CII South Africa Launch
CII’s Impact on Capital Projects

May 21, 2015
University of Pretoria

Stephen P. Mulva, Ph.D.
Associate Director, CII
QUESTION 1:
Which factor most influences an owner’s project NPV?

A. Contract Type
B. Working Relationships
C. Front End Planning
D. Planning for Startup

Bar chart showing:
- Contract (N=92) with 20.3% influence
- Work Rel. (N=44) with 33.8% influence
- FEP (N=187) with 6.1% influence
- Plan for S/U (N=400) with 3.4% influence
Experience is what you get when you didn’t get what you wanted.

– Randy Pausch
QUESTION 2:
What percentage of key business personnel are NOT involved in a project?

A. 8%
B. 13%
C. 22%
D. 43%
Whenever an individual or a business decides that success has been attained, progress stops.

– Thomas J. Watson
QUESTION 3:
The 40% most profitable projects make ______% of an EPC contractor’s total profits.

A. 60%
B. 85%
C. 140%
D. 280%
High expectations are the key to everything

– Sam Walton
### QUESTION 4:
Which role has the biggest impact on project schedule performance?

<table>
<thead>
<tr>
<th>Role</th>
<th>Percent Variation Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. CEO</td>
<td>22.9%*</td>
</tr>
<tr>
<td>B. Project Sponsor</td>
<td>21.7%*</td>
</tr>
<tr>
<td>C. Finance Manager</td>
<td><strong>35.4%</strong></td>
</tr>
<tr>
<td>D. Contract/Legal Mgr.</td>
<td>11.8%*</td>
</tr>
<tr>
<td>E. Project Controls Mgr.</td>
<td>33.5%</td>
</tr>
<tr>
<td>F. Engineering Team Leads</td>
<td>33.1%</td>
</tr>
<tr>
<td>G. QA/QC Manager</td>
<td>29.5%</td>
</tr>
</tbody>
</table>

* Not Significant at $\rho > 0.1$

$N = 39$
It isn’t what we know that gives us trouble, it’s what we know that ain’t so

– Will Rogers
CII History

- CII is an Organized Research Unit (ORU) of the Cockrell School of Engineering at the University of Texas at Austin

- Founded in 1983 by 29 companies; now 143 members

- Purpose is to MEASURABLY improve the delivery of capital facilities
CII Principles

- Place a premium on safety, ethics, professionalism, and excellence.
- Be results driven.
- Maintain the correct owner–contractor balance.
- Focus on research and dissemination activities that will improve capital project safety, cost, schedule, quality, and sustainability.
- Lead industry improvement through an engaged membership.
- Provide individual leadership development and professional development opportunities.
- Publish work that conforms to high quality standards.
- Promote a high level of knowledge transfer.
- Maintain small professional staff.
CII Today

- 143 member companies
- Working with more than 55 universities, 700+ research publications
- 20 active research teams
- 14 standing committees
- 12 active communities of practice
- Thousands of active participants
Owner CII Members

Abbott  General Electric  Procter & Gamble
Ameren  General Motors  Public Service Electric & Gas
American Transmission  GlaxoSmithKline  Reliance Industries
Anadarko Petroleum  Global Infrastructure Partners  SABIC
Anglo American  Huntsman  Sasol Technology
Anheuser-Busch InBev  Intel  Shell Global Solutions US
Aramco Services  Irving Oil  Smithsonian Institution
ArcelorMittal  Kaiser Permanente  Southern Company
Architect of the Capitol  Koch Industries  Statoil
BP America  LyondellBasell  SunCoke Energy
Cargill  Marathon Petroleum  Tennessee Valley Authority
Chevron  NASA  TransCanada
ConocoPhillips  NOVA Chemicals  U.S. Army Corps of Engineers
Consolidated Edison  Occidental Petroleum  U.S. Dept. of Commerce/NIST/EL
Dow Chemical  ONEOK  U.S. Dept. of Defense/Tricare Mgmt.
DTE Energy  Ontario Power Generation  U.S. Dept. of Energy
Eastman Chemical Company  Petrobras  U.S. Dept. of State
Ecopetrol S. A.  PEMEX  U.S. Dept. of Veterans Affairs
Eli Lilly  Petronas  U.S. General Services Administration
Enbridge  Phillips 66  Vale
Eskom Holdings  Pioneer Natural Resources  The Williams Companies
ExxonMobil  Praxair
Contractor CII Members

Aecon Group
Affiliated Construction Services
Alstom Power
AMEC
AZCO
Autodesk
Baker Concrete Construction
Barton Malow
Bechtel Group
Bentley Systems
Bilfinger Industrial Services
Black & Veatch
Burns & McDonnell
Cannon Design
CB&I
CDI Engineering Solutions
CH2M HILL
Coreworx
CSA Central
Day & Zimmermann
Dresser-Rand Company
Emerson Process Management
Enstoa
eProject Management
Faithful+Gould
Fluor
Foster Wheeler USA
Gross Mechanical Contractors
Hargrove Engineers + Constructors
Hilti
Honeywell
IHI E&C International
IHS
International Rivers Consulting
Jacobs
JMJ Associates
JV Driver Projects
KBR
Kiewit
Lauren Engineers & Constructors
Leidos Constructors
Matrix Service
McCarthy Building Companies
McDermott International
Midwest Steel
Parsons
Pathfinder
PCL Constructors
POWER Engineers
PTAG
Quality Execution
Richard Industrial Group
The Robins Morton Group
S&B Engineers & Constructors
SBM Offshore
Skanska USA
SNC-Lavalin
Supreme Group
Technip
Tenova
TOYO-SETAL Engenharia
UniversalPegasus International
URS
Victaulic
Walbridge
Wanzek Construction
The Weitz Company
WESCO International
Wilhelm Construction
Wilbros United States Holding
Wood Group Mustang
WorleyParsons
Yates Construction
Zachry Holdings
Zurich
Construction Industry Institute
Leading Research Universities

University of Alabama
Arizona State University
University of Arkansas
Auburn University
Baylor University
Bucknell University
University of California - Berkeley
Carnegie Mellon University
University of Cincinnati
Clemson University
University of Colorado-Boulder
Colorado State University
Columbia University
Drexel University
East Carolina University
University of Florida
Florida International University
University of Houston
University of Illinois
Illinois Institute of Technology
Iowa State University
University of Kansas
University of Kentucky
Lehigh University
University of Maryland
University of Michigan
University of Milwaukee-Wisconsin
Michigan State University
Mississippi State University
University of New Mexico
North Carolina State University
North Dakota State University
Northeastern University
Ohio University
Oklahoma State University
Oregon State University
The Pennsylvania State University
University of Pittsburgh
Purdue University
Polytechnic University of New York
San Diego State University
San Jose State University
Stanford University
State University of New York-Albany
Vanderbilt University
Virginia Tech
**The University of Texas at Austin***
Texas A&M University
Tsinghua University
University of Washington
University of Waterloo
University of Wisconsin-Madison
Worcester Polytechnic Institute

* Headquarters and founding university
CII Global Affiliates Network

- COAA
- CII
- CE-EPC
- CII-KFUPM
- Project Norway
- ECI
- KICT
- Project Asia
- CII South Africa
CII Knowledge Processes

Knowledge Creation
- Research to define best practices, breakthroughs, and industry norms.

Knowledge Management
- Dissemination through publications, implementation guides, educational materials, workshops, and conferences.

Knowledge Dissemination
- Management, organization, and assessment of the 700+ CII publications; oversight of Communities of Practice.

Knowledge Assessment
- Assessment of the impact of CII practices through benchmarking.
CII Practices (Research Findings)

**Project Planning Phase**
- Attract and Maintain Skilled Workers
- Automated Identification
- Effective Use of Global Engineering Workforce
- Environmental Remediation Management
- Equitable Risk Allocation
- International Project Risk Assessment
- Leader Selection
- Modularization/Preassembly
- Organizational Work Structure
- Project Delivery and Contract Strategies
- Project Security
- Project Teams
- Technology Implementation
- Value Management
- Work Process Simulation

**Design/Construction/Start-up Phases**
- Craft Productivity Practices
- Design for Maintainability
- Design for Safety
- Engineering Productivity Measurement
- Piping Design

**Project Life Cycle**
- Cost & Schedule Control
- Employee Incentives
- Fully Integrated & Automated Project Processes (FIAPP)
- Information Integration
- Management of Education & Training
- Managing Workers’ Compensation
- Project Health Assessment
- Small Projects Execution
Best Practices

Processes or methods that, when executed effectively, lead to enhanced project performance.

To qualify, a practice must be sufficiently proven through extensive industry use and/or validation.

• Front End Planning
• Alignment
• Constructability
• Lessons Learned
• Materials Management
• Team Building
• Planning for Start-up

• Partnering
• Quality Management
• Change Management
• Disputes Resolution
• Zero Accidents Techniques
• Implementation of Products
• Benchmarking & Metrics
• Project Risk Assessment
Use of CII Practices

Begins with strong leadership; ends with improved performance.

Corporate Strategy
- Leadership
- Improvement culture
- Funding
- Incentive
- Dedicated team
- Implementation Champion(s)

Project Level Use of Best Practices (Tactical)
- Front End Planning
- Zero Accidents Techniques
- Constructability

Project Performance (Bottom Line)
- Cost
- Schedule
- Safety
- Quality
- Change
TRIR Rates

*OSHA Construction Division, NAICS 236-238 (SIC 15-17)
CII’s Overall Impact – Cumulative Number of U.S. Recordable Incidents Avoided
CII Research – The Results

- 190 Research Teams
- Over 700 Publications
- 60 Industry Focus Areas
### RTs by Knowledge Area & Time

<table>
<thead>
<tr>
<th>Knowledge Area</th>
<th>Total Number of RTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>06 - Human Resources Mgmt</td>
<td>25</td>
</tr>
<tr>
<td>08 - Business &amp; Project Processes</td>
<td>25</td>
</tr>
<tr>
<td>12 - Info Mgmt &amp; Tech Systems</td>
<td>19</td>
</tr>
<tr>
<td>11 - SHE</td>
<td>18</td>
</tr>
<tr>
<td>09 - Project Controls</td>
<td>17</td>
</tr>
<tr>
<td>01 - Project Planning</td>
<td>16</td>
</tr>
<tr>
<td>07 - Project Org. &amp; Mgmt</td>
<td>15</td>
</tr>
<tr>
<td>02 - Design Optimization</td>
<td>14</td>
</tr>
<tr>
<td>10 - Risk Management</td>
<td>13</td>
</tr>
<tr>
<td>04 - Construction</td>
<td>7</td>
</tr>
<tr>
<td>03 - Proc. &amp; Mtls Mgmt</td>
<td>6</td>
</tr>
<tr>
<td>13 - Globalization Issues</td>
<td>4</td>
</tr>
<tr>
<td>05 - Facility SU and Operations</td>
<td>2</td>
</tr>
<tr>
<td>14 - Security</td>
<td>1</td>
</tr>
</tbody>
</table>

- 1984-1988
- 1989-1993
- 1994-1998
- 1999-2003
- 2004-2008
- 2009-2013
- 2014-
CII Research Cycle

CII Research Process – Topic Generation through RT Plan Approval

Key Changes/Benefits:
1. Research plan developed by academic & industry team
2. Budget/schedule developed after industry team is involved
3. Staffing commences immediately with BOA vote (no loss of momentum)
4. RT starts 4-6 months earlier
5. More formal gated process for approval

Select Academics Based on Qualifications/Interest & Fund Travel During Proposal Development

Start RT FEP Month Following BOA Vote

Go/No-Go Decision Based on Work Plan Including Budget & Schedule
CII Research Team Process

Industry Input (Domain Expertise)

Outputs
- Industry
- Conference
- RS & IR

Academic Input (Process Expertise)

Academic Body of Knowledge
New Research Teams Beginning in 2014

RT 320  Definition and Measurement of Engineering / Design Deliverable Quality

RT 321  Using Precursor Analysis to Prevent Low-frequency High-impact Events, Including Fatalities

RT 322  Improving Project Progress and Performance Assessment

RT 323  Finding Leading Indicators to Prevent Premature Starts, and Assuring Uninterrupted Construction

RT 324  Future Construction Needs of Virtual Design Models

RT 325  Best Practices for Succession Planning

RT 326  Can We Utilize Next-Gen Experience to Maximize Virtual Team Performance?

RT 327  (BTSC) Innovative Delivery Methods of Information to the Crafts
New Research Teams Beginning in 2015

RT 330 The Role of Frontline Supervision in Improving Construction Productivity and Performance

RT 331 Accessing the Maturity and Accuracy of FEED to Support Phase Gate Approvals

RT 332 Measuring the Productivity of Model-based Engineering

RT 333 Transition Management Between Construction Completion, Pre-commissioning, Commissioning, and Operations

RT 334 Best Practices for Preventing Out of Sequence Construction Activities and Minimizing Their Impacts

RT 335 Improving the U.S. Workforce Development System
Safety Research - Zero Accidents Techniques

Zero Injury Economics
Implementing Active Leading Indicators
Owner’s Role in Construction Safety

Making Zero Accidents a Reality
Real-time Pro-Active Safety in Construction
Strategies to Enhance Hazard Recognition
Safety Focus Drives Performance Improvement

Safety Research - Zero Accidents Techniques

- Zero Injury Economics
- Implementing Active Leading Indicators
- Owner's Role in Construction Safety
- Strategies to Enhance Hazard Recognition

TRIR Rates

*OSHA Construction Division, NAICS 235-238 (SIC 15-17)
Front End Planning Research

Research History

- 6 continents
- 279 organizations
- 9 research teams
- 1,017 projects studied
- 21 years
- 4,000 years’ experience
- 40 countries
- 40,000 downloads
- 157 team members
- $88 B project value
Front End Planning Research
Cost & Benefits

**Cost**
2 to 5% of total installed cost

**Savings**
$3 to $10 payback per $ spent
6 to 25% cost savings
6 to 39% schedule reduction
CII’s Special Publication 268-3

1. Introduction
2. What Can Your Organization Gain from Front End Planning
3. Front End Planning Tools
4. How to Make it Work
5. Keeping to Momentum
6. Conclusions
CII Research in the Press

The Construction Weekly
ENR
Engineering News-Record
October 18, 2010
- enr.com
The McGraw-Hill Companies
- TRANS-HUDSON RAIL TUNNEL ON LIFE SUPPORT
- HUNGARY BOOKS SLUDGE SPILL BOSS
- GREEN DEMO FOR WILLAMETTE RIVER SPAN
- WOMEN STRUGGLE FOR GAINS IN DOWN MARK

The Construction Resource
ENR
Engineering News-Record
JUNE 8, 2011
- enr.com
The McGraw-Hill Companies
- The Top 100 Project Delivery Firms
- Fighting the impulse to go hard bid (p. 23)

- RETHINKING WRENCH TIME
- THE EVOLVING SCIENCE OF KEEPING CRAFT WORKERS ON TASK

Every year, counterfeiters get away with an estimated $1 trillion in sales, including construction goods. Some copycats are virtually identical to the genuine article. Your next project could be at risk.
CII Member Resources

Research Products

- Research Summaries
- Implementation Resources
- Research Reports
CII Professional Development

- Executive Leadership Program
- Education Modules
- Courses
- Online Education
- Professional Development Continuum
- Registered Education Providers
- Web Seminars
- Custom Programs
Key Implementation Guidance

Corporate Commitment

Corporate Implementation Champion

Self Audit

Implementation Plan and Goals

Product Champions/Review Boards

Products Training

Product Implementation

Measure Results

Celebrate Success

CII Products

CII Support

Benefit/Cost Data
COPs Improve Knowledge Management, Promote Industry Learning

Knowledge Structure
- Research products
- Classified, stored
- Tends to be static
- Centrally available

Communities of Practice
- Knowledge sharing
- Interactive and dynamic
- Driven by productive inquiry
Current CII Communities of Practice (COP)

Safety (2007)
Sustainability (2007)
Globalization (2007)
Information Management (2009)
Front End Planning (2009)
Next-Generation Leaders (2010)
Risk Management (2010)
Quality Management (2011)
Federal Facilities Delivery (2011)
Modularization (2012)
Performance Assessment (2012)
Project Controls (2013)
Advanced Work Packaging (2015)
Highlighted Communities of Practice (COP)

- **Safety COP**
  - Meets monthly; second Wednesday at 10:00am CT
  - Leaders: Larry Green (BP) and John Barry, SABIC

- **Front End Planning COP**
  - Meets monthly; third Tuesday at 10:00am CT
  - Leader: Brian Kong (DOE)

- **Project Controls COP**
  - Meets monthly; second Tuesday at 9:00am CT
  - Leaders: Pat Pipping (Phillips 66) and Carl Bachman (Hargrove)
CII Performance Workshop
March 23–25, 2015

Workshop Theme:
“Leading Indicators”

- Safety
- Planning
- Organizing
- Leading
- Controlling
- Design Efficiency
- HR
- Quality
- Supply Chain
- Sustainability

Albuquerque, New Mexico
2015 Annual Conference

August 3–5
Boston, Massachusetts

New Research Findings • Member Case Studies • Guest Speakers
PERFORMANCE ASSESSMENT
“The management of capital investment has an enormous effect on profitability and competitiveness, yet few companies do it effectively. We believe that the use of evaluation tools, disciplined processes, and best practices can help companies trim capital spending by up to a quarter without reducing capacity or functionality – and improve their operating costs and revenues through better investment decisions.”
21st Century Project Context

“Old School” Project Management

Phase-Gate Based Project Management

The “Hidden” Projects

8-11% Variation
CII’s 10-10 Program (2013-Present)
10 Leading Indicators (Inputs)

CII 10-10 Performance Assessment Report
Industrial Projects - Engineering Phase
TENC12345 ~ Zydeco Chemicals Expansion

Date: Sep 10, 2014

Company: CII Engineering & Construction Co.
Project: Zydeco Chemicals Expansion
ID: TENC12345
Location: New Orleans, Louisiana, United States
Project Type: Chemical Manufacturing
Capacity: 100,000.00 short tons per day

Total Project Cost
- Local (2011): USD 275,000,000
- Chicago (2013): USD 289,382,845
- Midpoint of Phase: Dec 17, 2011
- Forecasted Phase Duration: 65.00 wks
- Actual Phase Duration: 91.29 wks

Input Measures

<table>
<thead>
<tr>
<th>Planning</th>
<th>Organizing</th>
<th>Leading</th>
<th>Controlling</th>
<th>Design Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score: 61%</td>
<td>N: 45</td>
<td>Score: 62%</td>
<td>N: 46</td>
<td>Score: 57%</td>
</tr>
<tr>
<td>Min 33%</td>
<td>1Q 59%</td>
<td>2Q 62%</td>
<td>3Q 67%</td>
<td>Max 86%</td>
</tr>
</tbody>
</table>
10 Outputs (Capacity and FTE-Based Metrics)

<table>
<thead>
<tr>
<th>Metrics Type</th>
<th>FEP/PROG</th>
<th>ENG/DES</th>
<th>PRO</th>
<th>CON</th>
<th>STA/COM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity-based</td>
<td>1. (Building) Forecasted Project Cost Efficiency</td>
<td>1. (Building) Forecasted Project Cost Efficiency</td>
<td>1. (Building) Forecasted Project Cost Efficiency</td>
<td>1. (Building) Forecasted Project Cost Efficiency</td>
<td>1. (Building) Actual Project Cost Efficiency</td>
</tr>
<tr>
<td></td>
<td>2. (Building) FEP (Programming) Cost Efficiency</td>
<td>2. (Building) Engineering (Design) Cost Efficiency</td>
<td>2. (Building) Total Equipment Cost/Capacity</td>
<td>2. (Building) Construction Cost Efficiency</td>
<td>2. (Building) Startup (Commissioning) Cost Efficiency</td>
</tr>
<tr>
<td></td>
<td>3. (Building) Forecasted Project Schedule Efficiency</td>
<td>3. (Building) Forecasted Project Schedule Efficiency</td>
<td>3. (Building) Forecasted Project Schedule Efficiency</td>
<td>3. (Building) Actual Project Schedule Efficiency</td>
<td>3. (Building) Startup Schedule Efficiency</td>
</tr>
<tr>
<td></td>
<td>4. (Building) FEP (Programming) Schedule Efficiency</td>
<td>4. (Building) Engineering (Design) Schedule Efficiency</td>
<td>4. (Building) Procurement Schedule Efficiency</td>
<td>4. (Building) Construction Schedule Efficiency</td>
<td>4. (Building) Startup Schedule Efficiency</td>
</tr>
<tr>
<td>Phase Burn Metric</td>
<td>7. FEP (Programming) Burn Rate</td>
<td>8. Engineering (Design) Phase Burn Rate</td>
<td>7. Procurement Phase Burn Rate</td>
<td>8. Construction Phase Burn Rate</td>
<td>7. Startup (Commissioning) Phase Burn Rate</td>
</tr>
<tr>
<td>Procurement Metrics</td>
<td></td>
<td>9. Total Cost of Equipment/Total Number of Major Equipment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>9. Total Project Cost/Number of Vendors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Total Project Cost/Number of Purchase Orders</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>11. Engineering Team Size/Engineering Phase Cost</td>
<td>13. Procurement Team Size/Total Cost of Major Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Metrics</td>
<td></td>
<td></td>
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<td>11. TRIR</td>
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<td>12. DART</td>
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</tbody>
</table>
The Logic of 10-10 *(33.1% Better Management)*

(CII) Practices

MANAGEMENT

(10-10) Measures

(The 5 M’s)

MATERIALS

METHODS

MANPOWER

MINUTES

MONEY

GOAL: OPTIMIZE

Supply Chain

Mechanization

Productivity

Performance

*Least Squares Method
Spørreskjemaene for CIIs 10-10-program.

Under finner du spørreskjemaene for de 5 ulike fasene for industri- og byggeprosjekter.

Det anbefales å ta en kort titt på veideren for utfylling før spørreskjemaene fylles ut.

Industriprosjekter:
Spørreskjemaene for de ulike fasene for industriprosjekter finnes under:
- Tidlig fase av prosjekter
- Prosjektseringsfasen
- Anskaffelsesfasen
- Byggefase
- Idriftsettelsesfasen

Byggeprosjekter:
Spørreskjemaene for de ulike fasene for byggeprosjekter finnes under:
- Programmeringsfasen
- Prosjektseringsfasen
- Anskaffelsesfasen
- Byggefase
- Idriftsettelsesfasen

Infrastrukturprosjekter:
Spørreskjemaene for de ulike fasene for infrastrukturprosjekter er finnes under:
- Tidlig fase
- Prosjektsering
- Anskaffelse
- Bygging
- Driftstelse
Typical Research Team Results – RT306

QUANTITATIVE MEASUREMENT OF PM COMPETENCIES
Research Team 306
Quantitative Assessment of Project Manager Competencies

Academic Team Members
Awad S. Hanna, University of Wisconsin-Madison
Jeffrey S. Russell, University of Wisconsin-Madison
Carol C. Menassa, University of Michigan
Alexandra E. Beletic, University of Wisconsin-Madison

Industry Team Members
Chair: Richard W. Bradford, Bechtel Group, Inc
Vice Chair: Jeffery L. Moore, Ameren Missouri
Dale C. Allen, Shell Global Solutions
Robert Bryant, BP Refining & Logistics Technology

Jose A Buitrago, Jr, CSA Group
Richard D. Carrithers, Jr., DTE Energy
George Carter, Anheuser-Busch InBev
Jeff Drinkard, Hargrove Engineers + Constructors
Ian D. Etzkin, URS Corporation
Roque Francisquez, SABIC - Saudi Basic Industries Corporation
Bryan Hoerner, Audubon Engineering Company, LP
Richard A. Krout, Walbridge
Rita M. Norat, Air Products and Chemicals, Inc.
Nancy Skinkle, Architect of the Capitol
Frank Williamson, Wood Group Mustang
PM CAT
(Project Manager Competency Assessment Tool)

A user-friendly tool designed to quantitatively assess and score PMs’ competencies.

1. Provides a thorough list of competencies and definitions that a PM should possess to successfully lead, manage and execute a project

2. Assesses the competencies of a PM and compares him/her to the industry

3. Improves PM effectiveness by targeting specific development needs to enhance their competencies in a personalized and more efficient manner

4. Enhances the selection process of qualified PMs
Data Collected
(Respondent and Company Information)

• 77 PM Supervisors from (at minimum) 29 companies
  – 154 PMs were analyzed

Company Type
- Owner 42%
- Contractor 31%
- Engineer 15%
- Architect 12%

Company Projects
- Private 47%
- Public 53%
Data Collected
(Company Size and Location)

Company Size

- [28%] < 250 Million
- [12%] 250 Million - 1 Billion
- [24%] 1 Billion - 25 billion
- [28%] 25 billion-50 billion
- [8%] > 50 billion

Company Locations:
- United States (92%)
- International (8%)
Tool Description and Validation

• Designed to reliably and consistently measure PM competencies
• Created to run in Excel 2007 (v 12) or later versions
• Rates PM’s competence on an industry-based scale
• Identifies training and development opportunities (competency gaps)
• Can help in the selection or placement of PMs
• Validated through beta testing
  – 93% accuracy rate
• Tool enhanced based on beta test feedback
List of PM Competencies

Knowledge/Experience
- Awareness and Use of IT
- Business/Financial Acumen
- Certification/Training
- Awareness of Similar EPC Projects
- Understanding of all Phases of Project Delivery
- Understanding of PM Job

Management
- Ability to Look Ahead and Plan
- Build Knowledge Networks
- Business Development
- Communications Management
- Focus on Client’s Needs
- Human Resource Management
- Integration Management
- Internal and External Relations
- Issues/Conflict Management
- Legal Issues
- Leadership in Safety
- Organizational Savvy
- Organizing Project Staff and Process Expertise
- Project Controls
- Risk Management
- Quality Management

Cognitive (Personal)
- Achievement and Action
- Analytical Thinking
- Courage
- Impact and Influence
- Initiative
- Personal Effectiveness
- Self-Awareness
- Strategic Thinking
- Vision
- Attributes
  - Accountable/Responsible/Reliable
  - Adaptable/Approachable/Listens/Relates to Others
  - Assertive/Aggressive/Result Driven/Decisive
  - Credible/Honest/Ethics/Integrity/Trustworthy/Loyal/Empathetic
  - Detail Oriented/Organized
  - Energetic/Enthusiastic
  - Mature/Self-Control/Professional
  - Positive Attitude/Seiflessness

Leadership
- Build Coalitions with Team
- Build Consensus
- Build Trust
- Develop and Mentor Others
- Cultural and Ethnic Sensitivity/Leverages Diverse Thinking
- Direct/Influential
- Engages Others
- Innovation
- Possess Strategic Insight
- Team Builder
Tool Input

Questions focus on the competencies that a PM should possess to successfully lead, manage & execute a project.

<table>
<thead>
<tr>
<th>I - KNOWLEDGE/EXPERIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the first section, the questions address the PM's knowledge and experience to lead a team effectively and enable team members to work efficiently.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not at All</th>
<th>Slightly</th>
<th>Somewhat</th>
<th>Very</th>
<th>Extremely</th>
<th>N/A</th>
</tr>
</thead>
</table>

A. Awareness of and knowledge to use state of the art technology

In the past year, how well did this PM...

- understand available information technologies provided by the company? [ ]
- make use of available information technologies provided by the company? [ ]
- embrace available information technologies provided by the company? [ ]
- encourage others to use available information technologies provided by the company? [ ]

B. Business/Financial Acumen

In the past year, how well did this PM...

- understand the business side of the project? [ ]
- understand the financial side of the project? [ ]
Tool Output

Project Manager Competency Assessment Tool

Project Manager Competency Report

Project Manager Name: John Doe
Job Title: Project Manager
Company Name: Example
Evaluation Date: 2-Feb-14
Evaluator: ABEL
Title: MOP
Telephone: 0
e-mail: 0

OVERALL PM SCORE 60.0%

GRAPH
(Displays PM Percentile Score versus the Industry Standard Distribution)

PM'S INDUSTRY PERCENTILE SCORE:

60.0%

The dark blue vertical line represents the PM's industry PERCENTILE score. The score ranges from 0 to 100 percent. Below 25% the PM scores below average. Above 75% the PM demonstrates a very high (excellent) level of competence.
The deployment of the PM CAT will:

- evaluate PM competence against the industry
- identify individual PM specific training needs
- identify future high potential PMs
CII RT 252 (Construction Productivity)

- Construction Productivity Handbook
CII Productivity Practices at Petrobras

Let’s do an immersion in productivity

- Support work
- Owner Requirements & Permissions
- Travelling
- Waiting
- Mobilization, tools & equipments
- Delay
- Direct work

Days 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15

U.R.
Actual Case – Petrobras REDUC Project

PIPING  ASSEMBLY

Increase Productivity

64%
22%

Man hours/Joints

1A  1B  1C

3 months  6 months
CII IMPACT
“I have seen and experienced first-hand the truly special collaboration between owners, contractors, and academics. These efforts have produced new knowledge and useful products positively impacting the industry. But in my opinion the most valuable legacy of CII has been the outstanding personal and professional development of the thousands of volunteer participants.”

Dr. G. Edward Gibson, Jr.
Arizona State University
The Owner’s Experience
“CII research became a significant enabler to the success of our construction activity. Today our Project Planning, Project Delivery, Construction Safety, and Benchmarking processes are all rooted in CII research and General Motors is looking forward to the years ahead of active CII involvement.”
Cost Growth (Owner)

Average budget = $44 million, n=127 (submitted after 2002)

CII Best Practice Usage
(Best Practice Index)
Schedule Growth (Owner)

Average planned duration = 131 weeks, n=155 (submitted after 2002)

CII Best Practice Usage (Best Practice Index)

Minimal Implementation

Robust Implementation

Better

Schedule Growth

28.8%
The Contractor’s Experience
“CII is the one place where owners, contractors, and academia work jointly on key initiatives to improve our industry. The depth of knowledgeable resources that actively participate is unparalleled in the industry. CII is also the one industry forum that through research provides deliverables and tools that its members can immediately put into practice. The benchmarking metrics from its members consistently validate the value of participation and membership. The opportunity to network and learn from industry leaders is also invaluable.”
Budget Factor (Contractors)

Average budget = $58 million, n = 81 (submitted after 2002)

CII Best Practice Usage
(Best Practice Index)

18.9%
Schedule Factor (Contractors)

Average planned duration = 109 weeks, n = 81 (submitted after 2002)

CII Best Practice Usage
(Best Practice Index)
SUMMARY
Company Benefits of CII Affiliation

- Improved capital delivery
- Transparent methodology to measure progress
  - Best Practice Use
  - Productivity
  - Industry
- Smarter, more confident, better prepared employees
- Implementation tool set
- Forum for company to company and company to academia relationships
- Industry intelligence and knowledge
- Recognition for employees
Participants Benefits of CII Affiliation

- Builds:
  - Knowledge
  - Leadership skills
  - Confidence
  - Industry intelligence

- Builds trusting relationships with customers and potential customers

- Grows the employee’s peer group – owners, contractors and academics

- Increases employee value to member company

- Forum for self actualization – accomplishing something for the greater good

- Satisfy professional development requirements
Industry Benefits from CII

- Research-based resources
- O+C+A collaboration yields industry best practices
- Collaboration model reduces fragmentation
- Participation develops future leaders
Coming together is a beginning; keeping together is progress; working together is success

– Henry Ford
Questions?

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