THE FUTURE IS NOT WHAT IT USED TO BE

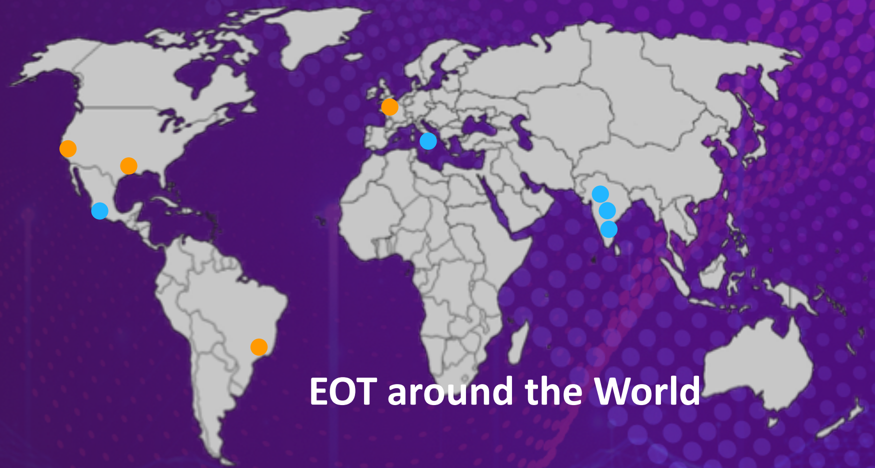
Unlocking the Promise of AI-Optimized O&G Assets

PI Enabled Data Pipelines for Analytics and ML

Matt Oberdorfer, CEO
www.eot.ai

Who is EOT?
Modernizing OT/IT Infrastructure to Utilize Modern AI/ML around the Globe

EOT is a global industrial software company offering a platform designed to enable AI-optimized digital assets using enterprise-wide insights to optimize each individual asset.
www.eot.ai



How to Unlock the Promise of AI Optimized O&G Assets

1. **Why and why now?** 1) Unpacking the Promise and Dilemma of AI Optimized O&G Assets, 2) Making a business case.
2. **Pick one! Use Case Discovery and Identification:** Identify 1-3 business challenges and size the financial and productivity impact and ROI when solved.
3. **8-Week Implementation Roadmap:** Design and deliver the Minimal Viable Product (MVP) within a short period of time.
4. **Roll MVP out into Production:** Plan and deliver an app or system to business and/or operational users.

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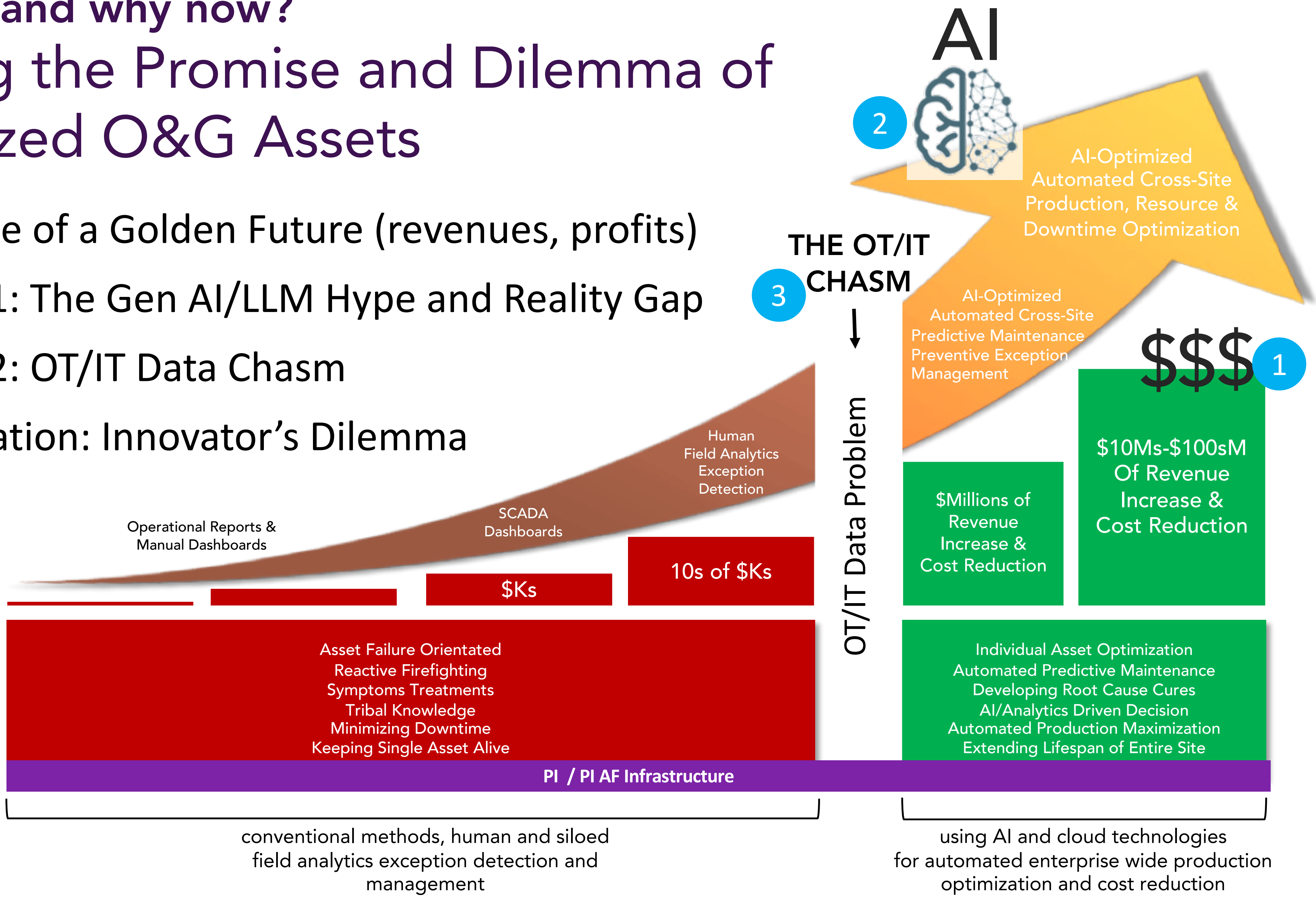
Step 1: Why and why now?

Unpacking the Promise and Dilemma of AI Optimized O&G Assets

1. The Promise of a Golden Future (revenues, profits)
2. Challenge 1: The Gen AI/LLM Hype and Reality Gap
3. Challenge 2: OT/IT Data Chasm

➡ The Implication: Innovator's Dilemma



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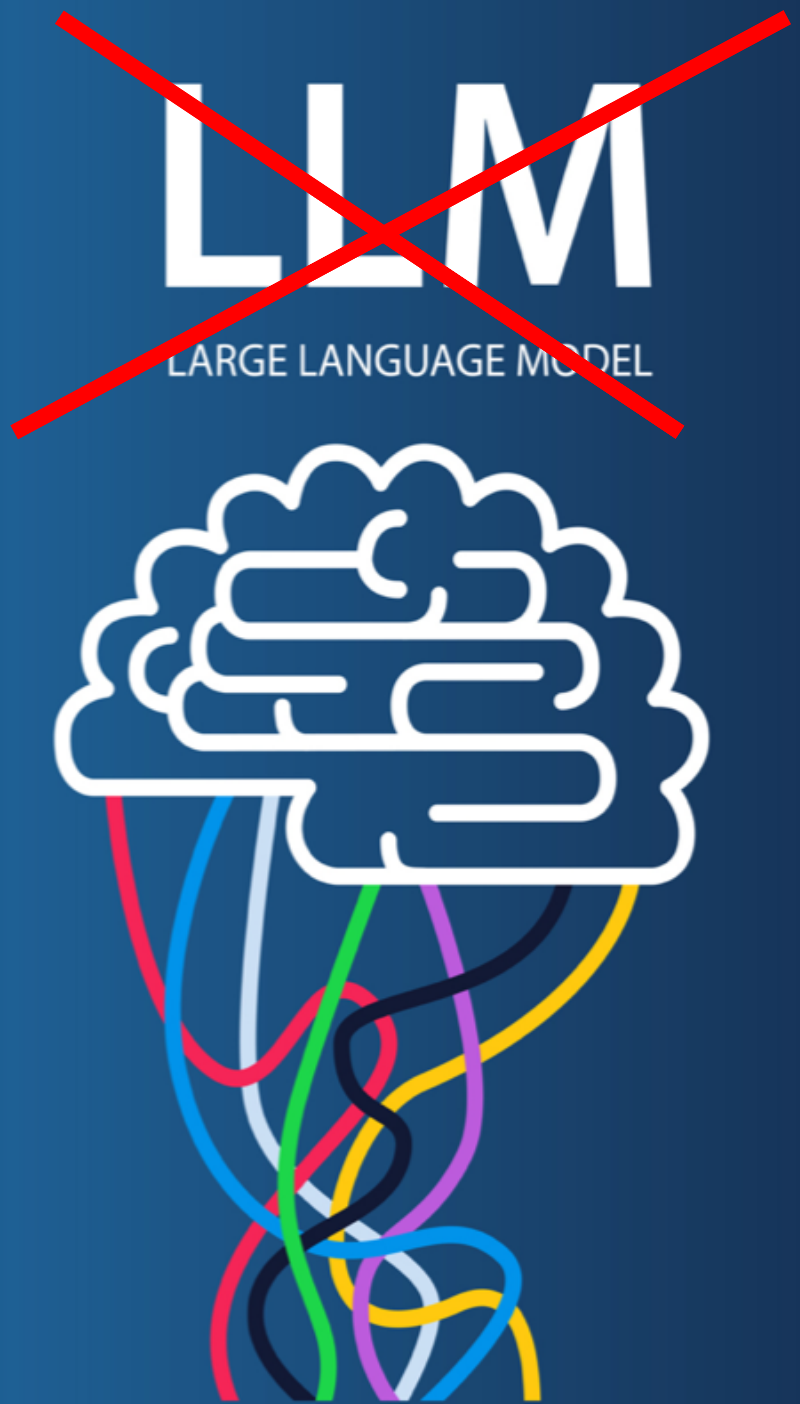

The Hype and Reality Gap

If you want unlock the business value of Operational IoT Data

Forget LLMs

Don’t fall for the hype.

Let’s talk about the (one) reason why these models can't be directly applied to operational data

Step 1: Why and why now? AI/ML Potential

ESP & ALS Top 10 Failure Reason/Operational Inefficiencies that can be predicted or mitigated using AI/ML

ESP & ALS: Top 10 failure reasons

Challenge	Benefits	Which ML/AI Models
Sand and Solids	Predictive Analysis: ML can forecast the probability of excessive sand production based on real-time downhole measurements.	Models: Time series analysis models like LSTM or ARIMA, and regression models.
Gas Locking	Anomaly Detection: ML can identify sudden changes in pump parameters that indicate gas interference or locking.	Models: Anomaly detection techniques like Isolation Forest or One-class SVM
Electrical Failures	Predictive Maintenance: ML can anticipate potential electrical failures based on trends in power quality and motor conditions.	Models: Neural networks, Random Forest, or regression models.
Corrosion	Predictive Analysis: ML can predict corrosion rates based on parameters like water cut, gas composition, and temperature.	Models: Regression models or Support Vector Machines.
Downhole Vibrations	Anomaly Detection: ML can monitor equipment vibration patterns to detect early signs of misalignment or wear.	Models: Time series models like LSTM or anomaly detection models like Autoencoders.
Poor Design or Incorrect Sizing	Recommendation Systems: ML can suggest optimal equipment designs and sizes based on historical performance data and reservoir conditions.	Models: Decision trees, clustering techniques, or neural networks.
Scale and Paraffin Buildup	Predictive Analysis: ML can anticipate scale or paraffin deposition risks based on fluid compositions and temperature changes.	Models: Regression models, neural networks, or ensemble models like Gradient Boosting.
Downhole Pressure and Temperature Fluctuations	Predictive Analysis: ML can forecast pressure and temperature fluctuations based on current reservoir conditions and injection/production rates.	Models: Time series forecasting models like LSTM or ARIMA.
Mechanical Wear and Tear	Predictive Maintenance: ML can predict when components are nearing the end of their useful life based on performance metrics and usage patterns.	Models: Survival analysis, regression models, or neural networks.
Cavitation	Anomaly Detection: ML can detect early signs of cavitation by monitoring pump performance metrics and fluid properties.	Models: Anomaly detection techniques like One-class SVM or Isolation Forest.

ESP & ALS: Top 10 operational inefficiencies

Challenge	Benefits	Which ML/AI Models
Inefficient Plunger Cycles	Predictive Analysis: ML can predict the optimal cycle timings based on historical data.	Models: Time series analysis using models like LSTM (Long Short-Term Memory) or ARIMA (AutoRegressive Integrated Moving Average).
Suboptimal Pump Settings	Predictive Analysis: ML can optimize pump parameters by analyzing real-time data and historical performance.	Models: Regression models, neural networks, or ensemble models like Random Forest.
Poorly Managed Gas-Liquid Ratios	Predictive Analysis: ML can anticipate the optimal gas-to-liquid ratio based on reservoir conditions and historical production data.	Models: Regression models or Support Vector Machines.
Choke Mismanagement	Predictive Analysis: ML can assist in determining the optimal choke size and setting to maximize production.	Models: Decision trees, neural networks, or regression models.
Inadequate Artificial Lift Selection	Recommendation Systems: ML can recommend the most suitable artificial lift method based on well parameters and historical data.	Models: Clustering methods like K-means or hierarchical clustering combined with decision trees.
Lack of Real-time Monitoring	Anomaly Detection: ML can continuously monitor data streams and promptly identify deviations from expected patterns.	Models: One-class SVM (Support Vector Machine), Isolation Forest, or Autoencoders.
Inaccurate Reservoir Modeling	Predictive Analysis: ML can aid in refining reservoir simulations by training on real production data and comparing with simulated outputs.	Models: Neural networks, especially deep learning models like CNN (Convolutional Neural Networks).
Flowline Restrictions	Predictive Maintenance: ML can predict when flowlines are likely to get blocked or restricted.	Models: Time series forecasting models, LSTM, or regression models.
Insufficient Pressure Maintenance	Predictive Analysis: ML can forecast reservoir pressure based on injection rates and production data.	Models: Regression models or neural networks.
Delayed Maintenance and Interventions	Predictive Maintenance: ML can predict when equipment or components are likely to fail or require maintenance.	Models: Survival analysis, Cox regression models, or neural networks.

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Why CDOs, Architects, and IT/OT Managers in Industrial Enterprises Have One of the Most Dangerous Jobs in World

Step 1: Why and why now?

Making a business case

How AI-Optimized Industrial Plants Benefit each Stakeholder in Your Company

What do executives and shareholders want?

Improve business and value of shares
Increase profits now and in the future
Maintain a great reputation and standing
Invest in advancements that change the game

What does operations want?

Access all equipment and production data in one place
Rapid onboarding of new assets
Provide high quality, actionable recommendations
Increase production, reduce downtime
Avoid spend as much as possible

What does finance want?

Do more, spend less
Increase profits
Drive down expenditures
Balancing budgets
Support business efforts and goals

What does IT want?

Modernize infrastructure and capabilities
Easy maintenance
Deploy scalable tools systems, and applications
Support and advance the workflows

Step 2: Pick one! Use Case Discovery and Identification

Identify 1-3 business challenges and size the financial and productivity impact and ROI when solved

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The Biggest Mistakes

1) Attempting to build a industrial data lake addresses all possible use cases. (This is often driven by business consulting firms that spend an excessive amount of time compiling use case lists involving the entire organization.)

2) Having no use case at all and adopting the mindset of putting all data into the cloud first, then discussing potential applications with users.

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Systems Architecture Development Process

Use cases
Challenge/value

Stakeholders/
Users

Business
Requirements

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Functional Architecture

System Design

Goal:

What components are needed to deliver business purpose, value and scope for TBD

Specifies:

Definition of components & their purpose, role & relationships

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Logical Architecture

Component Design

Goal:

Which technologies are best suited for implementing each component for a TB MVP/POC

Specifies:

Choice cloud services, applications, process and data flow

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Physical Architecture

Instance Design

Goal:

What/where to implement the instances of technologies/apps and their interactions

Specifies:

Naming for server, services, networks, accounts, IP addresses, IAM, etc.

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Blueprints and Reference Architecture
only available at the presentation

Thursday, October 26, 2023 11:25 to 11:55
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Industrial Data Lake Reference Architecture for Analytics and ML

PI-Enabled Data Pipelines via Snowflake SQL API into tables

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Step 3: How to successfully get from use case to MVP

8-Week Implementation Roadmap

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Step 4: How to Unlock the Promise of AI Optimized O&G Assets

Rolling MVP out into Production

Plan and deliver an app or system to business and/or operational users

1. Build out [redacted]
2. Identify a [redacted] producti [redacted]
3. Develop [redacted] and supports [redacted]

Blueprints and Reference Architecture
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Super Major O&G: How EOT helps US-based Energy Business to Get Closer to its Net-Zero Ambition

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Thank You!

Matt Oberdorfer

CEO, EOT

Learn More about
Unlocking the Promise of
AI-Optimized O&G Assets
for Your Company

Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

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