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TruContext for Bahrain Petroleum Company (BAPCO)

Use Case Pitch Deck — TruContext™ by Visium Technologies

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Executive Summary

- TruContext provides AI-driven unified analytics to improve operations, safety, and profitability at BAPCO.
- Targeted use case: Lateral lift optimization (enhanced recovery) integrated with refinery operations and asset protection.
- Expected outcomes: increased recovery, reduced downtime, lower emissions, and measurable OPEX reductions.

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Key Challenges Facing BAPCO

- Mature fields with declining recovery and complex reservoir behavior.
- Refinery modernization requiring reliable, predictable feedstock and process stability.
- Operational risk: equipment failures, safety incidents, and cyber-physical threats.
- Regulatory and environmental pressure to reduce emissions and improve reporting.

The TruContext™ Solution

- Unified Context Graph: combine SCADA, sensors, production, maintenance, and business data.
- AI Analytics: predictive modeling, anomaly detection, and prescriptive recommendations.
- Operational Dashboards & Digital Twins: real-time situational awareness for wells and refinery units.
- Data Sovereignty & Security: role-based access, encrypted logs, and audit trails.

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Lateral Lift Use Case — How TruContext Helps

- Predict optimal lateral well placement and artificial lift parameters using multi-source data.
- Real-time control loop: sensors → AI analytics → automated setpoint recommendations → operator validation.
- Predictive maintenance for ESPs/rod pumps to avoid catastrophic failures and reduce downtime.
- Reservoir optimization feedback: update models with production data to iteratively improve recovery.

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TECHNICAL ARCHITECTURE (HIGH LEVEL)

- Edge & Well Sensors: downhole gauges, surface flow/pressure, vibration and temperature sensors.
- Data Ingestion Layer: secure gateways ingest SCADA, historian, and mobile field data.
- TruContext Analytics: graph database, ML models, digital twin simulations, and rule engines.
- Integration & Ops: EAM, CMMS, DCS, refinery MES, and executive dashboards.

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ROI & Value Proposition

- Increase recovery factor: conservative 2–5% uplift in mature fields via optimized lateral lift (improves net revenue).
- Reduce unplanned downtime: predictive maintenance can cut failures by 30–50%, lowering OPEX.
- Refinery feed stability: improved throughput and yield during modernization, reducing margin volatility.
- Regulatory & ESG: automated emissions monitoring and reporting reduce compliance cost and risk.

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Pilot & Implementation Plan

- Phase 1 (0–3 months): Data readiness assessment, sensor audit, pilot well selection.
- Phase 2 (3–9 months): Deploy ingestion, baseline model training, dashboard setup, and ops training.
- Phase 3 (9–18 months): Scale to multiple wells, integrate with refinery MES, and continuous optimization.
- Governance: joint steering committee, success metrics, and handover to internal teams.

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Risks & Mitigations

- Data quality & integration complexity → Mitigation: phased data validation, adapters for legacy systems.
- Operational resistance → Mitigation: change management, operator-in-the-loop design, and training.
- Cybersecurity concerns → Mitigation: RBAC, encryption, and isolated integration zones.
- Project funding/timing → Mitigation: milestone-based contracting and cost-sharing pilot.

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IT/OT & SCADA Integration Use Cases

- Unified cybersecurity monitoring across IT and OT environments.
- Real-time SCADA anomaly detection using TruContext graph analytics.
- Event correlation across firewalls, PLCs, sensors, and historian data.
- Detection of unauthorized command changes, configuration drift, and access anomalies.
- Operational visibility: asset inventories, network topology mapping, and risk scoring.

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Cyber-Physical Security & Threat Detection

- Detect lateral movement attempts inside refinery & field networks.
- AI-based behavioral analysis of industrial devices (PLCs, DCS, SCADA servers).
- Automated incident timelines for rapid response and root-cause identification.
- Integration with SOC tools and SIEM platforms for unified alerts.
- Protection of safety-critical systems (ESD, SIS) from tampering.

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Advanced Operational Analytics (Sensor-Driven)

- Equipment vibration, temperature, and acoustic signal monitoring for fault prediction.
- Pump/ESP efficiency modeling from power curves and pressure/flow signatures.
- Steam, gas, and water injection optimization analytics.
- Energy consumption optimization across wells and refinery units.
- Anomaly detection for abnormal well behavior, sand production, gas lock, etc.

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Environmental, Air Quality & ESG Analytics

- Air quality sensors: real-time particulate, NOx, SOx, VOC detection and alerts.
- Flaring detection and quantification using sensor fusion and thermal imagery.
- Emissions monitoring dashboards for compliance reporting (Scope 1 & 2).
- Water usage, leakage detection, and wastewater discharge analytics.
- Integration with Bahrain national environmental reporting frameworks.

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Expanded Value Proposition

- End-to-end visibility: operations, cybersecurity, and environmental data in one graph.
- Lower risk exposure by combining cyber and physical analytics into a unified platform.
- Improved safety through predictive alerting and early detection of hazardous conditions.
- Optimized energy usage and reduced emissions aligned with Bahrain’s Vision 2030.
- Increased trust through auditability, transparency, and cross-domain situational awareness.

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