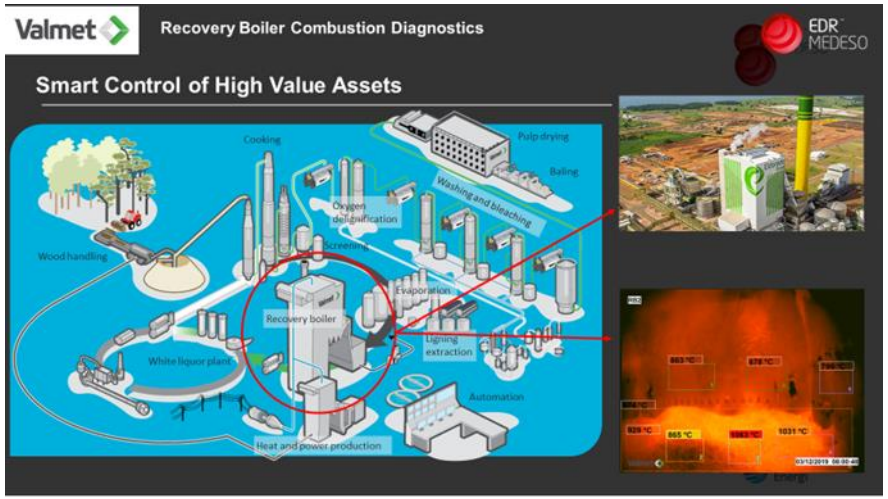
Valmet: Digital Twin for Combustion by EDR Medeso



Elevator Pitch

EDR Medeso has a unique capacity to use limited IOT data in combination with multiphysics and engineer performance and predictions of industrial equipment. Recognized by Gartner as a unique, innovative solution builder in Predictive Maintenance EDR Medeso can now help manufacturers and operators to realize extended value of their IOT investments, without need of more data. The IOT Analytics suite is offered as a SAAS on Azure, fully scalable and available globally.

Challenge

Valmet produce equipment like boilers for pulp and paper industry. "Black Liquor" is a by-product of pulp from mills that make products from trees, such as paper. It is currently used to recover chemicals and produce high-pressure steam used in the pulp and paper-making process.

It is a challenging process to combust the Black liquor in recovery boliers with high accuracy. The amount of spill over from the process needs to be washed frequently from inside the boiler, causing stand still of the mill since its at the heart of the production.

Solution

How was the challenged solved?
Data from a connected boiler at customer site in Brazil was shared with remote expertise at EDR.

EDR developed a Digital Twin of the boiler with the correct physical attributes. Then data was entered to represent the actual mix of the Black liquor and other parameters. Simulations were triggered on the Digital Twin to test new settings of the combustion in the boiler and optimize the process.

The results were shared via a web service with the local operators of the boiler in Brazil.

How was the solution realized?
A SAAS model was fed with data from controls at site, simulations calculated new setting points which were then sent to site.

Benefits

Improved combustion by regulating the oxygen valves

A major benefit was reduced spill of Black Liquor after combustion and reduced need of washing the boiler

Reduced guarantee risk levels

Opportunity to solve problems remotely

Business Value / Numbers

Customer Project outcomes:
More energy generated, productivity increase, reduced stops for washes estimated: 8,5 M € /annually

Potential in scaling the use case to many more plants

Avg. Implementation Cycle: 5-6 months
Minimal internal requirements: 2 people part time
Avg. | Azure Consumption: 25 k€/month
(in production, est. per plant)

Total value from benefits: 8,5 m€
Total Investment requirement: 200 k€

EDR MEDESO Valmet

[Partner] website Link:
EDRMedeso Digital Labs

Collateral / Learn More:
Video Link: Simulation Leadership Forum 2020 - Cummins vs Valmet - Simulation Leadership Forum (edrmedeso.com)

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Leading provider of cargo handling: Roller Bearing Virtual Sensors

Elevator Pitch

EDR Medeso has a unique capacity to use limited IOT data in combination with multiphysics to engineer performance and predictions of industrial parts. Recognized by Gartner as a unique, innovative solution builder in Predictive Maintenance EDR Medeso can now help manufacturers and operators to realize extended value of their IOT investments, without need of more data. The IOT Analytics suite is offered as a SAAS on Azure, scaleable and available globally.

Challenge	Solution	Benefits	Business Value / Numbers
Forklift trucks had unpredictable performance over time, in some situations with stand stills causing logistical problems at customer sites. The weight of the equipment forced service on the spot where equipment had stopped. This caused strain on customer relations as their business was interrupted. Spare parts logistics was hard to plan due to variable performance of trucks.	**How was the challenged solved?** The roller bearings were identified as being a critical component which needed attention. Previously, an IOT project with technology from AWS used a machine learning approach trying to identify and predict failures based on historical data. This was not sufficient. It was hard to understand how the roller bearings were affected overtime and why performance declined. With EDRs Virtual Sensor approach a new perspective to solving the problem was introduced. Physics models of a series of bearings was built and then environmental data applied to foresee loads and damage. These results provided the customer with failure probability.	The customer has revealed: -the varying dynamics of how trucks were used is what caused damage to the roller bearings, and specifically which movements of the trucks. This is valuable information both to R&D and instructions related to sales of the trucks. -the approach from EDR gave a completely new value to a previous IOT project, with very limited effort in just a few months -further benefits will be realized as the install base of trucks is widely connected. It is with limited effort to scale the Virtual sensors across all products -service planning is now possible based on real conditions, rather than purely statistical planning.	**Customer Project outcomes:** The project revealed, that in applying Virtual Sensors: -gains are to be made in reducing Warranty costs by enforcing the right use of trucks -uptime savings are realistic thanks to planned maintenance of bearings **Avg. Implementation Cycle:** 1-2 months **Minimal internal requirements:** 1 person **Avg. project volume:** 10k€ **Avg. | Azure Consumption:** 10k€/month (est per product serie) **Total Investment requirement:** 12k€

EDR MEDESO

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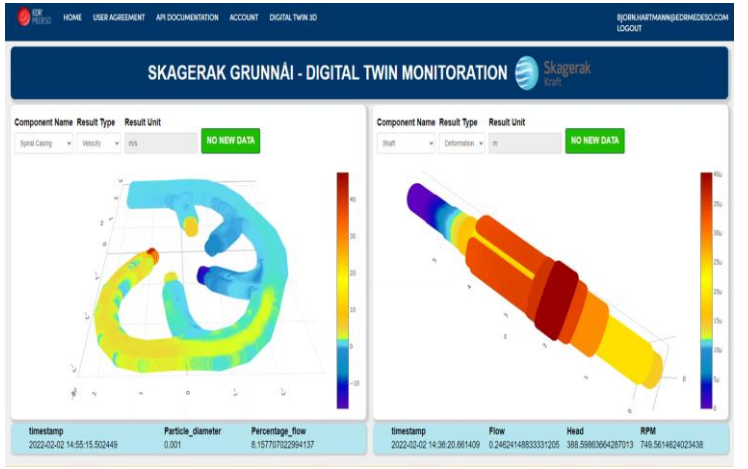
Skagerak Kraft: Digital Twin for Hydropower by EDR Medeso



Elevator Pitch

EDR Medeso has a unique capacity to use limited IOT data in combination with multiphysics and engineer performance and predictions of industrial equipment.

Recognized by Gartner as a unique, innovative solution builder in Predictive Maintenance EDR Medeso can now help manufacturers and operators to realize extended value of their IOT investments, without need of more data.

The IOT Analytics suite is offered as a managed service on Azure, fully scalable and available globally.

Challenge	Solution	Benefits	Business Value / Numbers
Every hour running means fossil free power, unplanned stops means monetary and environmental costs. A turbine in operation is expensive and difficult to open and survey. Current control system data could not describe internal status of critical parts such as impeller and casing; their wear because of sand in the water etc. Service planning was based on statistics which meant throughput was not optimized and neither the use of spare parts.	**How was the challenged solved?** Using existing data and simulating new data made it possible to understand the interior of the water turbines, so called Virtual Sensors were engineered. **How was the solution realized technically?** For the turbine as example; RPM, head, flow, diameter was loaded as inputs. Then the stress was calculated, and fatigue models could then be achieved. For the spiral casing, a DNV corrosion model was applied and the results visualized in a 3D Digital Twin with the erosion rate in different colors. **What software is included/ used?** IOT microservices on Azure for standard failure modes, triggering Ansys physics calculations. A webservice to visualize the 3D Digital Twins across the customers organization.	Skagerak Kraft do not have to open the turbines to monitor their wear and tear. Service planning is now possible based on real conditions, rather than statistical planning. 3D images helps guide to more efficient service Productivity gains by test in Digital Twin of flexible load of turbines	**Customer Project outcomes:** Digital Twin is used as a test bed for future changes which would mean productivity gains of est. 1,8-4,8 M€/year (depending on energy prices etc.) An avoided service stop for 1 month could save potentially M€s in generated fossil free energy (EDR est) **Avg. Implementation Cycle:** 4 months **Minimal internal requirements:** 1 person **Avg. project volume:** 75 k€ **Avg. | Azure Consumption:** 20 k€ for first turbine (10 in total of same model Pelton at Skagerak) **Total value from benefits:** 1,8 to +4,8 M€ **Total Investment requirement:** 100k€

EDR MEDESO Skagerak Energi

website Link:
EDRMedeso Digital Labs

Collateral / Learn More:
Case Study: Digital tvilling for økt robusthet i fremtidens energisystem (xn--nringslivnorge-0ib.no)

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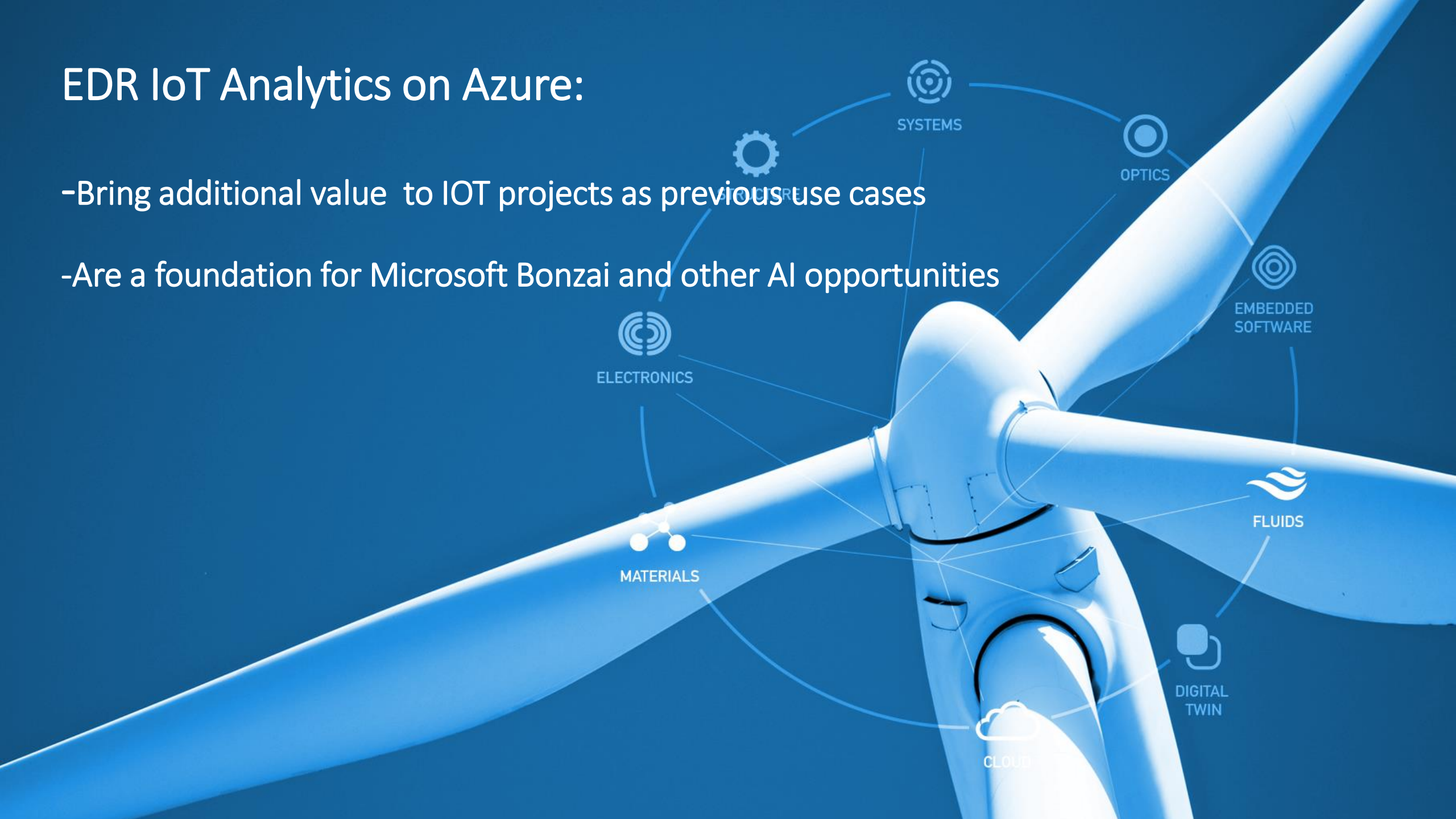
EDR IoT Analytics on Azure:

-Bring additional value to IOT projects as previous use cases

-Are a foundation for Microsoft Bonzai and other AI opportunities



Our Approach is being recognized

Recognized by Gartner in competition with 160 other vendors in the IoT-Enabled Predictive Maintenance space

EDRMedeso

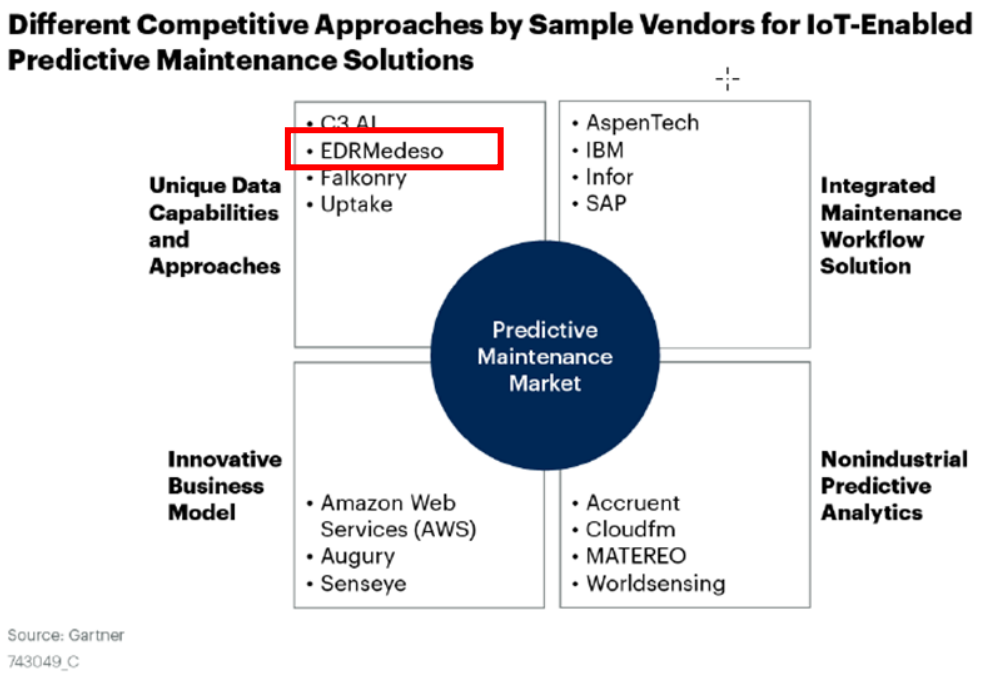
Product or Portfolio Overview

EDRMedeso, a private company founded in 1987 and headquartered in Västerås, Sweden, unlocks PdM for industrial assets and equipment with data from engineering simulations and proprietary engineering analytics intellectual property designed by EDRMedeso. Clients include Rolls-Royce Marine and Valmet.

How EDRMedeso Competes

EDRMedeso is a niche engineering-focused provider of PdM solutions. EDRMedeso achieves comparative levels of predictive analytics insights by combining data from engineering simulations and analyzing that data with models developed on the basis of engineering algorithms and statistical wrappers. This allows for the EDRMedeso PdM solution to deliver both predictive maintenance insights and remaining design life of products. The unique data approach is one that resonates well with clients in highly regulated industries where design life predictions are critical and where the installation of additional sensors and devices may be restricted if not prohibited.

Figure 1: Different Competitive Approaches by Sample Vendors for IoT-Enabled Predictive Maintenance Solutions



Source: Gartner
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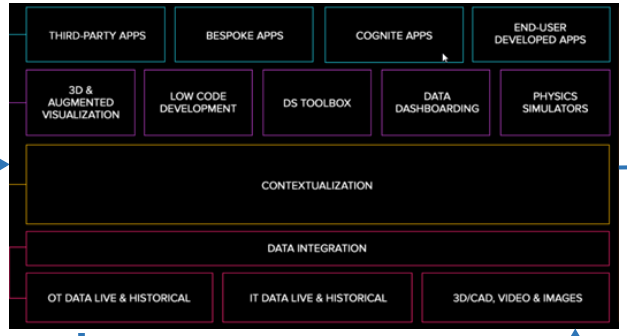
Gartner

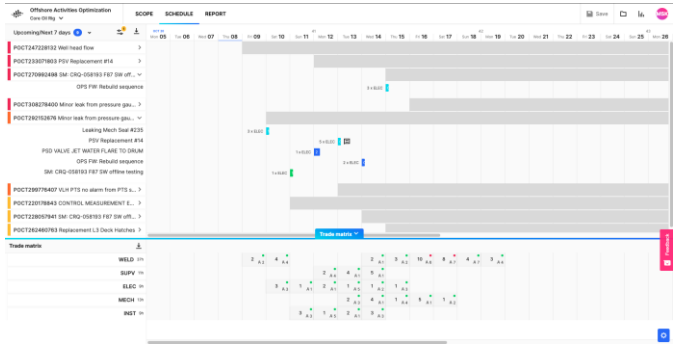
Analytics for IoT

Connected Asset

IoT Platform



IoT Application



Data stream

Business Data Points

EDRMedeso IoT Suite

IoT Analytics – example components

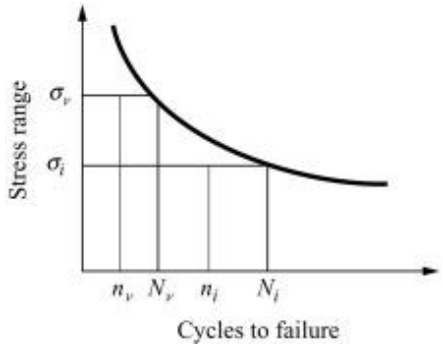
Runner

Plain Bearing

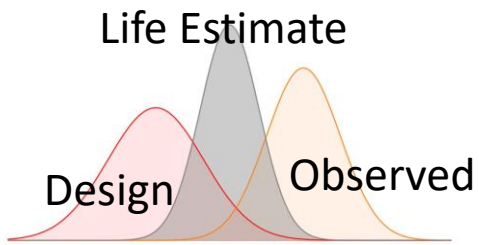
Roller Bearing

Spiral Casing

Shaft

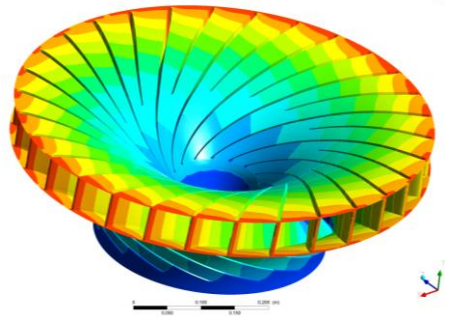


Fatigue source



Bayesian

Motor/Generator



Model from any

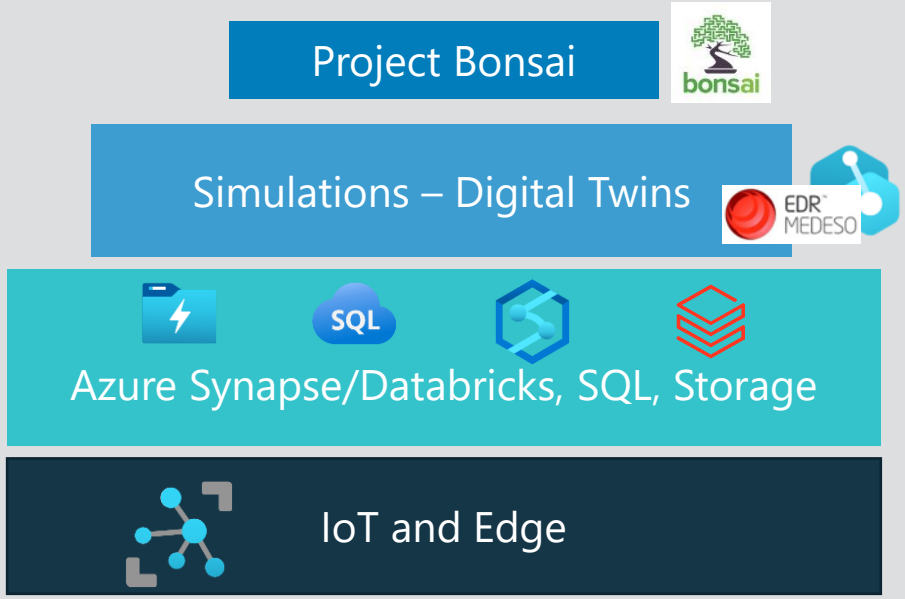
Why should you care about Project Bonsai

Leading edge technology that showcases Microsoft's innovation & leverages IOT

Helps customers bring AI to real-life use cases: Not a theoretical/academic exercise

Pull through other Azure technologies (Azure IOT, Percept) & leverage marketplace

Typical simplified Bonsai project Azure technology stack



Core Bonsai Azure service for brain AI training

AI simulator training and running
Simulator software scaling (EDR Digital Twins & Virtual Sensors)

Data collection
Simulation training data
Etc.

Smart sensors
Edge computing: AI (e.g., vision), local "brain" deployments

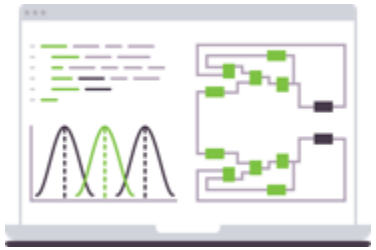
NEAL ANALYTICS

Bonsai service overview

A complete toolchain to build, train, and deploy BRAINs

1. Machine Teaching injects subject matter expertise into BRAIN training

2. Simulation tools for accelerated integration and scale of training

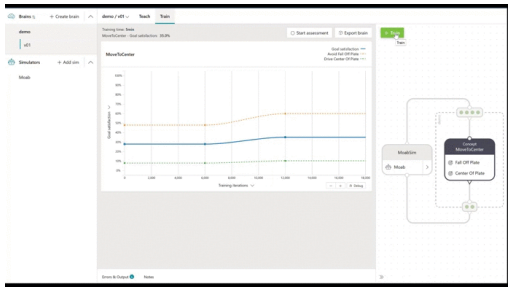


Ansys

EDR MEDESO

bonsai

3. AI Engine automates the generation and management of neural networks and DRL algorithms



4. Flexible runtime to deploy and scale models in the real world

Synthetic Data – Data of the Future

Prediction by Gartner.

Autonomous Systems of the Future use Synthetic Data.

A paradigm shift in AI: Digital Brains learn based on the ***Synthetic Data of Digital Simulations.***