

The Future of Mega CapEx Projects

Wayne Perciful

OG226254



About the speaker



Wayne Perciful

Wayne Perciful is the owner and CTO of Perciful Consulting, which offers CAD Management and custom automation solutions for the energy, pharmaceutical and technology industries as well as multi-national engineering, construction, procurement and management companies. Wayne had four years of CAD Management experience and six years piping design experience prior to being contracted to Shell's Upstream Unconventionals Americas department. While on assignment providing CAD Management and Piping Design services Wayne implemented automated facility drafting and design for Well site facilities, Salt Water Disposal facilities and Central Processing facilities, updated the drafting/design standards and automated implementation and maintaining of the drafting standards. Prior to assignment at Shell, Wayne was the Drafting and Design Manager for BHP Billiton's North American Shale department. In his spare time, Wayne works on practical application of machine learning and AI for CAD and project management.



Roadmap

THE UNPRECEDENTED MARKET FORCES AND THE RESULTING INNOVATION

- A brief look at just before the downturn
- Examining the pain points that exposed tremendous opportunity

REDEFINING WORK FLOWS, DELIVERABLES AND BUSINESS RELATIONSHIPS

- Redefining relationships
- D1AM: Design one, automate many
- Digital workflows
 - Automated development of 4D, 5D & 6D files
- Rethinking workflows
- Automated project handover

THE FUTURE OF MEGA CAPEX PROJECTS

State of mega capex projects

ADAPTING PROJECT PRODUCTIVITY TO A DIFFERENT WORLD OF COMPETITION

HARRY BENHAM

DIRECTOR, CARBURY CONSULTING
FORMERLY BP AND SHELL MAJOR PROJECTS

Just before the downturn

STILL IN THE INVESTMENT STAGE

- Many Shale producers were operating at a loss

THE SLOW DECENT INTO RAPID COLLAPSE

- Oil falls from \$112 a barrel to \$48 a barrel from June 2014 to January 2015
- Declining demand in 2015

MULTIPLIERS

- OPEC starts a price war
- Iran sanctions lifted

Early cost-saving measures & why they failed

STANDARDS MEASURES

- Design one, build many
 - Different environmental conditions
 - Different processing conditions
- Modular design sourced from low cost counties
- Low cost design centers

WHAT WAS NEEDED

- Automation
- Rapid flexibility to respond to any and all conditions.

Taking a deeper look

ENERGY COMPANIES

- Reduce cost and schedule
- Move from document driven culture to data driven culture.

ENGINEERING, PROCUREMENT, CONSTRUCTIONS AND MANAGEMENT COMPANIES

- Reducing labor costs while maintaining billable hours through aggressive workshare execution across several engineering, procurement, drafting and design centers from best value locations managed by High Value Project Delivery (HVPD).

SOFTWARE COMPANIES

- Engineering firms are their client, and their client's goal is maintaining billable hours through aggressive workshare execution from best value locations
 - A scalable database driven collaborative digital environment, in the cloud, with the flexibility to keep existing tools developed in any document type.
- Pay for use business model

Redefining relationships

PARTNERING WITH THE SOFTWARE COMPANY

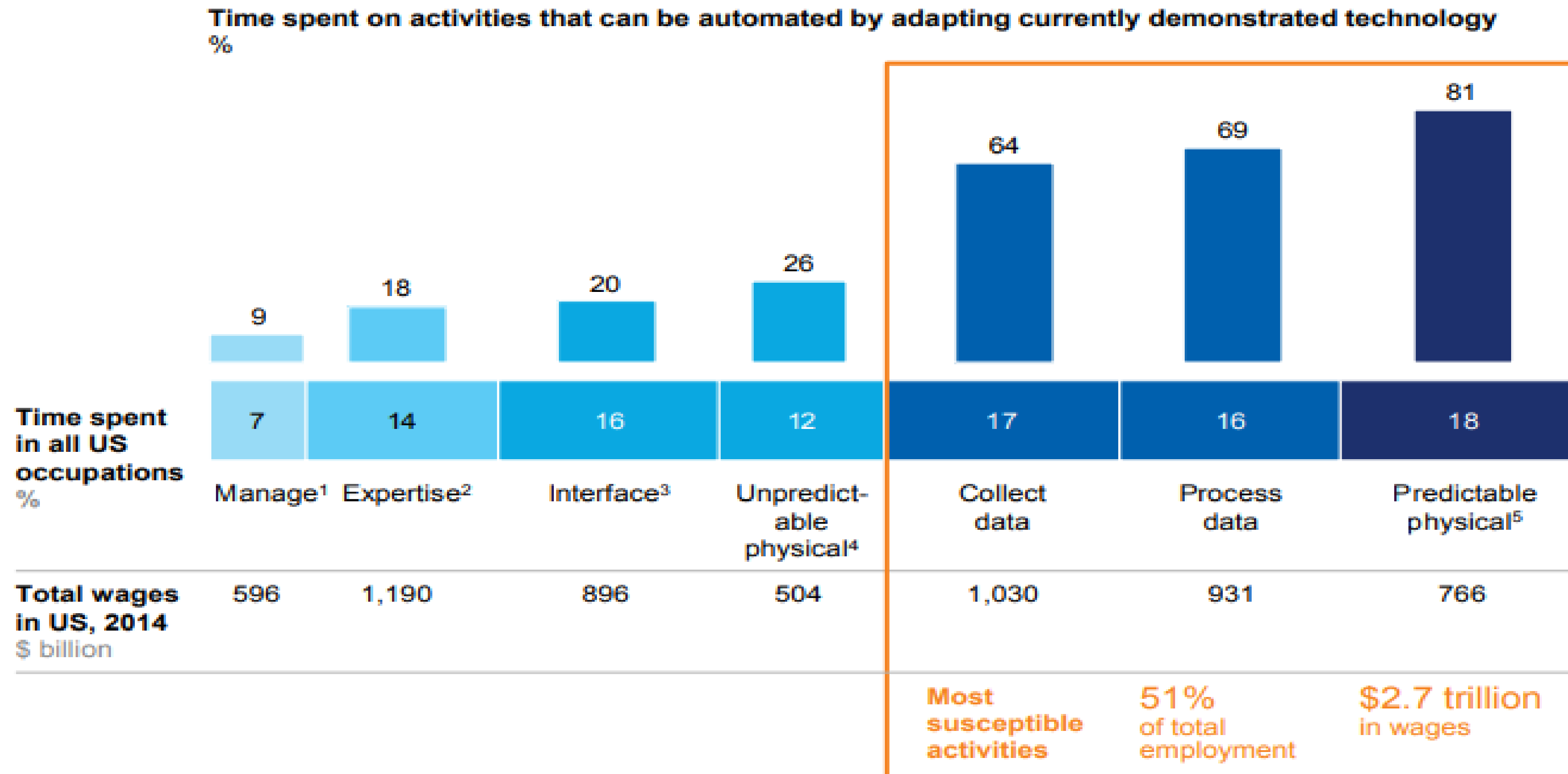
- License the CAD software used for the project through the Energy company directly
 - For exclusivity on the project, barter better software rates
- Financially incentivize software firms to achieve schedule compression through reduced labor hours
- Custom automation to be included by software company for the project

TECHNICAL SPECIALIST: PROGRAMING, CAD SOFTWARE AND DESIGNER

- Establish clear expectations with respect to drafting and design
 - Most importantly this includes the legal contract for the project
- Working with the CAD software firm to achieve greatest outcome with respect to automation and communication

Taking a look at automation

Three categories of work activities have significantly higher technical automation potential



- 1 Managing and developing people.
 2 Applying expertise to decision making, planning, and creative tasks.
 3 Interfacing with stakeholders.
 4 Performing physical activities and operating machinery in unpredictable environments.
 5 Performing physical activities and operating machinery in predictable environments.
 NOTE: Numbers may not sum due to rounding.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Impact of automation in upstream unconventionals

Shale well site facility design



Labor reduction

Shale well site facility design took engineering firms 160 hours for a total of 8,000 hours per annum. Using my automation it takes 40 seconds per facility for a total of 33 minutes per annum.



Cost reduction

Shale well site facility design done by engineering firms cost \$40,000 per facility for a total of \$2,000,000 per annum. Using my automation it cost \$1 per facility for a total of \$50 per annum.

Salt water disposal facility design



Labor reduction

Salt water facility design took engineering firms 900 hours per facility. Using my automation it takes 1 minute per facility.



Cost reduction

Salt water facility design done by engineering firms cost \$163,000 per facility on average. Using my automation it costs \$1.5.

Design one automate many

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PATENT PENDING

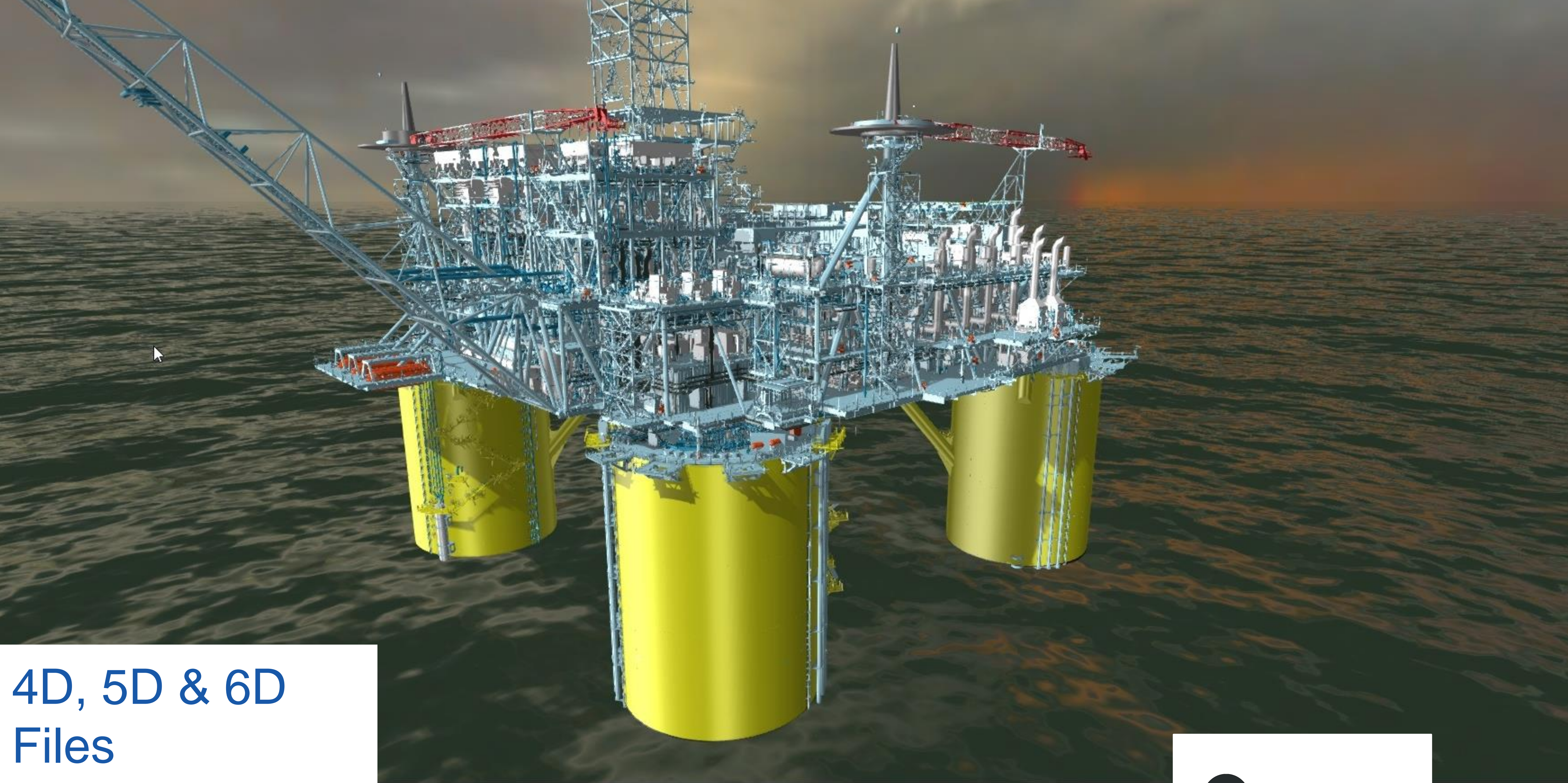
"The average interaction worker spends . . . 20% [of their workweek] looking for internal information"

Is it the current information

SOUTHERN COMPANY OPERATION'S DIGITAL FLEET INITIATIVE

CARL TONER

E&CS PERFORMANCE IMPROVEMENT MANAGER
SOUTHERN COMPANY OPERATIONS



4D, 5D & 6D Files



Reset View



Section



Measure



Visual Query

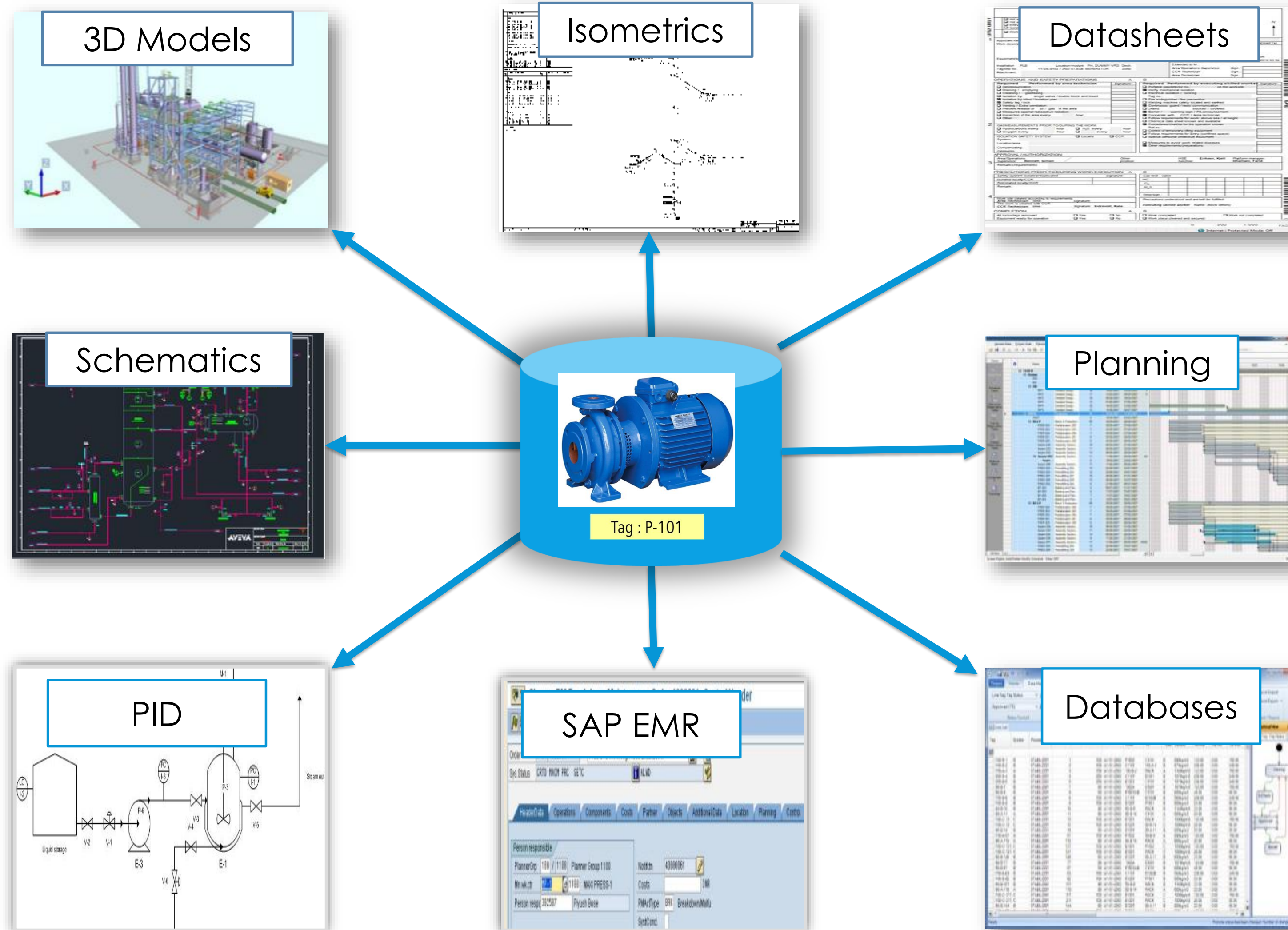


X-Ray



Collection

4D, 5D & 6D files require metadata manually linked by tag



50% reduction in time spent
searching for information.

75 - 90% reduction in handover
costs

Only viable on large capex projects

META DATA LINKING

- All meta data linking needs to be done manually, either from within the cad file or from within the database.

4D AND 5D FILES

- No built-in automation
- Content data uses proprietary data types, which requires specialty training in an expensive software package
- External data sources must be linked through the application
- No existing software development kit to modify the existing application

COST BARRIERS

- ✓ Given the manual meta data linking, proprietary data types, managed data access and lack of software development kit, cost to implement verse value-add limits 4D and 5D files exclusively to large capex projects.

Redefining relationships

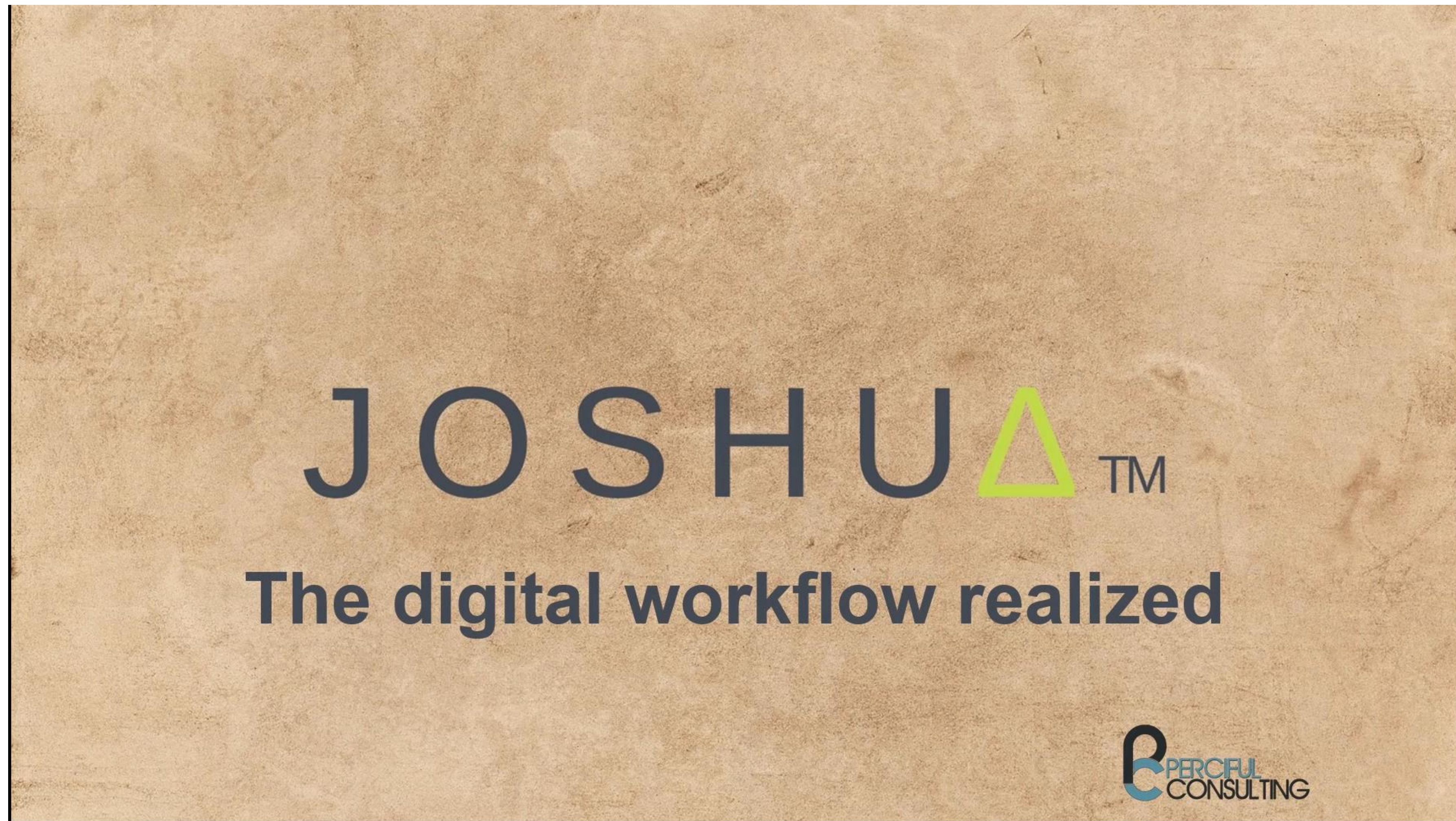
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The digital workflow realized



PATENT PENDING



Digitally accessible reports

1. Should-cost model
2. Line list
3. Available line numbers
4. Instrument index
5. Equipment list
6. Weight report
7. Valve count
8. Specialty item report
9. Master document list
10. Transmittal forms
11. Model/Isometric percent complete
12. Request for information

Some of the applications

WITH AUTOMATED SHOULD COST PROJECTIONS

- Inform designers of alternative components with either cost or schedule benefits
- Ensure consistency of parts used across the project

MODEL FILES

- Automate development of 4D, 5D & 6D files
- Automate the setting of insulation size
- Automate pipe support selection and spacing

ISOMETRIC DRAWINGS

- Automate the insertion of contractor and sub-contractor work codes
 - Automate construction work packages
- Add external process data into the borders

Forging best practices



4.2% of total CapEx is due to poor project handover!

1.8% Engineering and design information

1.3% Vendor information

1.1% O&M information

Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry (NIST GCR 04-867)

National Institute of Standards and Technology, U.S. Department of Commerce Technology Administration

Redefining relationships

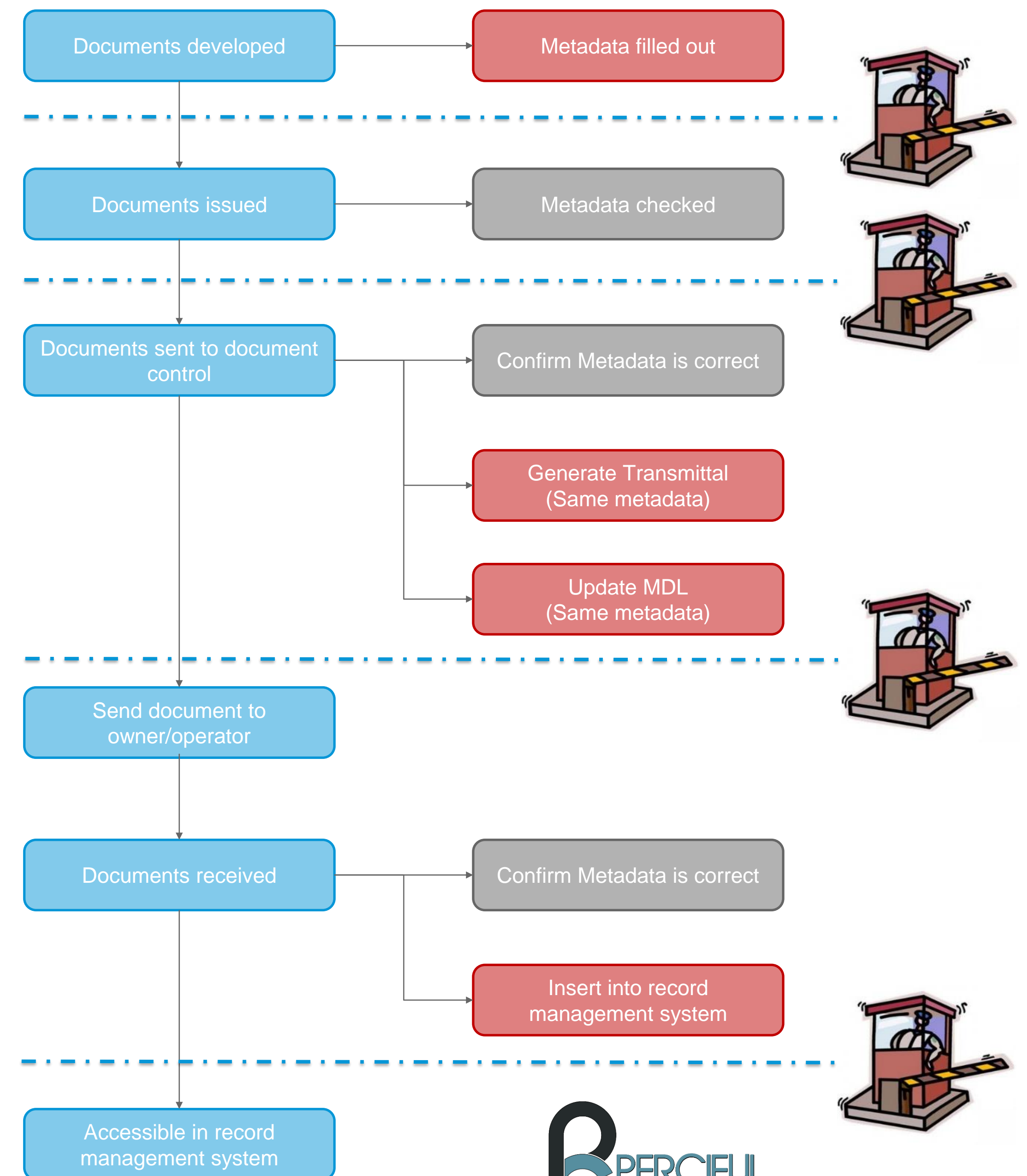
INFORMATION MANAGEMENT TO BE A SEPARATE SCOPE OF WORK

- Cloud based digital environment to be managed by third party information management team
 - Information management scope to include: Data governance and document management as well as software licensing
 - Instance of the record management software used by the energy company to be used for the project
 - Record management system to be imported at the conclusion of the project, automating hand over.

Delaying production further

CURRENT WORKFLOW PROCESS

- The metadata is:
 - manually typed 4 times
 - backchecked 3 times
- Automation eliminates the data entry as well as the entry into the document management system
 - Works for
 - Documentum
 - Opidis (formerly McLaren)
 - Sharepoint
 - ProjectWise
 - And many others



The Future of Mega CapEx projects

5 YEAR PLAN - FACILITIES ON DEMAND

- Working to achieve 100% automated design packages
 - A folder watch and D1AM
- An array of 3D printers and robots

JEFF BEZOS -

"So when it comes to space, I see it as my job - I'm building infrastructure the hard way. I'm using my resources to put in heavy-lifting infrastructure," he said. "So the next generation of people can have a dynamic, entrepreneurial explosion into space."

"We have to dramatically lower the cost of access to space."

Conclusion

- Partnering with the software company to:
 - financially incentivize schedule compression
 - negotiate lower rates for exclusive use of their software package
- Design One Automate Many
- Dramatically reduce deliverables by achieving digital workflows
- Work to eliminate project handover through automation and workflow updates



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