Transforming Asset Operations with Generative AI

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Agenda

- Industry Point of View
- High Value Use Case for Gen AI in Asset Operations
- Case Studies

Asset Industry Resilience: Trends and Challenges in Asset Operations

Aging Infrastructure

Transitioning Workforce

Extreme Weather
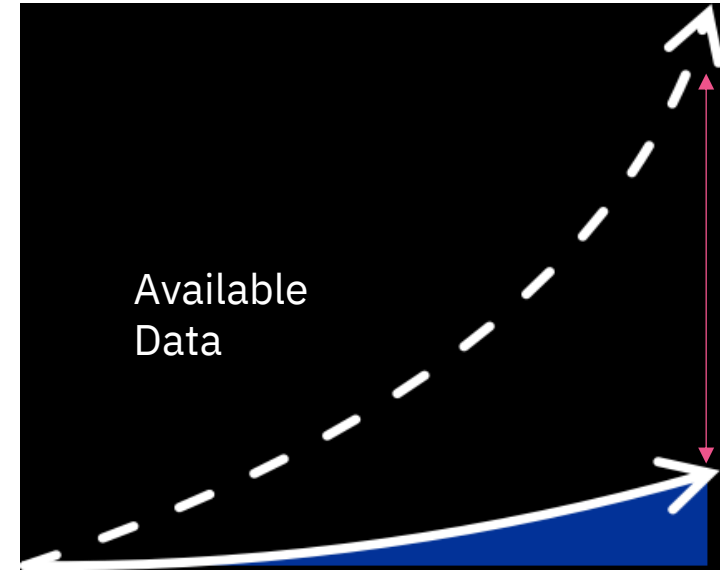
Cyber Security Threats

Digitization

Data Driven Decision Making

Clean Energy Initiatives

Grid Expansion/Capital Investment

Evolving Regulatory Frameworks

Knowledge Gap: Available vs Understood Data

- Siloed data fragmented in several information sources

- Inability to scale tribal knowledge

- Data volumes growing significantly due to digitization

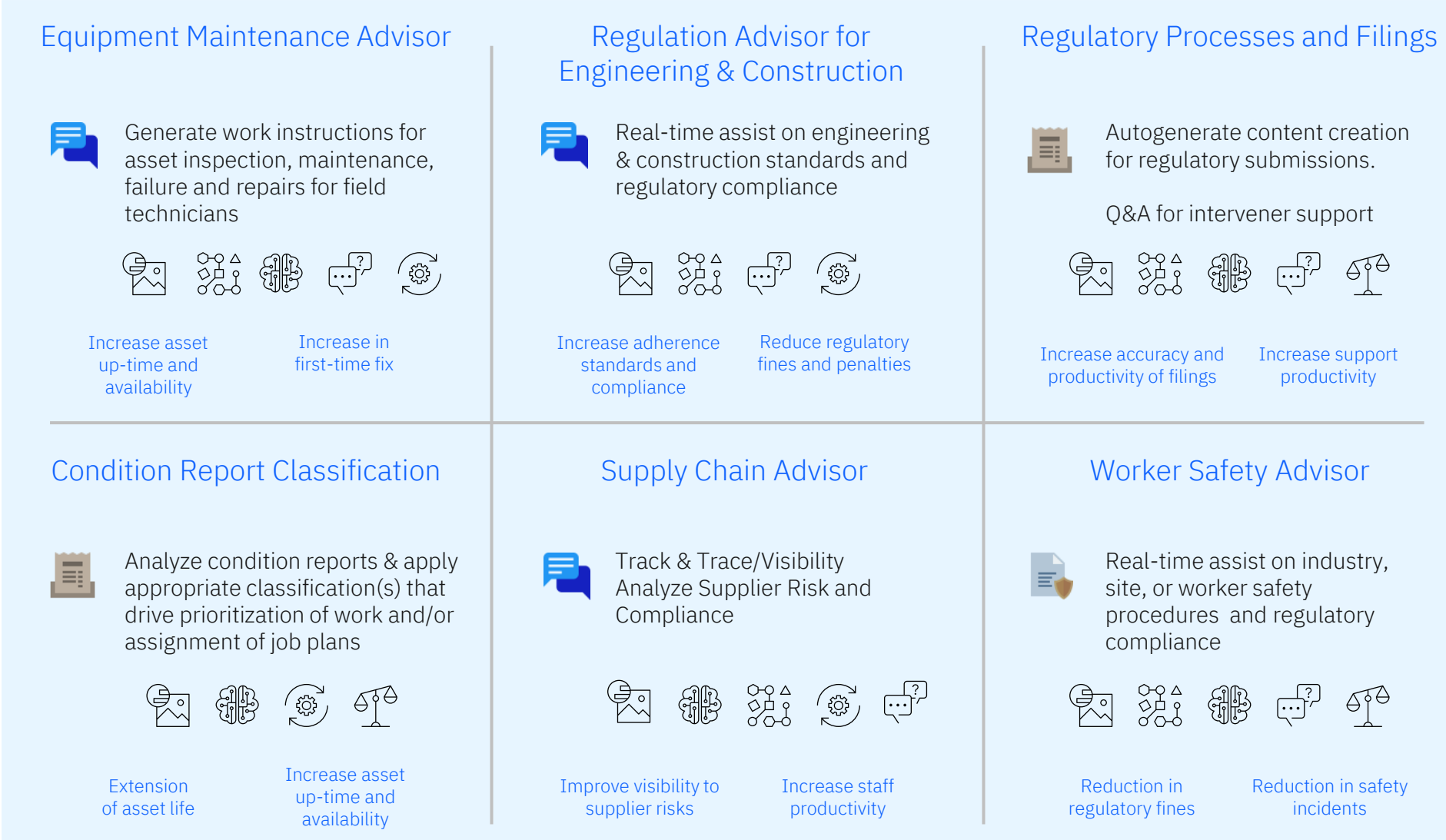- Knowledge workers not having access to trusted data

Generative AI for Asset Operations

Foundation Models can support optimizing Asset Management workflows, fueling innovation with staff skill augmentation

- Streamline maintenance planning and execution
- Increase worker safety
- Improve compliance

Key

Unstructured Data	External Data
Hybrid AI/ML	Visual Analytics
Interactive Dialogue	Process Alignment
Governance	Decision-making

Equipment Maintenance Advisor

Generate work instructions for asset inspection, maintenance, failure and repairs for field technicians

Increase asset up-time and availability

Increase in first-time fix

Regulation Advisor for Engineering & Construction

Real-time assist on engineering & construction standards and regulatory compliance

Increase adherence standards and compliance

Reduce regulatory fines and penalties

Regulatory Processes and Filings

Autogenerate content creation for regulatory submissions.

Q&A for intervener support

Increase accuracy and productivity of filings

Increase support productivity

Condition Report Classification

Analyze condition reports & apply appropriate classification(s) that drive prioritization of work and/or assignment of job plans

Extension of asset life

Increase asset up-time and availability

Supply Chain Advisor

Track & Trace/Visibility Analyze Supplier Risk and Compliance

Improve visibility to supplier risks

Increase staff productivity

Worker Safety Advisor

Real-time assist on industry, site, or worker safety procedures and regulatory compliance

Reduction in regulatory fines
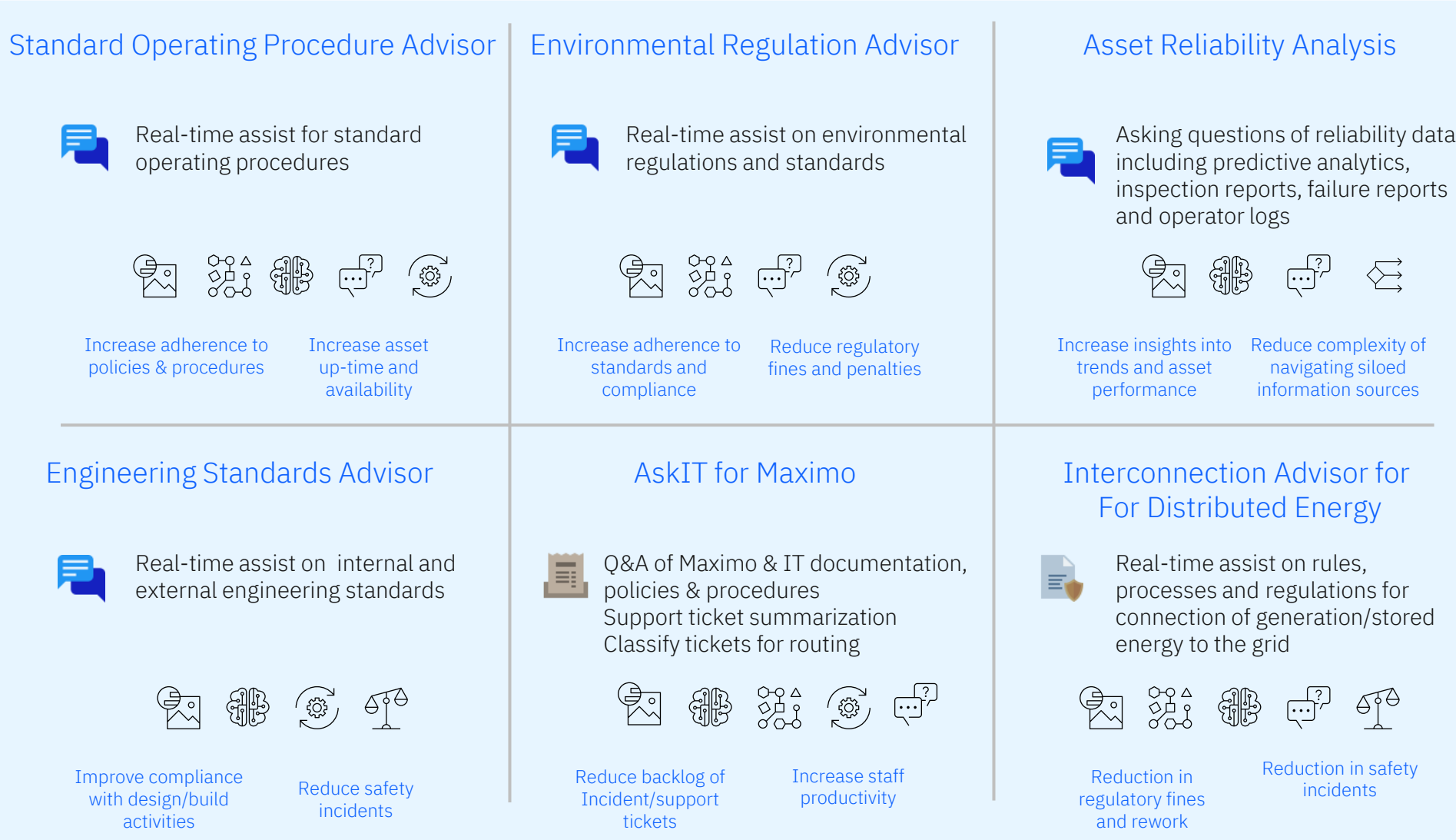
Reduction in safety incidents

Generative AI for Asset Operations

Foundation Models can support optimizing Asset Management workflows, fueling innovation with staff skill augmentation

- Improve adherence to regulations, policies and standards
- Enhance asset reliability
- Increase employee productivity

Key

- Unstructured Data
- External Data
- Hybrid AI/ML
- Visual Analytics
- Interactive Dialogue
- Process Alignment
- Governance
- Decision-making

Standard Operating Procedure Advisor

Real-time assist for standard operating procedures

Increase adherence to policies & procedures

Increase asset up-time and availability

Environmental Regulation Advisor

Real-time assist on environmental regulations and standards

Increase adherence to standards and compliance

Reduce regulatory fines and penalties

Asset Reliability Analysis

Asking questions of reliability data including predictive analytics, inspection reports, failure reports and operator logs

Increase insights into trends and asset performance

Reduce complexity of navigating siloed information sources

Engineering Standards Advisor

Real-time assist on internal and external engineering standards

Improve compliance with design/build activities

Reduce safety incidents

AskIT for Maximo

Q&A of Maximo & IT documentation, policies & procedures
Support ticket summarization
Classify tickets for routing

Reduce backlog of Incident/support tickets

Increase staff productivity

Interconnection Advisor for For Distributed Energy

Real-time assist on rules, processes and regulations for connection of generation/stored energy to the grid

Reduction in regulatory fines and rework

Reduction in safety incidents

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Example Data Sources for Watson

Asset Data

- Equipment technical manuals
  - Owner's manual
  - Engineering manual*
  - Equipment Specifications
- Engineering Diagrams and technical drawings
- Equipment location
  - Geolocation impacts on design
  - Weather impacts on operation
- Inspection Reports
- Work Order & History
  - Specific to the asset
  - Specific to like assets at other locations
  - Failure history/descriptions
  - Operator/Maintenance Log Files
  - Parts/Tools
- Condition Reports
- Metadata associated to Equipment being serviced
  - Equipment service history
  - Failure modes
  - Location
- Scada/IoT Sensor Data

Standards & Procedures

- Standard Operating Procedures
- Safety Procedures and Guidelines
- Maintenance & Repair Standards
- Engineering Standards
- Construction Standards & Regulations
- Interconnection Standards
- Environmental Standards & Regulations
- Other Regulatory Standards/Requirements

Other Knowledge

- Emails
- Technical Help Desk
  - Knowledge base
  - Knowledge Worker Experience
- Engineering knowledge base
  - Root-Cause Failure Analyses (RCFA)
  - Failure Modes & Effects Analyses (FMEA)
- Online Sources: Journals / Magazines / Intranet and Internet

Information Sources: Sharepoint, Box, Documentum, Enterprise Asset Management Systems, Access Databases, Departmental Systems

AI for Asset Operations – Typical Benefit Areas

Goals	Benefit Categories	Example Benefits
Increase Productivity	Labor Productivity	**1** Increase Operations & Engineering Productivity
		2 Increase Supervisor & SME Productivity
Reduce Cost	Labor Cost	**3** Speed Dissemination of Safety Procedures
		4 Speed Dissemination of Standard Operating Procedures
		5 Improve Mean Time To Repair
		6 Improve Time to Design + Build+Interconnect
	Asset Reliability & Performance	**7** Increase first time fix rates
		8 Reduce Unplanned Downtime Cost
		9 Increase Network Reliability
	Asset CapEx Optimization	**10** Extend Economic Life of Assets & Equipment
Mitigate Risk	Safety & Regulatory Compliance	**11** Increase Compliance and Reduce Penalty/Rework Cost
		12 Improve On Time Project Delivery
		13 Reduce Safety Incidents

AI for Asset Operations Value Drivers

Woodside Energy

Client: Australia's largest independent oil and gas company

Business Challenge:
- Aging workforce and heavy reliance on historical context and procedural information.
- Employees spent 80% of their time researching problems and 20% fixing it. Need for easy access to detailed answers to highly industry specific questions in remote locations
- Access to prior project documentation to incorporate valuable insights into current projects

Solution:
- Watson absorbed over 600,000 pages of documentation, from reports to correspondence regarding drilling equipment
- Client's employees have the ability to obtain immediate access to years of knowledge and experience to deliver and build enhanced products based on prior work
- Increased knowledge about prior projects results in the application of best practices and more satisfied customers

Business Value:

- Time spent on researching reduced by 75%
- Equates to US$10 million-worth of time savings
- Safety procedures are shared via virtual assistant to all employees, including new hires

Energy Northwest

Solution synopsis

A public power agency in the US increases the accuracy of condition report prioritization by 92 percent and reduces the severity of the reports by 80 percent when it engages IBM Data and AI Expert Labs and Learning to implement a cognitive solution based on IBM Watson technology.

Business Need:

Energy Northwest has a Condition Review Group (CRG) process that involves the submission and review of condition reports (CRs). At the onset of the engagement, the agency was looking for ways to:

- Increase the accuracy of report prioritization

- Reduce the severity of CRs

- Accelerate the classification of reports, thus allowing more time for issue resolution

- Increase the consistency of determinations by the CRG and reduce disagreements among members

To support its goals, Energy Northwest sought a powerful cognitive solution.

Solution Benefits:

By joining forces with IBM Data and AI Expert Labs and Learning to implement a cognitive solution based on IBM Watson software, Energy Northwest improved the efficiency of its CRG process. The client indicates that the solution increased the accuracy of report prioritization by 92 percent and reduced the severity of its CRs by 80 percent. Further, the solution helps accelerate report categorization while increasing the consistency of CRG determinations. Based on its positive experience with the project, the agency has recently reached out to the IBM team for assistance with another cognitive use case.

92%

increase in accuracy of condition report prioritization

E.ON

Solution synopsis: "Regelpedia"

An AI solution that easily structures and searches all regulations using natural language and with a purpose built interface for field technicians and engineers.

Business Need:

E.ON is faced with a vast number of regulations and restrictions regarding maintaining, running and expanding power grids and gas networks. E.ON was challenged with ever increasing quantity of information in a wide variety of IT systems, making it difficult and time consuming to find the right regulations. A delay to applying regulations was caused by multiple document versions from different information sources, as users needed to make sure they had the most current version of the regulations.

Solution Benefits:

Correct regulations located within seconds. 85% of the searches returned the regulation needed within the top 3 results. A "watchlist" feature was used to uncover inconsistencies in and between documents, reducing errors and rework. The solutons incorporates a simply, easy to use interface for field technicians and engineers

85%

searches return the regulation needed within top 3 results

A North American Gas Utility

Solution synopsis
Applying AI to Standard Operating Procedures to augment field workers daily activities

Business Need:

- Highly Regulated Industry requires that Natural Gas infrastructure adhere to national and local codes

- Field Engineers and Contractors are required to follow regulations contained in the Federal Code and as outlined in the company's *difficult-to-navigate* ~1000 page Gas Standards Manual.

- Corporate Knowledge is concentrated in a small number of retiring-soon employees, who are *frequently consulted* by field personnel when they have questions or issues.

Solution

Shift the burden of handling field inquiries from current staff using a self-service Virtual SME powered by Watson Assistant and Watson Discovery to simplify search and document navigation, as well as field calculation intents, *handholding* users through *dialog flows* to provide engineering calculations to field personnel.

Virtual Agent offloads the burden of handling the many questions asked by Field personnel and provides backup for the SME team.

Quick Access to the right location in standards documents saves time needed to lookup answers and procedures.

IBM

# AI-Powered Steam Turbine Operations & Maintenance Assistant

Client: Italian multinational energy company and one of world's leading electricity operators

Business Challenge:
- Limited understanding of health score of steam turbines and predicting when they were going to fail
- Lack of know-how on how to perform operational and maintenance procedures on steam turbine

Solution:
- PI historian data was correlated with SAP PM maintenance history to build predictive models for multiple subcomponents in the turbine
- Watson was trained on predictive fault codes, engineering and technical reports, site logs, system drawings, equipment specifications, engineering documents, and company maintenance standards
- Watson was used to offer a virtual assistant to provide response to questions performed by technicians as they operated or performed maintenance on equipment
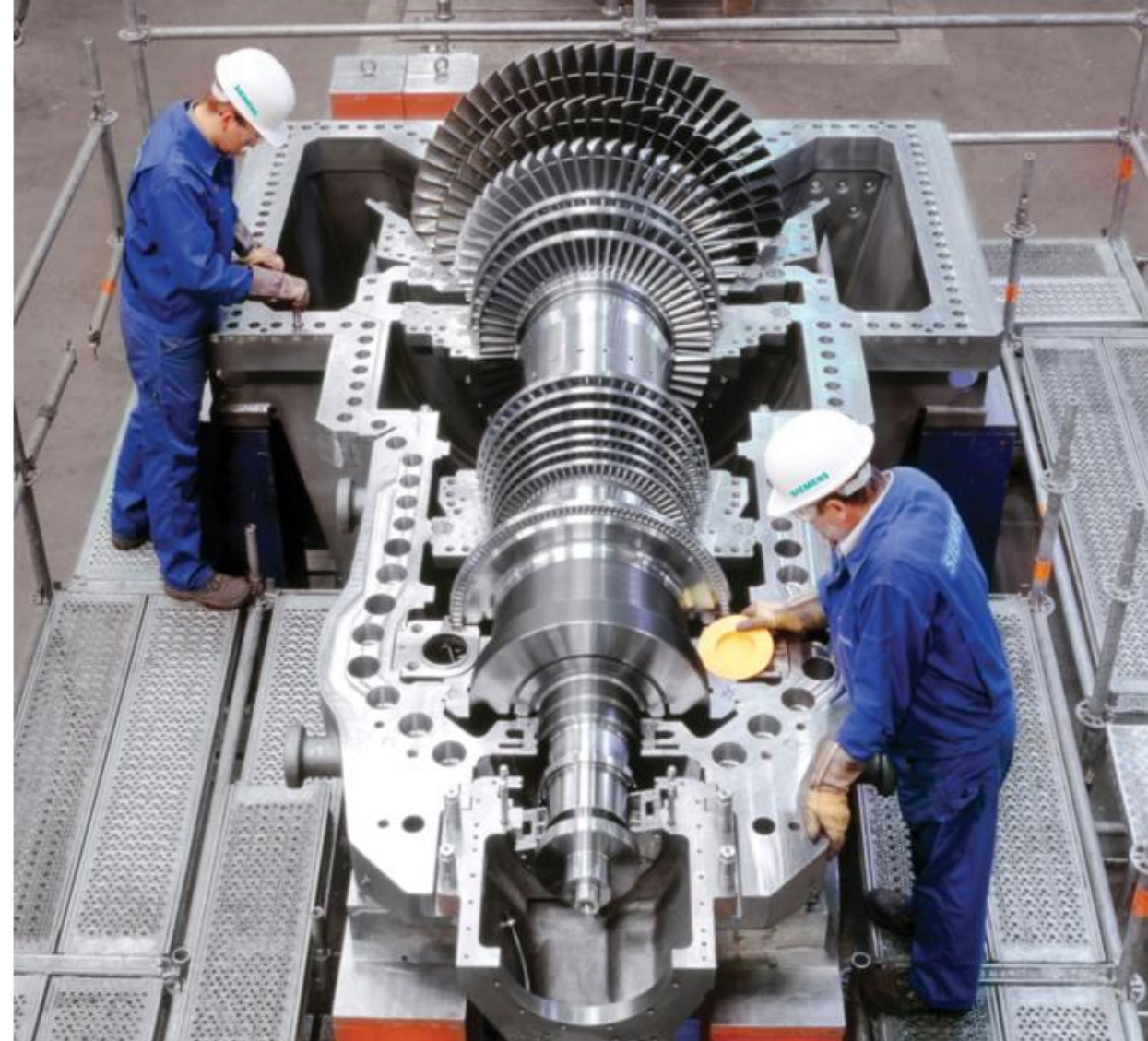
Virtual Assistant for responses to questions as technicians operated or performed maintenance on equipment

- Reduced time to action

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