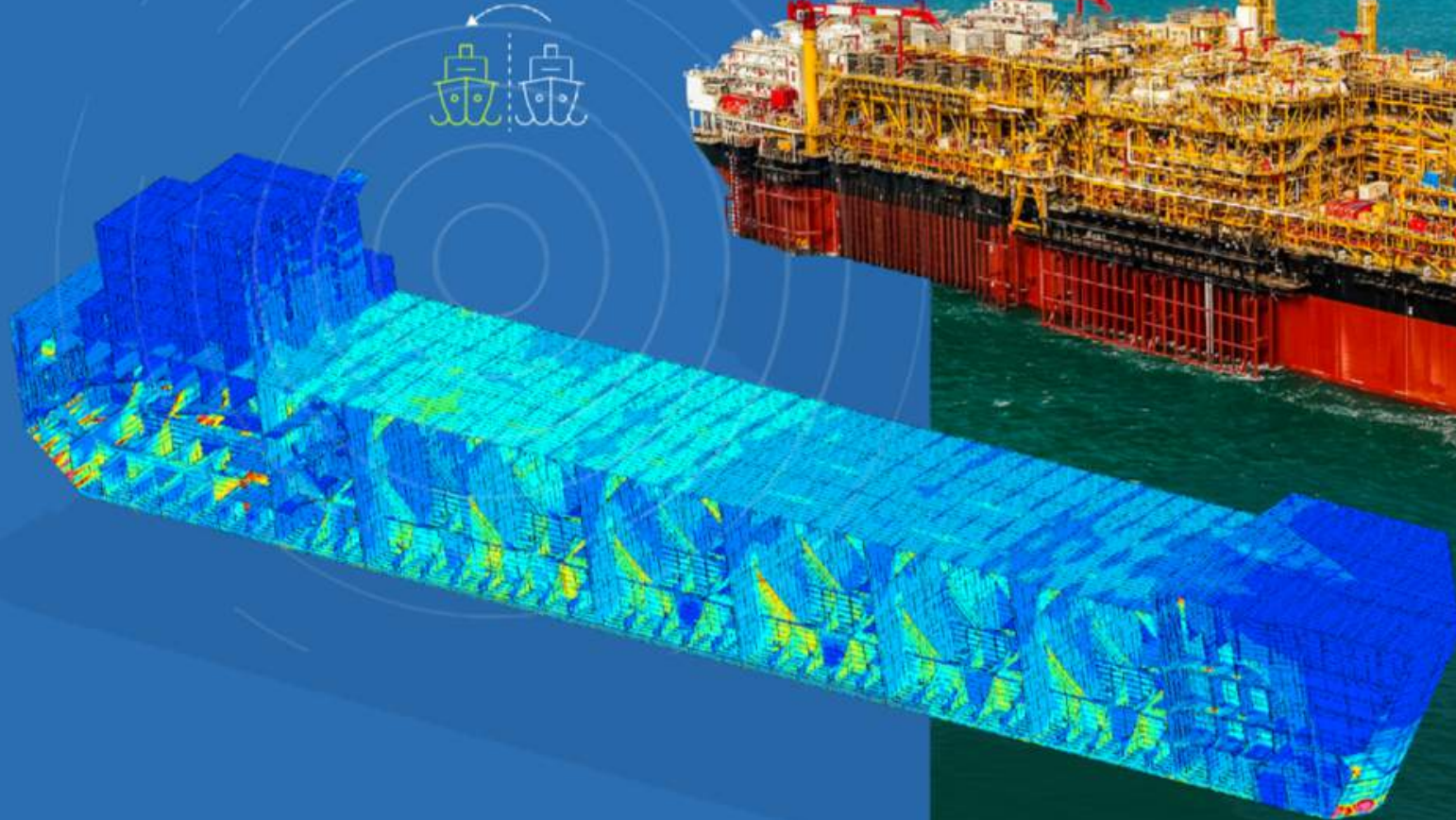




Case Study: Physics-Based Digital Twins for FPSOs



Production Efficiency in UKCS

73 % Production Efficiency

70 % Of production loss are due to equipment downtime

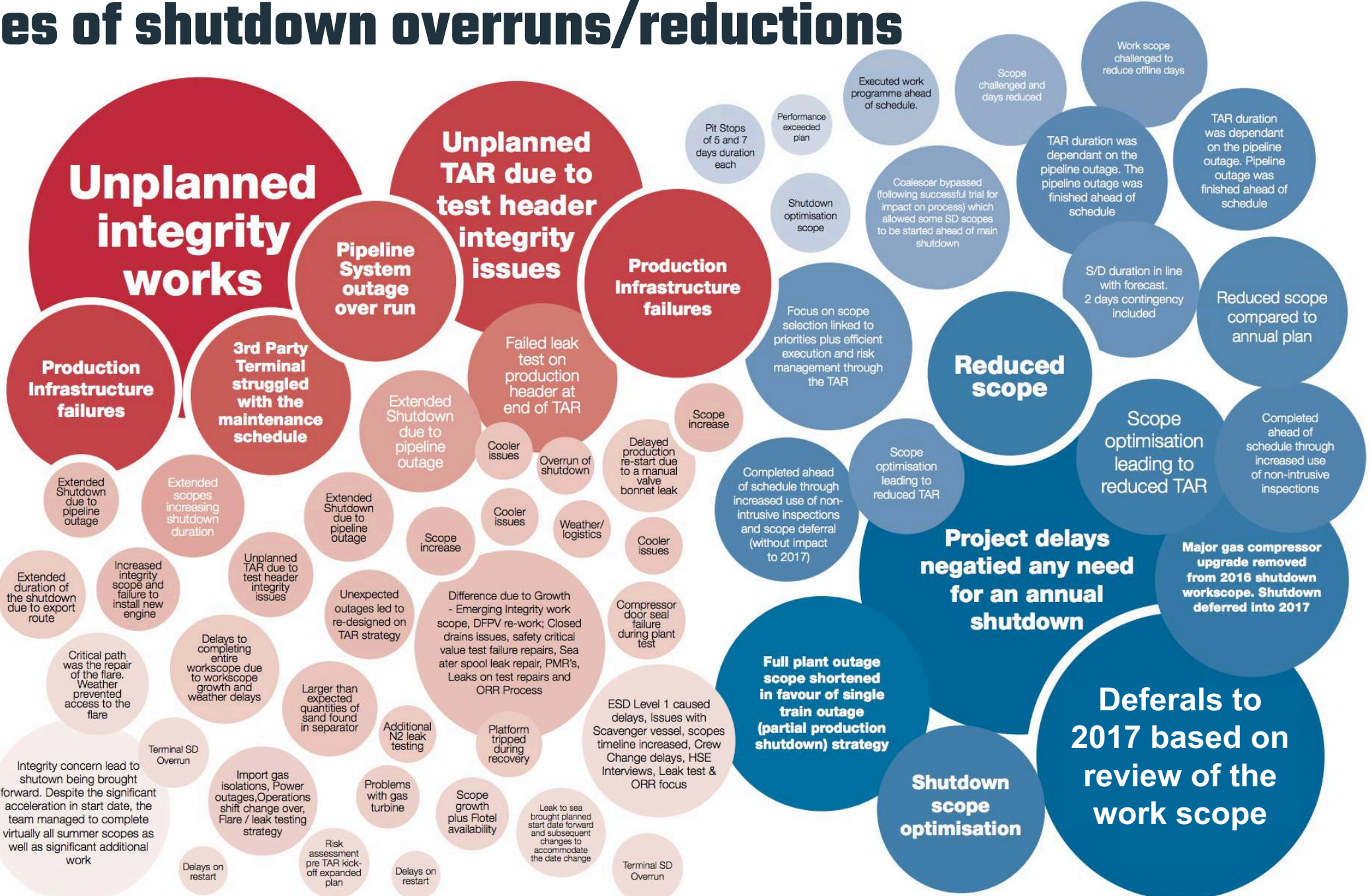
Source: Oil & Gas Authority (OGA) Production Efficiency report

Digitization of asset
lifecycle management
can unlock up to...

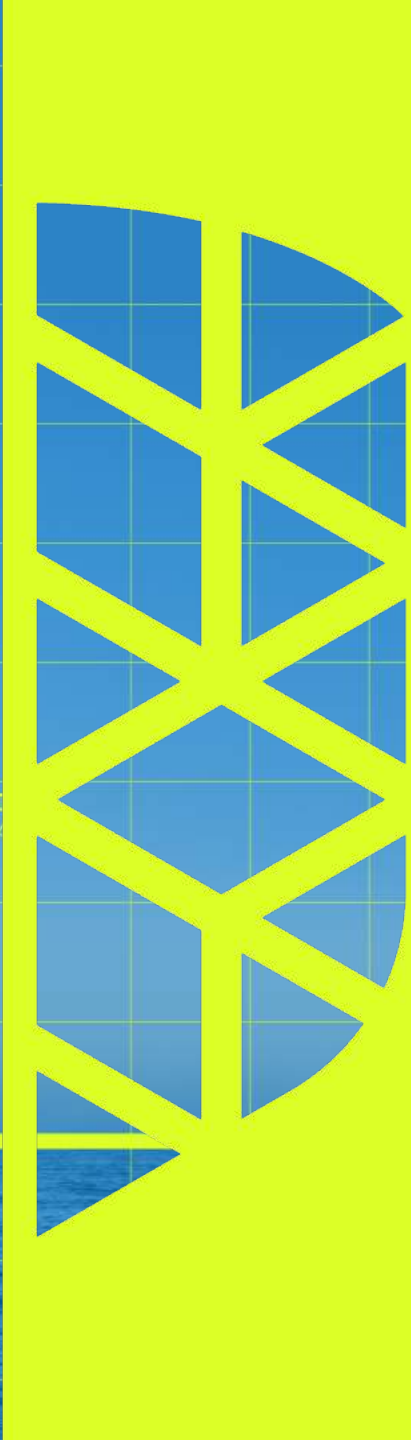
\$745bn

Source: World Economic Forum

Causes of shutdown overruns/reductions



Source: Oil & Gas Authority (OGA) Production Efficiency report



Akselos has created the world's fastest and most advanced engineering simulation technology, to help protect the world's critical infrastructure.

We call it a Digital Guardian.

RB-FEA TECHNOLOGY
AT A GLANCE

**100 academic
publications**

100

AKSELOS AT A GLANCE

**R&D funded by US
Department of Defence**

AKSELOS AT A GLANCE

**Equal to
150 years
Research &
Development**

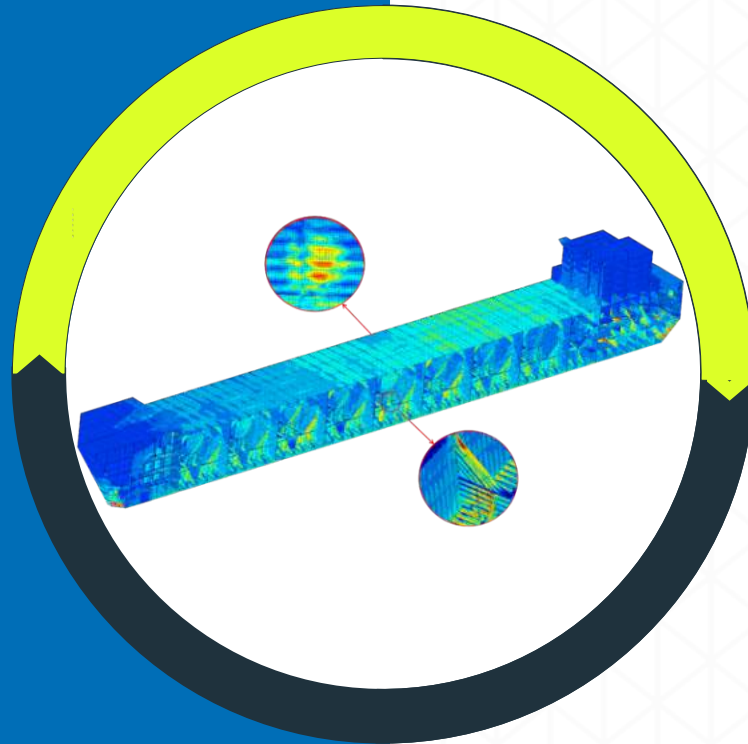
150

AKSELOS AT A GLANCE

**Top STEX 25
MIT spin-offs**

DESIGN

The most predictive tech used at the design stage is Finite Element Analysis (FEA).



OPERATIONS

The Digital Guardian is Built for operations:

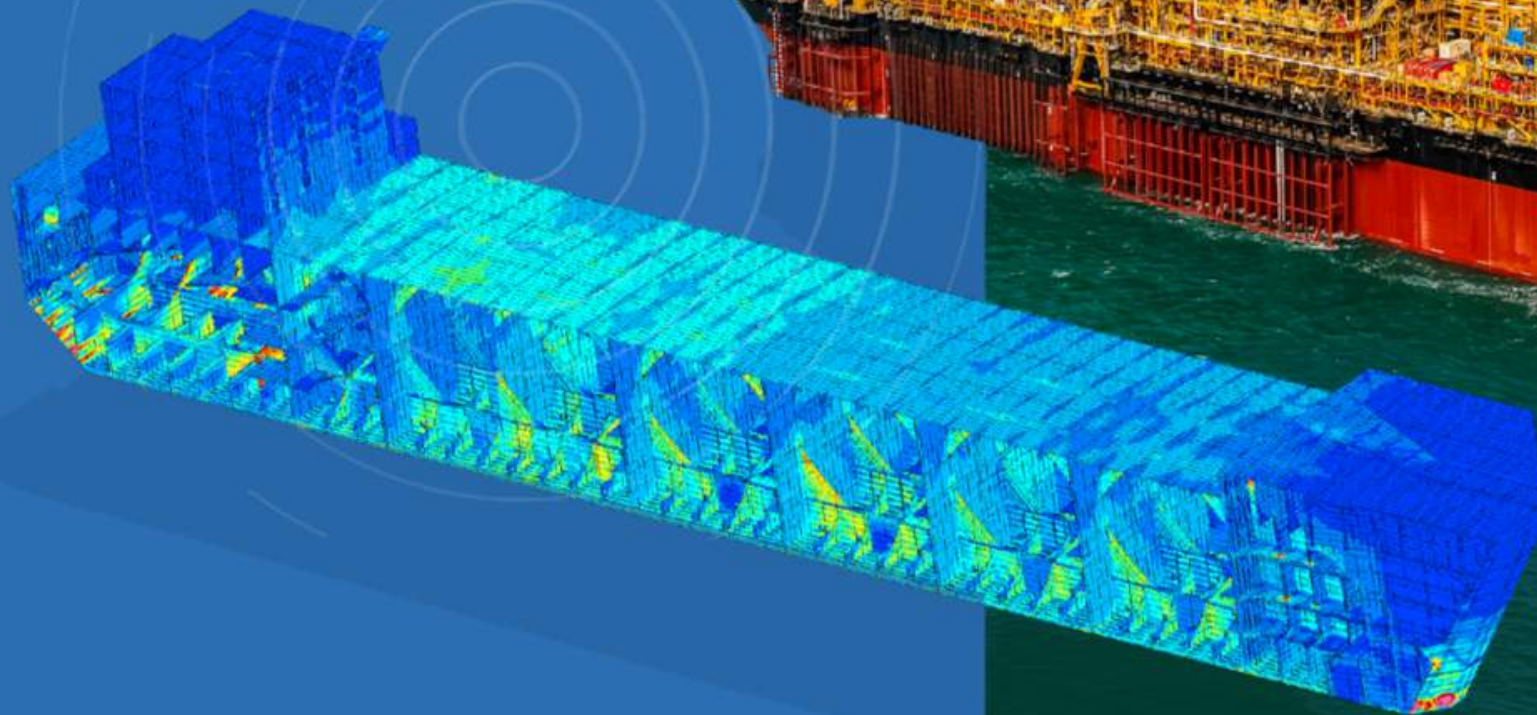
1000x faster

Largest holistic models

Leverages sensors data

Case Study

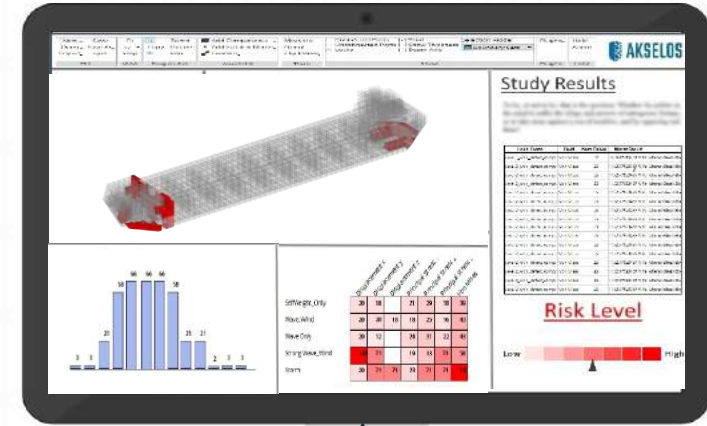
Physics-Based Digital Twins of an FPSO



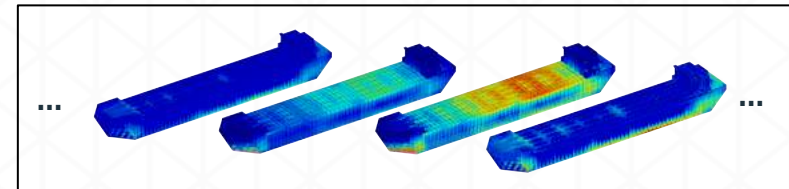
BEST IN CLASS STRUCTURAL INTEGRITY



Full Digital Thread from Thickness Inspection to Full Structural Integrity Report



100x of RB-FEA solves in minutes



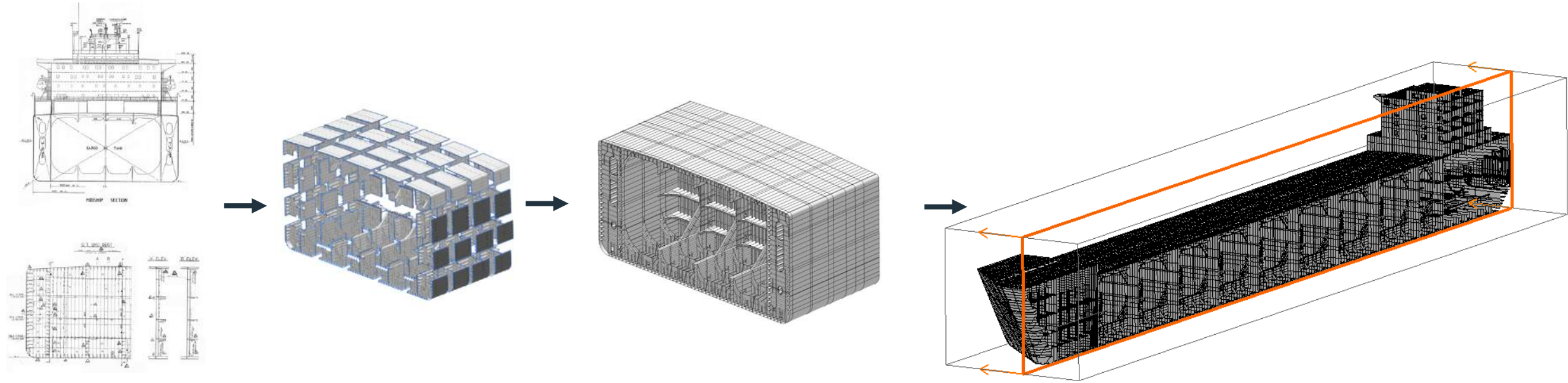
Motivation



- Optimize inspection intervals
- Utilize inspection and sensor data in real-time decision making



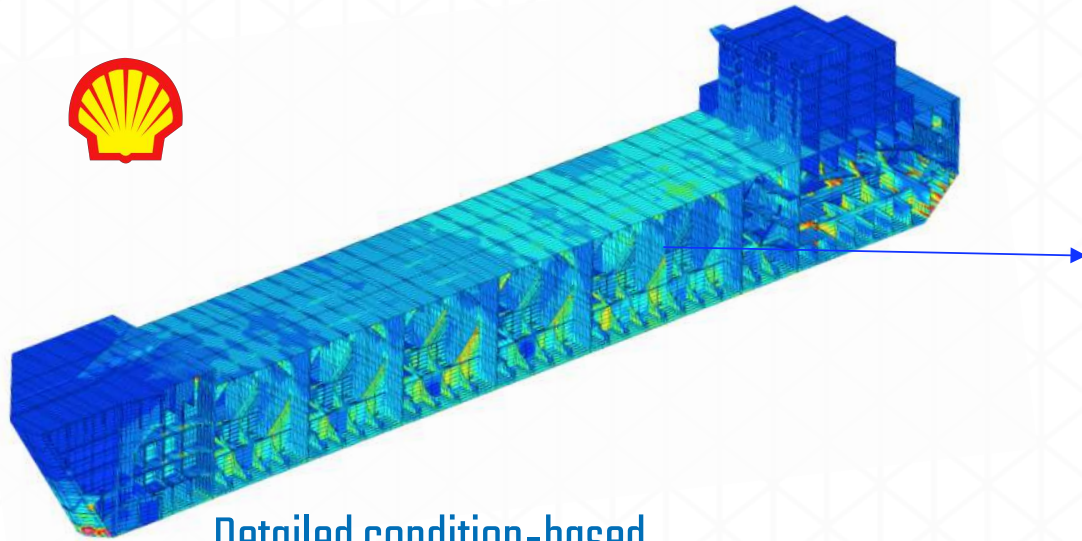
RB-FEA: Fast Component-based Modeling



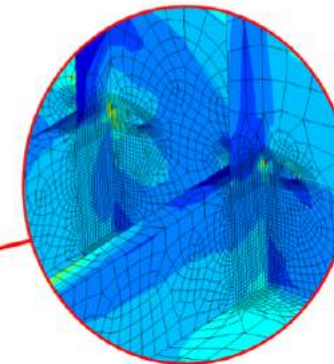
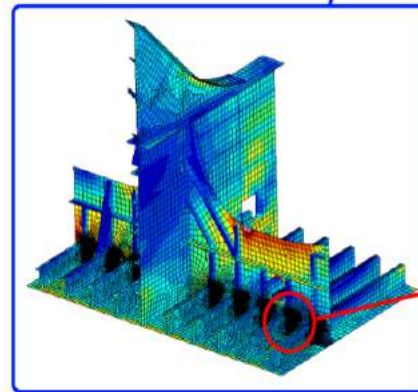
Case Study: Global Simulation of an FPSO

Model solved with Akselos Integra[®]

*Actual FPSO model is under NDA. This is a representative example.



Detailed condition-based
model of FPSO hull



Full FPSO Model

Speedup

**Months to
hours**

Number of FEA DOFs

>100,000,000

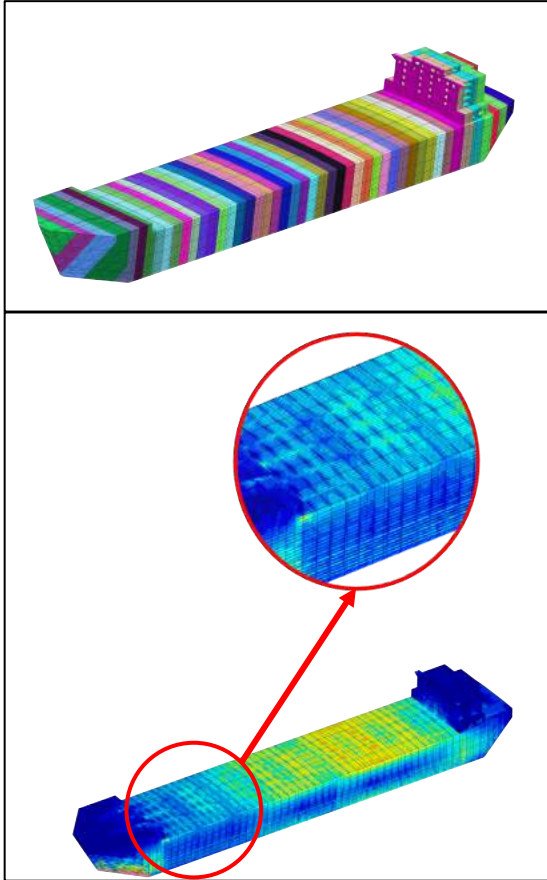
Akselos Components Used

>1,500

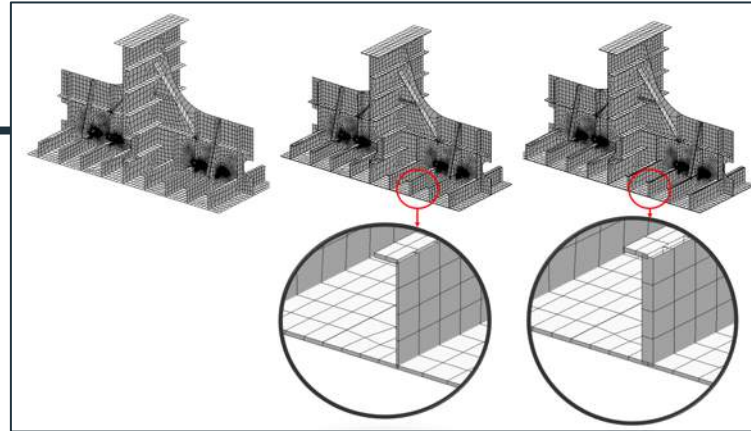


RB-FEA: Fast Component-based Modeling

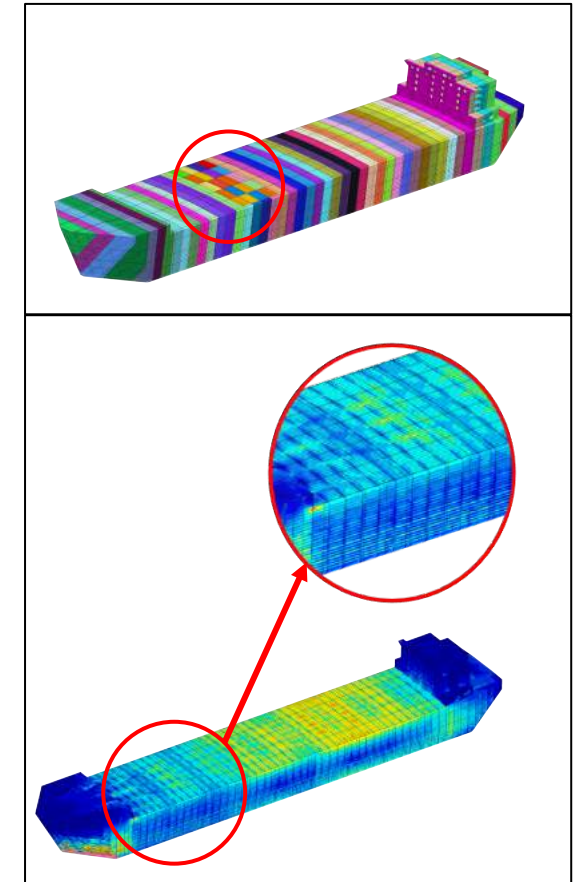
Thickness 100%



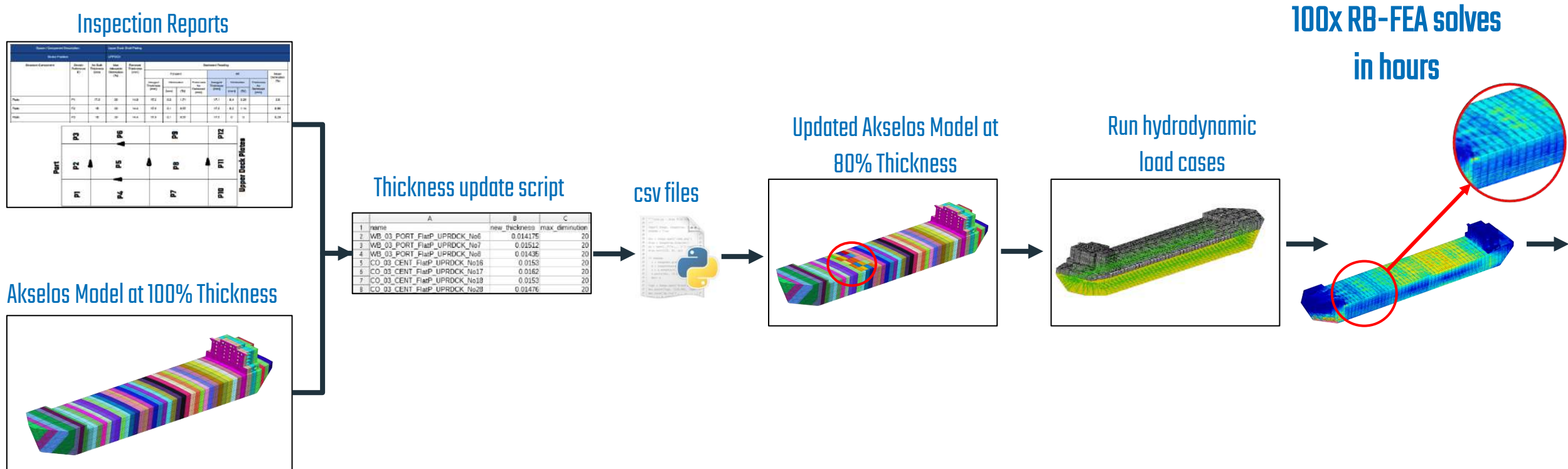
Change parameters, e.g. thicknesses, loads, crack lengths, and re-solve quickly



Thickness 80%

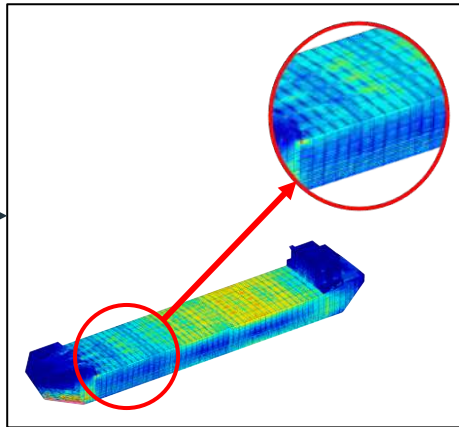


Workflow : Full Digital Thread from Thickness Inspection to Full Structural Integrity Report (1/2)

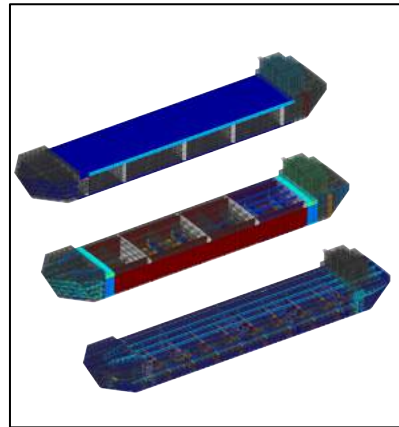


Workflow : Full Digital Thread from Thickness Inspection to Full Structural Integrity Report (2/2)

Updated Akselos model



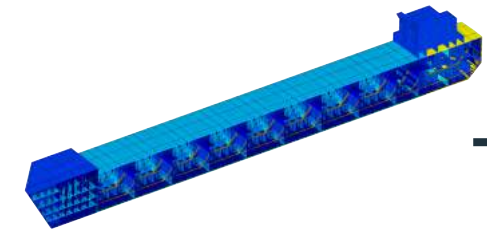
Automatic classification of plates, stiffened panels girders



Fatigue analysis procedure

Standards
(e.g. LR, DNV-GL, ABS, etc.)

Buckling evaluation



Reports



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