



Rice Global E&C Forum  
**Engineering &  
Construction**



# 2017 RICE GLOBAL E&C ANNUAL FORUM



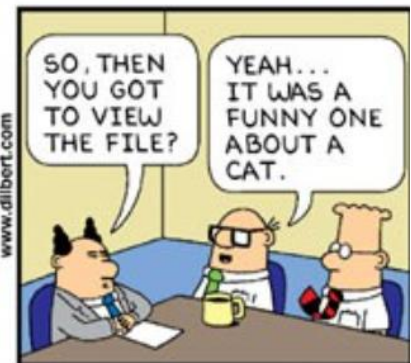
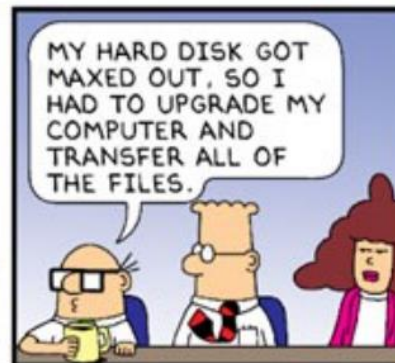
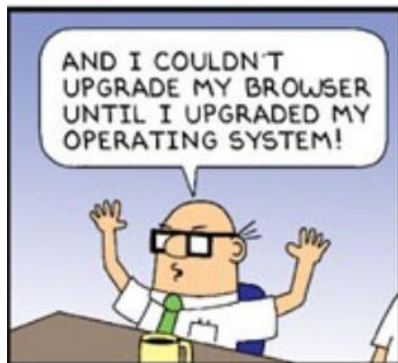
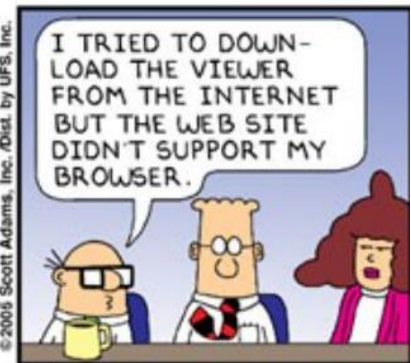
## **Getting to EPC 4.0**

### **An Interactive Panel Discussion**

*Moderator: Dick Westney*

[www.forum.rice.edu](http://www.forum.rice.edu)

# Upgrades are never easy!



# Tough Questions

Search

I'm Feeling Lucky

*Where does the industry need to go?*

*Do we all share the same vision?*

*What's being done to get there?*

*Are we moving in the right direction?*

*How well have the changes we have  
already made been working?*

# Meet our panel



**Chaitali Dave: Director of Strategic Sourcing**



**Manuel Junco: SVP & General Manager,  
Transformation, Strategy & Innovation**



**Blake Moore: (ret.)**



**Blake Consulting, LLC**



**Jim Rammell: VP, Corporate Construction  
Operations**



**Amish Sabharwal: Executive VP, Americas**

# Our format for each topic



**POLLING**



**PANEL**



**AUDIENCE**

# Our Topics for Today



1. HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?
2. ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?
3. CAN WE TAKE SAFETY TO THE NEXT LEVEL?
4. HOW DO WE BUILD THE WORKFORCE OF TOMORROW?
5. DO WE NEED TO BRING BACK THE BASICS?
6. CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?

# TOPIC #1



**HOW CAN WE IMPROVE  
ENGINEERING &  
CONSTRUCTION  
PRODUCTIVITY?**

# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?



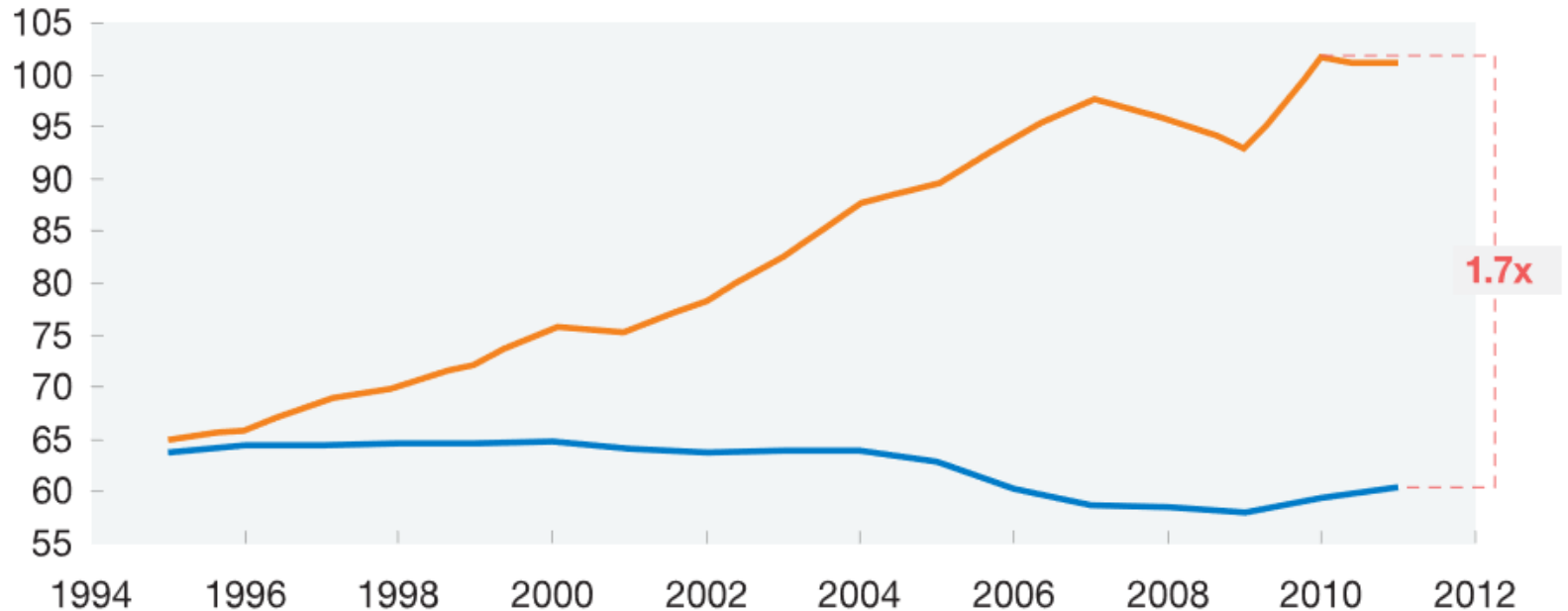
## Overview of productivity improvement over time

Productivity (value added per worker), real, \$ 2005

— Manufacturing  
— Construction

Source: McKinsey: The Construction Productivity Imperative

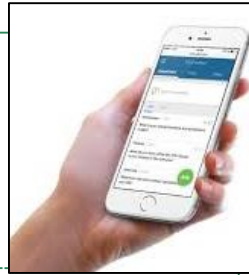
\$ thousand per worker



Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database



# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?



## Polling Question #1

**What are the root causes of low productivity?**

- 1. The industry has an old-fashioned mindset and is resistant to change.**
- 2. The owner/contractor commercial model does not reward investment in innovation.**
- 3. Construction projects are seen as one-off, so resistant to the improvements possible in manufacturing (continuous operation).**
- 4. There just aren't any new/better ways to do things.**

# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?

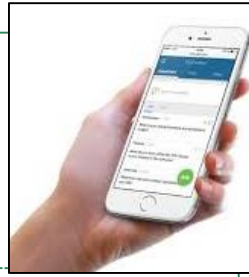


## Discussion question #1:

### Why are we not improving productivity?

- Has technology apparently failed to improve it?
- Have training programs failed to improve it?
- Are owners over-emphasizing short-term commitments to low price bidders?
- Are contractors failing to invest in their people?
- Are the demographics working against us?
- What are we missing here?

# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?



## Polling Question #2

### How can we improve productivity?

1. Technology is the answer!
2. Better training and an expanded workforce
3. New types of contracts that reward productivity
4. More widespread use of enhanced planning, PM, and construction techniques
5. Adopt more ideas from manufacturing (eg, “lean”)
6. We can’t improve it – get used to it!

# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?



## Discussion question #2:

### What are the trends for productivity?

- Do we see it improving? What might drive that?
- Do we see same low level, or even more decline? What might drive that?
- What is the single most important thing we should do?
- Is there a case for disruption?

# HOW CAN WE IMPROVE ENGINEERING & CONSTRUCTION PRODUCTIVITY?



## Questions & Discussion



# TOPIC #2



**ARE WE MAKING  
INTELLIGENT USE OF  
TECHNOLOGY?**

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**Drones**

**BIM (Building Information  
Modeling Systems)**

**Smart 3D modeling**

**3D Printing**

**Internet of Things**

**Cloud Collaboration**

**Nano- and materials  
technology**

**Virtual & Augmented  
Reality; Virtual Design &  
Construction**

**Machine Learning/  
Knowledge-Based Systems**

**Robotics**

**Wearable Computing**

**Big Data**

**Digitization**

# ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?



## Polling Question #1

**How would you rate the construction industry in terms of adapting new technology?**

- 1. We lag far behind manufacturing, farming, and other industries.**
- 2. We're actually doing a lot more than we get credit for.**
- 3. We are doing a lot with technology but we don't seem to see any real improvements.**
- 4. Engineering and construction are low-tech operations and have no room for new technology.**
- 5. I'm planning to retire soon – so who cares?**



# ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?



## **Discussion question #1:**

**What is keeping us from making more effective use of new technology?**

- **Contracting & procurement models? (who pays, who takes the risk, who gets the reward)**
- **Culture?**
- **New technology not really a good fit?**
- **Steep learning curve and hard to retain the learning**
- **No one wants to go first**

# ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?



## **Polling Question #2**

### **What technologies offer the best opportunities?**

- 1. Cloud-based computing**
- 2. Robotics**
- 3. Watson in the lead for project teams**
- 4. Virtual reality**
- 5. Digitization**
- 6. Smart 3-D modeling**
- 7. Other (if you pick this I will call on you!)**

# ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?



## Discussion question #2:

**What is your organization doing to implement new technology?**

- What are the results so far?
- How are you measuring the degree of improvement?
- What were your biggest barriers and how did you overcome them?
- Lessons learned?

# ARE WE MAKING INTELLIGENT USE OF TECHNOLOGY?



## Questions & Discussion

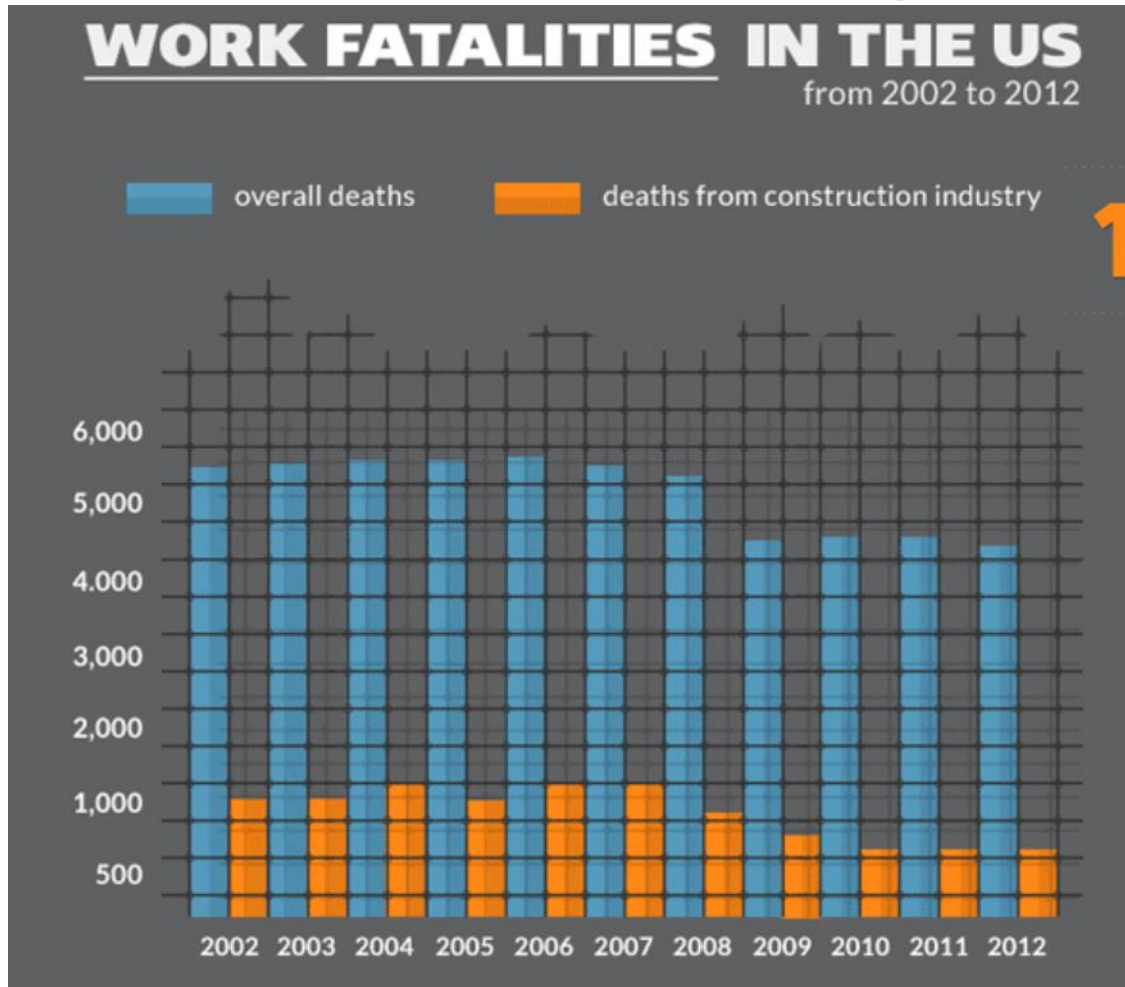


# TOPIC #3



**CAN WE TAKE SAFETY TO  
THE NEXT LEVEL?**

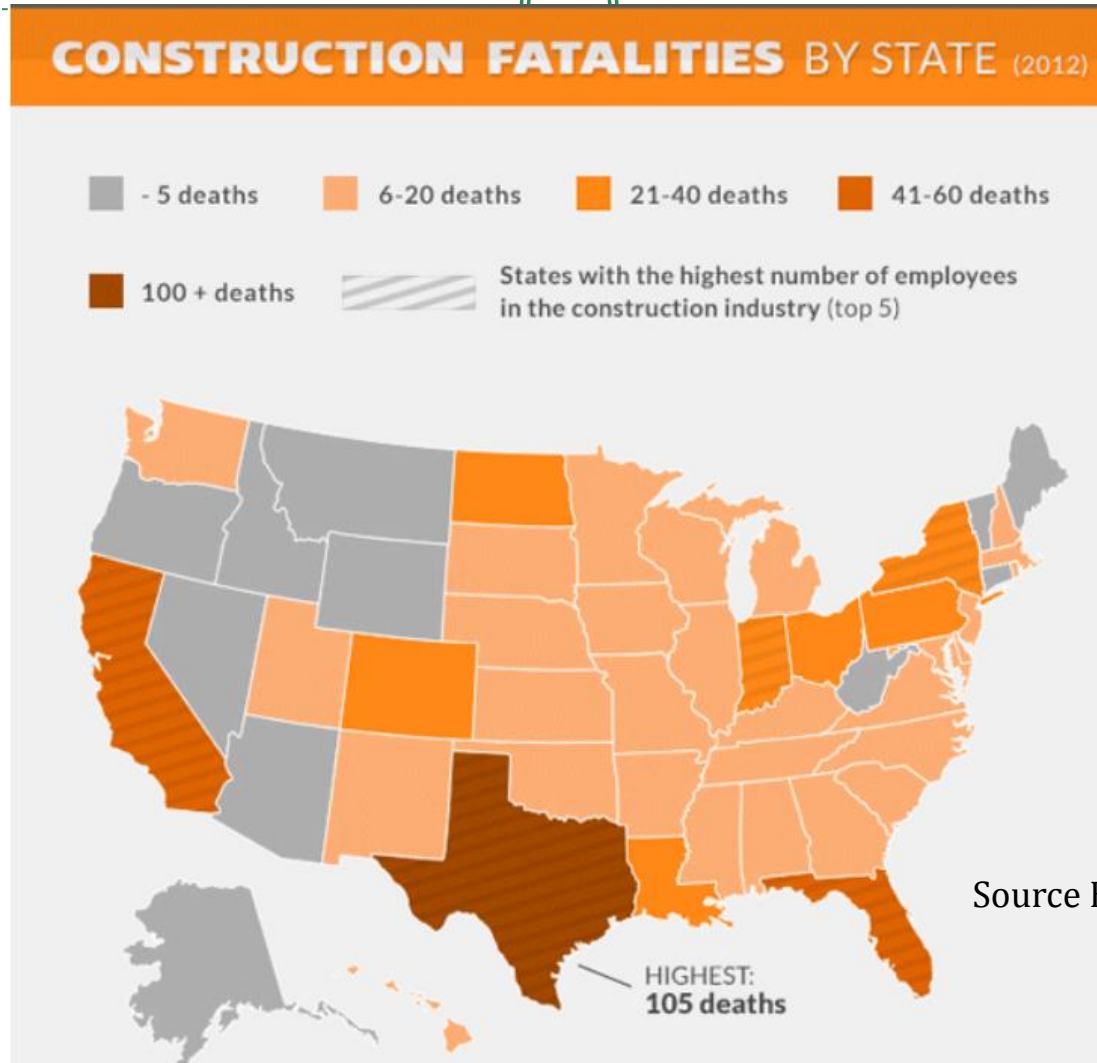
# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



**19.5%** OF ALL WORK DEATHS  
FROM THAT DECADE WERE FROM THE  
CONSTRUCTION INDUSTRY

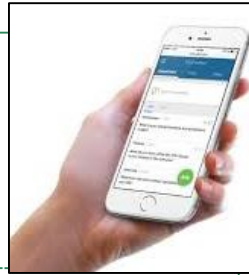
Source EHS Today, April 2014

# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



Source EHS Today, April 2014

# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



## Polling Question #1

**With which of these statements do you most agree?**

- 1. We have made astounding progress, but there is a lot more we can do, our statistics are leveling off.**
- 2. We have a great track record but construction is inherently dangerous and there will inevitably be injuries and fatalities.**
- 3. We have transformed the industry in the past 30 years, and the transformation continues.**
- 4. We have improved the industry but not yet transformed it; transformation is needed and it is possible.**



# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



## **Discussion question #1:**

**What is keeping us from improving safety still further?**

- **Are owner & contractor roles, responsibilities and accountability properly defined?**
- **Are there new methods or technologies available today that are underutilized?**
- **Are we fighting a losing battle against the loss of experienced craft and supervision?**

# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



## Polling Question #2

**What strategies offer the best opportunities to further improve safety?**

1. Better training
2. Better personal protection equipment
3. Increased safety awareness and stronger culture
4. More visible top-down leadership
5. More incentives
6. Other ideas (beware – you could get called on!)

# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



## Discussion question #2:

**What is your organization doing to continuously improve safety performance?**

- What are the results so far?
- How are you measuring the degree of improvement?
- What were your biggest barriers and how did you overcome them?
- Lessons learned?

# CAN WE TAKE SAFETY TO THE NEXT LEVEL?



## Questions & Discussion



# TOPIC #4



## HOW DO WE BUILD THE WORKFORCE OF TOMORROW?

# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?



## **The labor shortage will continue to plague the industry**

This trend is lingering after a huge chunk of the construction workforce were forced to leave the industry for other jobs during the recession when their work disappeared. Between April 2006 and January 2011, the construction industry eliminated more than 40% of its work force, cutting nearly 2.3 million jobs. Unfortunately, a significant portion of those workers haven't returned.

A lack of technical training in schools and less emphasis on the trades are also contributing to a smaller pool of workers entering the industry. Combined with an aging workforce, those factors are creating a struggle for construction firms seeking employees for positions ranging from skilled trades to managerial roles.

**Things really look bad!** Source: Construction DIVE, Jan 2017

# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?



**So are things really so bad?**

Bureau of Labor Statistics, Current Employment Statistics survey, October 06, 2017.  
Most recent 2 months of data are preliminary.

# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?



## Polling Question #1

**With which of these statements do you most agree?**

- 1. We have lost a lot of people, but we have the engineering and construction people we need now and for foreseeable future.**
- 2. No one wants to work construction anymore, and this problem will only get worse.**
- 3. Robotics will save the day, making up for lost people**
- 4. Construction work is a great career choice and opportunity – we just need to get the message out!**



# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?

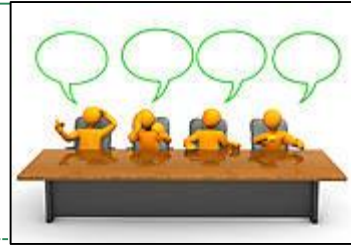


## Discussion question #1:

### What are we doing about the engineering workforce?

- What happens when the market turns and demand increases?
- What role will overseas value centers play in the years ahead?
- How will engineering software tools change the demand/supply balance?
- To what extent do current contracting models inhibit investment in new engineering talent?
- What is your company doing?

# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?



## Discussion question #2:

### What are we doing about the construction workforce?

- How big a problem is this – in the US, overseas?
- How do you see the long term trends for demand and availability – in the US, overseas?
- Are the various vocational training programs effective? What role should owners and contractors play in designing and funding these, and committing to employing graduates?
- What is your company doing?

# HOW DO WE BUILD THE WORKFORCE OF TOMORROW?



## Questions & Discussion



# TOPIC #5



**DO WE NEED TO BRING BACK  
THE BASICS?**

# DO WE NEED TO BRING BACK THE BASICS?

As opportunities are growing, much of the available talent is reaching retirement age. These factors are creating an extraordinarily positive jobs outlook for skilled project professionals.

By 2027, employers will need **87.7 million** individuals working in project management-oriented roles.



2017

2019

2021

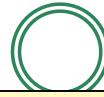
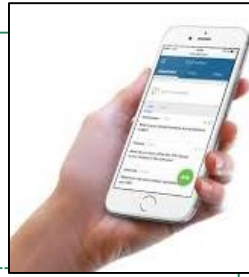
2023

2025

2027

Source: PMI

# DO WE NEED TO BRING BACK THE BASICS?



## Polling Question #1

**With which of these statements do you most agree?**

- 1. PM is becoming a lost art ... there is no substitute for experience and all the experience has left/is leaving the industry.**
- 2. The old school of PM no longer works – projects, and demographics are just too different. A new breed of PM is emerging.**
- 3. We now rely so heavily on software that critical thinking skills are being lost and we see projects suffering as a result.**
- 4. The expanded curricula in universities is having a positive effect, and qualified PMs are entering the industry.**

# DO WE NEED TO BRING BACK THE BASICS?

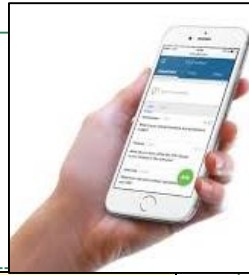


## **Discussion question #1:**

**To what extent are projects suffering from lost PM basics and critical thinking skills?**

- Is this a serious problem?
- How do owner and contractor perspectives differ?
- To what extent are trends to changing roles for owners and contractors impacting this trend?
- Is a new generation of PM emerging? What are their most important characteristics?

# DO WE NEED TO BRING BACK THE BASICS?



## Polling Question #2

### Which PM competency is most lacking today?

1. Functional integration
2. Leadership skills
3. Technical/engineering management
4. Construction management
5. Owner/contractor relationship management
6. Stakeholder alignment
7. Cost estimating and control
8. Planning/scheduling and productivity performance mgmnt
9. Risk management
10. Timely, critical decision-making



# DO WE NEED TO BRING BACK THE BASICS?



## Discussion question #2:

**What is your organization doing to improve PM competencies?**

- What are the results so far?
- How are you measuring the degree of improvement?
- What were your biggest barriers and how did you overcome them?
- Lessons learned?

# DO WE NEED TO BRING BACK THE BASICS?

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## Questions & Discussion

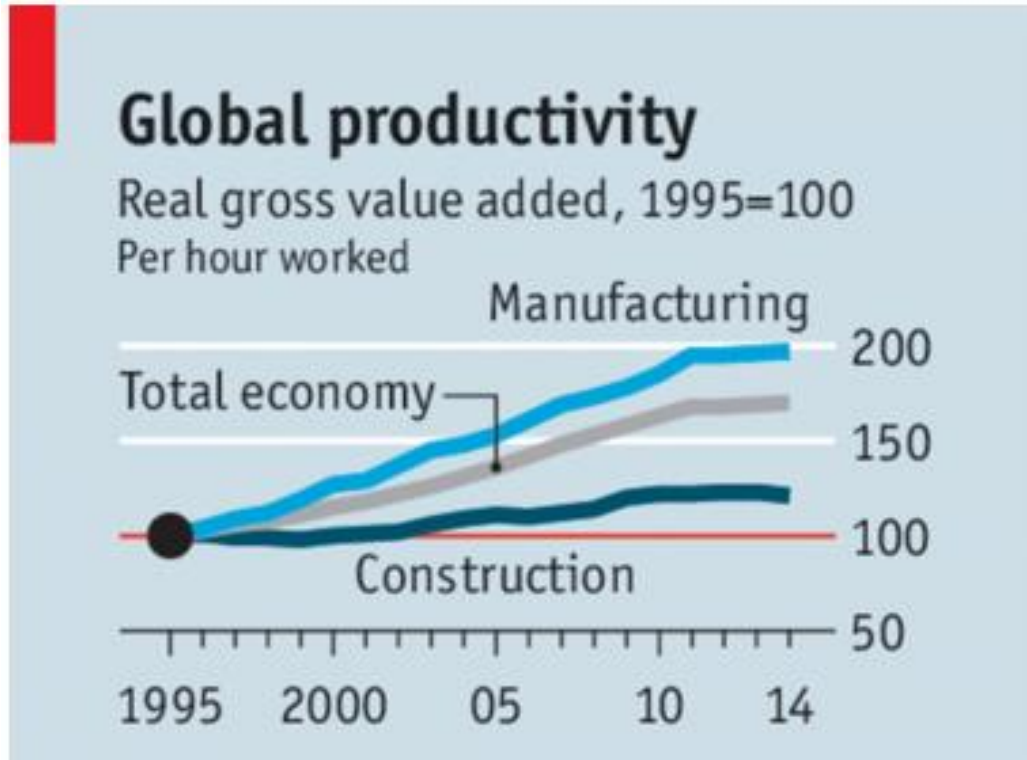


# TOPIC #6



**CAN WE EVER IMPROVE THE  
OWNER/ CONTRACTOR  
INTERFACE?**

# CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?



“... in America, construction productivity has plunged by  $\frac{1}{2}$  since the late 60’s ... no industry has done worse.”

The Economist, Aug. 2017

# CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?



## Polling Question #1

**With which of these statements do you most agree?**

- 1. Increased levels of trust are resulting in improved owner/contractor working relationships.**
- 2. Owners are coming to rely more heavily on contractor experience, insights, engineering solutions and expertise.**
- 3. The level of trust between owners and contractors is lower than ever.**
- 4. Trust and a spirit of cooperation can be established at management levels, but are often lost during the procurement process.**

# CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?



## **Discussion question #1:**

**What is your view of the current trends in owner/  
contractor trust and working efficiency?**

- **How are things changing and what is driving the change?**
- **Who is leading the change?**
- **What are the most difficult mindsets and behaviors to change?**

# CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?



## **Discussion question #2:**

**What is the single most important thing owners can & should do to improve the level of trust and cooperation?**

## **Discussion question #3:**

**What is the single most important thing contractors can & should do to improve the level of trust and cooperation?**

# CAN WE EVER IMPROVE THE OWNER/ CONTRACTOR INTERFACE?



## Questions & Discussion





# *Thank You!*

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