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The benefits of modern Integrated Control and Safety Systems architectures for FPSO facilities.

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Topics

- ✓ FPSO - Definition
- ✓ FPSO - Features
- ✓ Off-Shore Project today's core requirements
- ✓ FPSO customer's trend requirements
- ✓ A real application of ICSS
- ✓ Where we can have benefits
- ✓ Conclusions

FPSO – Definition

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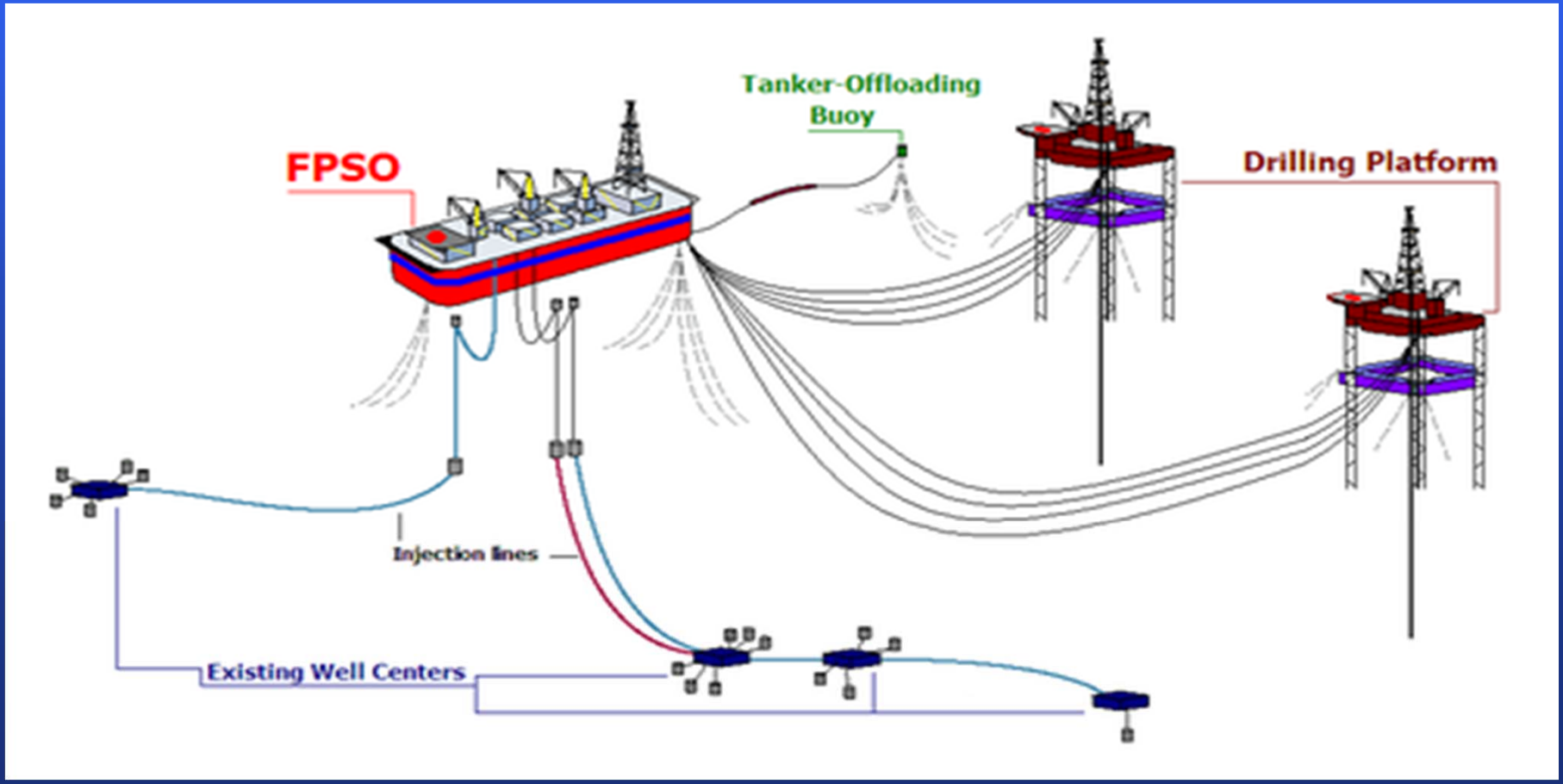
A Floating Production, Storage and Offloading (FPSO) unit is a floating vessel used by the Offshore Oil& Gas Industry for the processing of hydrocarbons and for storage of oil. An FPSO vessel is designed to receive hydrocarbons produced from nearby platform or subsea template, process them, and store oil until it can be offloaded onto a tanker or, less frequently, transported through a pipeline.

(by Wikipedia)



FPSO - Features

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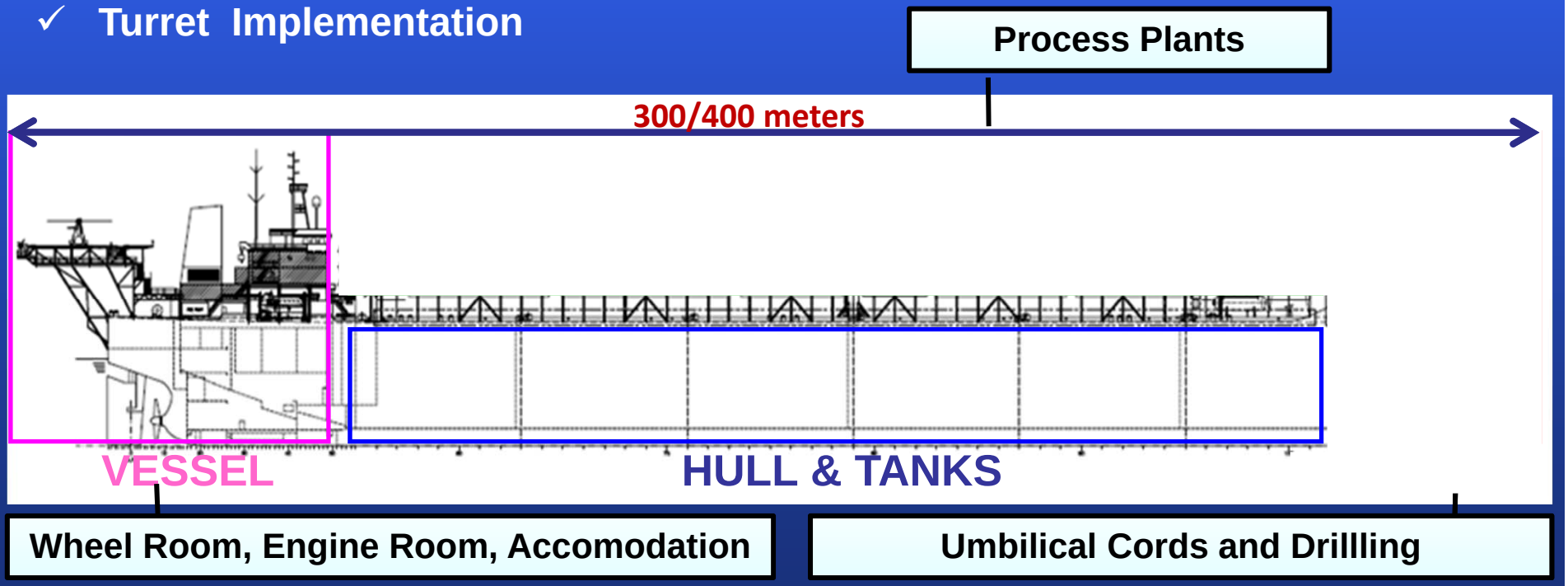
FPSOs can be a conversion of an oil tanker or can be a vessel built specially for the application.

In case of conversion of an oil tanker the following steps are carried out:

- ✓ **Hull refurbishment**
- ✓ **Topside (process area) implementation**
- ✓ **Turret Implementation**



Today's core requirements

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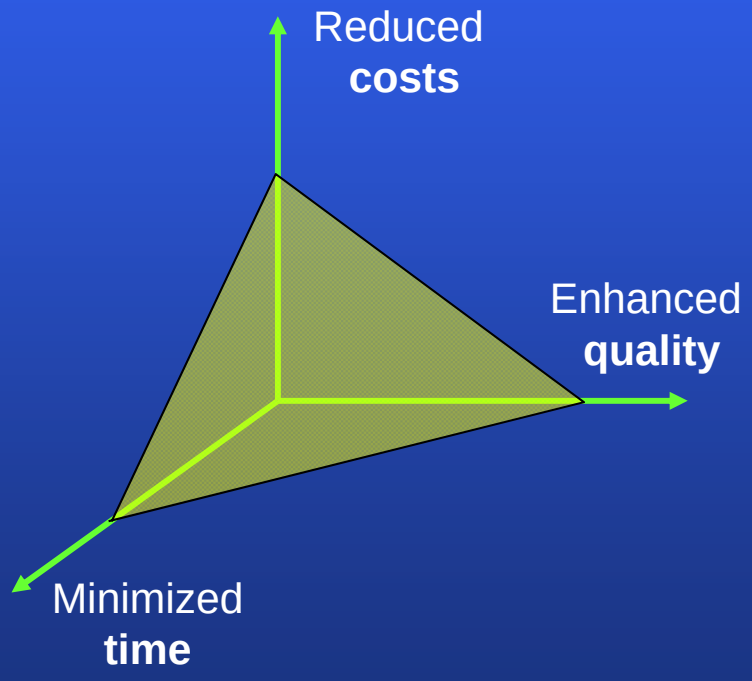
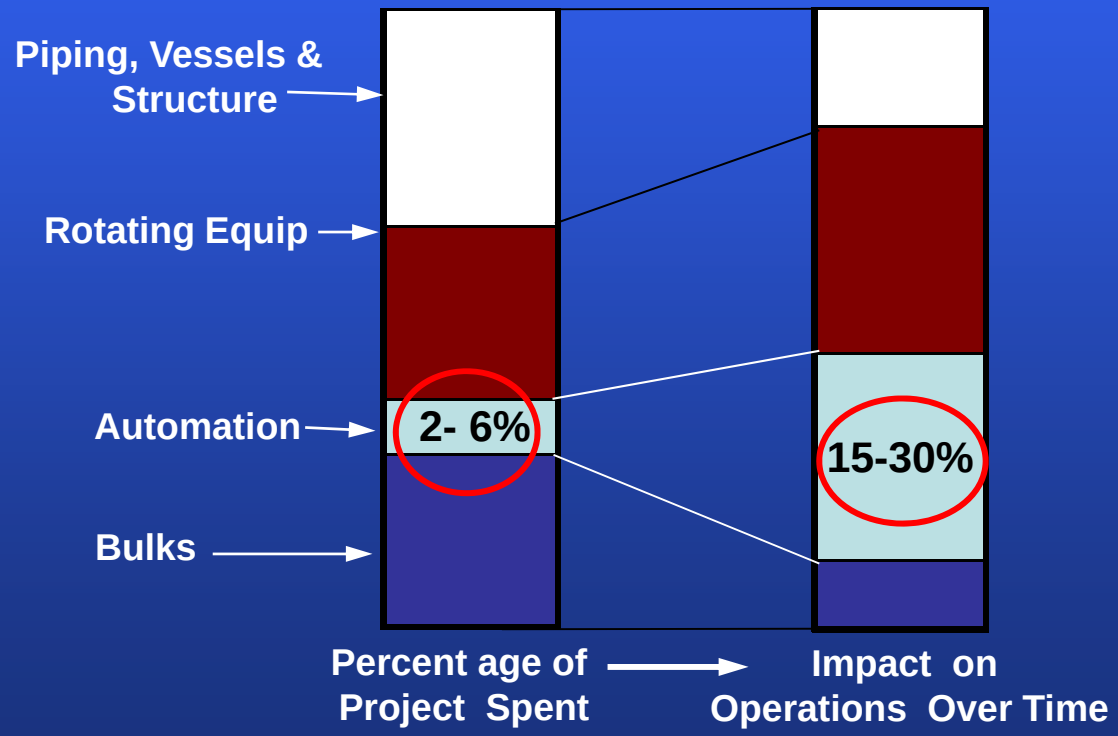
>>> Reduction of time to «first oil» = earlier production = earlier ROI

Off-Shore Project Core requirements:

- How to make engineering more cost-favorable with improved quality?
- How to accelerate time to electrical-instrumental installation completion?
- How to accelerate time to production with faster commissionig & start-up?
- How to reduce complexity and interfaces during operational and maintenance activities?





"Suppliers offering a truly integrated offering of process and safety are saving end users substantial project costs in engineering and lifecycle expense."

Source: ARC

FPSO Customer Requirements

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- **Actual Trend:**

Overall costs optimization
Don't compromise quality
Don't compromise safety
Time to commissioning reduction
Use of modern technologies

Very **integrated,** that is from the same manufacturer

F&G Integrity Level **SIL 2**
ESD Integrity Level **SIL 3**

Accomodation Fire Detection based on **addressable system**

Removal of hardwired links between the systems by the replacement with «**safety buses**» and «**certified protocols**».

Reduction of process hardware links and junction boxes by using remote I/O boxes suitable for field installations

ICCS Overall Architecture

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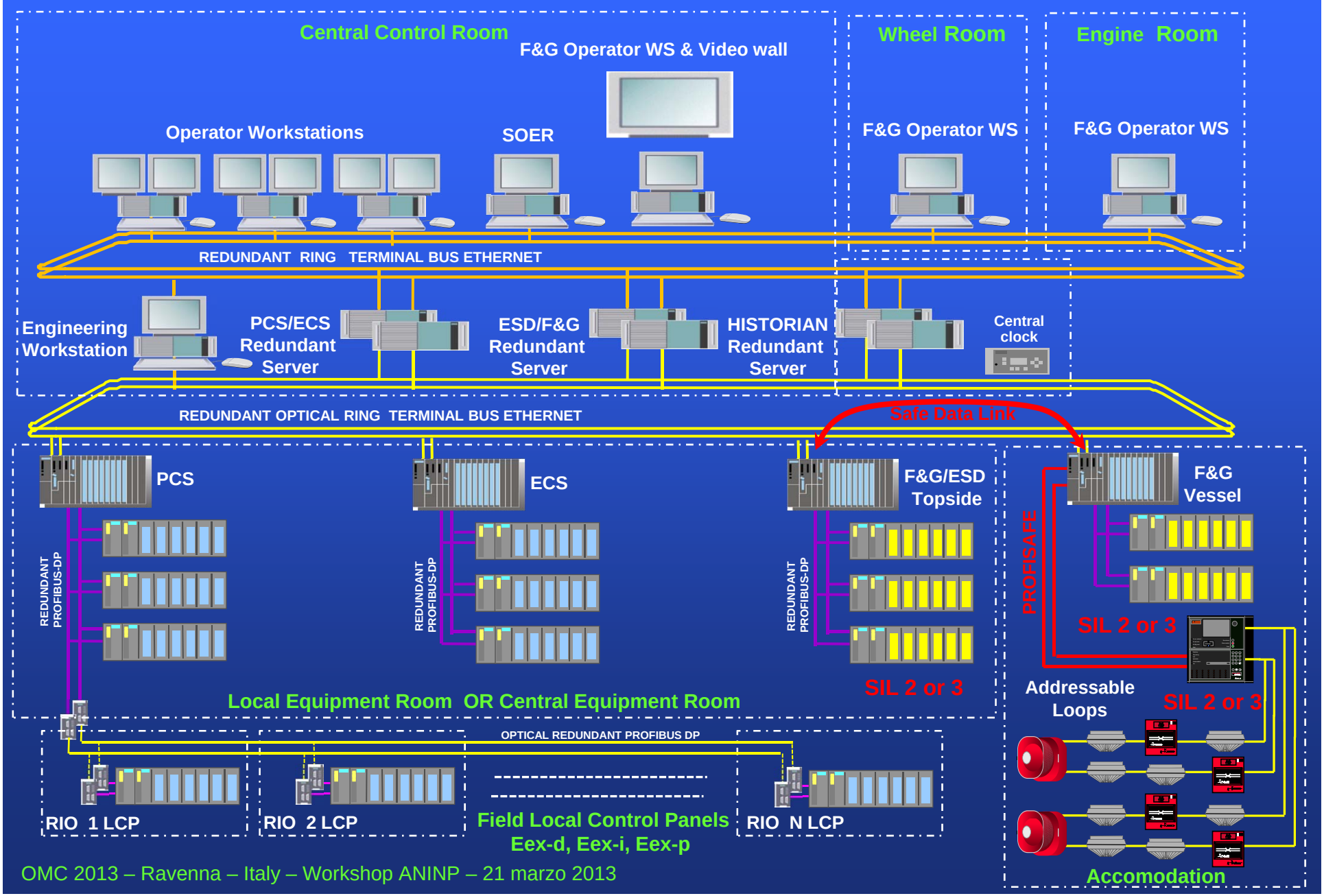

ICCS Overall Architecture

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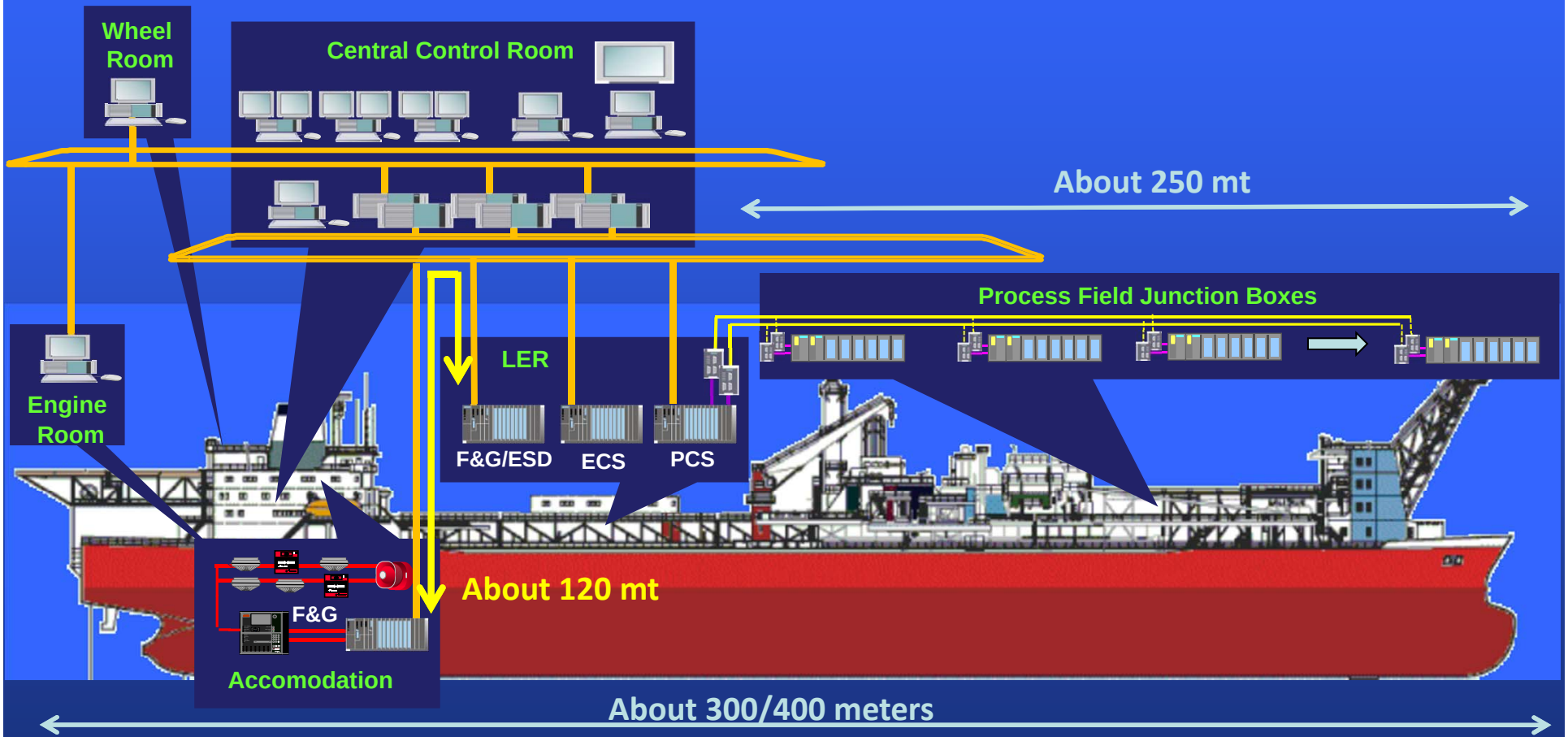
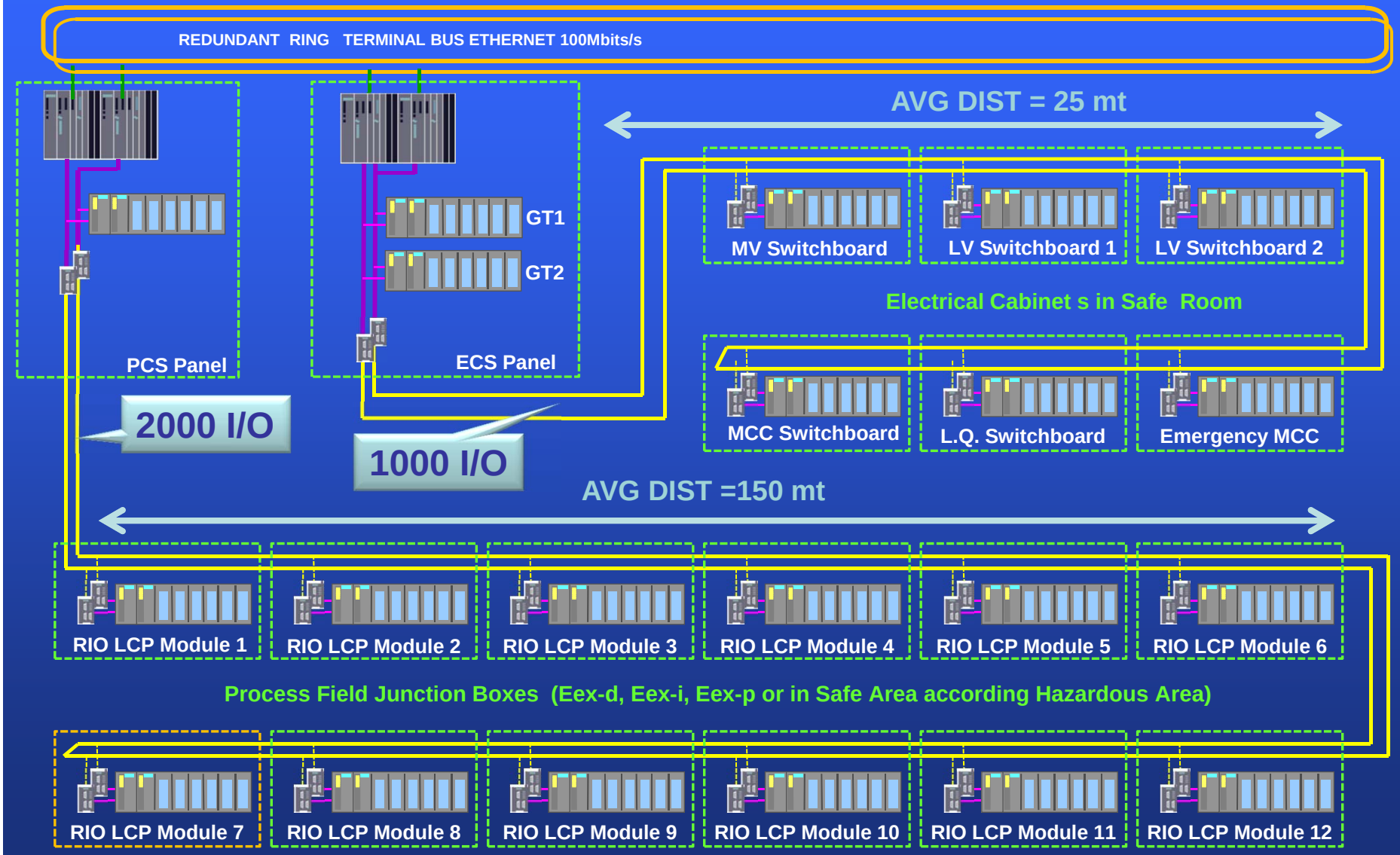


Real application - Control



Real application - Safety

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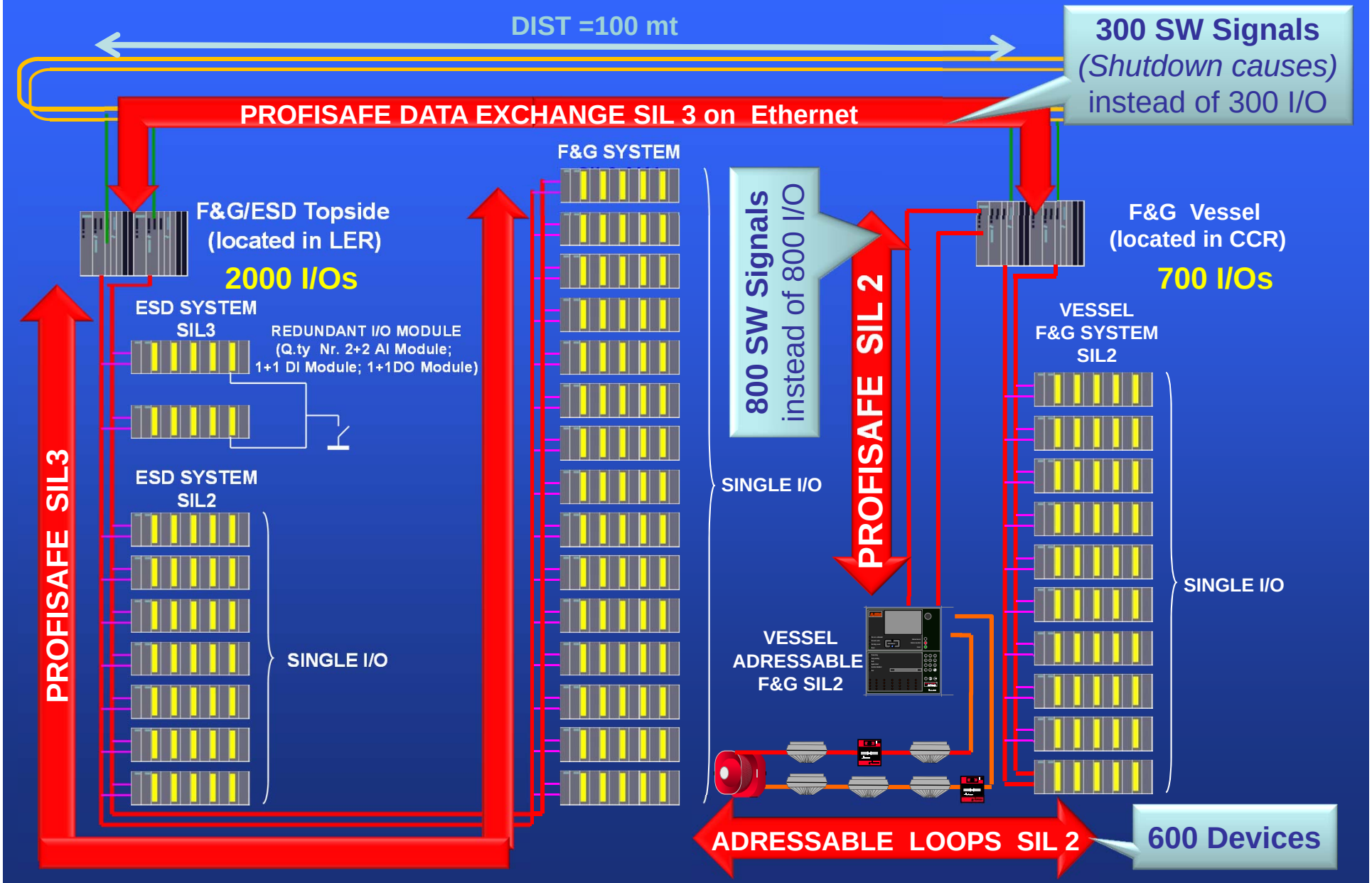

Real application – Cabling saving

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Cable saving (12 pairs shielded armoured), related cable trays, junction boxes, bulk materials and installations activities.

PCS Panel	⟷	PCS remote rack I/O	$\frac{2000\ I/Os}{12\ pairs} \times 150\ mt \cong 25.000\ mt$ of cable
ECS Panel	⟷	ECS remote rack I/O	$\frac{1000\ I/Os}{12\ pairs} \times 25\ mt \cong 2.000\ mt$ of cable
F&G Topside	⟷	F&G remote rack I/O	$\frac{2000\ I/Os}{12\ pairs} \times 100\ mt \cong 25.000\ mt$ of cable
F&G Topside	⟷	F&G vessel	$\frac{300\ I/Os}{12\ pairs} \times 100\ mt \cong 2.500\ mt$ of cable
F&G Vessel	⟷	Addressable Panel	$\frac{800\ I/Os}{12\ pairs} \times 5\ mt \cong 300\ mt$ of cable
Field Loops	⟷	Addressable Panel	$other\ saving$

Remember also a simpler field engineering !

Real application – New safety sw tools

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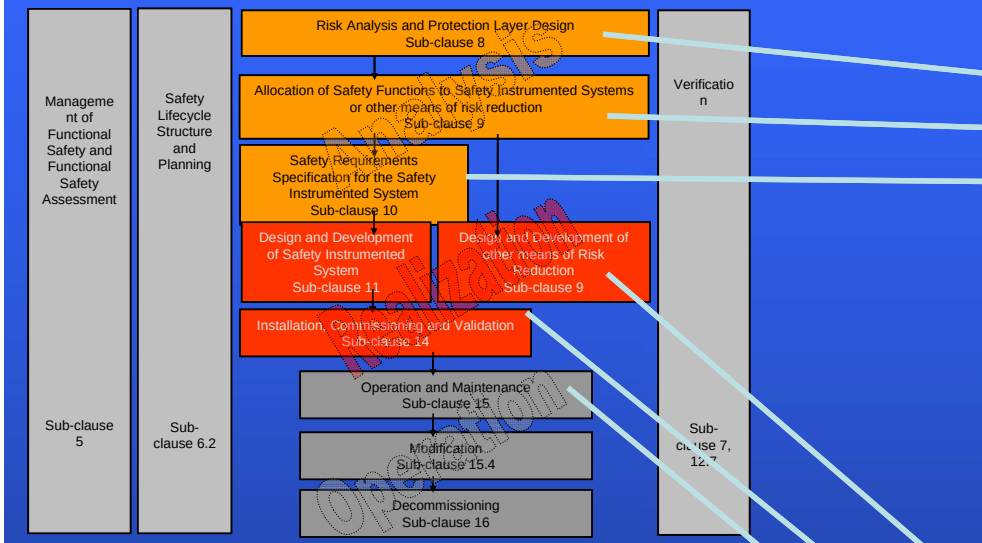
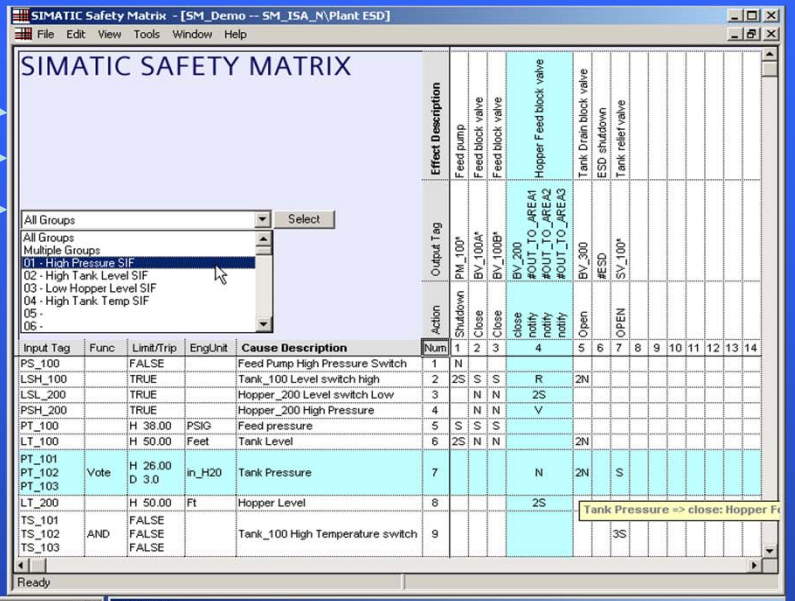
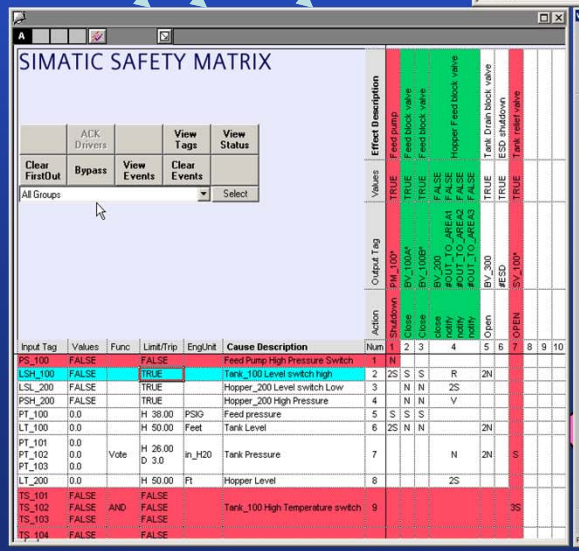
Today technologies offers safety software tools able to save costs during the Safety Lifecycle from the engineering to operation and maintenance phases.

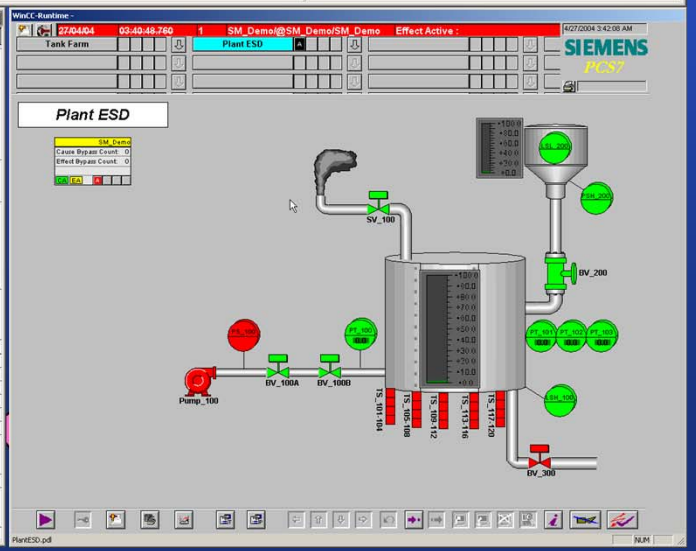




Cause & Effects Engineering, Operations and Maintenance Tool

- Eliminates translation errors by automatically generating the logics
- Automatically generates HMI faceplate to visualize matrix
- Interface for maintenance overrides and I/O simulation during FAT or SAT
- Automatically generates change the documentation (IEC 61511) and the Events Log





Where we can have benefits?

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	ICSS FEATURES			
	Integrated Control & Safety System from the same manufacter	Distributed Remote I/Os on Profibus or High Speed Ethernet	Certified Bus with protocol according IEC61508/61511	Addressable Fire Control Panel according IEC61508/61511
	vs.	vs.	vs.	vs.
PROJECT LIFE PHASE	Multiple manufactures	Traditional point-to point hardwired links	Traditional safety hardwired link	Not Adressable
Engineering	Yes	Yes	Yes	Yes
Cabling Material		Yes	Yes	Yes
Installation		Yes	Yes	Yes
Commissioning	Yes	Yes	Yes	Yes
Operation	Yes			
Maintenance	Yes	Yes	Yes	Yes

Conclusions

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New features of Integrated Control & Safety System combined with certified safety buses and addressable F&G systems

Architecture Semplicity + **Technical Innovation** − **Overall Costs** − **Interfaces** = ☺

But the most consistent financial benefit, due to an earlier installation and commissioning, is the time reduction of an earlier "First Oil".

This economical value could be definitely ten times greater than the saving obtained during the project, depending on the expected daily plant production.

Therefore, nowadays, EPC contractors or End-User have new opportunities to optimize the costs of the overall plant lifecycle, taking advantage of the new technologies offered by Control & Safety systems, even though the more difficult barrier to overcome are the old cultural heritages that often we could have, despite we live in the "age of the networks".

Thank you!

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Fores Engineering is an Italian company established in 1992, part of the **Rosetti Marino Group,** specialized in the Project Management, Engineering, Procurement, Integration, Construction and Commissioning of systems for the Oil & Gas both upstream and downstream, in the field of Offshore platforms and Onshore plants, Petrochemical, Chemical and Power plant fields. Its main products are Control & Safety Systems, Telecommunication & Security Systems, Skid Mounted Package Units, Wellhead Control Panels, Process Analyzer Systems, Equipped Shelters.

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