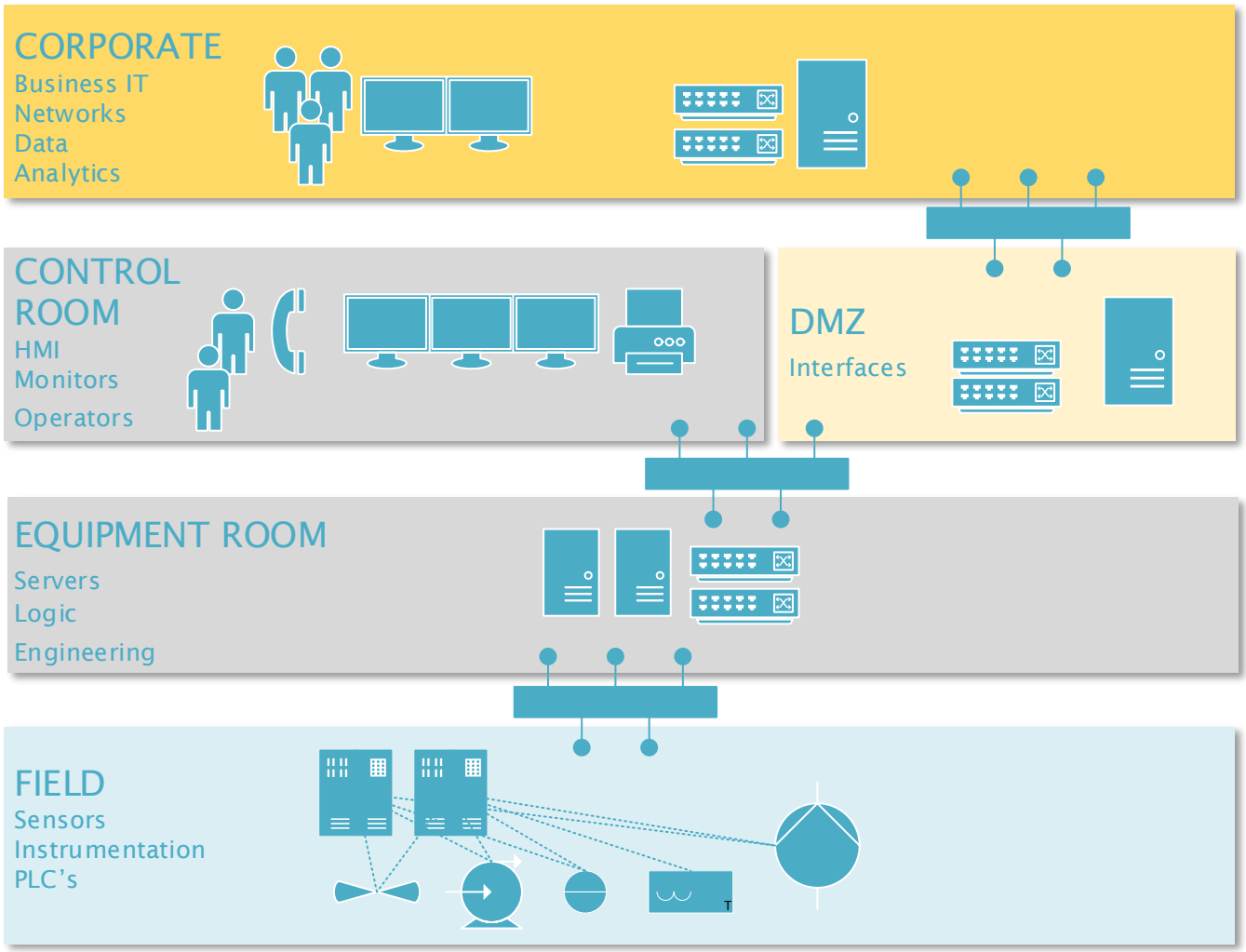
OT System Architecture

Industry to Corporate

Operational Technology architecture can vary but in general follows a high level standard. The connection to business IT networks are of particular interest. Goals change between each zone.



Operational Technology

Ultimate Guide for Engineers

OT Cyber Security

Why Now?

The three key drivers for Cyber Security Importance in OT networks are:

- Increasing Threat Landscape (More attacks)
- Technology (Connectivity, Big Data)
- Governance (States and Countries protecting Critical Infrastructure)

Refer to Stuxnet, Saudi Aramco Hack and Triton. Very dangerous cyber attacks on Critical Infrastructure.

Source:
https://www.engineeringinreallife.com/post/why-cyber-security-for-operational-technology-why-now

What are specifics in OT Cyber?

In Operational Technology environments the cyber security comes second to the primary function of the equipment. It is either mission critical or safety critical processes and therefore cannot stop.
IT Cyber Security Solutions do NOT work in OT environments without specific configuration.

Source:
https://www.engineeringinreallife.com/post/it-vs-ot-cyber-security-differences

OT in Industrial Control Systems

Role

Industrial Control Systems are comprised of the entirety of the controls, not just the computer and networking hardware and software. The processes and the instrumentation focuses on the logic and operations.
OT is of interest in terms of the hardware and software but IT will not know how to configure the controls and logic in the industrial control system, they are only interested in interfacing.

Security Standards

There are many specific ones but as a point of reference for those in OT you should become familiar with the following security standards:

- ISO 27001/02
- ISA 62433
- NERC CIP
- NIST 800-53

IIOT and the Future of ICS

IIOT?

Industrial Internet of Things is a natural progression from the Internet of Things which is essentially smart devices that act as sensor or control nodes that connect to the cloud for configuration, monitoring and control. This has several opportunities in the industrial space - but similar to IT vs OT, the needs are different in the OT environment.

IIOT Impact on future of ICS

The advancements in IIOT devices are quickly building cases for industry to adopt.
The risks of putting untested and new equipment has operational risk that is slowing progress.
IIOT will allow industries to address pain points around efficiency, predictive maintenance vs scheduled maintenance, modularisation, minimizing costs for small changes.
System architectures, concepts of operations, company cultures and cyber security will need to change for this to become reality.

Making a case for OT and IIOT Migration

Who are the Stakeholders

Understanding the people involved to make a shift is key for making any case.
The end users (operators and engineers) are not typically the same as the purchasers (asset owners, business managers).

What are the pain points of each group? Is there a business need? As Engineers you still need to understand the business need and the technology is in place to fit that need.

What's the punchline?

Business needs drive decisions. Proving an efficiency gain is not enough.
Instead of:
"The technology enables predictive maintenance, we save on maintenance costs."

Think:
"When an issue occurs that stops production, we have to wait for maintenance before continuing. Predictive maintenance means fixing it before the stop of production"

Biggest Risks with OT

Risks we contend with

The biggest evidence that IT and OT systems have different goals are when you perform **risk assessments** on both types. CIA is Confidentiality, Integrity and Availability.
The high risk scores in IT are more often around Confidentiality where as the high risk scores in OT are often around availability.

Unplanned Outages

Outages means there is no production happening. Businesses offset this by getting valuable work done in this time window.
Unplanned outages are a pure loss.
It costs due to lack of production
But also reputation too!

Source:
https://www.engineeringinreallife.com/post/what-is-operational-technology

Jobs in Operational Technology

Which Fields can I work in?

Several opportunities exist around Industrial Control Systems for many sectors including energy, transport, manufacturing, process plants, utilities and any critical infrastructure. Operational Technology specifically, means there is opportunity to interface with IT technologies and understand both worlds.
The future prospects are huge with OT, Cyber Security, IIOT, AI and ML.

Engineer Types working in OT

- Electrical Engineers
- Systems Engineers
- Network Engineers
- Computer Engineers
- Chemical Engineers
- Mechatronic Engineers
- Cyber Security Engineers

Want to become an OT Expert?

Become a member of Engineering IRL

Real Skills for a successful life in Engineering. We have a strong focus on Operational Technology and IIOT with all the information you need to know expanding on what you have read in this guide.

Source:
https://www.engineeringinreallife.com

Real stories from an OT Career

10+1 Steps to Problem Solving:
An Engineer's Guide From a Career in Operational Technology and Control Systems.

An Engineering Book with an expert method backed by stories from a career in OT and ICS. New members get free access to read the book online!

Source:
https://www.engineeringinreallife.com/book