



PROJECT PRODUCTION  
INSTITUTE

# Digitalize & Industrialize Construction

## What Does It Mean and How to Do It?

7<sup>th</sup> Annual Symposium

09 December 2020

# CONSTRUCTION MATTERS FOR THE WORLD ECONOMY



... but has a long record of poor productivity

Construction-related  
spending accounts for

**13%** of the  
world's GDP

...but the sector's annual productivity  
growth has only increased

**1%** over the  
past 20 years

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**\$1.6 TRILLION** of additional  
value added

could be created through higher productivity, meeting half the  
world's infrastructure need

McKinsey Global Institute (2017) Reinventing Construction: A Route to Higher Productivity



To increase the value Engineering and Construction  
provides to the economy and society

Those who own, design and deliver capital projects







17-March 2020

# Top Project Delivery Trends Transforming the Industry: What Project Leaders Need to Know





Workers building cars in a factory, 1930s.

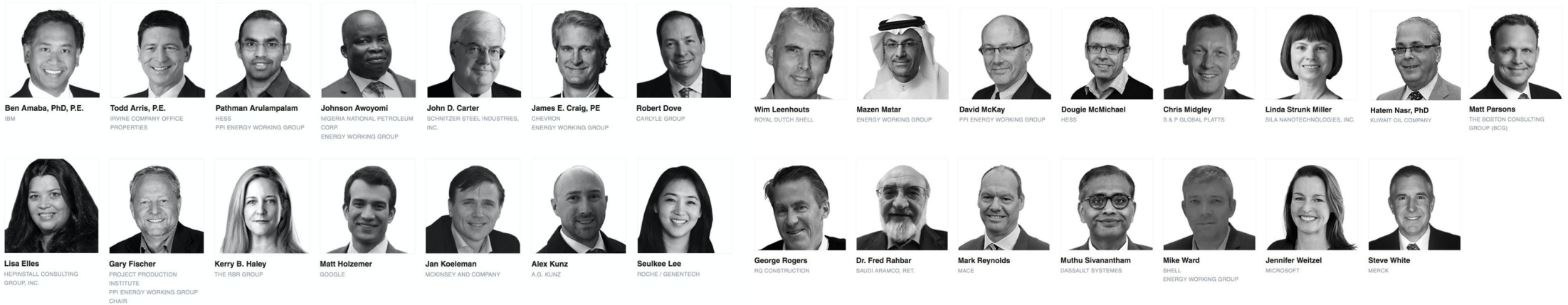


# From **That** to **This**:

Other Industries Have  
Perfected Modern Production.  
So, When Will Construction?



# Industry Council

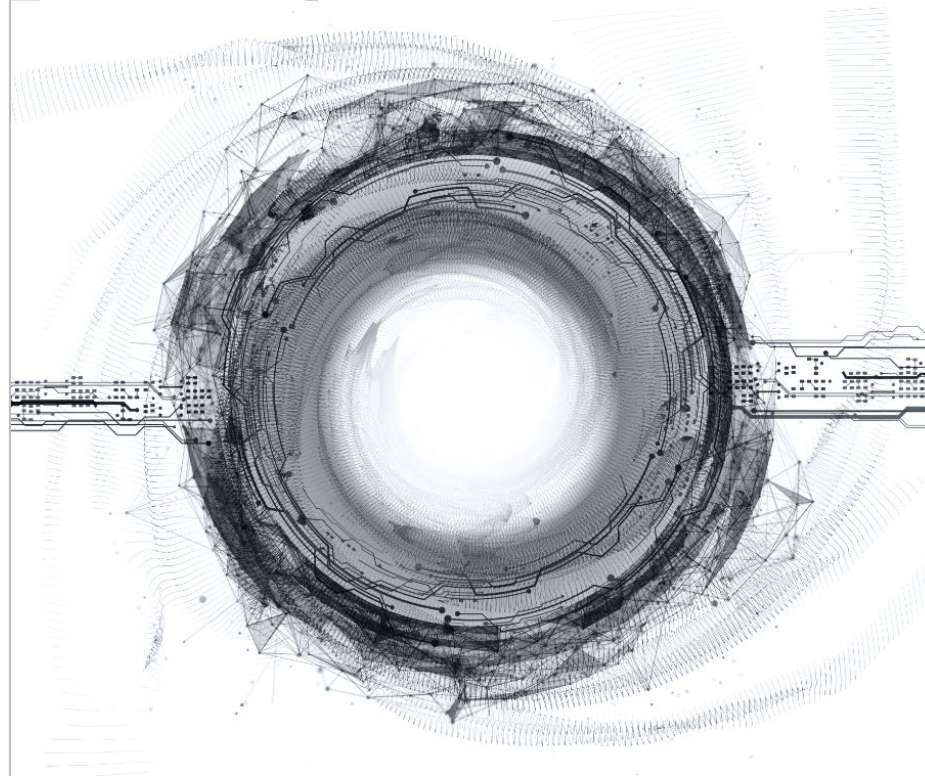




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Overview

# Energy Working Group



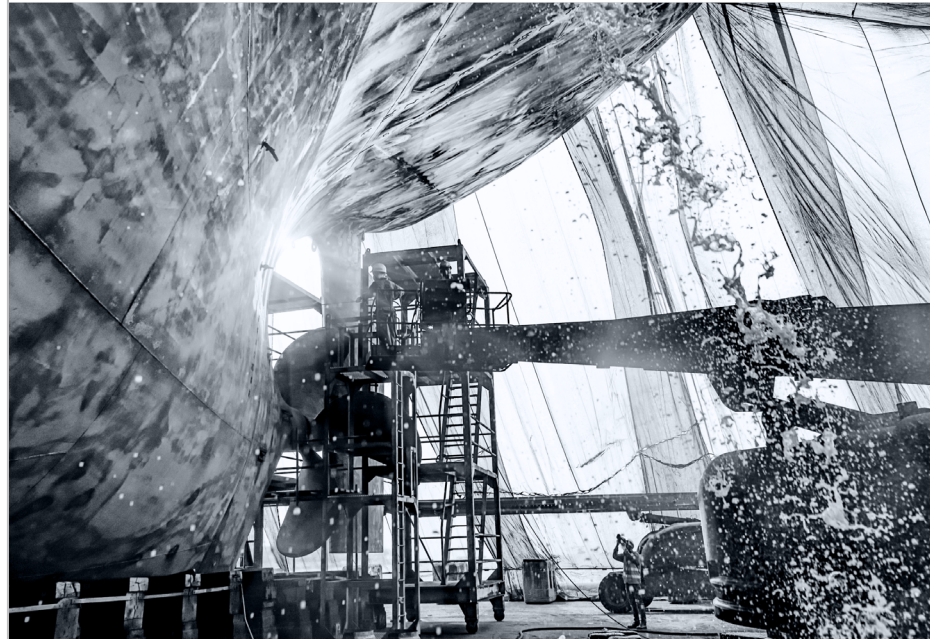




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Overview

# Shipbuilding and Ship Repair Working Group



# Are Your Supply Chains Resilient?

## Supply Chain Resiliency During COVID-19 And Beyond



**Gary Fischer**  
Project Production Institute  
PPI Energy Working Group Chair



**Paul Massih**

5 MAY 2020



- The COVID-19 global pandemic has highlighted shortcomings and risk of supply chain decisions made with the aim to reduce cost. Specifically, how the adoption of “Just in time” by manufacturers has driven reduction of intermediate storage and “global sourcing” has driven supply from distant low-cost sources.
- The current upheaval in supply chains has raised several questions: how “resilient” are the supply chains for capital projects? Some sectors rely heavily on supply from one country, is that wise? What can and should project leaders do to minimize the impact of supply chain disruption on their projects or provide agility to handle unforeseen circumstances?





# Does Agile Apply to Capital Projects?



**Edward Pound**  
Executive Director  
Project Production Institute



**Martin Fischer**  
Stanford University



**Ben Amaba**  
IBM

6 NOVEMBER 2020



- Based on reported success using Agile for software development in their IT Departments, executives are looking at more widespread application of Agile in their companies
- One such application is the design and construction of capital assets. However, software development projects and capital projects are fundamentally different for a myriad of reasons
- Capital project owners should determine if Agile is suitable for capital project delivery efforts and use the options that achieve best possible project delivery outcomes





## How to Achieve Project Objectives During COVID-19

### Panelists



Jim Banaszak, PhD  
McKinsey & Company



James Choo, PhD  
Strategic Project Solutions



David Parker  
Cloudleaf



# Supply Chain Resiliency During COVID-19 and Beyond

04 August 2020

## Panelists



**Gary Fischer**

Project Production Institute



**Phil Kaminsky, PhD**

Amazon, UC Berkeley



**Paul Massih**

Strategic Project Solutions



**Mark Spearman, PhD**

Project Production Institute



59:54

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PPI Virtual Conference Series  
**Does Workface Planning Work?**



48:02

▶

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59:31



PROJECT PRODUCTION INSTITUTE

Virtual Conference Series

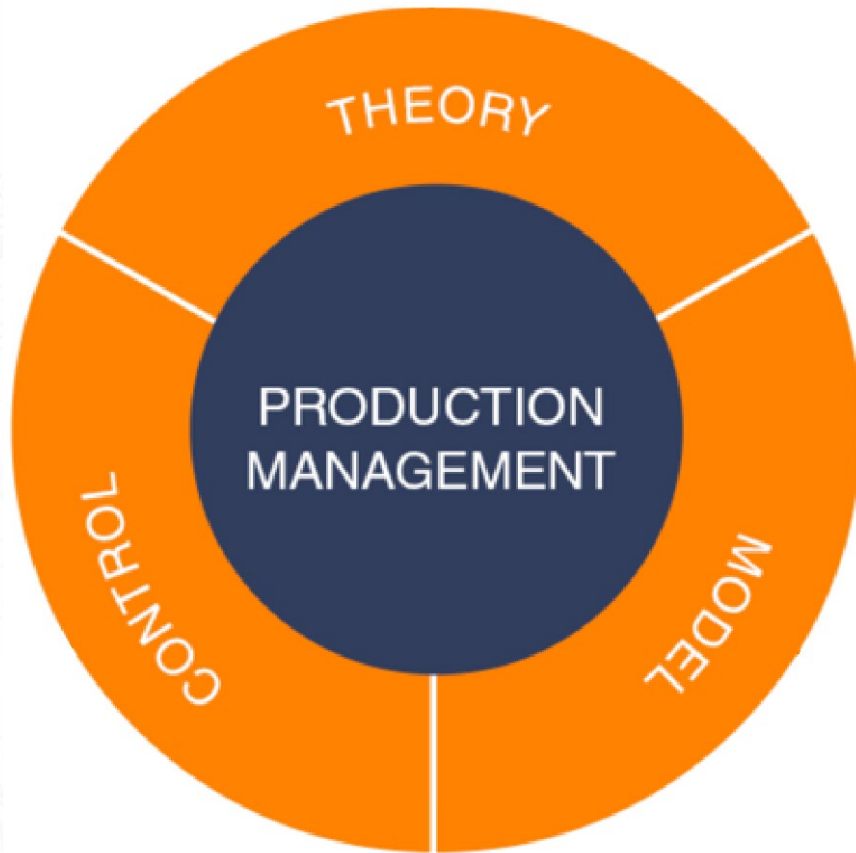
# Does CPM Scheduling Work?



# Earned Value Management

January 2020





**H. Glenn Ballard, PhD**  
UC BERKELEY



**H.J. James Choo, PhD**  
PROJECT PRODUCTION  
INSTITUTE



**Martin Fischer, PhD**  
STANFORD UNIVERSITY



**Phil Kaminsky, PhD**  
UC BERKELEY



**Hatem Nasr, PhD**  
KUWAIT OIL COMPANY



**Shekar Natarajan**  
AMERICAN EAGLE OUTFITTERS,  
INC.



**Mark L. Spearman, PhD**  
TECHNICAL DIRECTOR  
PROJECT PRODUCTION  
INSTITUTE

**Stanford**  
ENGINEERING

Center for Integrated Facility Engineering

**Berkeley**

Industrial Engineering  
& Operations Research  
COLLEGE OF ENGINEERING







# CAL POLY

## CM421 - Advanced Project Management (Delivery)



**Stanford**  
**ENGINEERING**

| Center for Integrated Facility Engineering

# CEE241 – Managing Fabrication and Construction Project Production Management



# Certification Programs



Center for Integrated Facility Engineering



Construction Management

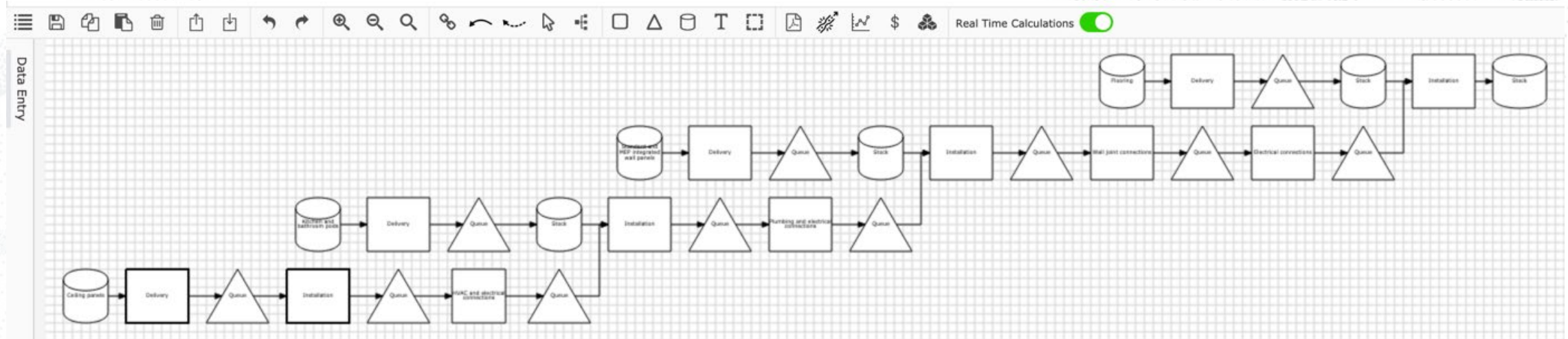


Construction Sciences









# Project Production Mapper



# Symposium Agenda





# 2020 PPI Achievement Award



Contribution and Thought Leadership in PPM

Presented at the Annual PPI Symposium

Academics & Practitioners







**H. Glenn Ballard, PhD**

UC BERKELEY



**Gary Fischer**

PROJECT PRODUCTION INSTITUTE  
PPI ENERGY WORKING GROUP CHAIR



**Martin Fischer, PhD**

STANFORD UNIVERSITY



**David McKay**

PPI ENERGY WORKING GROUP



**Mark L. Spearman, PhD**

TECHNICAL DIRECTOR  
PROJECT PRODUCTION INSTITUTE



**Jennifer Weitzel**

MICROSOFT





# 2020 PPI TECHNICAL ACHIEVEMENT AWARD



Phil Kaminsky, PhD

Earl J. Isaac Professor in the Science and  
Analysis of Decision Making

Industrial Engineering & Operations Research

UC Berkeley



# Could we ever have imagined 2020?

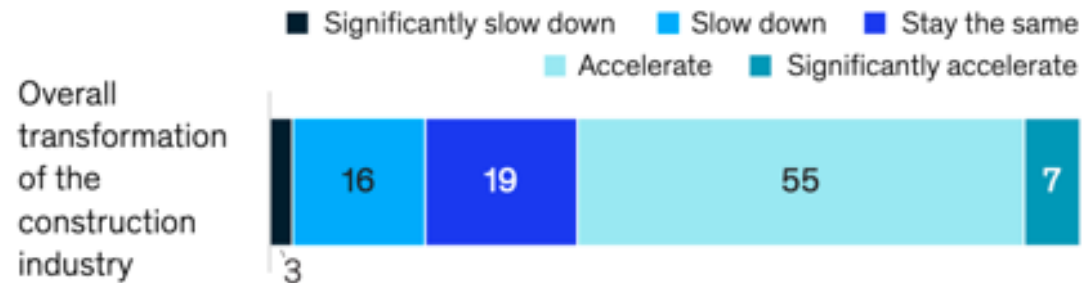




# There is a Silver Lining

**As a result of COVID-19, do you believe that transformation of the construction industry will accelerate, stay the same, or slow down?**

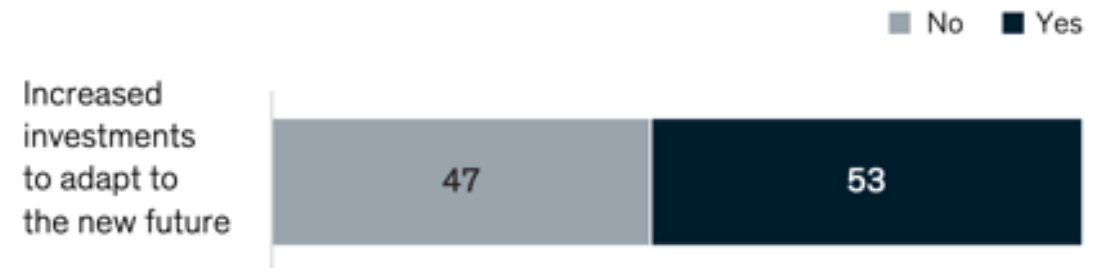
Share of respondents, %



Source: McKinsey & Company, Survey of 100 CxOs, May 2020

**As a result of COVID-19, has your company increased overall investments to adapt to the new future?**

Share of respondents, %



# What If?

Projects were predictable

Schedules improved by 30-50%

Actual costs reduced by 20-50%

ROI improved 50%

# Upstream Projects Fail at an Alarming Rate

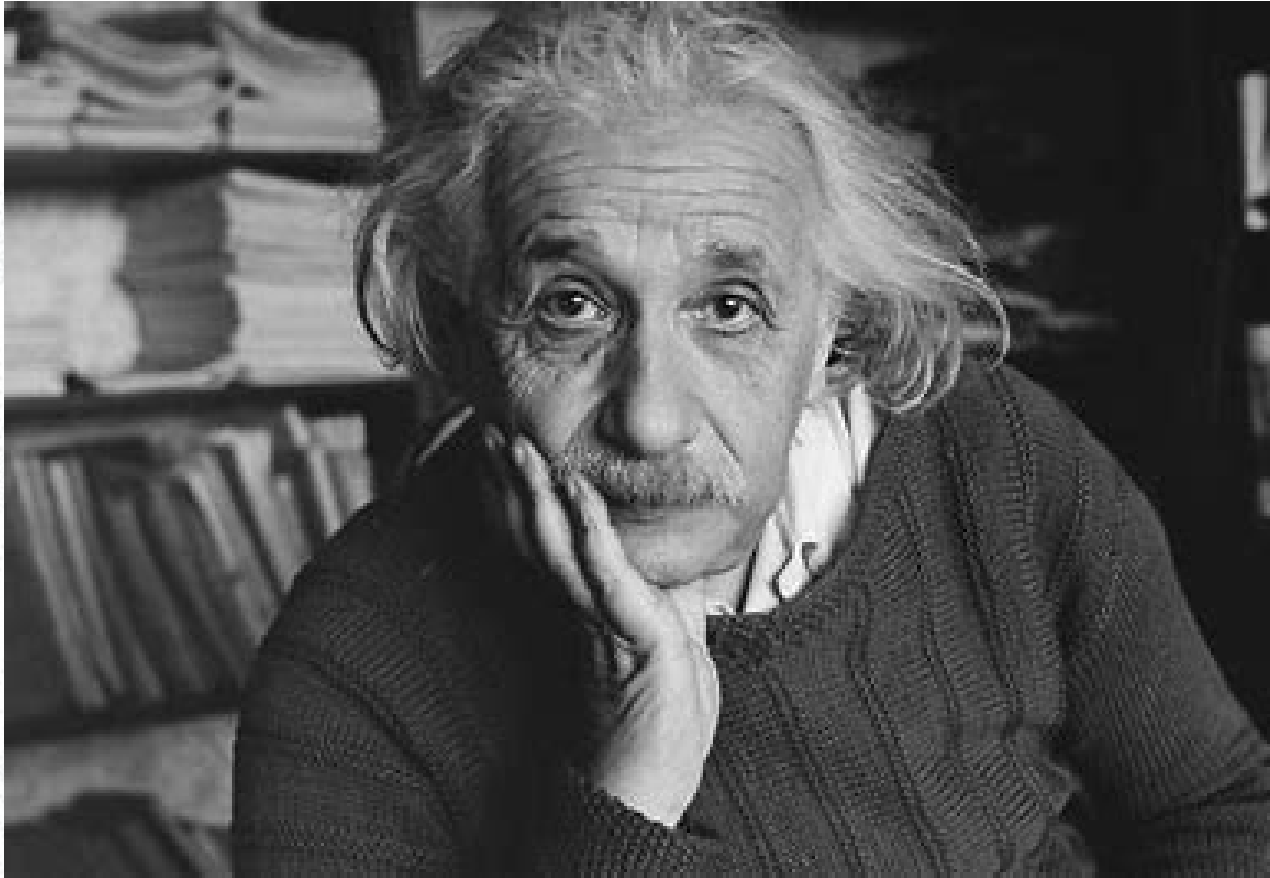
48%	21%	9%
Met cost or schedule	Met both cost and schedule	Met cost, schedule and attainment

Source: Independent Project Analysis, 2018



# Guaranteed with Current Practice





“If you always do what  
you always did, you’ll  
always get what you  
always got.”



## Customer Success – Adelaide Aqua Desalination Plant

## CHALLENGE

## Recover schedule for \$1.83bn desalination plant



## RESULTS

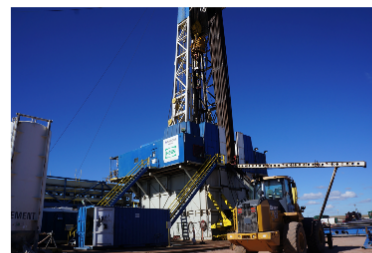
**Delivered ahead of planned schedule**

Milestone	Program Date	Actual Date	Variance
SP-1 Practical Complete	03 Aug 12	19 July 12	15 days
SP-1 Project Handover	12 Sep 12	28 Aug 12	15 days
SP-2 Practical Complete	12 Nov 12	25 Oct 12	18 days
SP-2 Project Handover	22 Dec 12	04 Dec 12	18 days

## Customer Success – Onshore Field Development

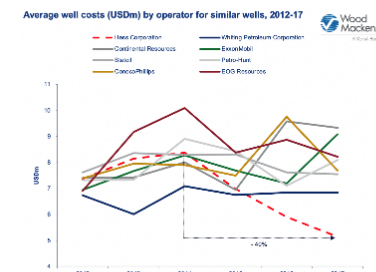
## CHALLENGE

Reduce cost and use of cash for well delivery onshore



## RESULTS

Well cost reduced ~50%



### Customer Success – Gorgon LNG (Trains 2 & 3)

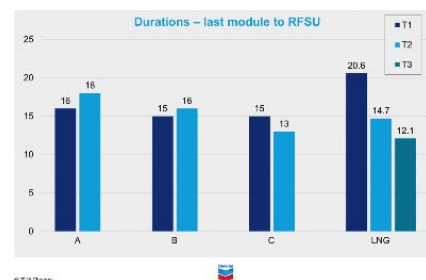
## CHALLENGE

## Recover schedule for \$55bn Liquefied Natural gas plant



## RESULTS

**Reduced schedule duration by 58%**



## 2: Impact story: Implementing PPM enabled a basic materials client to accelerate schedule

### Situation

**Investment in new technology** critical to the future of the enterprise. Scope creep and delays in delivery of equipment were **causing slippage** which could ultimately lead to an erosion of the competitive advantage which was the purpose of the investment

## Challenges

**Highly complex mega-project**  
Engineering scope was **not fully defined, aligned or, worst case, known**  
Project team lacked an **integrated view of project status**  
**Focus on excuses and blame**, not on addressing the root causes for delays in task execution

### Approach

Production control sequencing of construction activities **uncovered a critical sequence of events not previously anticipated and enabled mobilization of resources to accelerate the supply chain**

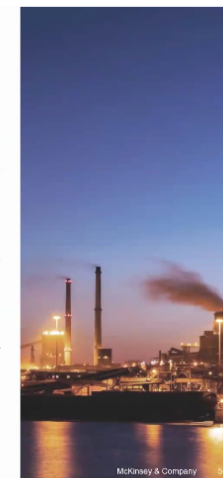
**Drove field productivity** through continuous improvement sessions on critical operations

**Stood up new organization** with new director and responsible area managers in cross functional teams working collaboratively with contractors, suppliers and engineers

**Changed the mindset of the project team** from “reporting activities” to “driving results”

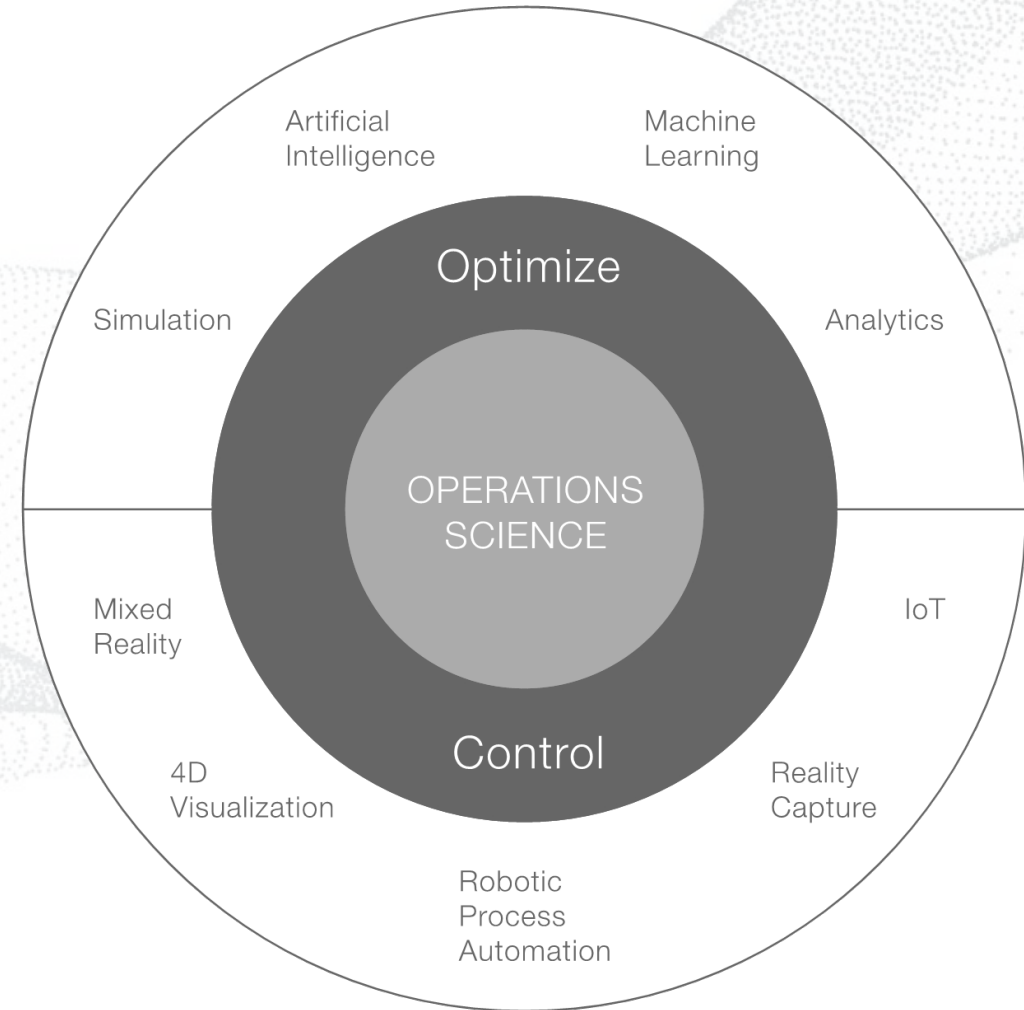
## Results...

<b>~3 month</b>	<b>+125</b>
schedule acceleration on 12 month remaining schedule (25%)	% field productivity improvement





# PPM FRAMEWORK



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# What you are going to hear today





Climb on board? / be left behind?



# KEYNOTE



## Anil Seth, PhD

Professor of Cognitive and Computational Neuroscience

Co-Director, Sackler Centre for Consciousness Science

Co-Director, CIFAR Program on Brain, Mind, and  
Consciousness

Editor-in-Chief, Neuroscience of Consciousness

Engagement Fellow, Wellcome Trust

University of Sussex, UK