Digital Transformation in the EPC Space

What Is It?

What Does it Do?

How Can I Profit From It?

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What is Digital Transformation?

- Digital transformation marks a rethinking of how an organization uses technology, people, and processes in pursuit of new business models and new revenue streams, driven by changes in customer expectations around products and services. – CIO.com
- **Digital transformation is** about bringing together people, data, and processes—**disrupting** technology to transform your company and create value for your customers. – Microsoft
- Digital transformation is the adoption of digital technology by a company. Common goals for its implementation are to improve efficiency, value or innovation. - IBM
- **“Re-Thinking”**

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Why is Digital Tranformation Important?

- Accelerating Change: Change is rising Exponentially. Requires acceleration of digital solutions broght to market (Sirius.com)
- **Digital Competition: Traditional Models disrupted by “Born Digital” models, aka: Digital Natives**
- Customer Expectations: Ensure Interactions are Seamless & Exceptional
- **CRITICAL: MUST HAVE AN ROI!!!**

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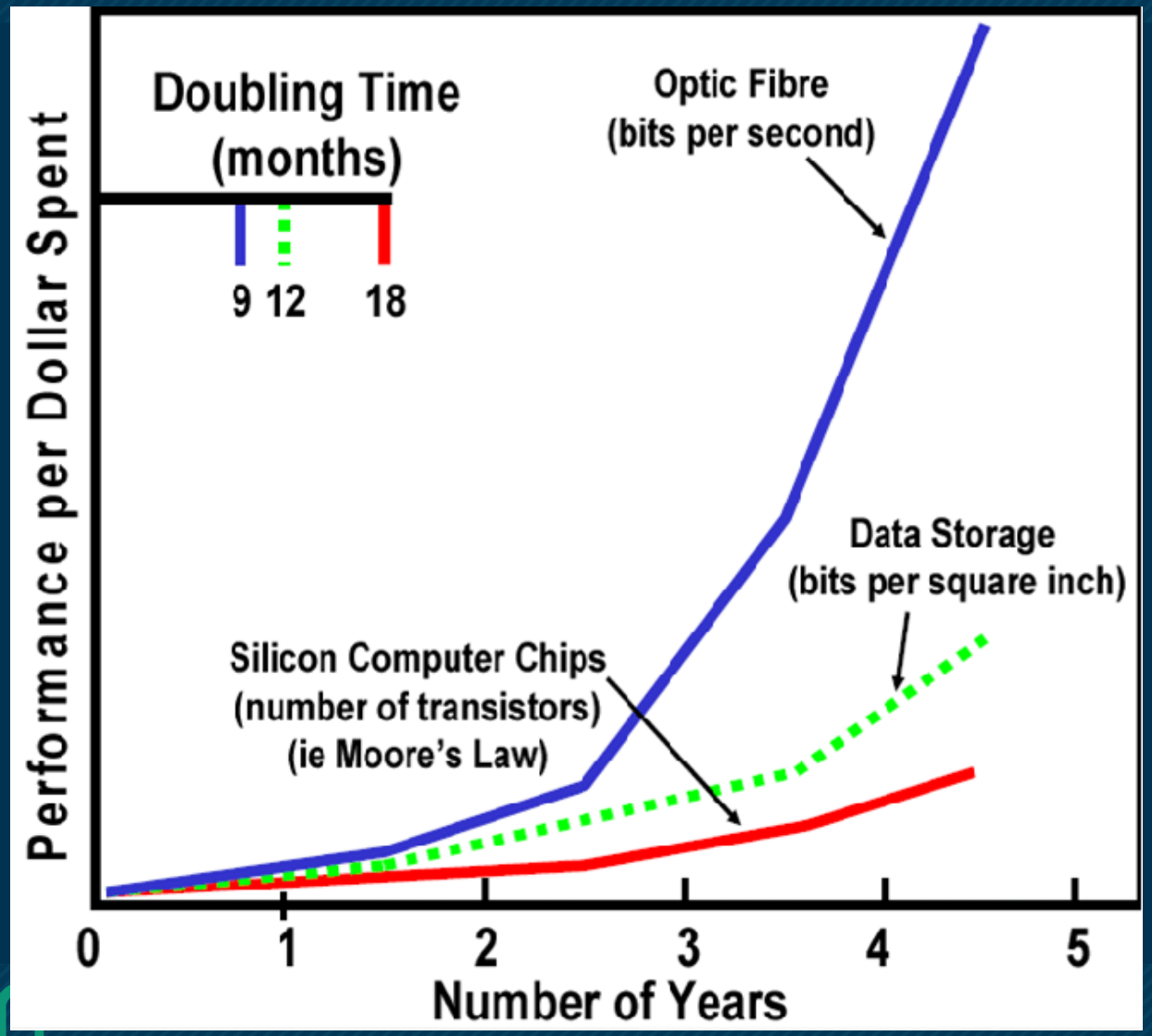
Moore's Law: Processing Speed Doubles Every 18 Months



- Intel Founder Robert Moore: Processing Speed Doubles 18 Months (Researchgate.net)
- Compounding Effect
- Applications Must Coincide
- Data Requirements Grew:
  - Dialup - Modem
  - Broadband

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Digital Transformation: Through the Years

News? What News?

News Then:

News Now:

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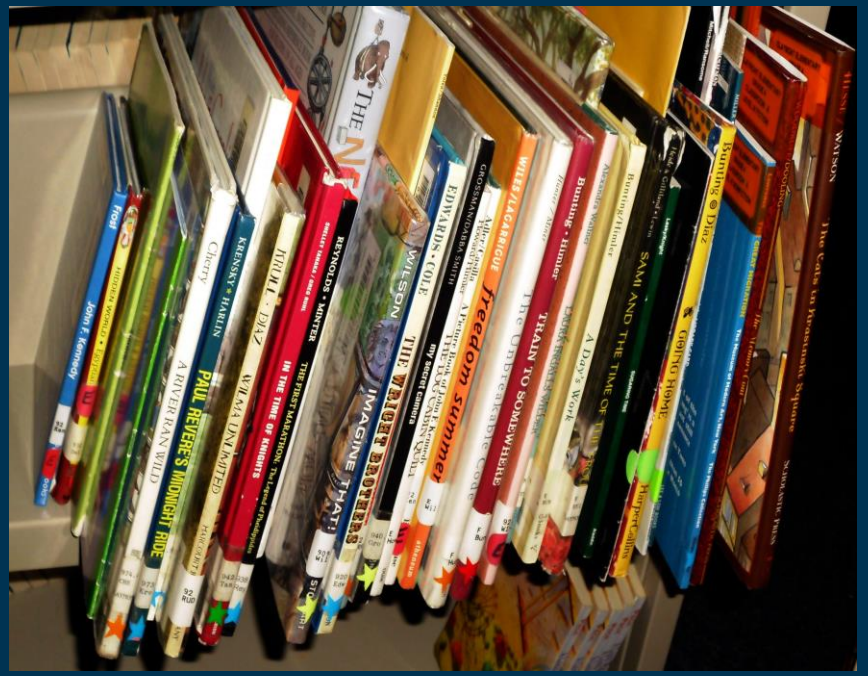
DT: Advertising, Research, & Content

Historically:

Physical, Immobile

Printed & Bulk



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DT: Social, Digital, & Device Transformation

- Advertising:
  - Social Media & Web
- Digital Business Cards & Resumes
- Tablet PC & Kindle Book Access

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Companies that Failed to Transform

Kodak: Once a Dow Jones Stock

100+ Years, Bankrupt in 2012

- Established with Slow Bureaucracy
- Transition to Digital Cameras: 10 Year Plan
- 2008: Camera Phones
- Social Media

General Motors:

King of the Fortune 500

- Thick, Redundant Management
- Duplication of Work & Offerings: Chevy/Olds, Buick/Pontiac
- Bet on Cheap Oil Forever: No EV Offering
- Sold Prius Tech to Toyota: $500MM

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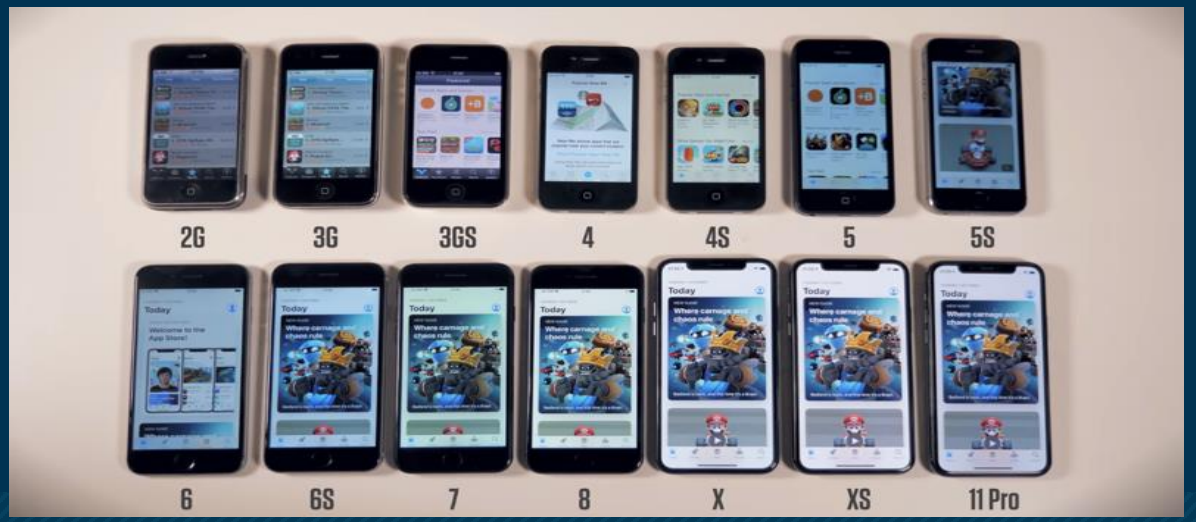
Capitalizing on Market Trends

Problem: Pirating CD's

Apple: iTunes, iPod, iPhone

- Portable Storage
- Upheld Music IP
- Created Digital Market
- Replilcate for Apps & Media



- A New Genre
- First Movers
- Later Copied
- "Cool Factor"

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From Local to Offsite & Virtual

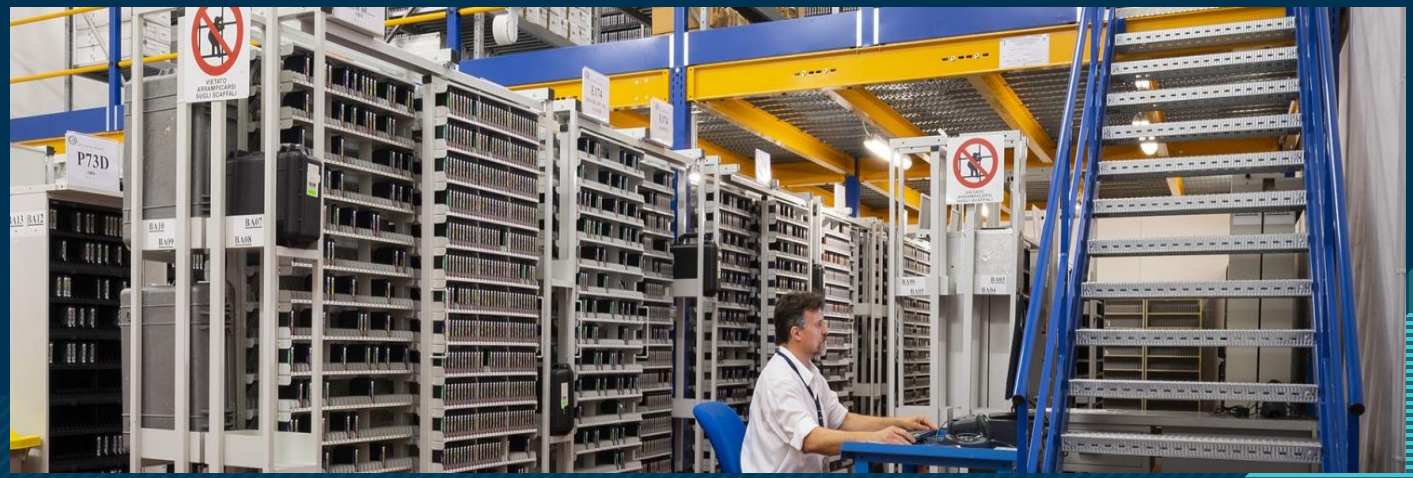
Floppies, Discs, Land Lines: OH MY!

- STORAGE: Installation & Tech Storage Space
- Limited Data Transfer via Landline & Modem

Replacement:

Data Storage & Transfer

- Portable & Offsite Storage
- Data Redundancy
- Zoom & Web Meetings



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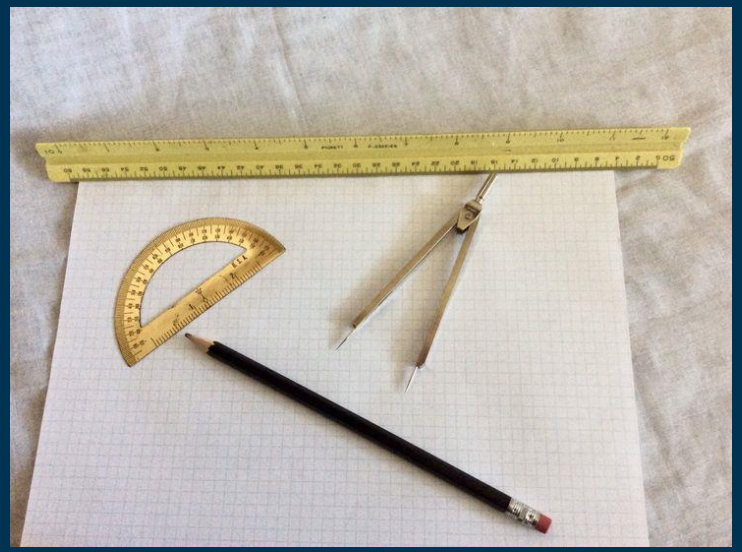
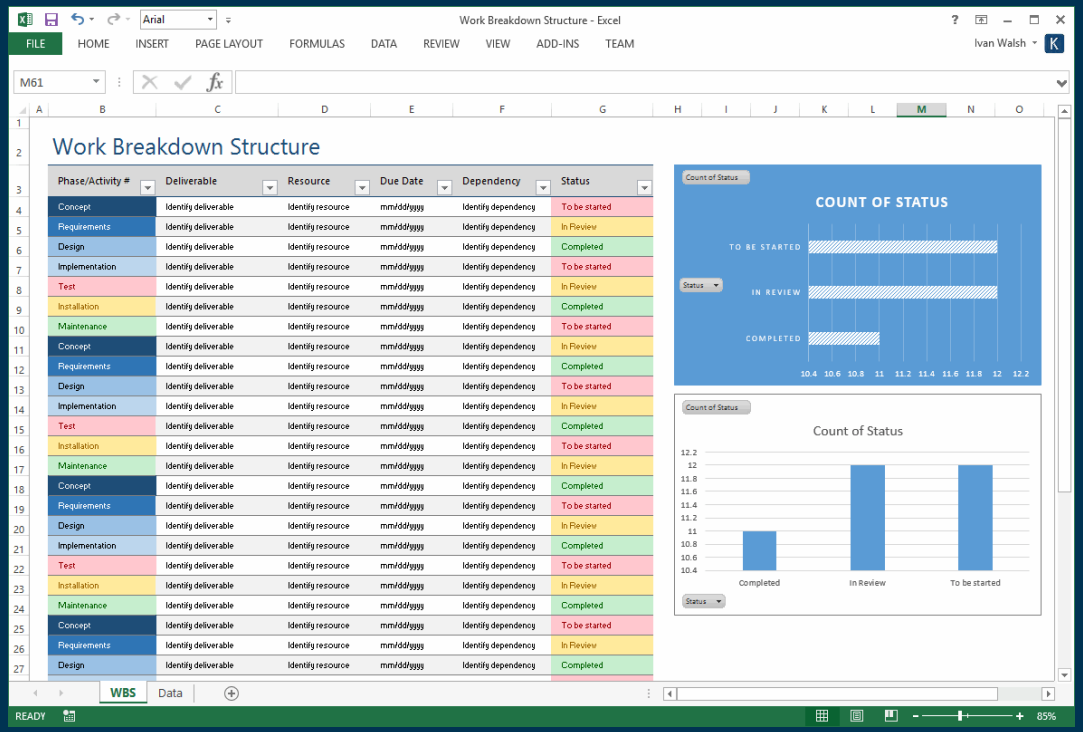
Change of Calculations & Measurements



- Transition from Protractor, Drafting Paper
- Slide Rules, Calculators, Accounting Ledgers
- Still Used in Different Capacities



- Spreadsheets: “End-all, Be-all”
- Replacement & Modernization: Accounting, Calculations, Real Estate, Bookkeepiing, Engineering Analysis
- Problem: Lack of Specificity & Standardization

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Enter: The Age of Artificial Intelligence

Old Model:

- Local & Per-User Model
- Becomes Antiquated
- Disparate Systems & Versions
- Updating Challenges
- Crashes & Burns

New Model:

- Software That Learns
- Automation:
  - Standardization
  - Process-Oriented
  - Data Consistency
  - Reusability & Referencability
  - Software that Augments (not “replaces”) Decision Making

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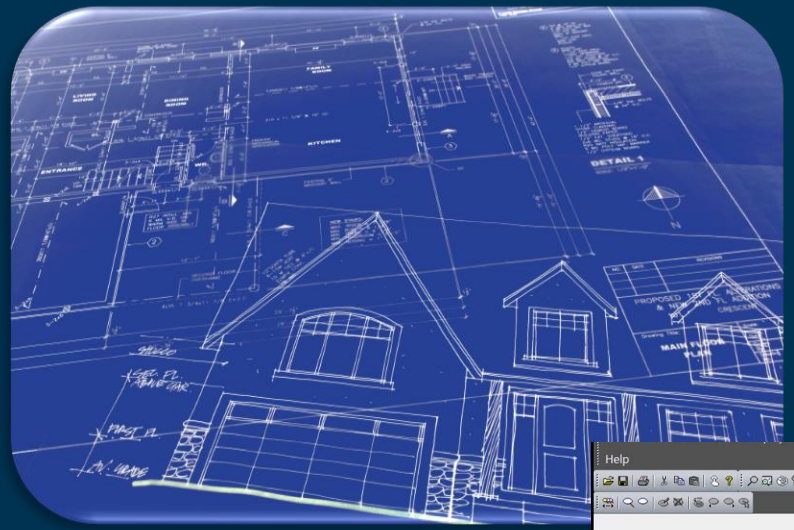
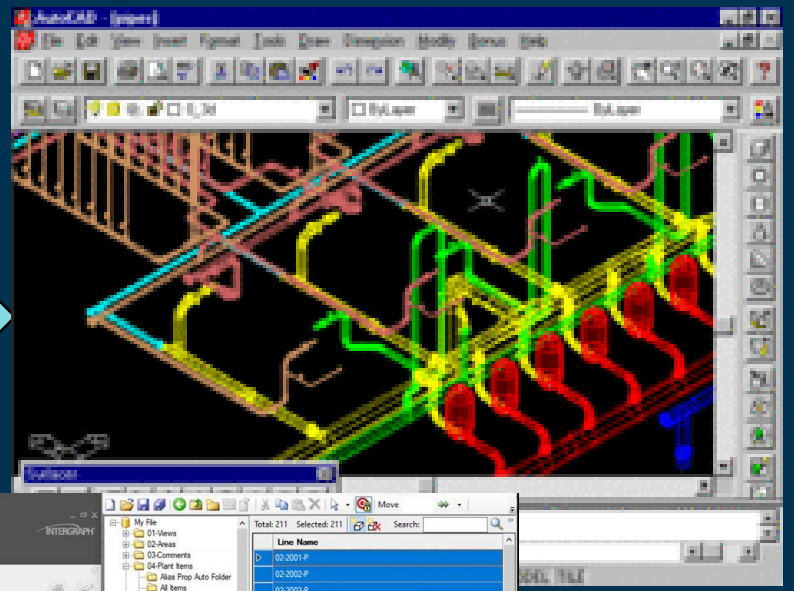
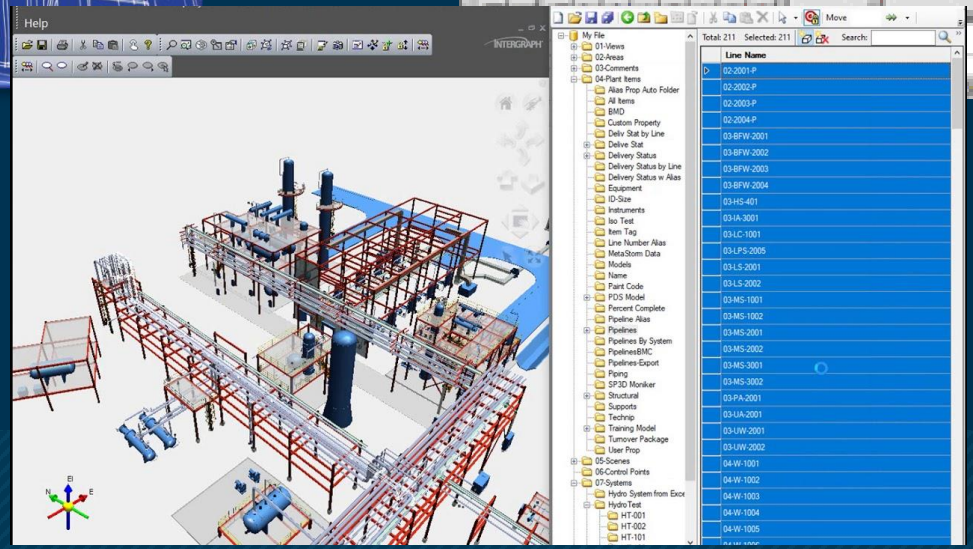
Specified Tools:

Templates & Blueprints:



AutoCAD & SmartPlant





- Industry-Specific Calculations
- Industry Standardization
- Auditing Trails
- File Sharing

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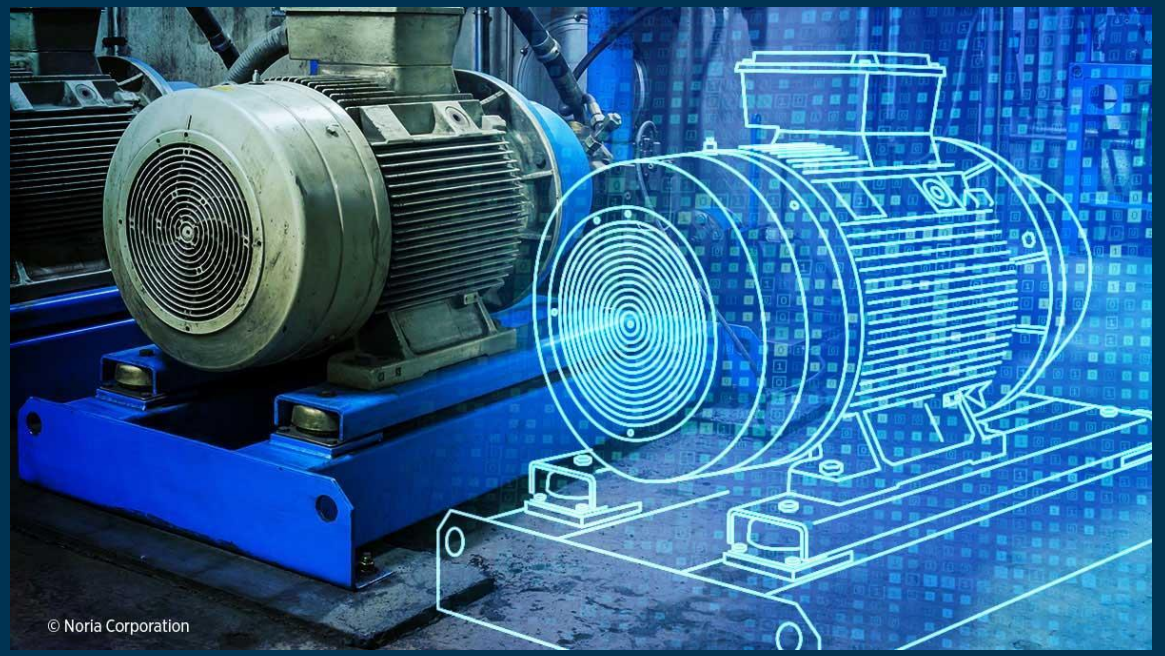
Miniature Models

- Still Used
- Limited in Scope
- Limited Variability

Digital Twin



- Digital Simulation of Actual Equipment Used
- “What If” Scenarios: R&D, System Integration, & ERM
- Monitoring, Tracking, Analyzing, & Integrating Aspects
- Production Facilities (Large EPC’s)

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Process Benefits of Digital Transformation & Digital Twin

- Platform may have 30 years estimated, and Economics/ROI factor this
- Longer Life = Longer Revenue
- Design based on Assumptions & Safety Factors
- Robustness built in Design
- More Steel = More Fabrication & Higher Build $
- Use of Digital Twin & Digital Tech Simulation Replaces Over-conservative estimates with Real-life info

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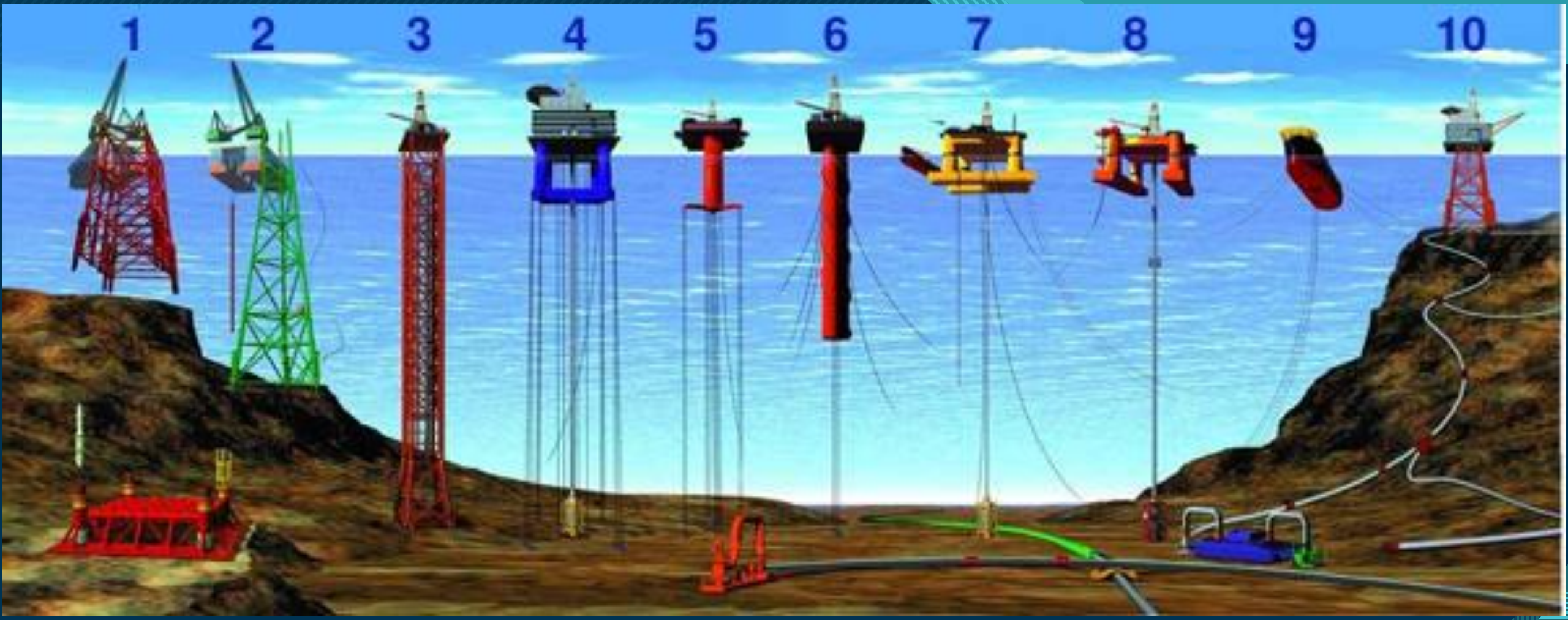
Platforms: Fixed vs. Floating



- 1, 2,10) conventional fixed platforms; 3) compliant tower, 4,5) vertically moored tension leg platform and min-TLP; 6) spar; 7,8) semi-submersibles; 9) FPSO
- Water Depth: Shallow (0-1,000 ft) - #1,2,3,10 above, Deep Water (1,001 ft to 10,000 ft) - #4-9 above

With Digital Twin DT You Can:

- “Nerves of Steel” – Name of a DT Model for Hybrid Replica of Subsea Vessel
- Gather & Analyze Data
- Cycle back & Challenge Assumptions
- Design Optimization
- Reduce IMR* = Product Life Extension
  - (*Inspection, Maintenance, & Repair)
- Deploy Tech to:
  - Monitor Subsea Infrastructure
  - Spend less on IMR Vessels
  - Reduce Dependence on Costly Routine Inspections

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Diver Limitations - Overcome by Remote Operated Vehicle (ROV)

- Maximum water depth for commercial divers is 1,000 ft.
- Past 1,000 ft water depth, work performed subsea by Remotely Operated Vehicle (ROV)
- ROVs are capable of working in water depths up to 10,000 ft and as shallow as 20 ft
- Unoccupied, highly maneuverable underwater robots operated by an operator/pilot onboard the installation vessel
- Two arms that are designed after the human arm and hand. They do not have fingers, but have claws that rotate and an elbow joint

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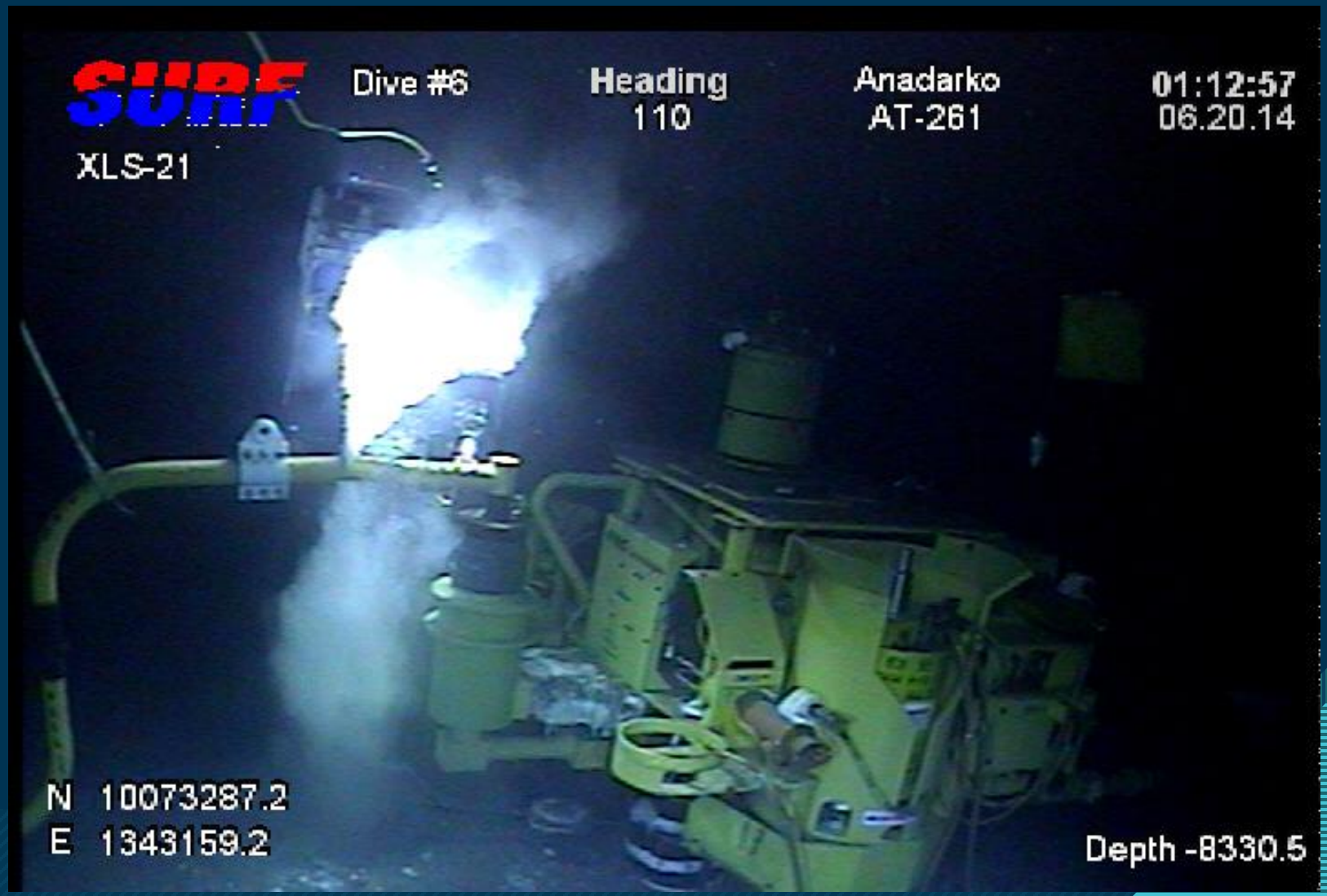
Remote Operated Vehicle (ROV) - Operating Subsea

- Example of ROV screen and data as seen from topside Operator
- Left “arm” gripped around jumper to stabilize ROV
- Right “arm” using circular saw to cut the jumper pipe
- Can see the ROV’s umbilical



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Operational Benefits of Digital Transformation

- Reduce Standy Time
- Anticipate If/When something breaks
- Collect & Analyze Data to Forecast Downtime
- Reduce Downtime from 3% to 2% = Increased ROI
- Better Maintenance and Lifespan of:
  - Pipelines
  - Control Systems
  - Structures

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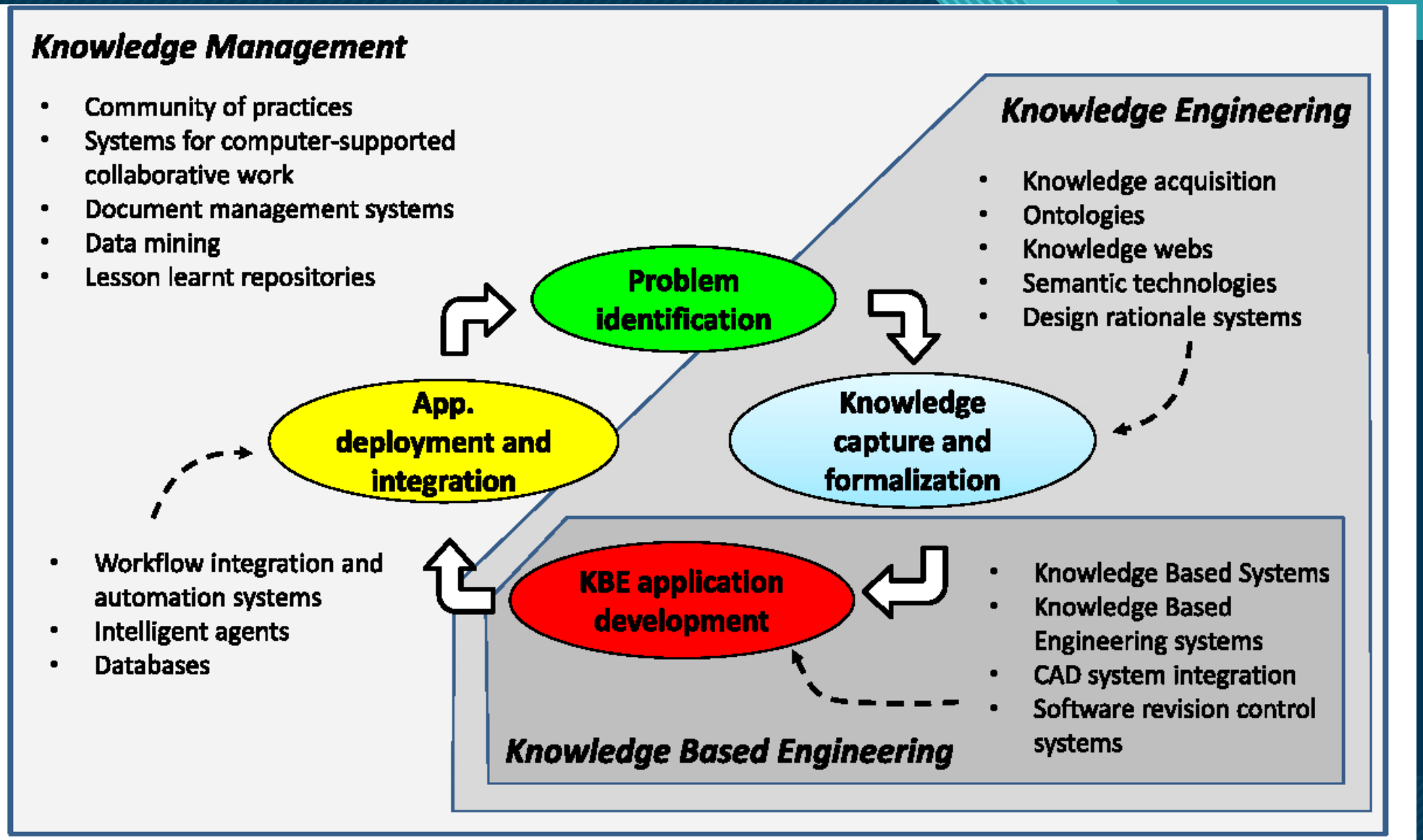
Knowledge Engineering Facets
Emulate the Thought Patterns of SME (semanticscholar.org)



- Process Transformation: Radically Changing Process Elements to Meet New Business Goals

Use Cases Across:

- **Users, Applications, & Processes**
- **To Assist with Familiarity & Adoption of New Tools**

Compliance:

- **HSEQ**
- **Risk Reduction**

Standardization:

- Leverage Size & Scale
- Single Face to Customer & Suppliers
- From Regional to Global Business
- M&A
- Compare Performance
- Beware Reason/Excuses:
  - "We're Different"
  - Granting Deviations

Efficiency:

- **Reuse**
- **Get Faster**
- **Process Standardization**

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*www.Garrtner.com

Context and Overview

Technical Evaluation is one of the most **labor-intensive** processes leading into **longer lead times**, supply chain inefficiencies and **loss in project revenue**

	Technical Specifications	Data Sheets	Material Requisitions	Technical Bid Evaluations	Kick-off meeting	Vendor Doc Review
Docs	▪ Technical Specifications (Generally amendment / substitution to related API clauses) ▪ General technical requirements for an item. ▪ Example:- Technical specifications for API 610 centrifugal pumps	▪ API / ASME or other relevant standard datasheet in excel format	▪ Word document indicating various project requirements like scope of supply & work, vendor documentation protocol, spare requirement etc. ▪ MR Package (Sent to suppliers)	▪ Technical comparison between vendors ▪ Generating technical queries based on deviations/clarifications /non-compliance ▪ Final TBE report with recommendations		
Systems / Tools	▪ API Standards libraries	▪ API Standard datasheets for reference & creation ▪ Process Simulation SW SmartPlant® PES Aspen HYSYS® Ansys	▪ Leverage previous documents ▪ Supplier Portal, mail or FTP for transferring files	▪ Leverage previous documents ▪ Mail for collaboration and transferring documents	▪ Leverage previous and historical documents	▪ Document Management + Project management SW

Engineer's Challenge

The Engineer's **challenge with TBE process** today, is that too much time is spent on mindless **compilation and search** highlighting a **lack of a Single System of record**

Legacy Knowledge

Legacy knowledge is inconsistent, easily lost and inefficient. It leads to Lower productivity, missed opportunities, and information rework

Repeated Data Entry

Engineers repeatedly re-enter specs from data sheets and supplier responses into spreadsheets to start technical evaluations

Info Security Concerns

Sending email attachments and use of excel, always pose a risk of inappropriate access and leakage of information

Multiple Sources of Info

Engineers must search and refer multiple systems and folders to assist with decision making and evaluation

Project Overruns

Project timelines have become very competitive. Bottom line pressures mean that upfront technical activities are squeezed

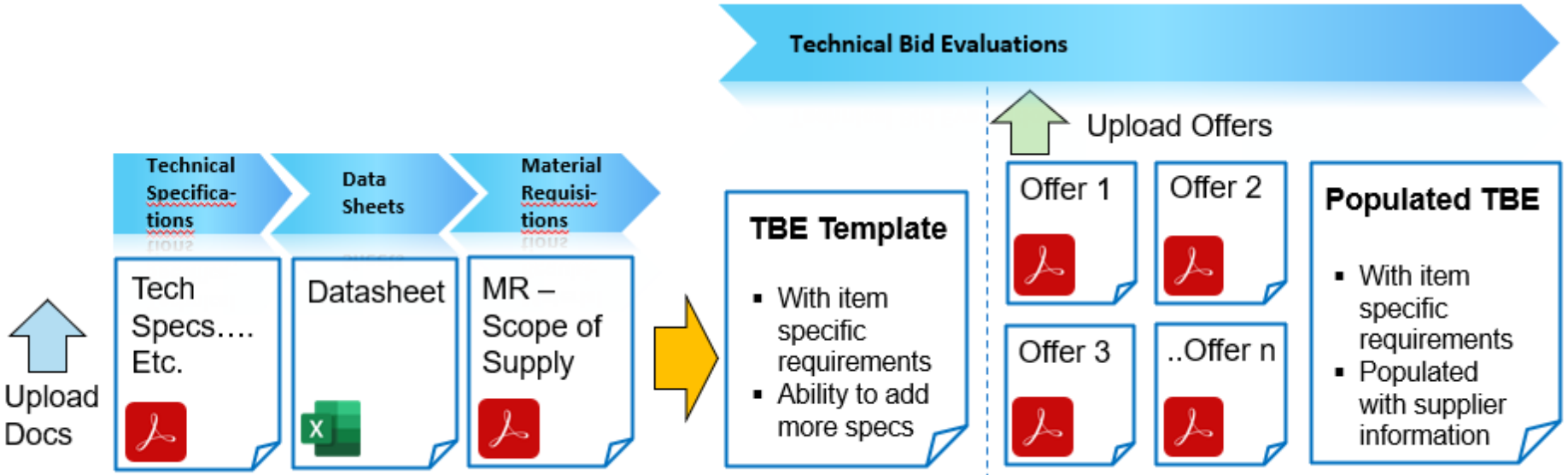
Manual Collaboration

Manually, keep track of dozens of emails and notes to manage responses and interaction. Asking too many questions, if requirements are not well established

MR: Material Request | TBE: Technical Bid Evaluation | TQ = Technical Query

Single System of Record

Rudy is built on **Engineering Language Processing (ELP)** building blocks and will **digitally transform** your **TBE process** and **technical evaluation knowledge management**



Global TBE Template, configurable to client needs

All attributes including, Design Conditions | Site Conditions | Client Specific Requirements | Operating Conditions

Template Agnostic Document and Knowledge Management

Evaluation Engine, Collaboration Suite & Insights Hub

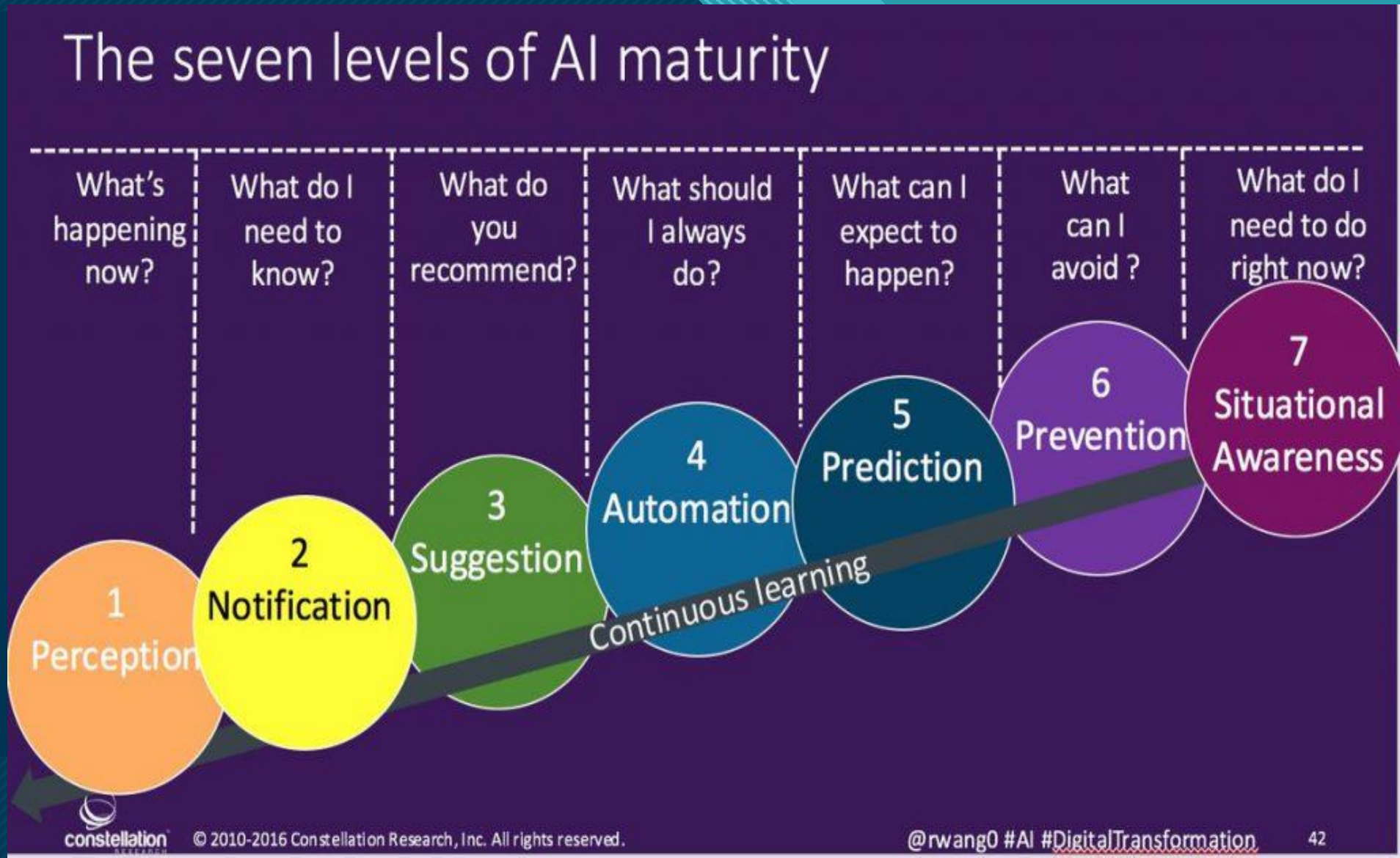
Mintmesh Proprietary Engineering Language Processing (ELP) Algorithms

Key Benefits

- Single System of Record
- TBE Knowledge Management
- Collaboration platform
- Eliminates dependency on legacy knowledge
- Global Search & Find
- Progress Dashboard for executive oversight
- Insights Hub for performance analytics
- Ask Rudy for recommendations
- Predictive capabilities for effective evaluation
- Improve Operational Effectiveness for TBEs

Digital Transformation AI Maturity Curve – Multiple Perspectives

- Recurring Themes:
  - Automation
  - Adaptation
  - Predictability



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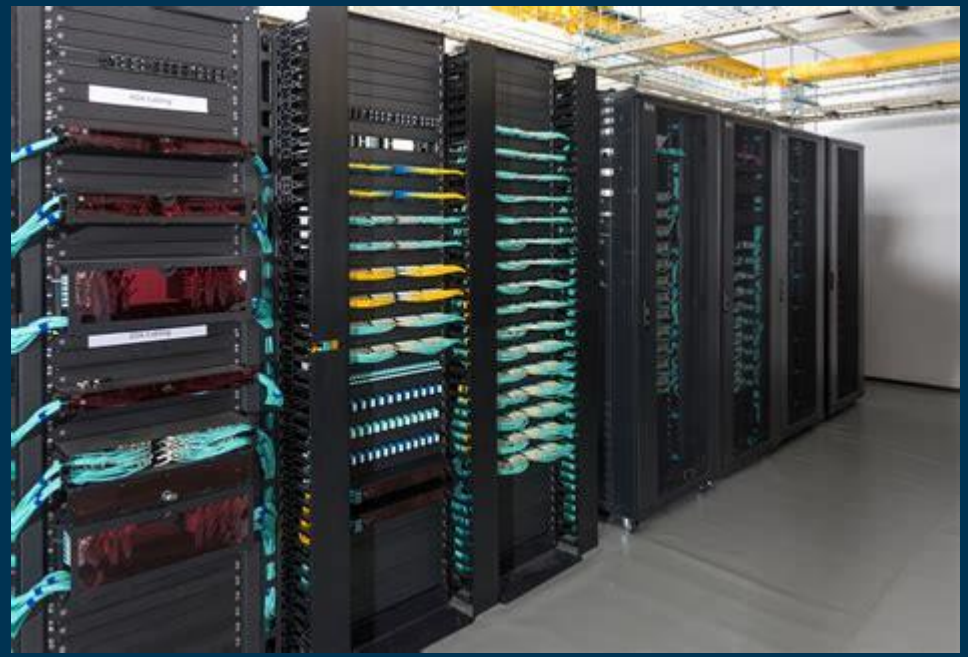
AI Maturity Model: Where is Your Company Along the Curve?

1. Technology Awareness: Interest & Imagining Potential.
2. Experimental Activation – Data Science. Moving out of R&D and Academic Experimentation
3. Operationalization of AI: Process Optimization & Product/Service Innovations
4. Systems Approach: AI for Process & Supply Chain Transformation.
    1. New & Disruptive Digital Models
5. Transformative: AI Becomes the Foundation for New Models, Processes, and Activities



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Putting it All Together: How to Profit from Digital Transformation

Rudy for Engineers

Success Story and Amazing Value

Rudy will not only provide significant bottom-line **savings for engineers** but also provide important structural benefits by becoming the **single platform for all TBE knowledge**

About the Client

Client is a **billion-dollar EPC** company in North America

Client's Objective

TBE's were taking very long and causing schedule overruns. They wanted to **free up engineering time** for contingencies and protect margins

Client Particulars

- Average items per project for non-bulk items– **90**
- Average Material requisitions per project for bulk items– **40**
- Projects per year - **6**
- Blended Engineering Cost – **USD 55/hour**

Results

- Average time saved per equipment – **25 Hours/Tag**
- Average time saved for bulk items – **45 Hours/MR**

Operational Savings

- USD 225K / project
- USD 1.3M / year

Process Benefits

- Single platform for TBE knowledge and document management
- Search & find ability to improve engineers' effectiveness
- Continuous collaboration with supply chain stakeholders
- Secured transactions without risky emails or attachments
- Built in reliability and auditability

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Got Questions?

Find Answers:

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