

Data Centric Execution – Focused Future

Arun Ven

Project Management, Fluor India

Sheikh R. Manihar Ahmed

Control Systems, Fluor India

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UnisonSM

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Agenda

- ▶ Fluor Overview
- ▶ Current Scenario
- ▶ Data-Centric Execution – Enabler of Fluor's Vision for Project Delivery
- ▶ EPHDSM (EPC Project Health Diagnostics)
- ▶ MD/SASM (Market Dynamics/Spend Analytics)
- ▶ Challenges
- ▶ Conclusion
- ▶ Open Discussion

FLUOR OVERVIEW



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Company

- ▶ **One of the world's largest** publicly traded engineering, procurement, fabrication, construction and maintenance companies
- ▶ **Designs, builds** and **maintains** capital-efficient facilities for Clients on six continents
- ▶ Delivers **integrated solutions** for Clients in the energy & chemicals, government, life sciences & advanced manufacturing, infrastructure & power, mining & metals and operations & maintenance market sectors
- ▶ Serving more than **4,000** Clients in over **60** countries
- ▶ **No. 164** on the 2019 **FORTUNE® 500** list with revenue of **\$19.2** billion in 2018
- ▶ More than **53,000** employees executing projects globally
- ▶ **107-year Fluor** legacy
FLUOR®



Fluor Corporate Headquarters | Dallas, Texas

We transform the world by building prosperity and empowering progress.

Global Differentiators

- ▶ Provide **fit-for-purpose** EPFCM services and cost-competitive solutions to optimize each Client's capital project
- ▶ Master **supply chain advantages** by using our global procurement network and in-country suppliers
- ▶ **Self-perform fabrication** at our strategically located fabrication yards
- ▶ Execute tough projects in **challenging and remote environments** by leveraging our global resources
- ▶ Deliver **sustainable projects** through an uncompromised focus on health, safety and environmental excellence



COOEC-Fluor Fabrication Yard | Zhuhai, China

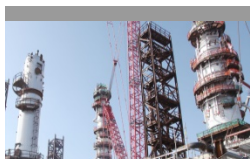
Major Offices and Fabrication Yards

Client Markets

- ▶ Energy & Chemicals
- ▶ Power
- ▶ Infrastructure
- ▶ Mining & Metals
- ▶ Life Sciences & Advanced Manufacturing
- ▶ Government



Client Market Portfolio



Energy & Chemicals

- ▶ Biofuels
- ▶ Carbon Capture
- ▶ Chemicals & Petrochemicals
- ▶ Gas Processing & Gas Treating
- ▶ Gasification, Gas to Liquids/Chemicals, & IGCC
- ▶ Heavy Oil Upgrading & Oil Sands
- ▶ Hydrocarbon Transportation - Pipelines
- ▶ Liquefied Natural Gas (LNG)
- ▶ Offshore Oil & Gas Production
- ▶ Onshore Oil & Gas Production
- ▶ Operations & Maintenance
- ▶ Petroleum Refining
- ▶ Polysilicon
- ▶ Sulfur Recovery
- ▶ Utilities & Offsites



Infrastructure & Power

- ▶ Aviation
- ▶ Bridges
- ▶ Commercial & Institutional
- ▶ Environmental Compliance
- ▶ Heavy Civil
- ▶ Offshore Wind Farms
- ▶ Operations & Maintenance
- ▶ Ports & Marine Terminals
- ▶ Public-Private Partnerships
- ▶ Rail & Transit
- ▶ Renewable Energy
- ▶ Thermal Power
- ▶ Toll Roads & Highways



Mining & Metals

- ▶ Fertilizer
- ▶ Metals
- ▶ Metals Process Expertise
- ▶ Mining
- ▶ Mining Process Expertise
- ▶ Operations & Maintenance



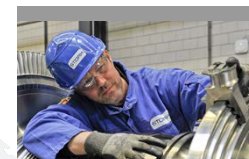
Life Sciences & Advanced Manufacturing

- ▶ Biotechnology
- ▶ Carbon-Based Materials
- ▶ Consumer Products
- ▶ Food & Beverage
- ▶ Glass-Based Materials
- ▶ Medical Devices
- ▶ Operations & Maintenance
- ▶ Pharmaceuticals
- ▶ Silicon-Based Materials
- ▶ Water



Government

- ▶ Contingency Operations
- ▶ Government & Nuclear Services



Diversified Services

- ▶ Asset Life-Cycle Solutions
- ▶ Asset Performance Improvement
- ▶ New Asset Readiness
- ▶ Maintenance
- ▶ Operations
- ▶ Plant Engineering Services
- ▶ Power Services
- ▶ Staffing Resources

Integrated Solutions

Comprehensive Life-Cycle Services for Client Capital Assets

Design	Engineering	Procurement	Fabrication	Construction	Start-up	Diversified Services
<ul style="list-style-type: none">▶ Feasibility Studies▶ Conceptual Design▶ Scope Definition▶ Process Simulation▶ Technology/License Evaluation▶ Estimating▶ Project Financing▶ Routing▶ Siting▶ Permitting▶ Advanced Process Modeling	<ul style="list-style-type: none">▶ Front-end Engineering▶ Detailed Engineering▶ Modular Construction▶ Process Simulation▶ Safety Planning▶ Systems Integration▶ Planning & Scheduling▶ Cost Control▶ Fabrication▶ Advanced Work Packaging	<ul style="list-style-type: none">▶ Low-Cost Country Sourcing▶ Requirements Planning▶ Purchasing▶ Materials Management▶ Supplier Quality▶ Contracts Management▶ Fabrication▶ Logistics▶ Expediting▶ Warehousing▶ Contract Staffing	<ul style="list-style-type: none">▶ Self-Perform Fabrication▶ Modular Construction▶ Sourcing▶ Purchasing▶ Quality Control▶ Safety Programs▶ Material Control▶ Contractor Management	<ul style="list-style-type: none">▶ Self-Perform Construction▶ Project & Program Management▶ Construction Management▶ Craft Staffing & Training▶ Field Mobilization▶ Contractor Management▶ Modular Construction▶ Safety Programs▶ Quality Control▶ WorkFace Planning▶ Equipment, Tools & Fleet Services▶ Rigging▶ Scaffolding	<ul style="list-style-type: none">▶ Precommissioning▶ Engineering Support▶ Systems Checkout▶ Commissioning▶ Turnover▶ Initial Production▶ Validation▶ Plant Readiness	<ul style="list-style-type: none">▶ Asset Life-Cycle Solutions▶ Asset Performance Improvement▶ New Asset Readiness▶ Maintenance▶ Operations▶ Plant Engineering Services▶ Staffing Resources

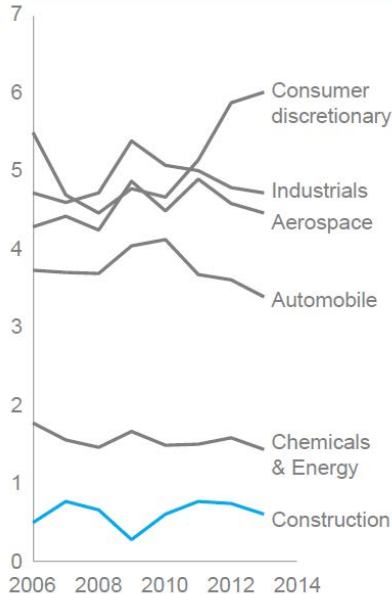
CURRENT SCENARIO



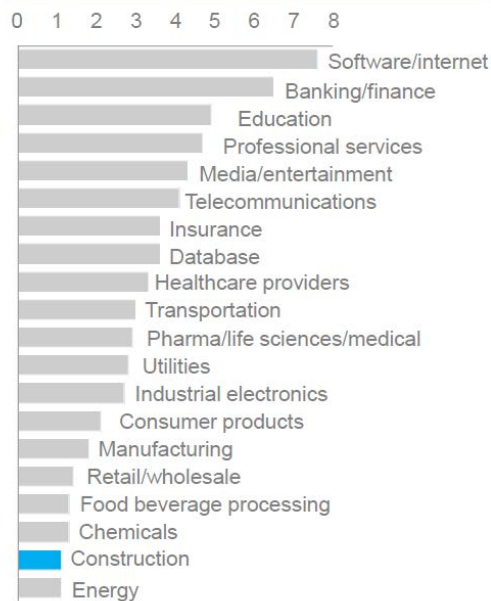
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Engineering & Construction Industry

Construction is the lowest spender on R&D across select major industries
% of Revenue spend on R&D



Spend on IT is 1%, which is among the lowest across all sectors
% of Revenue spend on IT



- ▶ Lack of investment in R&D and IT/data solutions
- ▶ Engineering output per hour has lagged other industries
- ▶ Construction productivity is flat or decreased over the last 40 years
- ▶ Limited focus and no consistency of data
- ▶ Challenges with project predictions
- ▶ 75% of Oil, Gas and Chemicals large capital projects were behind schedule, and 63% of those projects were over budget
- ▶ Factory productivity increased 10% to 15% with effective use of big data in companies in the automotive, consumer goods and life sciences sectors

There is significant opportunity to differentiate

Data provided by McKinsey

Current Scenario

- ▶ Current industry faces lack of research and good practices for better operational facilities
- ▶ Companies are not getting profits and do not invest on research components
- ▶ Reducing manpower (skilled labor)
- ▶ Large data available, but not structured properly

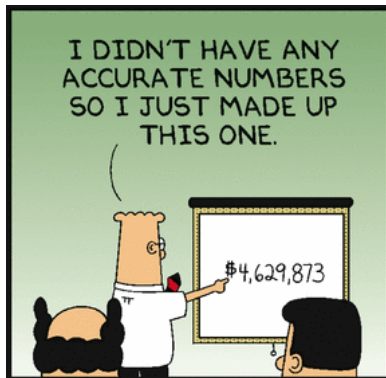
Status of “Data” Prior to 2017

- ▶ Data standards vary from project to project, typically driven by Client requirements
- ▶ Examples:
 - 90+ ways to define “cooling tower”
 - 10+ ways to define “P&ID”
 - 5+ ways to define “PO”
 - 4+ ways to define “kilogramme”
 - No standard descriptions used for activities/deliverables in progress and schedule

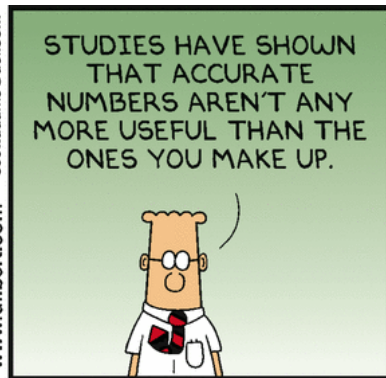
© 2012 Ted Goff



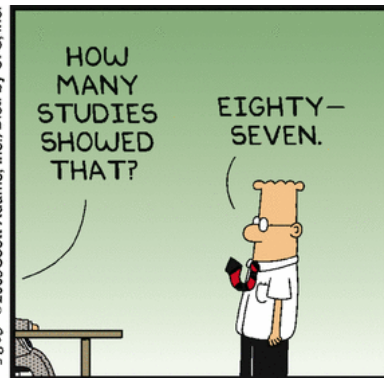
“Here’s a list of 100,000 warehouses full of data. I’d like you to condense them down to one meaningful warehouse.”



www.dilbert.com scottadams@aol.com

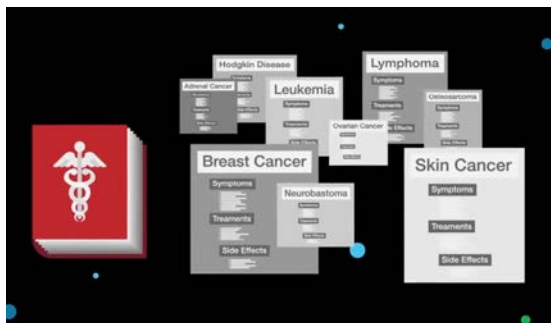
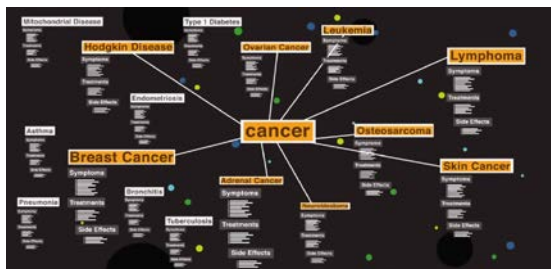


5-8-08 © 2008 Scott Adams, Inc./Dist. by UFS, Inc.



What if?

What if we could build a “health diagnostics” tool for projects similar to patient care using IBM Watson technology?



Skin Cancer

Symptoms

- Dark speckles
- Dark lesions

Treatments

- Immunotherapy

Side Effects


- Flu-like symptoms
- Nausea

Age: 52

Sex: M

Stage: 1

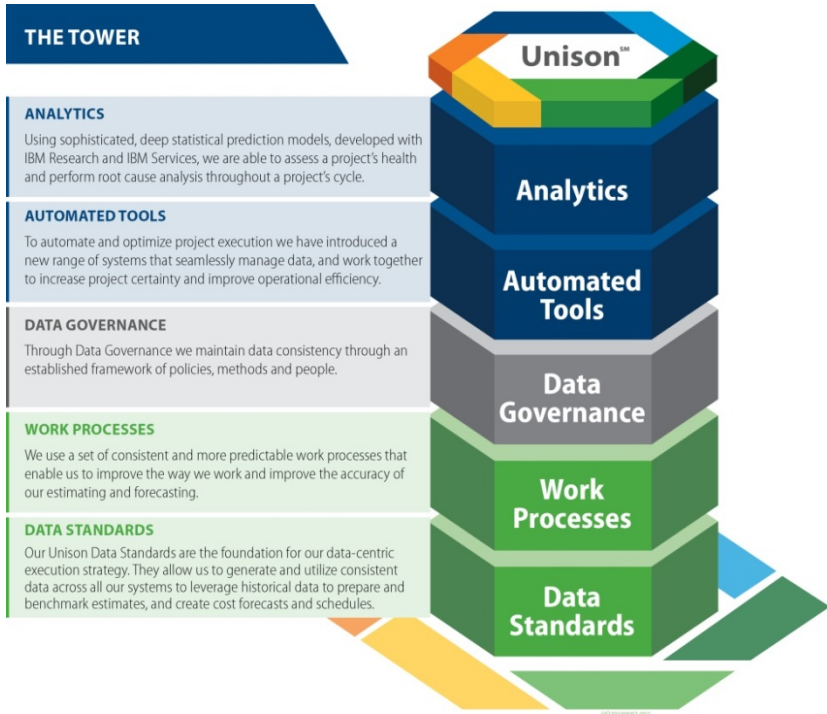
A cartoon character of a man with a beard and glasses, wearing a red t-shirt with a yellow lightning bolt and grey pants, stands on a brown ground against an orange background.



DATA-CENTRIC EXECUTION:
AN ENABLER OF FLUOR'S VISION FOR
THE FUTURE OF PROJECT DELIVERY

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Data-Centric Execution Powered by Unison



WHAT IS DATA-CENTRIC EXECUTION?

Data-centric execution is an integral component of Fluor's vision both in terms of cost-competitive innovation and execution excellence.

It is revolutionizing the way we work by utilizing data to positively impact all stages of project execution, for the full life-cycle, from estimation to construction, and engineering to procurement.

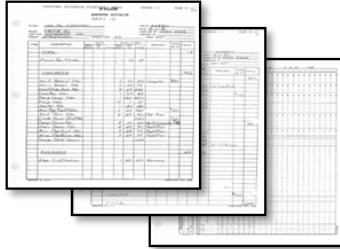
WHAT IS UNISON?

Unison is the platform of approved data standards, consistent work processes and global governance that allows Fluor to realize a data-centric approach to its business.

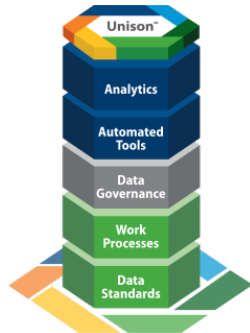
Applying standardized data from across current and past projects is central to Fluor's success and crucial to executing with excellence.

Unison powers an array of innovative systems and tools, which in turn empower employees to streamline performance, optimize project profitability, and drive cost and schedule certainty.

Data-Centric Execution – Why?



Our Past



Our Future

- ▶ Data was **project-centric** with no view at the Corporate level
- ▶ Data standards and structures were **not consistent** across projects
- ▶ Data was **repeatedly** and **redundantly** extracted, transformed and re-loaded from one process to the next
- ▶ Lack of a defined **single source of truth** for controlled data items on projects
- ▶ **Optionally applied** across the corporation, resulting in many data variations from project to project

The Benefit and Value

- ▶ With Data-Centric Execution, Unison and effective Data Governance, we can:
 - **Enhance project proposals** utilizing standardized data
 - Produce **higher quality estimates**
 - **Improve capital cost forecasting**, by keeping the estimate “evergreen”
 - Compare project baselines against reference data to **better assess risk**
 - Standardize BoQs(Bill of Quantities) allowing **like-for-like comparison** of subcontractor bids
 - Enhance on-project cross-discipline data interfaces to **assist with sequencing activities** and **reduce rework**
 - Increase on-project automation of data between tools to **improve efficiencies** and **schedule**
 - **Perform project performance predictions** with cognitive analytics
 - Monitor the **health of our projects** and **better predict outcomes**

Data-Centric Execution – Big Data Analytics

- ▶ Leveraging Fluor domain expertise together with IBM T.J. Watson Research Center to create two proprietary predictive analytics systems
 - EPC Project Health Diagnostics (EPHD) powered by Watson
 - Market Dynamics/Spend Analytics (MD/SA) powered by Watson
- ▶ Deliver value from proposal through execution phases
- ▶ Innovation leading to strategic competitive advantage
 - First-of-their-kind systems in EPC industry
 - Meaningful and actionable business insights
 - Rapidly predict best-in-class pricing globally, project status and outcomes, and improve quality and services
 - Thousands of sophisticated mathematical data analytics models leveraged

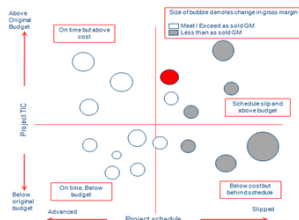
EPHD: EPC PROJECT HEALTH DIAGNOSTICS



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EPHD: Our Vision

ANALYSIS ACROSS MULTIPLE PROJECTS FOR PERFORMANCE INSIGHTS



PROJECT HEALTH MONITORING AND FINAL OUTCOME PREDICTION FOR CORPORATE PROJECT REVIEW AND PROJECT MANAGEMENT SUPPORT

Early Warnings

- Delay in process P&ID
- Out of sequence model review
- Scope changes



Engineering Hours



Total Installed Cost



Gross Margin

PROJECT OUTCOME SIMULATIONS AND SCENARIO EVALUATIONS AS PROJECT MANAGEMENT DECISION SUPPORT TOOL



“What if” scenarios and simulations to support decision making



Prescriptive capabilities based on expert recommendations

PROJECT BASELINE ASSESSMENT FOR FINAL OUTCOME PROBABILITY AND RISK ASSESSMENT



Comparison of project baseline against reference class decision making

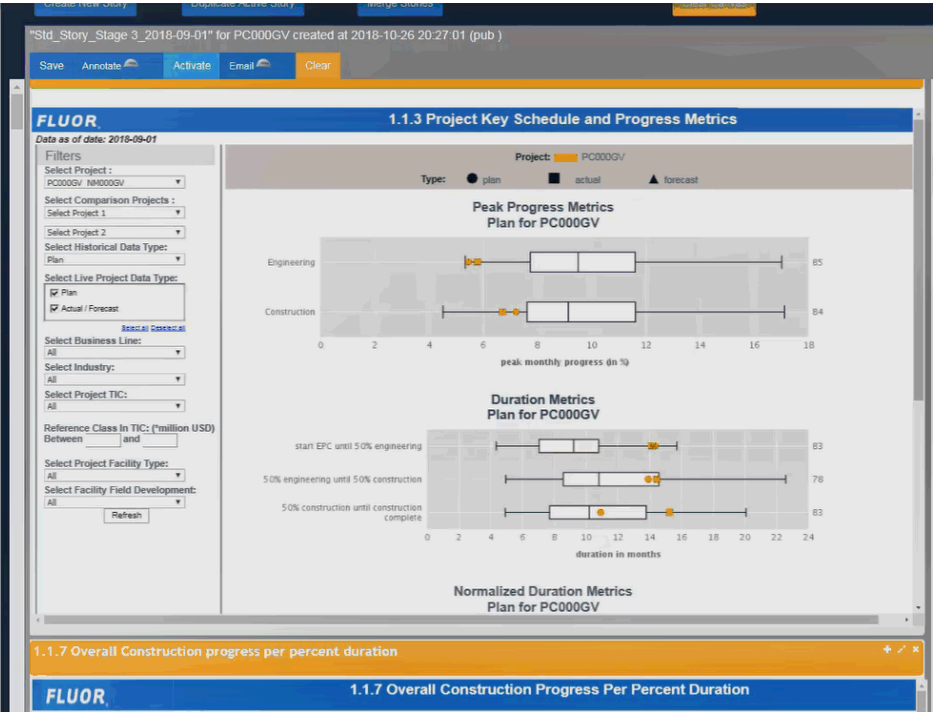
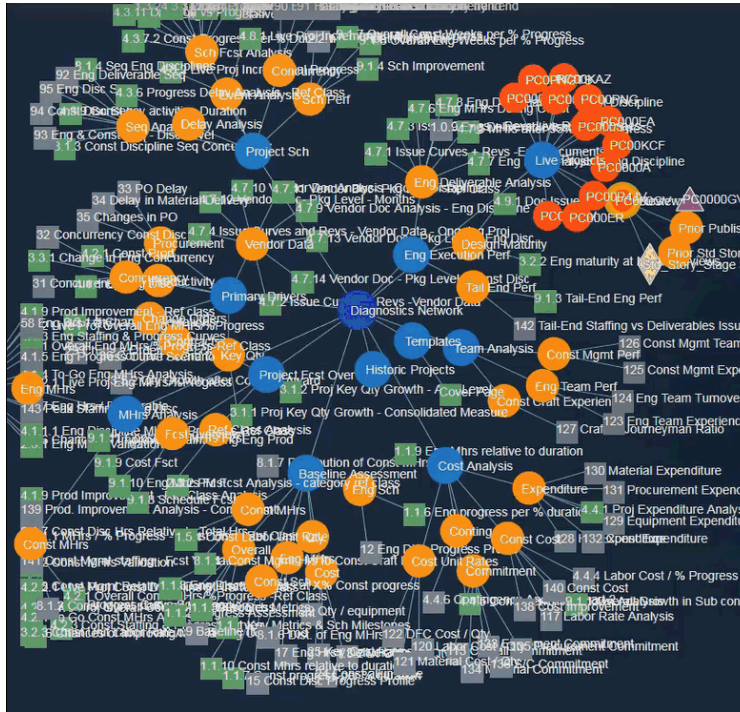


Simulation of strategic options at project conception

EPHD: Executive Dashboard

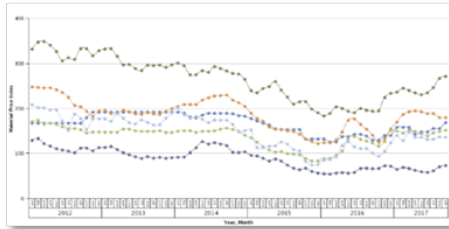
PC0000A NM0000A Lump Sum EPC	Actual Progress			Growth in						Deep Dive Analysis		
	Overall	Engg	Const	Overall Schedule		Engg Mhrs		Const Mhrs			Cost	
				Project Fcst	Prediction (£ 97% const)	Project Fcst (For 100% engg)	Actuals (£ 100% engg)	Project Fcst (For 100% const)	Actuals (£ 97% const)		Project Fcst	Prediction
PC000GV NM000GV Lump Sum EPC	Actual Progress			Growth in						Deep Dive Analysis		
	Overall	Engg	Const	Overall Schedule		Engg Mhrs		Const Mhrs			Cost	
				Project Fcst	Prediction (£ 97% const)	Project Fcst (For 100% engg)	Actuals (£ 100% engg)	Project Fcst (For 100% const)	Actuals (£ 97% const)		Project Fcst	Prediction
PC00KCF NM00KCF Lump Sum EPC	Actual Progress			Growth in						Deep Dive Analysis		
	Overall	Engg	Const	Overall Schedule		Engg Mhrs		Const Mhrs			Cost	
				Project Fcst	Prediction (£ 95% const)	Project Fcst (For 100% engg)	Actuals (£ 100% engg)	Project Fcst (For 100% const)	Prediction (£ 95% const)		Project Fcst	Prediction

EPHD: Diagnostic Neural Network and Standard Story

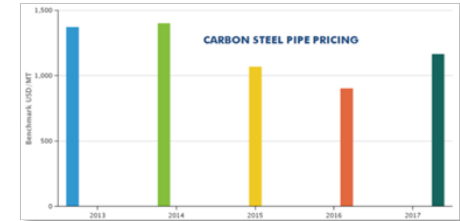


Market Dynamics/Spend Analytics (MD/SA)

RAW MATERIAL TRENDS



FLUOR HISTORICAL AND CURRENT PRICING



FLUOR MARKET DYNAMICS SPEND ANALYTICS Powered by IBM WATSON



MARKET INTELLIGENCE



CURRENCY TRENDS



CLIENTS | SUPPLIERS | EPCs | PRODUCTS | INDUSTRIES

CHALLENGES



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Challenges: Achieving True Data Centricity

- ▶ Clients need to recognize the value
 - What is your company's definition and strategy for data-centric execution?
- ▶ Finding a common definition and standards
 - High percentage of standards under ISO
- ▶ Need to understand the difference in data needed for EPC versus data needed for lifecycle management
- ▶ Industry needs standards and well-defined requirements
- ▶ Software suppliers need to provide open products that are easy to integrate and easy to learn
- ▶ Investing for the future: balancing cost and value

CONCLUSION



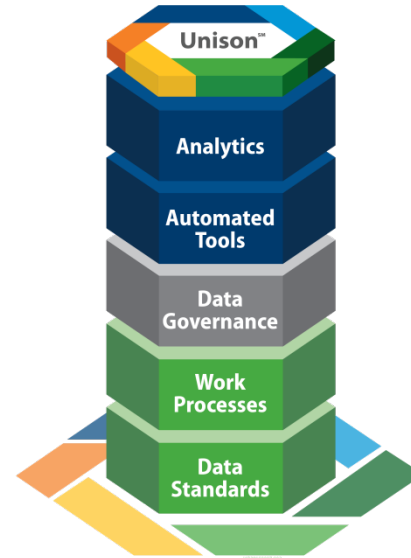
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Moving Ahead: Data-Centric Execution

Our Past

The image shows three overlapping spreadsheets from a software application. The top spreadsheet is titled 'BIDDER ESTIMATE AREA 10' and contains a table with columns for 'ITEM', 'DESCRIPTION', 'QTY', 'UNIT PRICE', 'TOTAL PRICE', 'MEASUREMENT', and 'UNIT'. The table lists various construction items such as 'CONCRETE', 'Weld. Metal Plate', 'Steel Pipe', and 'Cable Tray'. The spreadsheets are layered, with the top one being the most prominent, illustrating a traditional, manual data management process.

Our Future



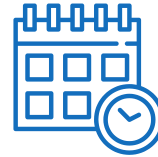
Moving Ahead: EPHD



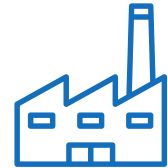
**Data
Consistency**



**Project
Predictions**



**Schedule
Certainty**



**Capital
Efficiency**

OPEN DISCUSSION



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