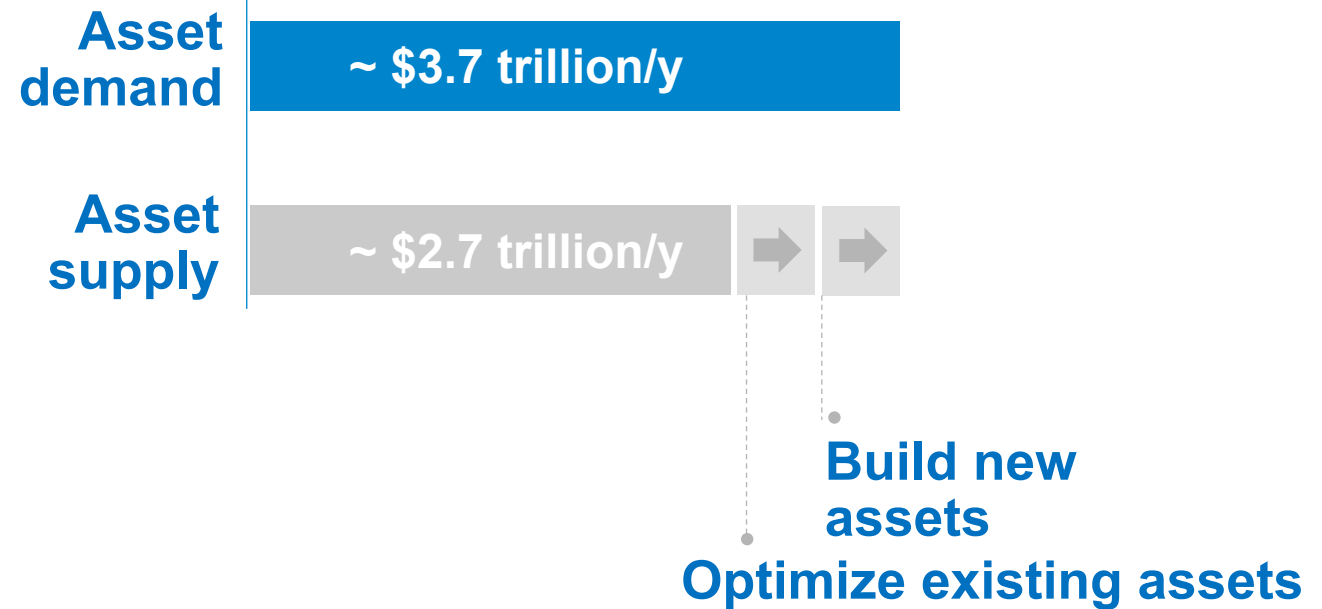


AKSELOS DIGITAL TWINS

Physics-based simulations transforming operations



The global infrastructure gap & the tools needed to close it



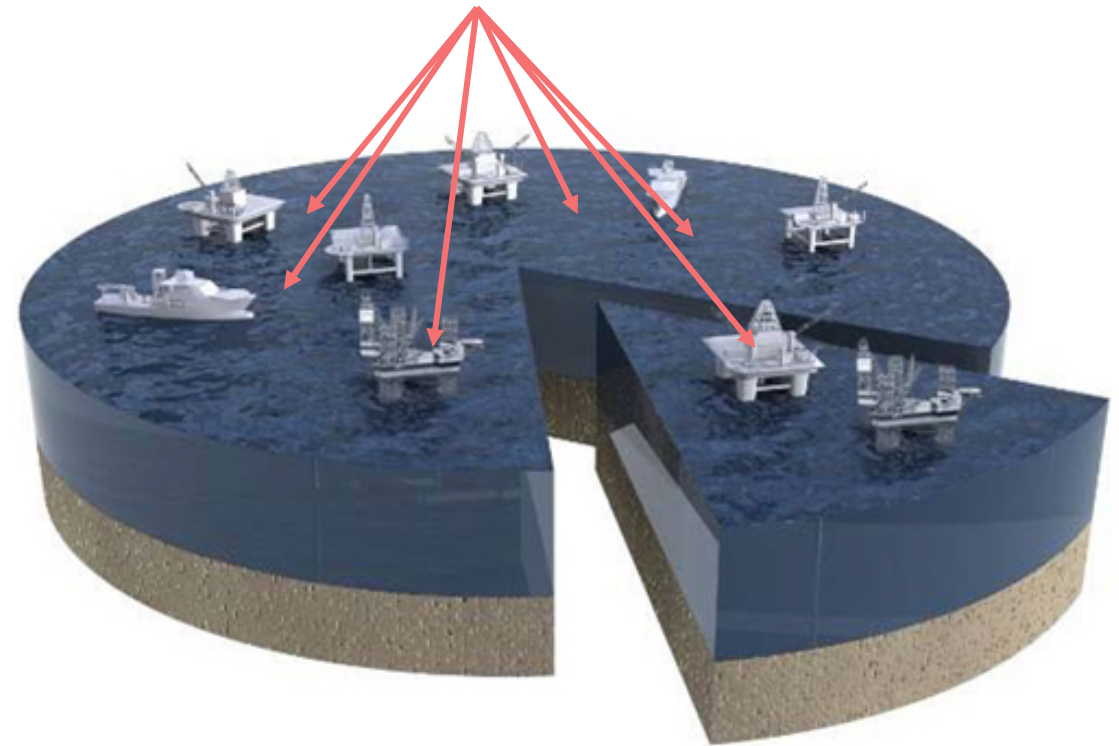
Source: WEF Strategic Infrastructure Report - 2014

The challenges for asset-heavy industries

- Long asset lifetime
- Challenging environmental conditions
- Asset life extension
- Fixed maintenance budgets
- Decisions based on judgement (not data)



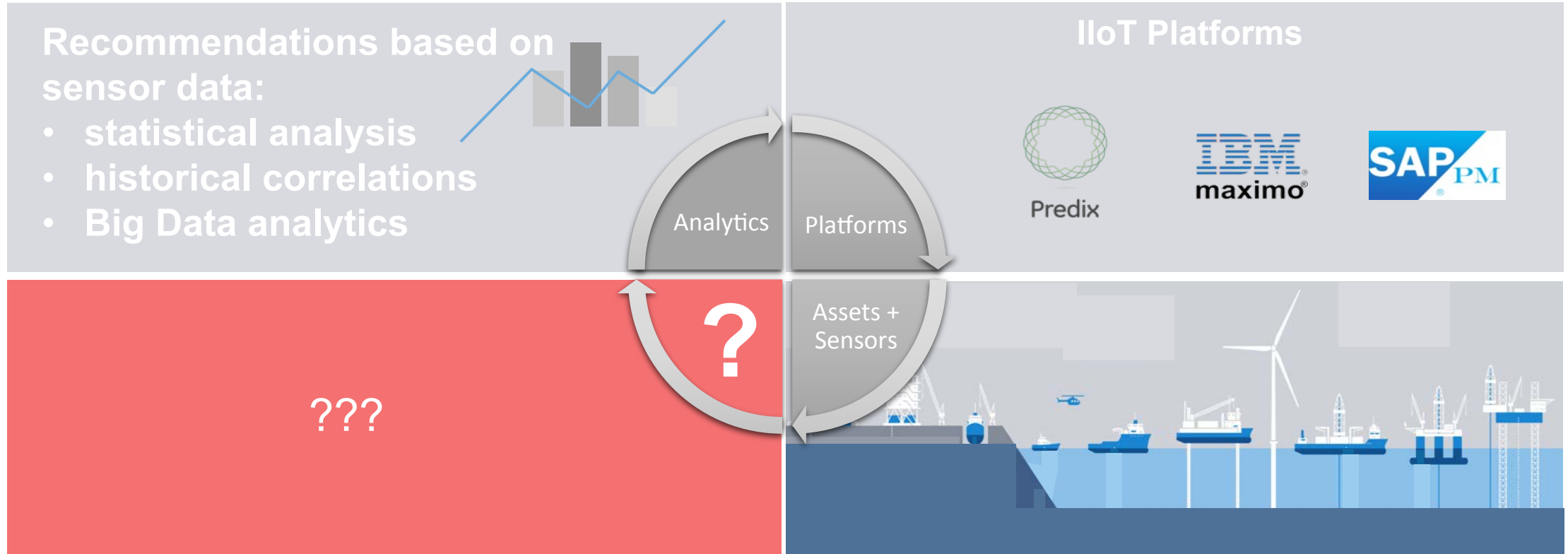
Maintenance Budget



Big Data/IIoT Platforms

Only 30% of failure modes are reliably predicted by sensors today.

Source: GE estimates

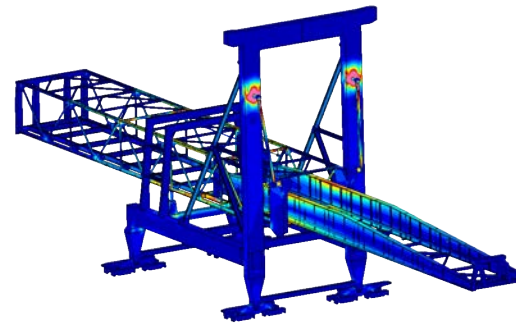
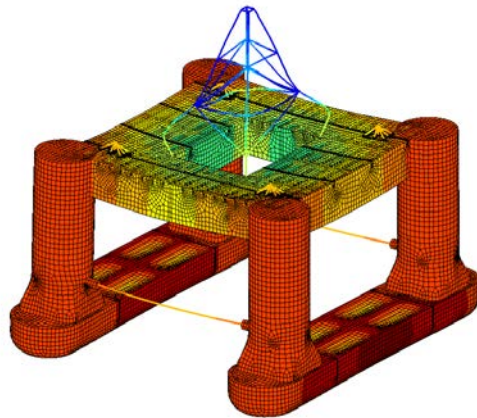
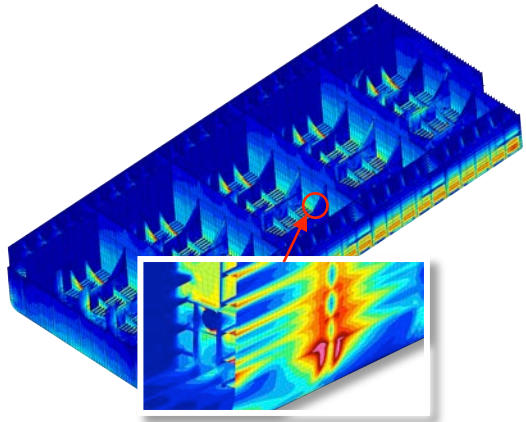


What if

we could have instantaneous
physics-based simulations
calibrated with sensor data?

Akselos Digital Twins

Cloud-based platform for fast, physics-based analysis of critical infrastructure



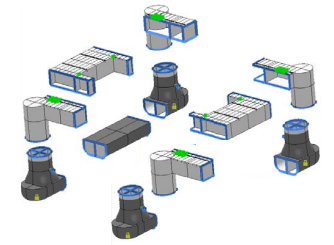
New Algorithms (from MIT) Bring Speed and Scale

**Compute
1000x Faster**



Pre-computed Components
Create/update RB-FEA components, store pre-computed data on cloud

$$\underbrace{[\mathbf{A}]}_{\mathcal{N} \times \mathcal{N}} \underbrace{[\mathbf{x}]}_{\mathcal{N} \times 1} = \underbrace{[\mathbf{f}]}_{\mathcal{N} \times 1} \rightarrow$$

Computational Approx.  $\leftarrow \nabla \cdot \boldsymbol{\sigma} + \mathbf{F} = 0$

Physics

Solution/Analysis
Set materials, loads, boundary conditions and solve

Model Assembly
Connect components to create simulation-ready models

Akselos Complements Big Data/IIoT Platforms

Sensor data
+ Physics model

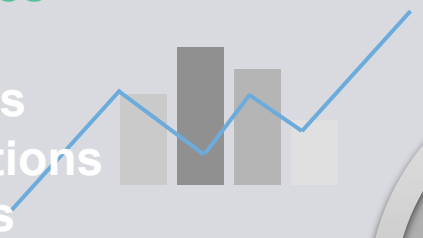
30% accuracy

97% accuracy

Source: GE estimates

Recommendations based on sensor data + **Physics model**:

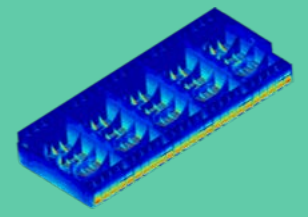
- statistical analysis
- historical correlations
- Big Data analytics



IIoT Platforms



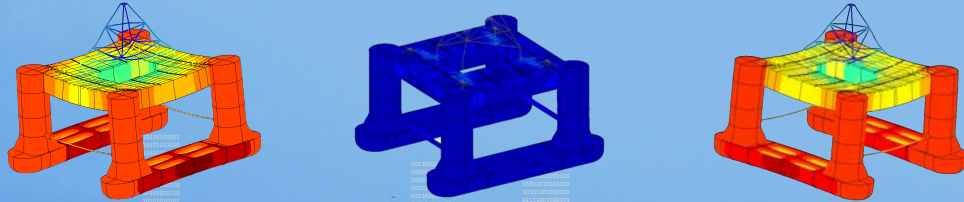
Fast physics-based models



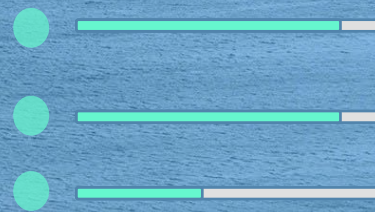
BENEFITS OF AKSELOS DIGITAL TWINS

Data-driven, physics-based decision making:

- Asset performance optimization
- Life extension
- Maintenance scheduling and prioritization
- Failure prediction/prevention
- Contingency planning/“what if” scenarios



Estimate of remaining
asset lifetime:



Thank you!



Akselos Digital Twins

Physics-based simulations transforming operations

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