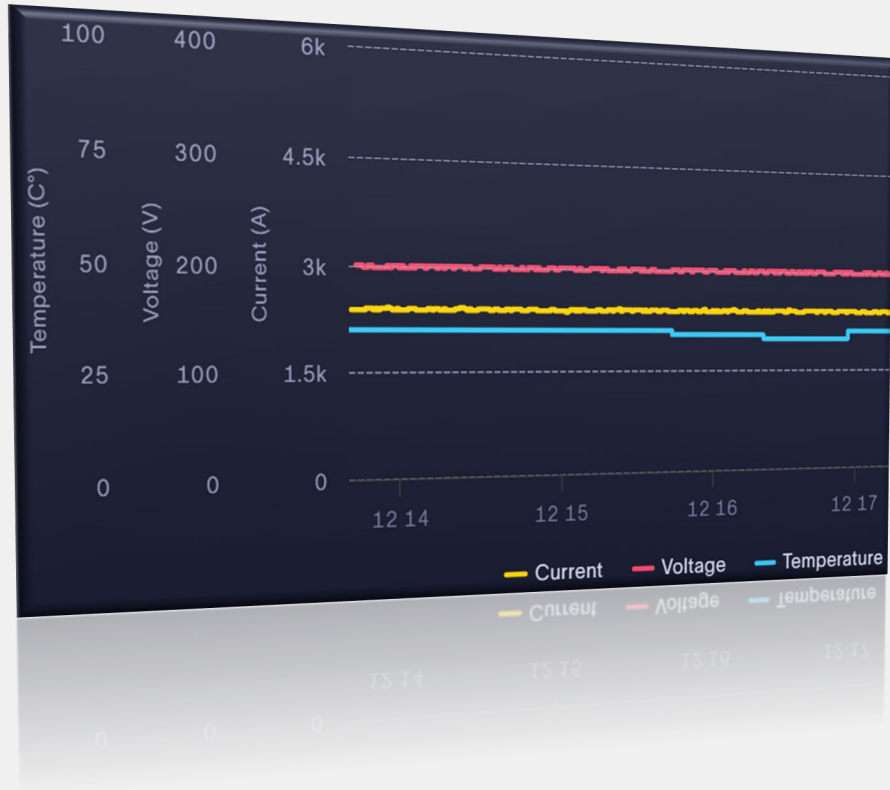# Next Generation cloud and edge computing platform

Improves data performance availability and system integration for subsea control systems

Tobias Stünkel, Senior Controls Automation Engineer, 29-October-2024

Current Situation

Cloud System

The performance of the asset

↳ Server based

  ↳ Own software architecture

Topside Control Software / Gateways

The control of the asset

↳ Server based and third-party systems

  ↳ Own software architecture

Subsea Control Module

The module at the asset

↳ Proprietary printed circuit boards

  ↳ Own software architecture

Engineering and operational challenges

Different system architectures

↳ Operating systems

   ↳ Windows, Linux, iOS …

↳ Programming libraries

↳ Programming tools

↳ Graphical user interface and available functionalities

System availability

Data resolution

Target objectives

↳ subsea / topside / global

Address the challenges for all systems

Mandatory features

↳ Allow domain experts to program in the preferred environment

    ↳ Integration in all systems without further adjustments

↳ One graphical, open and modular object library

↳ Data resolution as per system demand

Key functions

↳ Microservices in containerized solutions

↳ Edge computing possibilities

↳ HTML5 web frontend

SLB Design Language System
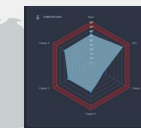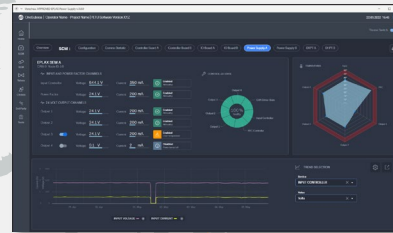
Subsea Live
Optimizing asset performance

MICROSERVICES

Shared development for one solution

Shared development and services for one solution

Virtual Flowmeter Development from Flow Assurance

↳ Process optimization

Asset performance monitoring from Digital Enablement

↳ System Overview

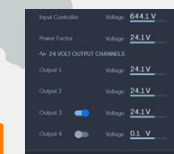↳ Analytics

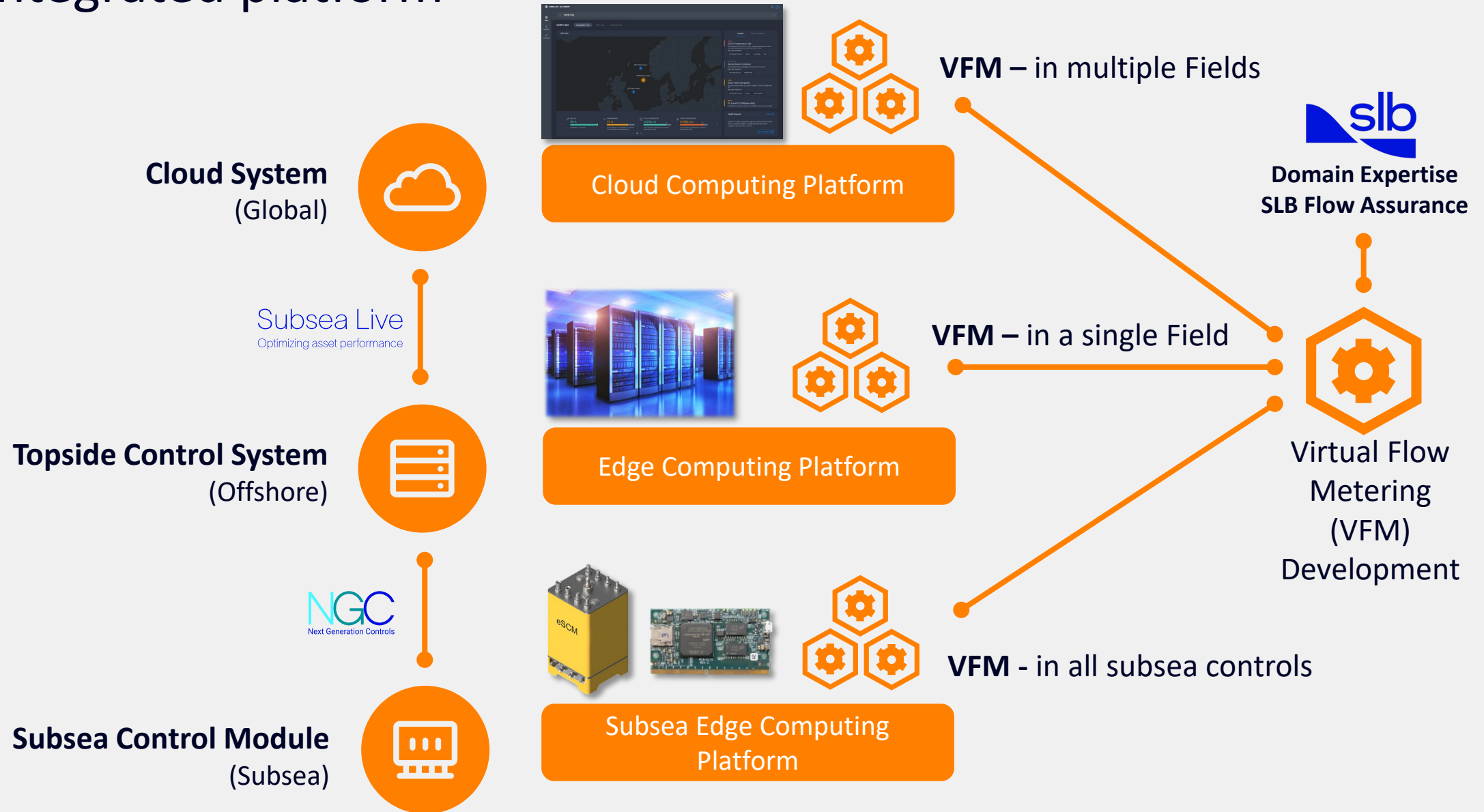Flow control valve development from Completions
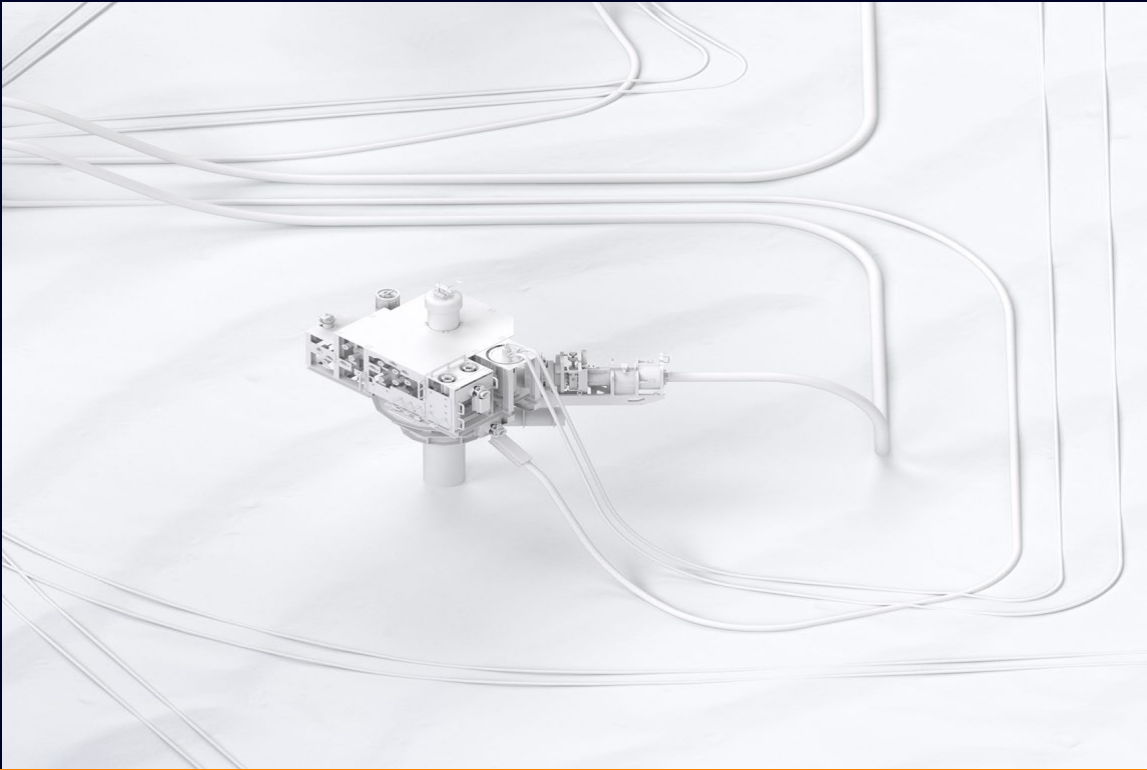
↳ Downhole zone control

Production Control from Controls

↳ Offshore Control

↳ Safety

One integrated platform

Cloud System
(Global)

Cloud Computing Platform

VFM – in multiple Fields

**Domain Expertise
SLB Flow Assurance**

Subsea Live
Optimizing asset performance

Topside Control System
(Offshore)

Edge Computing Platform

VFM – in a single Field

Virtual Flow
Metering
(VFM)
Development

NGC
Next Generation Controls

eSCM

Subsea Control Module
(Subsea)

Subsea Edge Computing
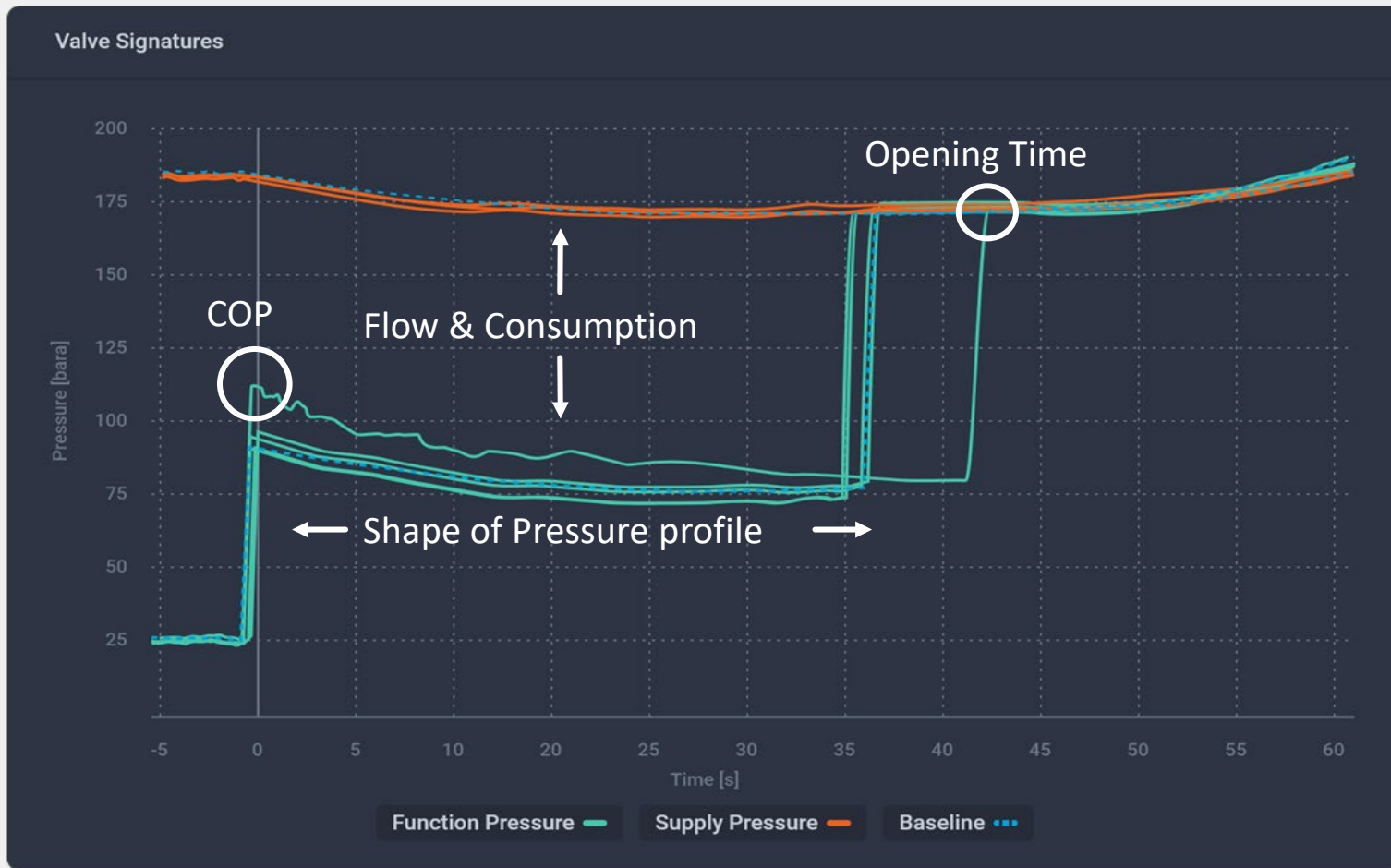Platform

VFM - in all subsea controls

Data availability: subsea valve

Valve Pressure Profiles

⌐ Pressure readings in the "subsea control module (SCM)" provide the operator with the status of the valve

⌐ Pressure profiles show valve operations

Valve Signatures

COP

Flow & Consumption

Opening Time

Shape of Pressure profile

Function Pressure — Supply Pressure — Baseline ⋯

COP – Crack Open Pressure

Valve Pressure Profiles

↳ Pressure readings in the "subsea control module (SCM)" provide the operator with the status of the valve

↳ Pressure profiles show valve operations

↳ Key parameters help identify status of the valve

slb One Subsea

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Characteristics of the platform components

Subsea Controls
- High resolution data
- Pressure and flow vs. threshold-based algorithms
- Limited computing power
- No historical data

Local topside control software
- Access to all status, measurements and commands
- High resolution pressure profiles on demand
- Alarm system
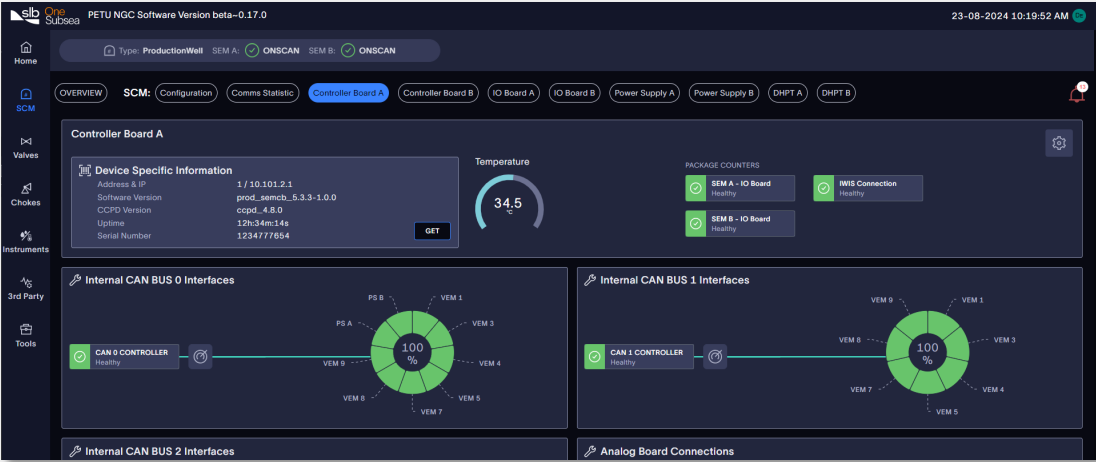- Limited historical data
- Simple comparison of pressure profiles only

Cloud system
- High computing power
- Advanced algorithms and machine learning
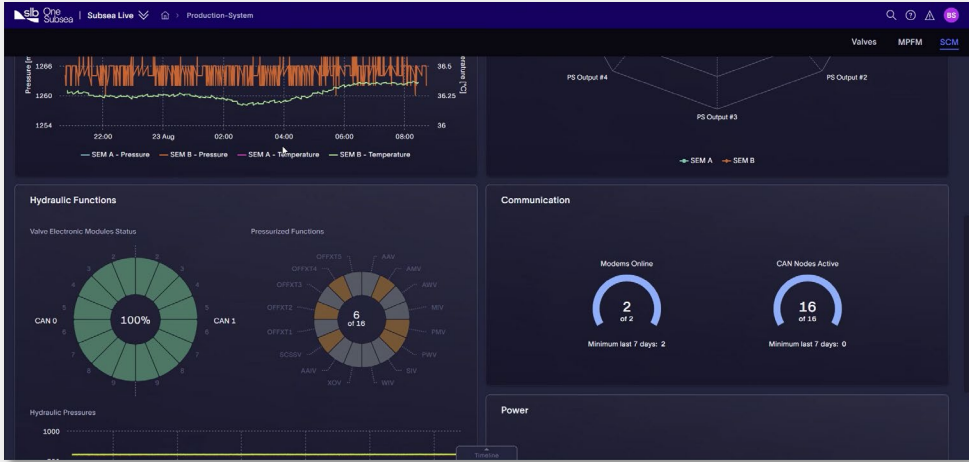- Endless historical data
- Large valve database
- No access to high resolution data
- Unable to monitor smaller valves

One shared and open graphical user interface

Modular user interface
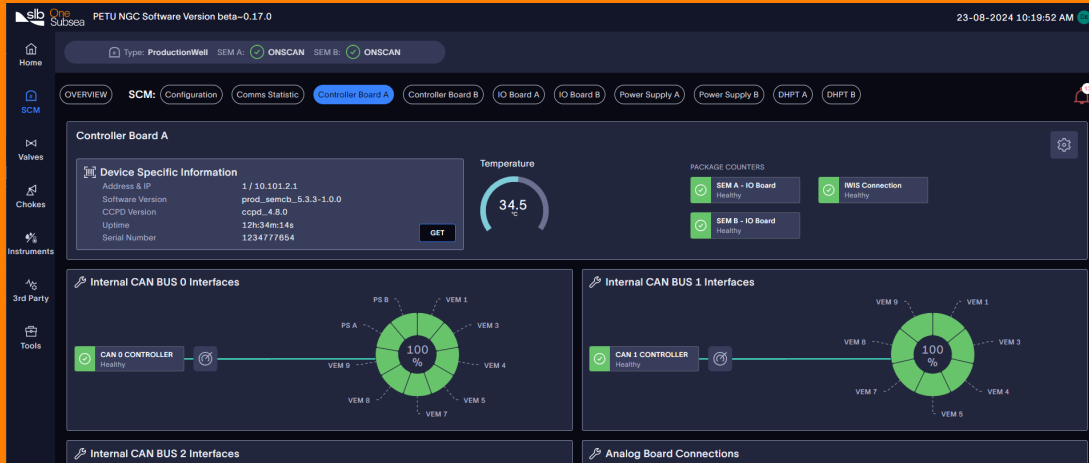

Topside control software (local)

Cloud system (global)

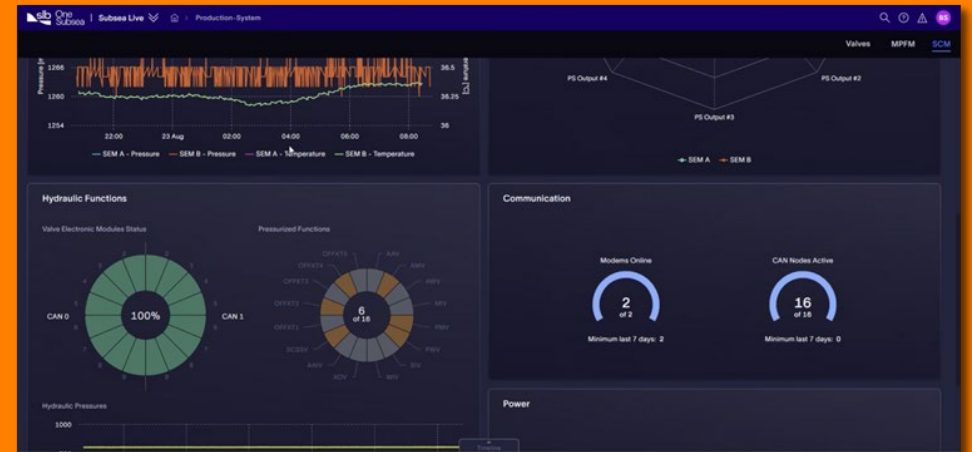One graphical object development for entire platform

DLS
SLB's design language system

Unified graphical user interface

Topside control software (local)

Cloud system (global)

↳ Improves end-user experience by providing one look and feel

↳ Reduces training effort over the entire platform

↳ New functionalities and lessons learned are available for everyone in the entire platform

Conclusion

↳ Domain experts develop their algorithms without knowing the target system

↳ Ability to use the algorithms on every target systems

↳ Full integration of different products and systems

↳ Operating one system with unified graphical user interface

↳ One system improves monitoring / support during operations

↳ One system improves development and runtime efficiency

↳ Parts of the platform can be independently used

Thank you