Planned Obsolescence, ‘MidLife’Updates & Next generation

Subsea Controls Down Under, Perth, WA- Oct 2018,
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October 2018 – Perth

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Planned Obsolescence, ‘MidLife’ upgrades & Next generation

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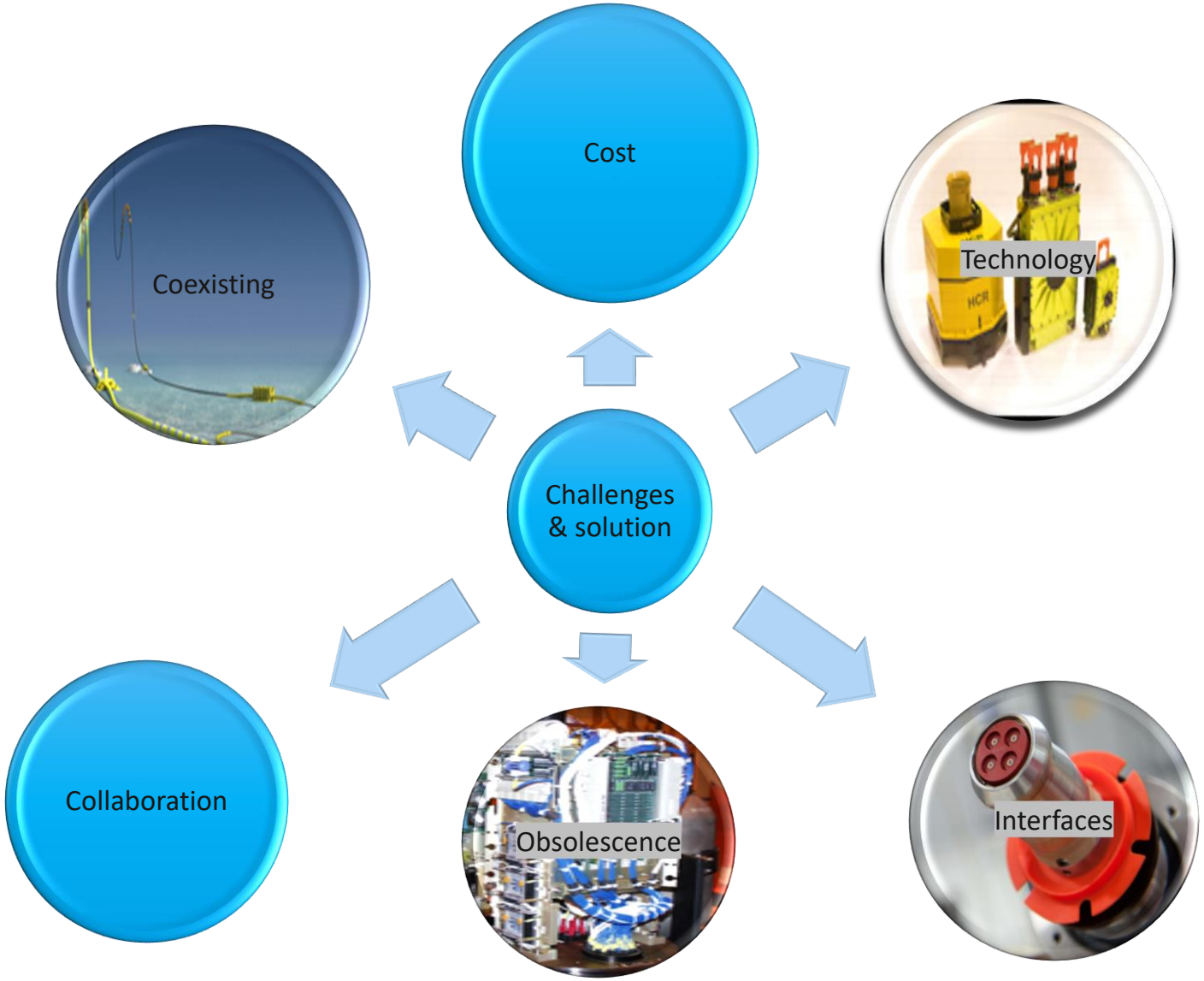
Midlife upgrades – Challenges and solution

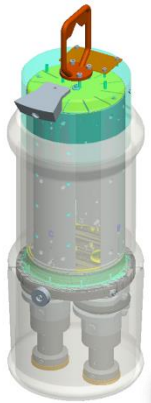


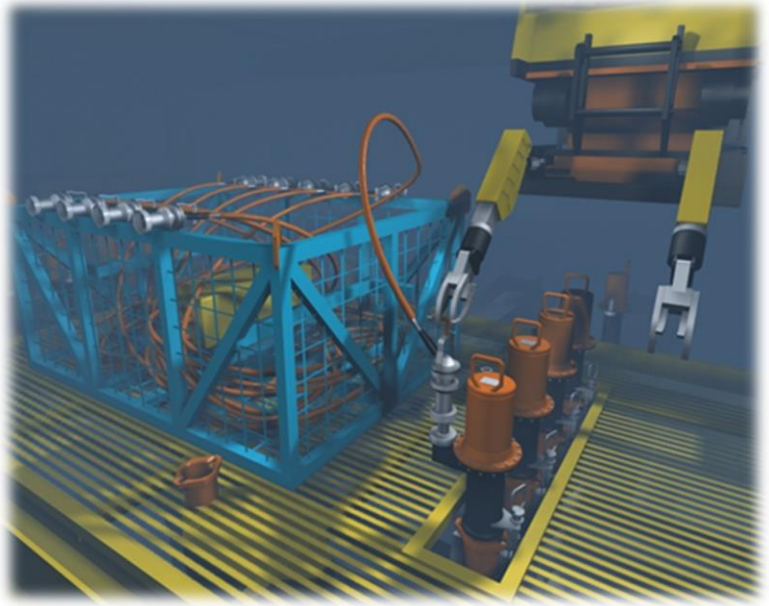
Midlife upgrades – Challenges and solution

- Midlife control system upgrades or change out are driven by:
  - Product obsolescence
  - New functionality/technology for product optimization
  - Reliability or technical operational challenges
  - Governmental requirement changes.
  - Field life time extension that drives monitoring functionality
  - Large scale control system upgrades
- Challenge and solution is to have a safe and painless transition during midlife upgrade

Challenges and Solution – Case

Retrofit manual valve in existing systems with electrical actuator to solve operational changes in existing fields



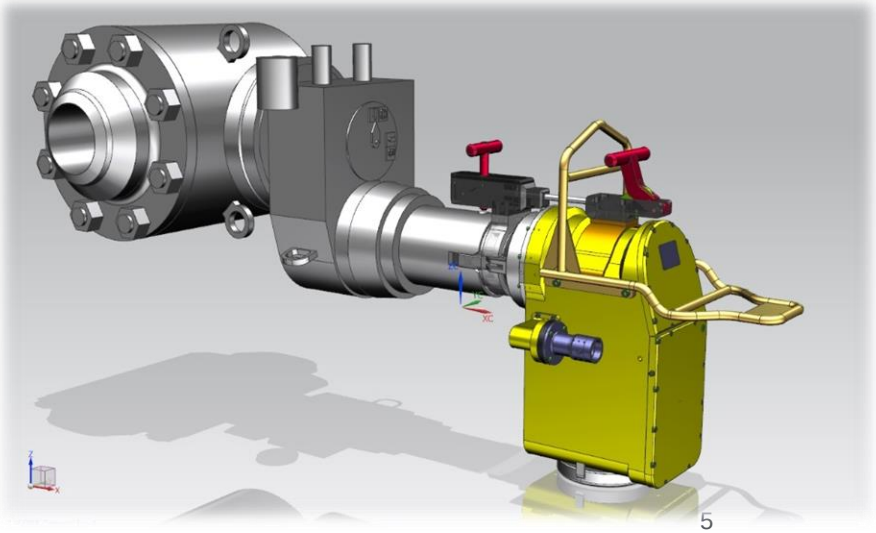


Challenges

- Electrical system actuator needs more power than a traditional subsea control system.

Solution

- Battery used to integrate electrical actuator system in legacy system for retrofit functionality.(choke /manifold)
- Subsea Uninterrupted Power Supply for SIL safety systems for safety critical retrofit application



Generation of Control System

- Since 1985 developed 5 Generations of Controls System together with
  - MCS
  - SPCU
  - SCM (SEM)
  - SRM
  - Communication Modems
  - DCV's
  - Software
  - Instruments

100 System

150 System

200 System

200e System

800 System

TechnipFMC - SEM Generations

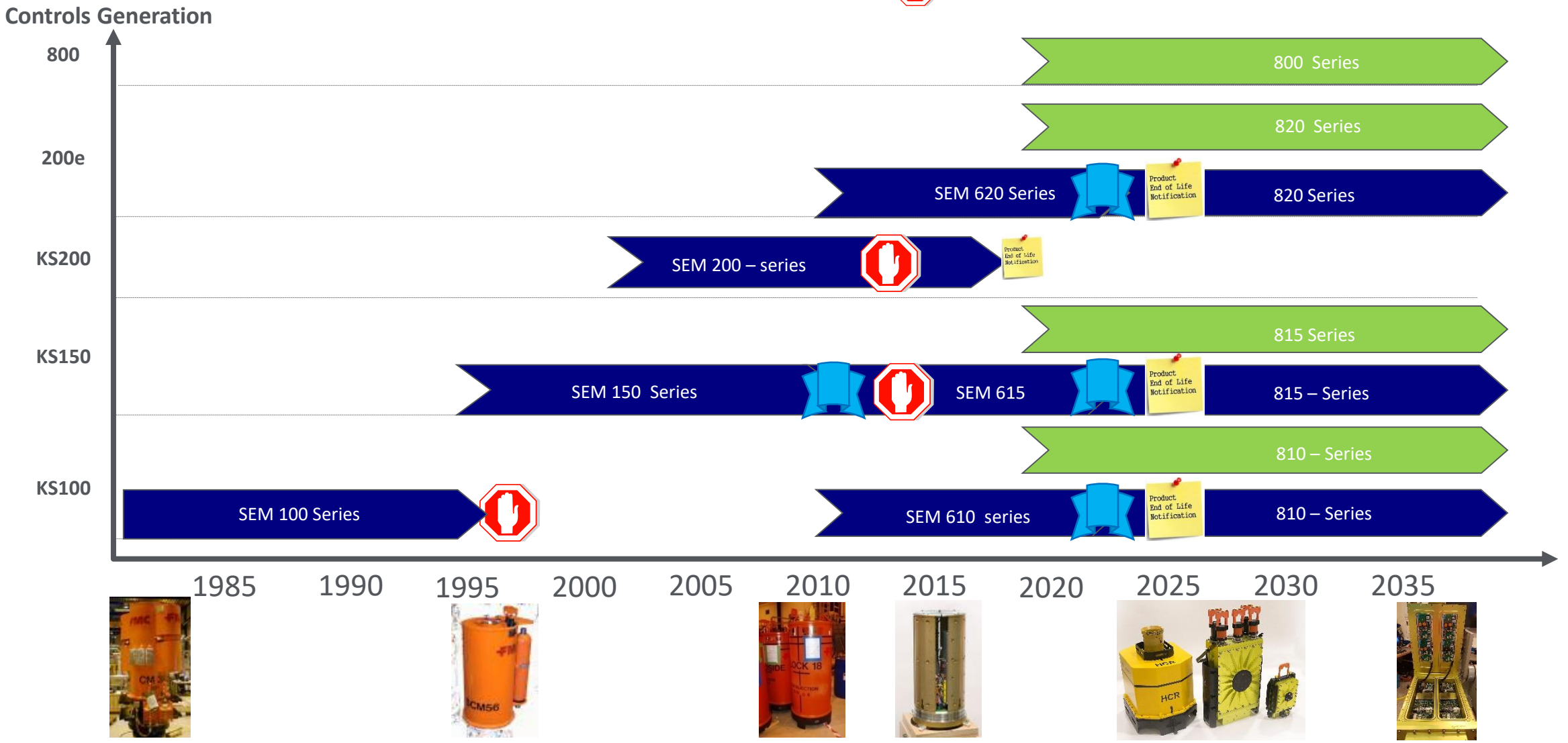
= Midlife upgrade available

= End of life notification

= Electronics obsolete

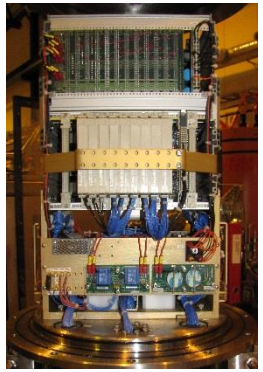
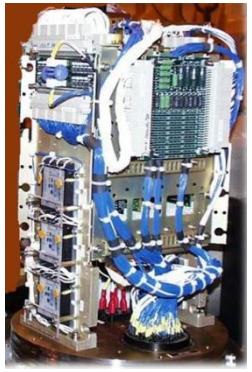
SCM MKII/III HW Platform

PCR/HCR HW Platform



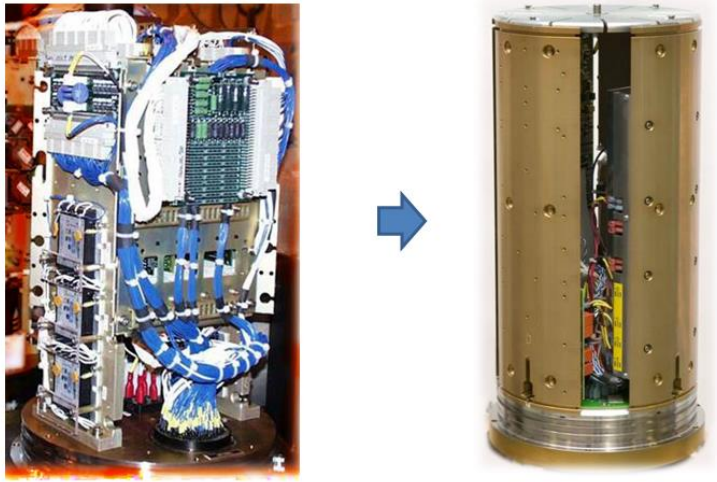
TechnipFMC

Solutions – SEM Generations

	SEM 100	SEM 150	SEM 200	SEM600	SEM 800
					
Year of production	1985-1995	1995-2009	2001-2006	2007 →	2018 →
API 17F / ISO 13628-6 compliance.	No	No	Yes	Yes	API 17F FOURTH EDITION
Communication	Signal on power 1.2kb/s	Signal on power 2.4kb/s	Signal on Power 33.6kb/s. Fiber 4Mbit/s	Signal on Power 234 -1.500 kb/s. Fiber 1Gbit/s	Signal on Power 234 -1.500 kb/s. Fiber 1Gbit/s
Protocol	Proprietary	Proprietary	Proprietary	Open architecture TCP/IP	Open architecture TCP/IP
Industry Standard Interface	4-20 mA only	4-20 mA & Serial	4-20 mA, IWIS	IWIS & SIIS compatible MDIS Emerging	IWIS & SIIS compatible MDIS compatible
SIL rated solutions	1	1	1	1 – 3	1-3

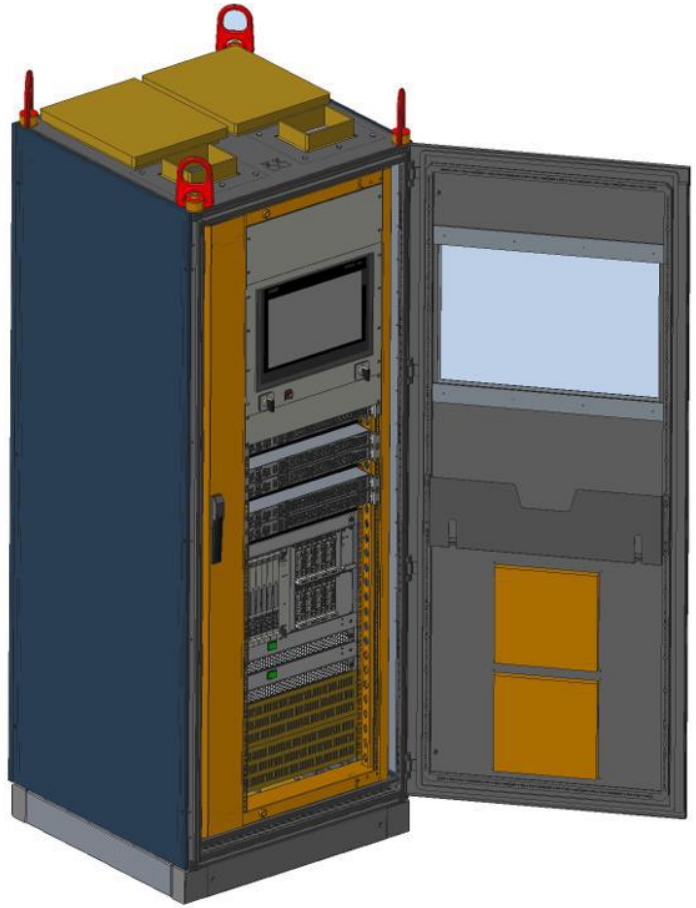
Upgrade Solution Subsea Electronic Module - Case

- TFMC SEM 600 is an improved solution designed to extend the life of fields with SEM legacy based SCM's
- SEM is a drop-in solution for SEM150/100 that supports new sensor interfaces such as CAN bus and IWIS.
- Topside changes are only needed if customer wants to enable additional functionality.
- Upgrade opens up for installation of a 200e system topside by activating the 200e functionality in the SEM615.
- SEM615 is a part of the field proven SEM600 series with significant improved reliability.
- Upgrade have been done since 2012 with good track record.



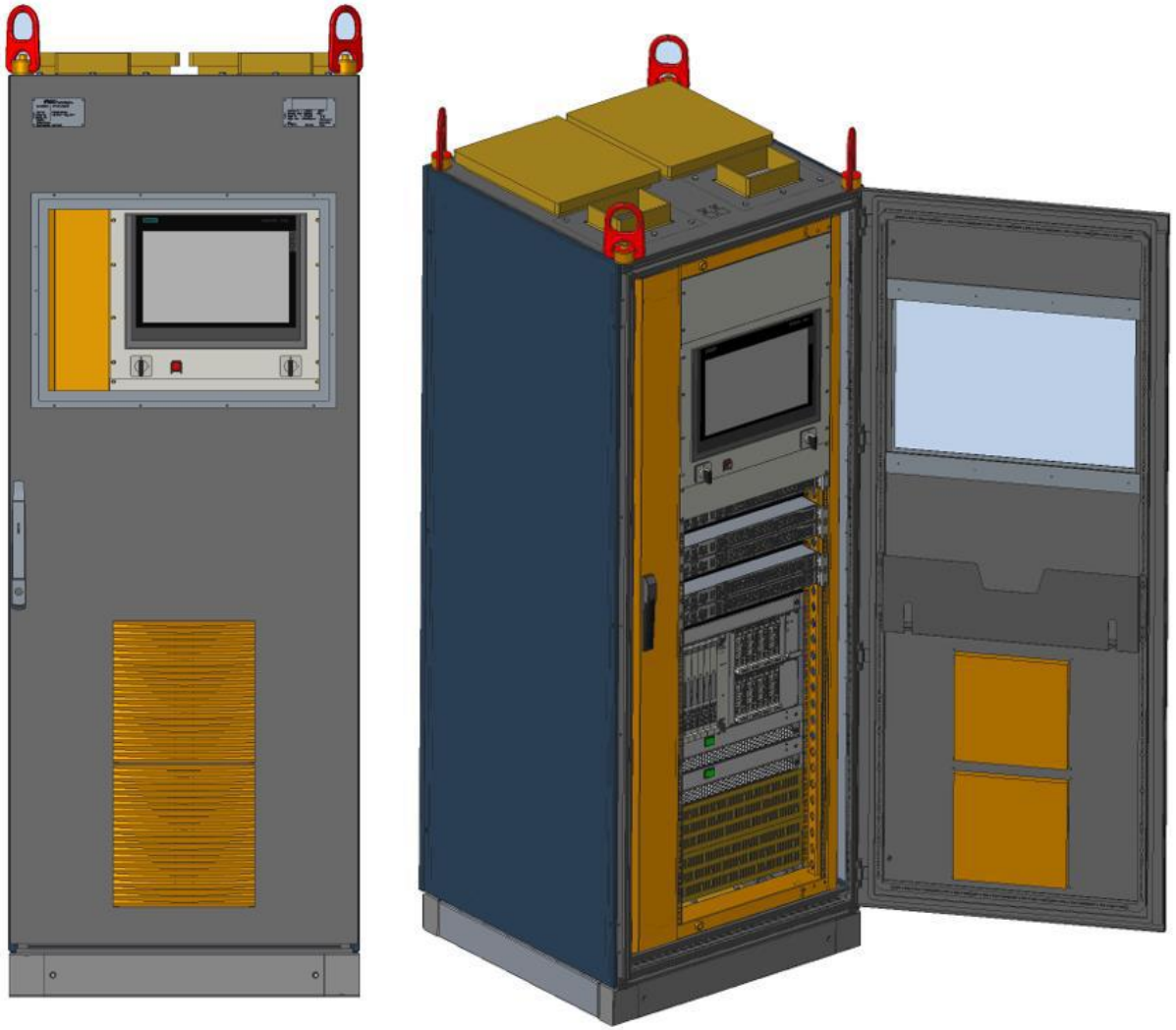
Upgrade Solution Topside Power and Communication - Case

- TFMC latest SPCU design is an improved solution designed to extend life of fields and standardize.
- MCS Changes can be done in phase and are only needed if customer wants to enable additional functionality.
- Upgrade opens up for enabling of a 200e/800 system by activating the 200e/800 functionality in the SPCU for further 'life of fields'- extensions/upgrades.
- Cabinet supports improved conditioning monitoring and latest generation umbilical monitoring systems.
- SPCU Upgrade installed and proven in use since 2017.

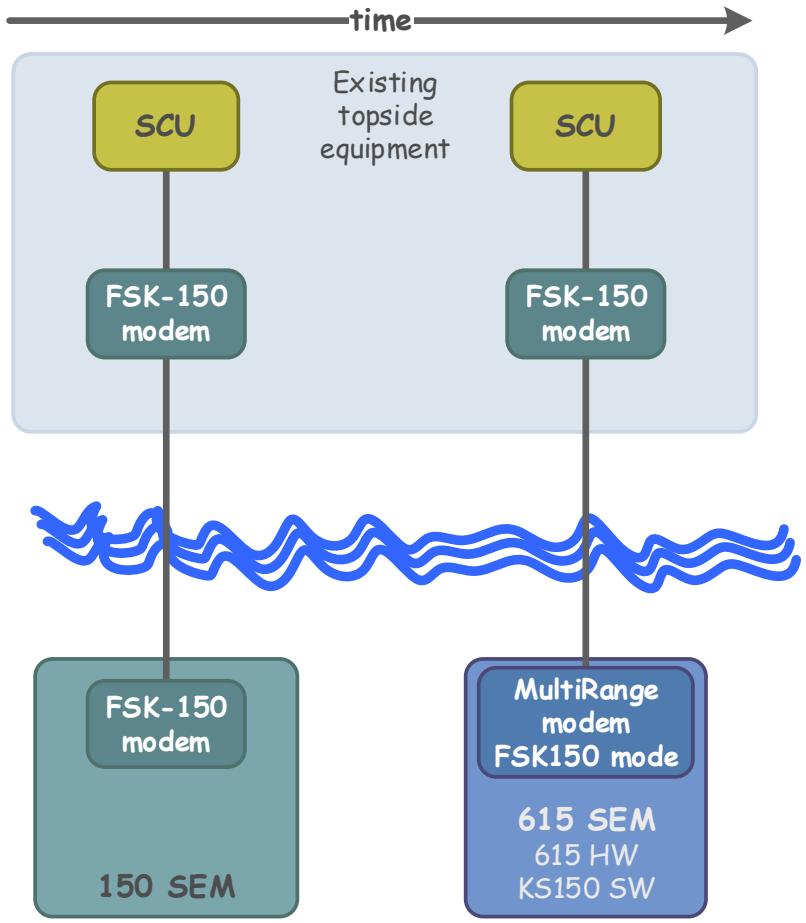


Midlife upgrade SPCU Key Features

- Remote housekeeping and control available on FMC722 or Modbus TCP/IP.
- Local housekeeping and control available on touch screen.
- MDIS ready hardware.
- Dual Redundancy.
- KS200e, KS200/150, KS150 & KS100 system & modems supported.
- Adjustable output voltage
- Link separation on power line >80dB.



Upgrade Solutions Examples



Original system

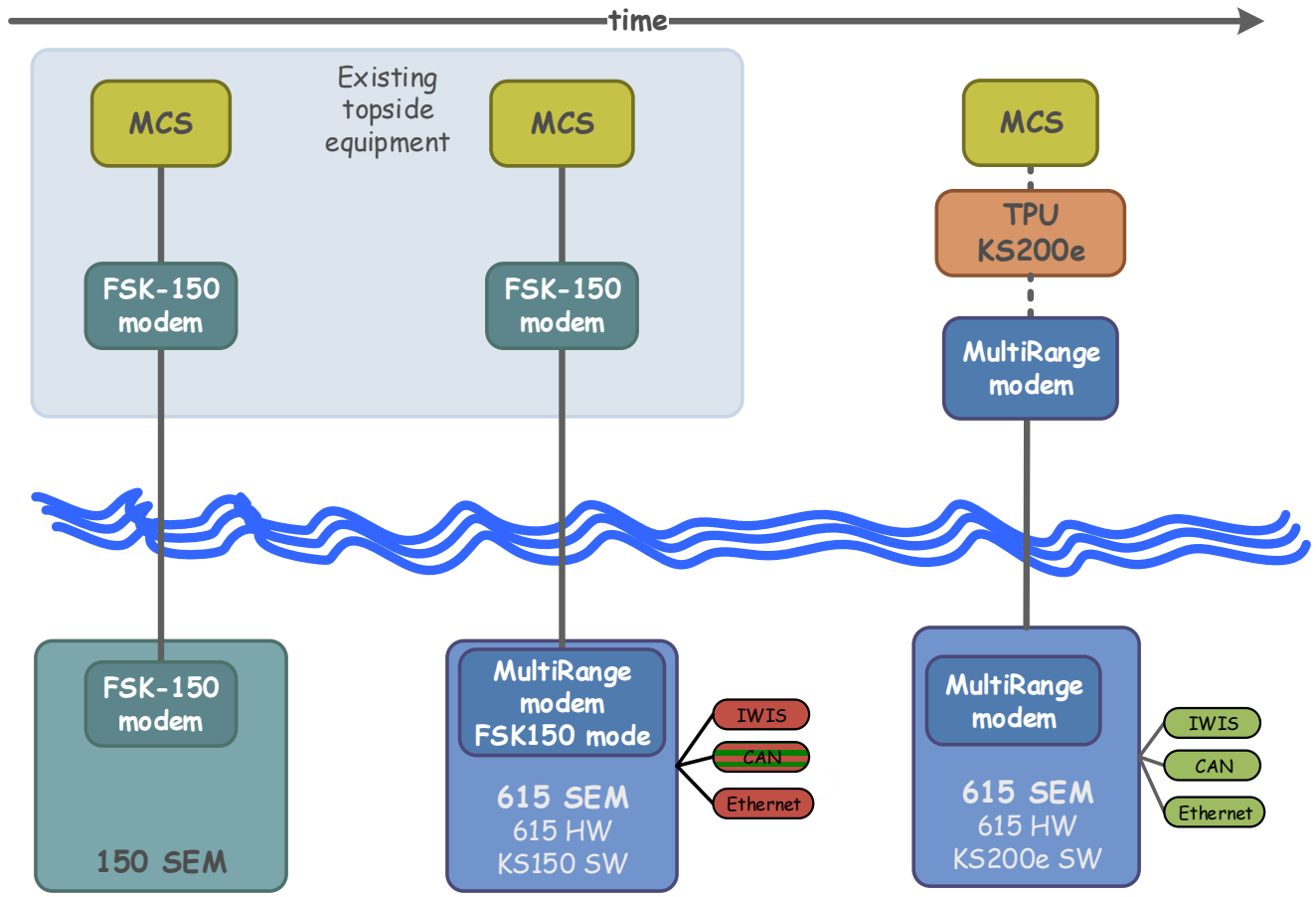
Obsolescence challenges solved

Original functionality

No topside changes needed

Upgrade of a TFMC 100/150 system

Midlife Upgrade Solution



Existing system

Obsolescence challenges solved

Original functionality

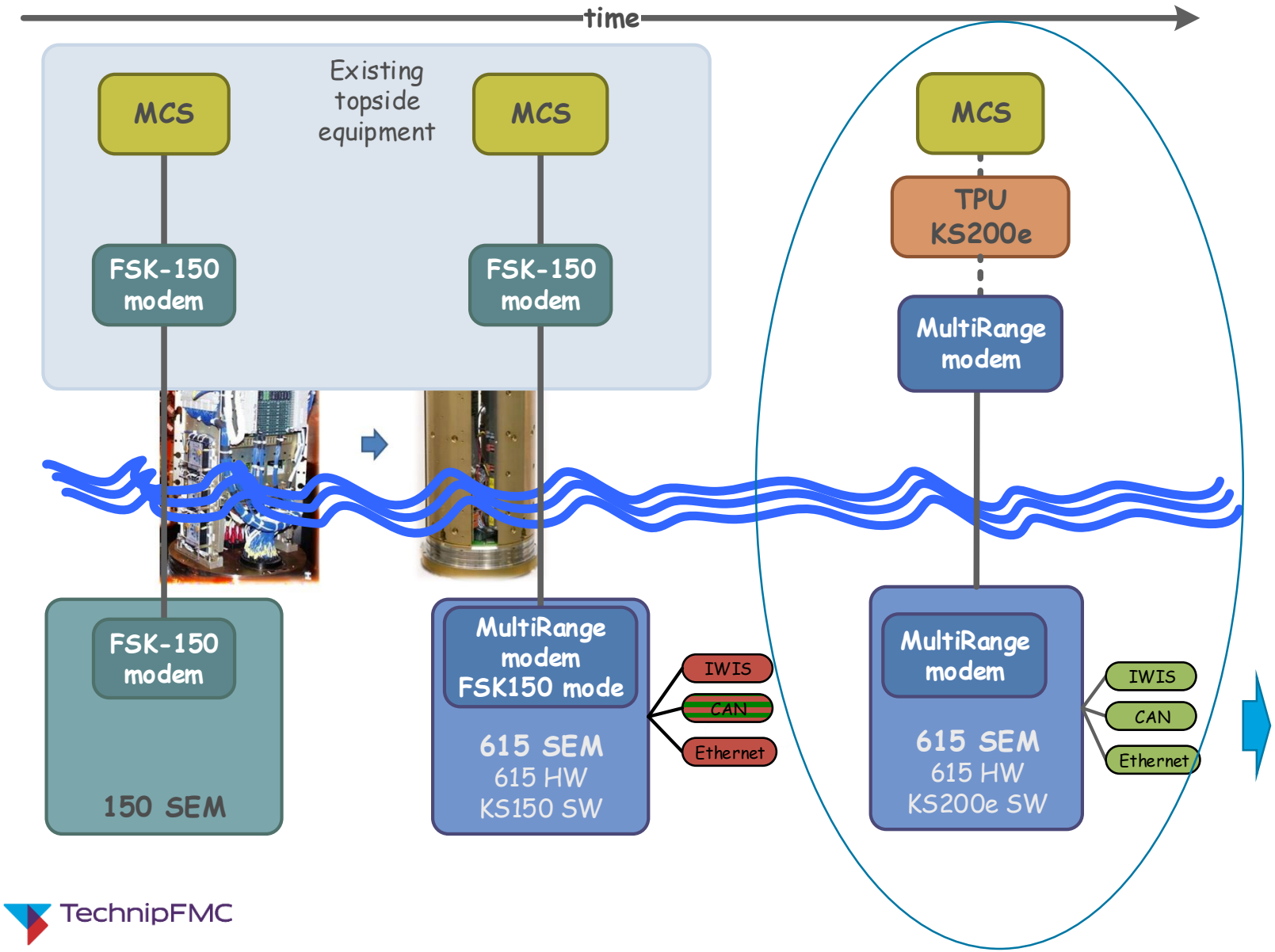
No topside changes needed

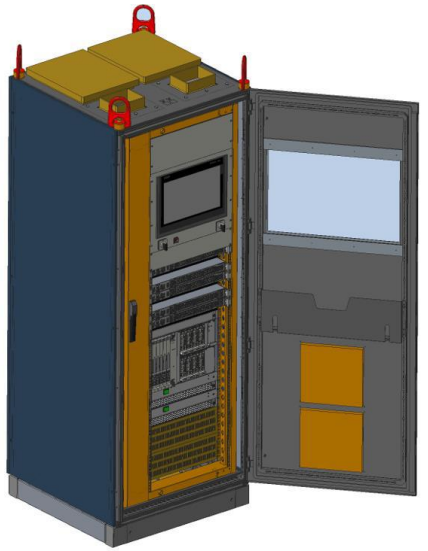
Obsolescence challenges solved

Improved bandwith.

IWIS and SIIS (CAN, Ethernet)

Upgrade solution Woodside Angel project



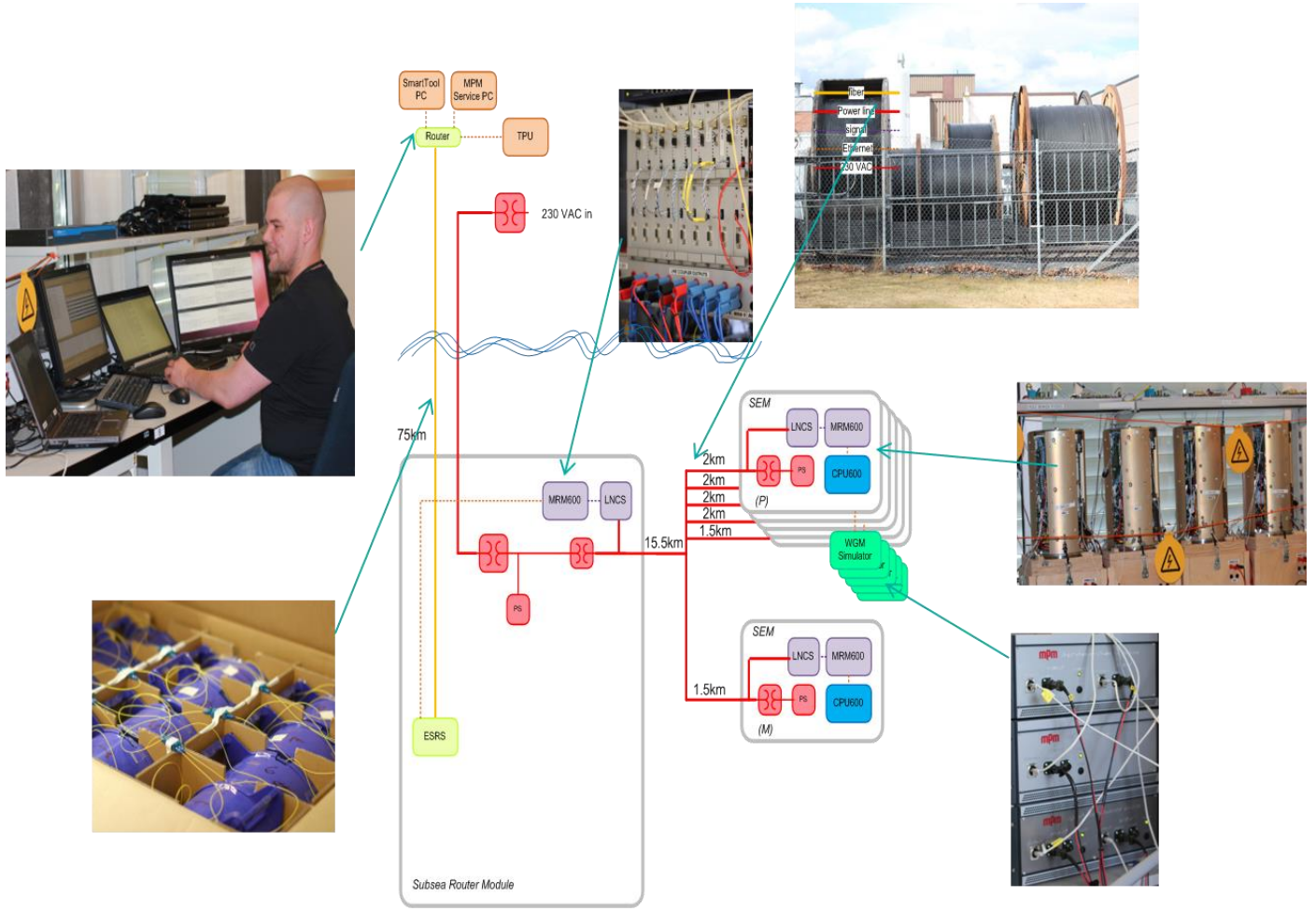


System advantages :

- ✓ Open architecture using IP com
- ✓ Advanced sensor could be connected. SIIS /Ethernet.
- ✓ Higher bandwidth after converting
- ✓ Standardized topside interface 722

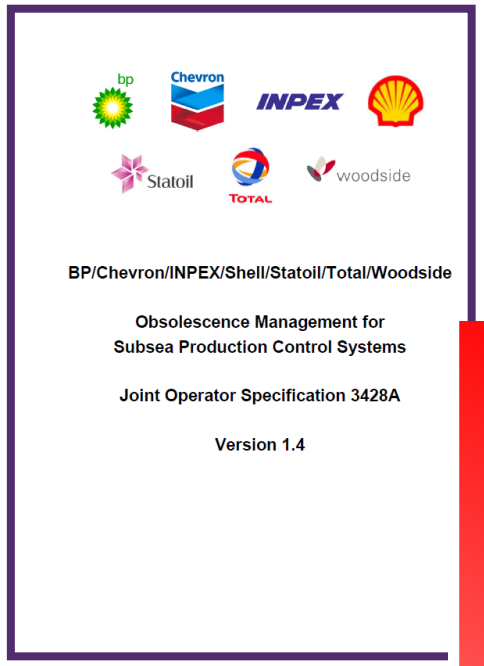
System Performance Analysis

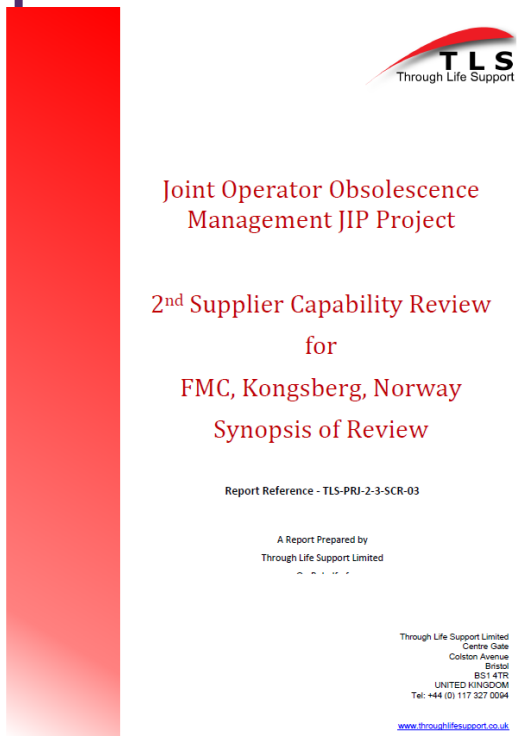
- Full scale Topology Test to verify complex configuration and coexisting of new and old modem systems .
- Up to 200 km electrical cable and 300 km fibre optical line for test available.
- New equipment can improve production and reliability on existing installation
- Important to assure safe and painless transition during upgrade



Obsolescence Managment

- Form a historic point of view focus has not been Obsolecence managment /planning
- The Joint Obsolescence Management Specification is a joint effort between several clients
- TFMC has developed OM plans, global Work instruction and specification and master documents to be complying with API 17F





Conclusions

FMC have firmly addressed the requirements of Specification and used sound Project Management principles to set in place a plan to achieve full compliance across all activities by 2015.

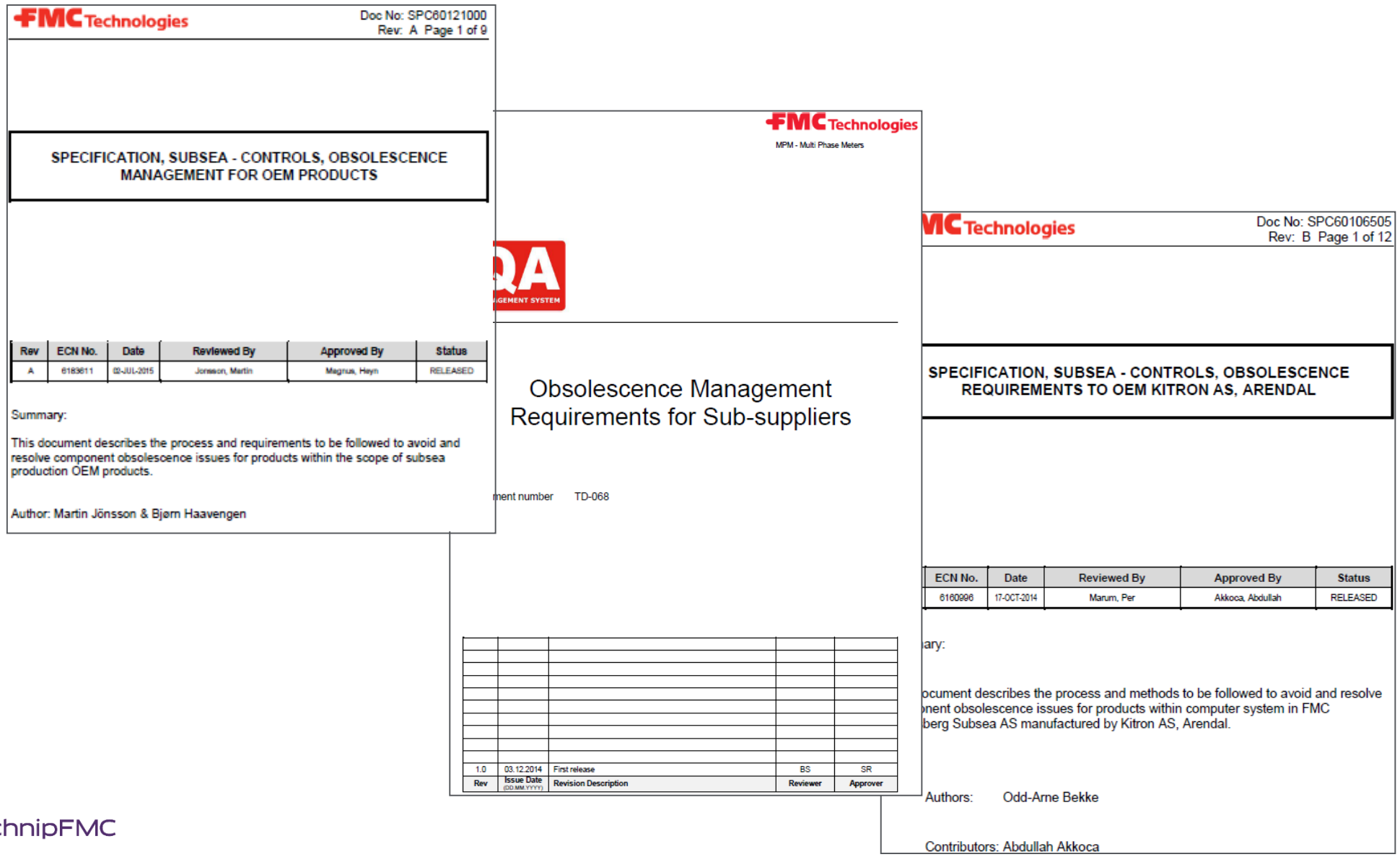
Generation of a GAP analysis and then auctioning and measuring success against this analysis is a good practice and will enable FMC control over implementing the RS.

This second SCR was a bit of “surprise” and FMC are to be congratulated on the actions taken and the obvious commitment to providing their customers (Operators) with a FMC capability to achieve the contractual requirements for Obsolescence Management.

Whilst it may be seen that there has been no noticeable improved delivery to the customer since the original SCR the organisation and processes that have been implemented and planned to be implemented will achieve compliance faster and more effectively than was evident from the first SCR.

FMC should be congratulated on their progress and commitment.

OM Specifications, various levels in value chain



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Doc No: SPC60121000
Rev: A Page 1 of 9

SPECIFICATION, SUBSEA - CONTROLS, OBSOLESCENCE MANAGEMENT FOR OEM PRODUCTS

Rev	ECN No.	Date	Reviewed By	Approved By	Status
A	6183611	02-JUL-2015	Jonsson, Martin	Magnus, Heyn	RELEASED

Summary:

This document describes the process and requirements to be followed to avoid and resolve component obsolescence issues for products within the scope of subsea production OEM products.

Author: Martin Jönsson & Bjørn Haavengen

FMC Technologies

MPM - Multi Phase Meters

QA

Obsolescence Management Requirements for Sub-suppliers

ment number TD-068

Rev	Issue Date (DD.MM.YYYY)	Revision Description	Reviewer	Approver
1.0	03.12.2014	First release	BS	SR

FMC Technologies

Doc No: SPC60106505
Rev: B Page 1 of 12

SPECIFICATION, SUBSEA - CONTROLS, OBSOLESCENCE REQUIREMENTS TO OEM KITRON AS, ARENDAL

ECN No.	Date	Reviewed By	Approved By	Status
6160996	17-OCT-2014	Marum, Per	Akkoca, Abdullah	RELEASED

ary:

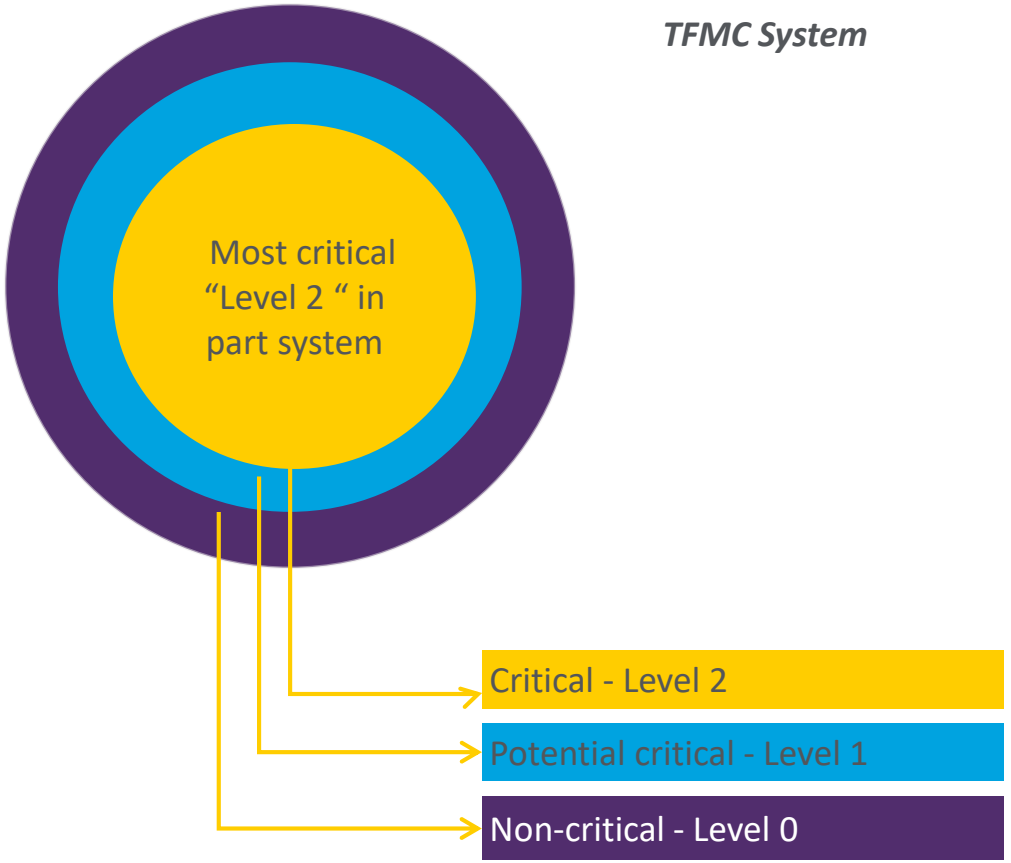
ocument describes the process and methods to be followed to avoid and resolve nent obsolescence issues for products within computer system in FMC berg Subsea AS manufactured by Kitron AS, Arendal.

Authors: Odd-Arne Bekke

Contributors: Abdullah Akkoca

Several levels of managing obsolescence -

Highest focus to most critical components



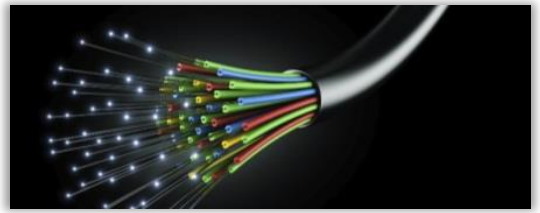
Next generation controls introduction

Next Generation - Why

- Current generation has been around since early 2005
- Market is changing
  - More open architecture
  - Increased flexibility
  - Reduced downtime, improved availability
- Increased standardization and supplier led solution
- Cost efficiency
- Improved modularity
- Identified areas for improvement on components
- Improved assembly and test

Modern advantages

- Electronics and electrical systems have become smaller and more reliable
- Hardware being replaced by software
- Modern materials save weight
- Modern IT solutions enable information sharing and improved data handling
- Smaller, light weight modules
- Increased use of COTS elements
    - Improved obsolescence handling
    - Standardized interfaces



Improved Manufacturing Process Goal

Today

H O W	Chose from Pre-configured product family	Stocking	Design for Manufacture (LEAN, design thinking, cross functional)	Automated coding and documentation	Automated testing

Project advantages - Operational phase

- Reliability
  - Concepts and technical solutions based on 30 years global experience married with industrial trends
  - Minimum 30 year lifetime to be verified by accelerated life testing
  - Testing to destruction to screen extreme limits of components
- Flexibility
  - Allows re-configuration without retrieving equipment
    - Add functionality as you need it
  - 1+n levels of redundancy
  - Allows hot-swap of equipment
  - Simpler retrievability
  - Components prepared for all electric transition

Technology Developments

New technology and equipment's are required for:

- High Pressure and High Temperature
- Subsea Processing
- All Electric Solutions
- Interface Standardization
- Additional Functionality
- New Fluids

- Obsolescence
- Cost reduction
- Reliability
- Market Demand

Conclusion & Summary :

Challenges today and yesterday

- Low volume Market
- Customer specific requirement.
- Custom built products

Solution

- Flexible Standard designs
- Configurable Products and system building blocks
- Standardized production processes
- Extensive product /component qualification
- Focus on obsolescence
- Design for optimal MMR performance

Questions?

Thank You