Lessons Learned from Consulting and Construction Projects

UT-Dallas Project Management Symposium
Mike Wheeler, Fluor Corporation

- 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
- #153 on the 2018 FORTUNE® 500 list with revenue of $19.2 billion in 2018
- More than 53,000 employees executing projects globally
- 107-year Fluor legacy
Corporate Financial Performance

![Revenue in US Billions](image)

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
## Integrated Solutions
### Comprehensive Life-Cycle Services for Client Capital Assets

<table>
<thead>
<tr>
<th>Design</th>
<th>Engineering</th>
<th>Procurement</th>
<th>Fabrication</th>
<th>Construction</th>
<th>Start-up</th>
<th>Diversified Services</th>
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<tbody>
<tr>
<td>Safety Programs</td>
<td>Material Control</td>
<td>Contractor Management</td>
<td>Modular Construction</td>
<td>Safety Programs</td>
<td>Quality Control</td>
<td>WorkFace Planning</td>
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<td>WorkFace Planning</td>
<td>Equipment, Tools &amp; Fleet Services</td>
<td>Rigging</td>
<td>Scaffolding</td>
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## Client Market Portfolio

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

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

**Mineral & Metals**
- Fertilizer
- Metals
- Metals Process Equipment
- Mining
- Mining Process Equipment
- 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**
- Biofuels
- Carbon Capture
- Chemical & Petrochemicals
- Gas Processing & Gas Treating
- Gasification, Gas to Liquids/Chemicals, & IGCC
- Heavy Oil Upgrading & Oil Sands
- Hydrocarbon Transportation & Pipelines
- Natural Gas (LNG)
- Offshore Oil & Gas Production
- Offshore Oil & Gas Production
- Operations & Maintenance
- Petroleum Refining
- Polymers
- Sulfur Recovery
- Utilities & Offsites
Fluor Is Transforming How EPC Execute Capital Projects

- Leveraging Fluor domain expertise together with IBM T.J. Watson Research Center to create two proprietary predictive analytics systems
  - EPC Project Health Diagnostics (EPHD$^{\text{SM}}$) powered by Watson
  - Market Dynamics / Spend Analytics (MD/SA$^{\text{SM}}$) 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 improves quality and services
  - Thousands of sophisticated mathematical data analytics models leveraged

Value

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<th>MD/SA$^{\text{SM}}$</th>
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<tr>
<td>Deliver fact based insights and early warning indicators on project performance</td>
<td>Leading edge tool providing supply chain insight and precise estimates</td>
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<tr>
<td>Predict issues such as rising costs or schedule delays based on historical trends and patterns</td>
<td>Sourcing and negotiation strategy</td>
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<tr>
<td>Identify the root causes of issues and the potential impacts of changes as input to the decision-making process including estimate analysis, forecast evaluation, project risk assessment and critical path analysis</td>
<td>Showcases market trends for key raw materials and potential opportunities and risks for timing of purchases</td>
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<tr>
<td>Drive more certainty into project schedules and costs for our clients</td>
<td>Validate and benchmark current pricing trends against data from multiple projects and identify most competitive suppliers globally</td>
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<td></td>
<td>Combines historical and current pricing on materials to predict future prices by incorporating raw materials, currency, and market intelligence</td>
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<td>Incorporates project specific requirements such as sourcing country, suppliers, etc.</td>
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EPHD<sup>SM</sup> Timeline

2015
- Data collection
- Semantic data modeling
- Fluor ontology
- Correlation analysis
- Predictive models
- 1<sup>st</sup> Engineering deep dive

2016
- Descriptive analytics
- EPHD user interface
- Diagnostic Neural Network (DNN)
- Improved data quality and data collection

2017
- Executive dashboard
- Automated standard story
- Sr executive reviews
- Expert driven predictive models
- 1st Construction deep dive
- Tail end engineering prediction models

2018
- Project Health Monitor control system (PHMcs)
- Cognitive interface to EPHD
- Enhanced data visualization and descriptive analytics
- Feature bundle/belief network
- “Watson” best fit selection

Note: Italicized items are under development

EPHD<sup>SM</sup> Metrics

- 120 Completed EPC Projects Loaded
- 15 Years of Historical Project Data
- 12 Live Projects Being Monitored and Analyzed

New EPC and EPFC projects being added as engineering starts
- General criteria:
  - Projects over $500 million in Total Installed Cost (TIC)
  - E&C, Power and Mining
  - Will expand criteria to include additional business lines and TIC values
In The Future... “Construction” Continues on EPHDSM

- Evaluate potential construction execution analytics (CEA) viability – congestion modeling
- Cost prediction models validation/testing
- Belief network/feature bundle predictive modeling
- Multi-modal Cognitive user interface (UI)
- Continue expansion of descriptive analytics and UI
- PM Forecast monitor and Hierarchical Prediction Model
- Higher order “Watson” AI

MD/SA SM Timeline

- 2015: Data collection
- 2016: Material Market Bulletin (MMB)
  - Equipment & Materials
    - Pipe
    - Steel
    - Vessels
    - Pumps
    - Fittings
    - Flanges
- 2017: Equipment & Materials
  - Valves (manual & automatic)
  - Stick-built Contracts
  - Modules
    - Pipe Rack
    - Process
    - Logistics
- 2018: Storyboard access to Lump Sum projects
  - Executive Dashboard
  - Equipment & Materials
    - E&I
    - Other mechanical categories

Note: Italicized items are under development
Other Supply Chain Key Initiatives

- **Digital Transformation**
  - Predictive Analytics
  - Field Material Management
  - RFID
  - Source-to-Pay and Supplier Lifecycle Performance
  - Supply Chain Financing
  - Robotic Process Automation
  - Data Standardization
  - Material Visibility

Transformational Projects

- **Consulting Transformation Projects**
  - Gemini Consulting
    - Albemarle, Post-IPO, R&D Optimization, Market-Focused and Operations & Maintenance
  - CSC Index
    - OxyChem, Supply Chain and Building a High Performing Team
  - AT Kearney
    - DuPont Textiles & Interiors / Invista Koch Industries, Overhead Cost Reduction
    - Fluor Corporation, Overhead Cost Reduction
  - MW Wheeler and Associates, Inc.
    - El Paso Pipeline, Supply Chain, Overhead and Capital Cost Reduction
    - El Paso E&P, Supply Chain
    - Atlanta Gas Light Resources, Overhead Cost Reduction, Supply Chain
    - Celanese, Logistics Offshoring

- **Supply Chain Transformations**
  - Reliance Industries Limited, Mumbai, Maharashtra, India
  - Fluor Corporation, Irving, Texas, USA
John P. Kotter’s Eight Steps to Transformation

Dr. John P. Kotter is the Konosuke Matsushita Professor of Leadership, Emeritus, at the Harvard Business School, a New York Times best-selling author, the founder of Kotter International (a management consulting firm based in Seattle and Boston), and a well-known thought leader in the fields of business, leadership, and change.

EIGHT STEPS TO TRANSFORMING YOUR ORGANIZATION

1. Establishing a Sense of Urgency
   - Examining market and competitive realities
   - Identifying and discussing crises, potential crises, or major opportunities

2. Forming a Powerful Guiding Coalition
   - Assembling a group with enough power to lead the change effort
   - Encouraging the group to work together as a team

3. Creating a Vision
   - Creating a vision to help direct the change effort
   - Developing strategies for achieving that vision

4. Communicating the Vision
   - Using every vehicle possible to communicate the new vision and strategies
   - Teaching new behaviors by the example of the guiding coalition

5. Empowering Others to Act on the Vision
   - Getting rid of obstacles to change
   - Changing systems or structures that seriously undermine the vision
   - Encouraging risk taking and nontraditional ideas, activities, and actions

6. Planning for and Creating Short-Term Wins
   - Planning for visible performance improvements
   - Creating those improvements
   - Recognizing and rewarding employees involved in the improvements

7. Consolidating Improvements and Producing Still More Change
   - Using increased credibility to change systems, structures, and policies that don’t fit the vision
   - Hiring, promoting, and developing employees who can implement the vision
   - Reinventing the process with new projects, themes, and change agents

8. Institutionalizing New Approaches
   - Articulating the connections between the new behaviors and corporate success
   - Developing the means to ensure leadership development and succession

Elements Needed to Deliver a Sustainable Transformation

- Manage the Transformation Program as a Company Initiative, Not the Consultants Program
- Win the Hearts and Minds of Middle Management ... Or Implant Some New Managers in Key Areas
- Reinforce New Behaviors
- Proactively Answer the Basic Question Every Employee Has In Their Mind ... What’s In It For Me?
- Involvement from the Bottom to the Top of the Organization
- Make It Simple to Understand
High Performing Teams

- Listening
- Managing a Conversation for Possibilities
- Managing the Background Conversation
- Distinguishing Conversations for:
  - Possibility
  - Action
  - Description
- Coaching
- Turning Breakdowns into Breakthroughs
- Recognize and Celebrate Success

What I Wish Someone Had Shared With Me Early In My Career About Managing Projects

1. Know What You Don’t Know and Find Someone on Your Team That Does Know
2. Leadership Is Not Always About Leading, Sometimes You Need to Follow
3. Be Open To New Learnings and Possibilities
4. The Power of Preparation
5. You Can Never Have Too Much Communication
6. Celebrate the Small Wins
7. Balance Being In the Moment with a Focus on Future