

Spatial Data, Digital Twins & AI:

Turning context into confident decisions in Oil & Gas environments



The presentation to OPERA London explores how spatial data, digital modelling, and artificial intelligence are re-shaping decision making across the Oil & Gas sector, moving organisations from fragmented data toward contextualised insight.

Oil & Gas assets operate within complex physical, environmental, and operational ecosystems. Traditional datasets, inspection reports, P&ID's, isometrics, maintenance logs, and sensor data often exist in isolation, limiting their value at the point of decision. This session demonstrates how spatially defined data environments unify these inputs within a single, accurate digital representation of the asset, creating a shared operational outcome for engineers, operators and risk managers.

The presentation will outline how high-fidelity spatial capture (laser scanning, photogrammetry, drones, and mobile mapping) underpins verified 3D models and digital twins. These models provide the context required for AI systems to function effectively enabling automated defect identification, condition monitoring & trend analysis.

A core focus will be the importance of data quality 'junk in junk out' and contextualising data to make it accessible and understandable for users.

We will also explore how these data insights can potentially be used within the world of insurance to support decision making for risk assessment and financial impacts in the event of claims.

By embedding layered factors directly within a spatial model, stakeholders can:

- Understand not just what a defect is, but where & how critical it is
- Prioritise interventions based on consequence, exposure, and interdependency
- Reduce uncertainty in risk assessments, loss prevention strategies, and underwriting decisions
- Improve alignment between asset integrity, operational performance, and insurance outcomes.

The session will also address practical considerations, model accuracy, AI benefits/limitations, and the importance of human oversight—particularly in safety-critical and insurance-driven environments.

Ultimately, the presentation positions spatial data, modelling, and AI not as standalone technologies, but as an integrated decision support framework—one that transforms raw data into actionable intelligence, reduces risk, and supports faster, more confident decisions.

John Tomes

Manging Director | Urban Surveys & Omnia

Spatial Data & Asset Integrity

John Tomes is a business owner in the field of spatial data & AI asset condition assessments for the Built Environment, Industrial and Oil & Gas sectors.

His work focuses on the application of laser scanning, drone inspection & 3D modelling supported by AI analysis. Techniques developed to drive asset evaluation, integrity management, and support risk-informed decision making.

He has 20 years experience living and working throughout the Middle East across all industry sectors including operating in live plant and shutdown environments. He has a comprehensive understanding of inspection constraints, data accuracy, and data uncertainty.

His work aligns with established engineering and inspection frameworks including API, ASME, ISO, and insurer technical requirements.

John's current focus is the practical use of AI-assisted defect identification combined with engineering-grade 3D models to drive contextualised data access for end users in conjunction with digital twins



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