Leadership for the Next Generation

2009 Annual Conference Proceedings

Reno, Nevada
July 28–30, 2009

Construction Industry Institute
at The University of Texas at Austin
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Welcome to Peppermill Resort & Conference Center. While you are in Reno you will have the opportunity to enjoy the serene charm of the Sierra Nevada mountains and the freshness of the high desert air. During your stay in Nevada, be sure to explore the many natural and manmade wonders in and around Reno: Lake Tahoe offers fishing, golfing, swimming, and boating; Reno’s downtown has interesting shops and museums; historic mining and frontier towns are within driving distance; and there are many opportunities for hiking and biking on the Sierra Nevada Trail.

Our theme this year is “Leadership for the Next Generation.” Our teams of presenters have done an outstanding job of creating the valuable knowledge we will need as we transfer our skills, methods, and wisdom to the engineers and constructors of tomorrow. We’ll hear keynote talks from Dr. Marianne Jennings of Arizona State University’s business ethics program, C. Michael Illanne of Chevron’s Project Resources Company, and Ralph Peterson, Chairman Emeritus of CH2M HILL. During the Economic Forum portion of our program, internationally known economists David Wyss and Asieh Mansour will deliver their forecasts on the global economy.

This year’s plenary and implementation sessions address the following research topics: craft productivity in the mechanical trades; making implementation a reality; quality management today; action research in lean construction; integrated global procurement and materials management; information integration to improve project performance; estimating as a competency in capital projects; enhancing and expanding innovation; adapting modularization in shipbuilding to construction; and employee training under economic constraints. We will also hear two compelling case studies: the first is a report from the DOE’s Hanford Nuclear Waste Facility on the project’s successful use of CII’s Project Health Indicator (PHI); and the second demonstrates Saudi Aramco’s Pitfall Prevention Tool, the company's innovation on CII’s Lesson Learned wisdom.

Last year we returned to Keystone to celebrate CII’s vast contributions to the engineering and construction industry during our first 25 years. Today, we meet in Reno to look ahead at what the industry will need as we proceed into the 21st century. We hope that you gain much from the conference program, that you are invigorated by the mountain setting, and that you enjoy the spirit of collegiality and innovation that is at the heart of each CII Annual Conference. As ever, we have brought together the best of the best in the industry. Let’s start building the future—right here, right now.

WAYNE CREW
CII Director

JIM MILLER
Conference Chair
New Materials, Better Engineering, State-of-the-Art Project Management, and Same Old Ethical Issues

Keynote Address: Marianne Jennings

Abstract

In exchange for Giants tickets and Blackberries, New York City inspectors routinely turn a blind eye to everything from missing permits to faulty scaffoldings. In the last year alone, violations of the Foreign Corrupt Practices Act have cost construction firms $5 billion. Because safety precautions eat into margins, firms round corners when it comes to allotting maintenance budgets and making prudent decisions. Recently, in at least two companies, employees who threw down the flag for safety violations on their companies’ sites were told not to worry about safety and were sent back to work. From faulty repairs on a peanut processing plant to shortcuts on scaffolding to $55 million in bribes to government officials in Russia, the industry continues to grab headlines. A 2008 book proclaims that we all lie to each other in negotiating price and completion dates, and we all simply live with it. Dr. Jennings will take a look at the typical and continuing ethical lapses in the industry and how to fix them, once and for all.

Keynote Speaker

Marianne M. Jennings, Professor of Legal and Ethical Studies – Arizona State University

Dr. Marianne Jennings is a member of the Department of Management in the W.P. Carey School of Business at Arizona State University and is a professor of legal and ethical studies in business. She joined the faculty at ASU in 1977 as an assistant professor and was promoted to full professor in 1983. She teaches graduate courses in business ethics and the legal environment of business in the university’s MBA program. Dr. Jennings has authored more than 130 articles in academic, professional, and trade journals. Currently she has six textbooks and monographs in circulation. Dr. Jennings earned degrees in finance and law from Brigham Young University.

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Craft Productivity Research Program – Phase I
Craft Productivity Research Program Research Team

Learning Objectives

- Understand the objectives of the craft productivity research program.
- Examine why some projects are more productive than others.
- Learn how to improve the productivity of mechanical crafts.
- Discuss management practices that have a positive impact on craft productivity.
- Learn how to contribute and get involved.

Abstract

Identifying where opportunities for improving construction productivity exist and understanding how they can be leveraged are the main objectives of this research on craft productivity. Phase I of the program has focused on issues in the mechanical trades. As a first step toward accomplishing its goals, the research team has identified improvement areas in these trades. This presentation will show the results of this initial phase of the program, including the team’s vision for a craft productivity improvement roadmap.

The team will provide details of Phase I, including an overview of its analysis of CII’s Benchmarking and Metrics data on the impact that best practices have on mechanical trade productivity. Innovations that have improved this productivity will also be discussed. Finally, the presentation will cover the best practices that the team is using as the basis of the proposed craft productivity improvement roadmap.

Plenary Session Presenter

Dan Christian, Director, Power Market Sales – Victaulic

Dan Christian has worked for 28 years for Victaulic, a world leader in piping solutions based in Easton, Pennsylvania. He is Director of Victaulic Power Market Europe, Middle East, and India. He is also a member of both ASME B31-1 and ASME B31-3, and is serving as the current chairman of ASME B31-9. He holds a B.S. in Mechanical Engineering/Mechanical Contracting from Kean University and an M.S./MBA in Industrial Technology from Montclair University.

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Implementation Session Moderator

Robin Granger, Manager, Contract Management Office – Ontario Power Generation

Having joined Ontario Power Generation (OPG) in 2000, Robin Granger’s work as Manager of the Contract Management Office requires him to interface with the craft trades on a daily basis. His diverse background in craft trade and project management allows him to provide insightful support to the CII Research Team 252 “Craft Productivity Research Program – Phase I.” Drawing on this expertise, he will serve as the team’s implementation session moderator. Mr. Granger completed his Boilermakers Apprenticeship in 1977 in his native Scotland. Moving to Canada in 1980, he first worked at building boats and buses, and later held a position as the operations manager for the assembly of the first deHavilland Dash 8 Series 400 airplane.

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Panelists

Warren Adamson, Manager of Construction Services – S&B Engineers and Constructors, Ltd.
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Paul M. Goodrum, Associate Professor, Department of Civil Engineering – University of Kentucky

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Shannon D. Hopkins, Site Construction Manager – Eastman Chemical Company

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Mark Stofega, Performance Engineering – Fluor Corporation

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RT 252 Members

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<td>Petrobras</td>
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<tr>
<td>William Boyd</td>
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<td>Carlos Caldas</td>
<td>UT Austin</td>
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<td>Paul Goodrum</td>
<td>U of Kentucky</td>
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<td>Robin Granger</td>
<td>Ontario Power Generation</td>
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<td>Carl Haas</td>
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<td>Shannon Hopkins</td>
<td>Eastman Chemical</td>
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<td>Thomas James</td>
<td>Zachry</td>
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<td>Paul Murray</td>
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<td>James Matteison</td>
<td>URS Washington Division</td>
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<td>Jake Priest</td>
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<td>Michael R. Smith</td>
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<td>Bechtel</td>
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RT 252 Students

- Chandra Foley
- Jie Gong
- William Hinkle
- Mahdi Safa
- Yongwei Shan
- Dong Zhai
- Di Zhang
Questions

- What is the Craft Productivity Program?

- What can you tell me today that will help improve my productivity?

- What are you going to do for me in the future to improve my productivity?

Craft Productivity Research Program

BMPI Database Analysis

Materials Management

Equipment Logistics

Craft Information Systems

Human Resource Management

Construction Methods

Environmental Safety And Health

Best Productivity Practice Implementation Index

Phase I: Mechanical

Phase II: Electrical

Phase III: Concrete

Phase IV: Structural Steel

Phase V: Productivity Breakthrough Roadmap

Innovation Workshops
Best Productivity Practices

- Materials Management
- Equipment Logistics
- Craft Information Systems
- Human Resource Management
- Construction Methods
- Environmental Safety and Health

Best Productivity Innovations

Leadership
Next Generation

What can you tell me today that will help improve my productivity?
Notes

Productivity Practices: Data Sources

• CII Benchmarking and Metrics (BM&M)
  – Mechanical crafts
  – Best and emerging 32 practices investigated in BM&M survey
  – Number of projects: 92

• Labor Productivity = Input (Hours)/Output
  – Lower is better

Best Processes for Mechanical Productivity

Mechanical Productivity Innovations

Note: * statistically significant at 0.05 confidence level
** statistically significant at 0.01 confidence level
What are you going to do for me in the future to improve my productivity?

Best Productivity Practice Implementation Index (BPPII)

- Ensure that practices necessary to improve construction productivity are planned and implemented.

Best Productivity Practices Implementation Index

- Materials Management System
- Site Tool Management
- Machinability
- Short Interval Planning
- Project Planning
- Constructability Review
- Training and Development
- Behavioral
- Organizational Structure
- Employment
- Sequence and Scheduling of Work
- Startup, Commission, and Turnover Plan
- New Product Investigation
- Site Layout Plan
- Job Safety
- Substance Abuse Programs
- Safety Training and Orientation
Notes

Implementation Session

• Get details on data analyses
• Learn how to improve productivity in mechanical trades
• Become involved in developing the BPPII
Making Implementation a Reality
Implementation Strategy Committee

Learning Objectives

• Understand how implementation requires planning and corporate support.
• Learn how CII implementation resources can assist.
• See how new CII implementation resources provide feedback.
• Learn how owners and contractors have utilized these resources to advantage.

Abstract

Corporate implementation champions and corporate sponsors are critical to successful implementation. Frequently, businesses become aware of the value of implementing CII research findings yet fail to plan for implementation of those practices. The CII Implementation Strategy Committee continues research in this area and has new, valuable tools to share with the CII community. These tools provide basic elements for successful implementation. The plenary session will demonstrate how careful strategy and planning is essential to embed CII research findings within organizational processes.

In the implementation session, members of a panel consisting of an owner CII member and a contractor CII member will describe their respective implementation journeys. They will also discuss their use of implementation facilitation tools such as the CII Implementation Planning Model, and talk about the lessons they have learned. Dr. Paul Chinowsky will explain the use of the model published in 2008 and how the new web-based Implementation Planning Model can both help chart an implementation path and assess areas of strength and weakness.

Plenary Session Presenter

Tracie M. Griffitt, Engineering Manager – Jacobs

Tracie Griffitt currently serves as Engineering Manager at Jacobs Engineering, having had wide experience in project, mechanical, and quality engineering. She has worked in the refining, petrochemical, brewery, and pharmaceutical industries. Ms. Griffitt has also worked on a variety of grassroots and heavy revamp upgrades, pharmaceutical lab complexes, refinery LSG and ULSD compliance projects, crude and coker unit debottlenecks, and powerhouse and compressor upgrade projects. As a quality engineer, she has been involved with work process development and mapping, team building and best practices facilitation, employee training, and evaluation metrics. In addition, Ms. Griffitt has also served as an engineering department manager. She holds a mechanical engineering degree from the Colorado School of Mines.

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Implementation Session Moderator

**W. Scott Cameron**, Global Process Owner/Project Management – The Procter & Gamble Company

W. Scott Cameron serves as Global Process Owner/Project Management at Procter & Gamble. Mr. Cameron has spent over half of his 39-year career managing capital projects within a variety of Procter & Gamble business areas. He is a recipient of P&G’s highest engineering honor, the Prism Award; this prestigious award recognizes individuals who use their knowledge to make sustained contributions to further the company’s competitive advantage. Mr. Cameron has been a member of the CII Implementation Strategy Committee since 2006. He has also served on the NASA Academy of Program and Project Leadership Advisory Board and the Southwest Ohio Project Management Institute Executive Advisory Board. He holds both bachelor’s and master’s degrees from Iowa State University.

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Panelists

Paul S. Chinowsky, Associate Professor, Civil Engineering, Environmental & Architectural Engineering – University of Colorado–Boulder

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Making Implementation a Reality

Plenary Session Slides

Leadership
Next Generation

Making Implementation A Reality
2009 CII Annual Conference
Reno, Nevada

Implementation Strategy Committee
What CII Members Are Doing Today in Quality Management
Quality Management in the Capital Facilities Delivery Industry – A Best Practice Refreshment Research Team

Learning Objectives

• Identify elements of an effective quality management system (QMS).

• Learn how the focus of quality management (QM) has evolved from inspection-based programs to business process improvement systems.

• Discern differences between highly effective vs. less effective QMS.

• Learn about Implementation Resource 254-2.

Abstract

Advancements in technologies, tools, and processes have changed the QM systems currently being used for capital facilities delivery. RT 254 identifies and analyzes the QM systems, programs, and continuous improvement activities being used in the capital facilities industry today. At the implementation session, the team will discuss its conclusions, including what it found to be the key elements of an effective quality management system, how to assess the QM maturity of an organization, and how owners and contractors approach QM from different perspectives. The discussion will also introduce other implementation tools developed by the research team to facilitate improvement of QM systems.

The implementation session will begin with a “Family Feud”-style game show where the academic will explain the research methodology, analysis techniques, and key conclusions. The owner and contractor panel members will discuss the important take-aways from their perspectives. The panel will continue with an explanation of the implementation resource and how member organizations can use it to assess the maturity of their organizations’ quality management efforts and identify areas needing improvement.
Plenary Session Presenter

Barry E. Rittberg, Director of Quality Assurance – Fluor Corporation

Barry Rittberg, Director of Quality Assurance at Fluor Corporation, has over 30 years of quality management experience. Having joined Fluor in 1991, Mr. Rittberg assumed his quality management leadership role in 2001. In this capacity he is responsible for maintaining Fluor’s worldwide network of quality assurance managers and the global ISO9001 quality system, practices, and computer systems that they use. He has completed foreign and domestic assignments with major EPC firms in the areas of engineering, procurement, manufacturing and construction. His experience includes oil and gas, nuclear and fossil power projects, supplier quality, and manufacturing quality control. Barry holds a California PE registration in quality engineering and a master’s degree in quality assurance from California State University, Dominguez Hills.

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Implementation Session Moderator

Robert J. Ries, Assistant Professor, M. E. Rinker School of Building Construction, University of Florida

Robert J. Ries is an assistant professor at the M.E. Rinker, Sr. School of Building Construction and Associate Director of the Powell Center for Construction and Environment, both at the University of Florida. He received his B.S. degree in architecture from the Pratt Institute in 1982. Following ten years experience at architecture firms, and after earning his architect’s license, he entered Carnegie Mellon University in 1993, where he earned a master’s degree in 1995 and a doctorate in 1999. His research focused on integrated computational support tools for life cycle assessment (LCA) of the built environment. Two years later, Dr. Ries assumed a faculty position at the University of Pittsburgh, where he served as Director of the Green Construction and Sustainable Development Program in Civil and Environmental Engineering. His primary research is focused on improving the environmental performance of buildings, with a concentration on environmental impact assessment methods. This work includes developing application of environmental LCA for the building domain and LCA studies of building systems and operations. His research work also includes indoor environmental quality, lighting, thermal comfort, and benefit-cost analysis of high-performance building systems.

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Panelists

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What CII Members Are Doing Today in Quality Management

Plenary Session Slides

Research Team 254, Quality Management in the Capital Facilities Delivery Industry
A CII Best Practice Refreshment

2009 CII Annual Conference
Reno, Nevada

Quality Management - Capital Facilities Delivery

• Does your organization’s quality management system deliver the results you expect?

The Term “Quality”

• A Google search returns over 1.8 billion hits

  Google search results

  • Many definitions
    – Fit-for-purpose/service (Juran)
    – Meets specified requirements
    – Conforms to requirements (Crosby)
    – Ability to satisfy stated or implied needs
The Evolution of Quality Management

- Craftsmanship
- Mass Production
- Quality Control / Inspection
- Compliance to Standards
- Continuous Improvement
- Business Process Improvement

Quality Is More than Slogans

- Quality is job one. (Ford)
- Quality is free. (Crosby)
- Quality is doing things right vs. doing the right things.
- Quality is remembered long after the price is forgotten. (Gucci family slogan)
- Do it right the first time.
- Whenever you do a thing, act as if all the world were watching. (Thomas Jefferson)
- When you’re out of quality, you’re out of business.
- You want it bad, you get it bad.
- Cost-Schedule-Quality... pick two.

CII Body of Knowledge – Quality

**Fifteen CII Publications on Quality Management:**
- Source Documents (SD),
- Research Reports (RR),
- Research Summaries (RS)

**Past Studies:**
- Costs of Quality Deviations
- Total Quality Management (TQM)
- Quality Performance Measurement
- Making Zero Rework a Reality
- Quality Function Deployment
RT 254 – Research Objectives

CII Best Practice Refreshment

- Review the current body of knowledge and make recommendations.
- Determine the current state of quality management in the capital facilities delivery (CFD) industry.

RT 254 – Research Approach

- Initial Survey
  - CII Members
- Structured Interviews
  - CII Organizations with Effective QMS
- Data Analysis
- 53 CII Organizations Participated

Key Quality Management Practices and Characteristics

- Leadership commitment
- Formal QMS implementation
- Certification
- Clearly defined metrics
- Mandatory supplier/subcontractor QMS
- QMS training
- Culture of continuous improvement
RT 254 – Research Highlights

Outcomes
- It is possible to determine the maturity of a quality management system.
- There is a relationship between all major QMS standards.
- ISO 9001 is the basis for most QMS but is only the starting point.
- No agreed industry metrics exist for quality.

Implementation Resource 254-2
- Helps organizations develop QMS
- Helps mature organizations improve current QMS
- Three-step process

STEP 1
Define and develop your QMS

STEP 2
Assess the effectiveness and maturity of your QMS

STEP 3
Improve the effectiveness of your QMS

Quality Management in the Capital Facilities Delivery Industry Best Practice Refreshment Research Team

Nabil Arnaout, Bechtel Group, Inc.
Ankil Baral, University of Florida
William C. Beck, WorleyParsons Limited
Bruce Bowman, Intel Corporation
Donald Mrozek, Smithsonian Institution
Joseph Marinacci, U.S. General Services Administration
Dr. Kim LaScola Heedy, University of Arkansas
John Peacock, Ontario Power Generation
Cynthia J. Richert, Abbott – Co-Chair
Dr. Robert Ries, University of Florida
Barry E. Rittberg, Fluor – Co-Chair

W. J. Roxelle, J. Ray McDermott, Inc.
Robert K. Ryan, The Shaw Group Inc.
G. Richard Scott, ConocoPhillips
Robert R. Spear, Jacobs
Kobus Shassen, Gineren-LTA
Fikret K. Turan, University of Pittsburgh
Ron R. Williams, Aramco Services Company

Past Members
Erwin E. Kiess, CSA Group
Melinda Loti, Bechtel Group, Inc.
Peter A. Sandy, Marathon Oil Corporation
Vinod K. Srivastava, Suntoco, Inc.
What CII Members Are Doing Today in Quality Management

Implementation Session Agenda

- Quality Management Family Feud (Owners vs. Contractors)
- Research Results
- Panel Discussion
- Implementation Resource 254-2
- Questions & Answers

Quality Management - Capital Facilities Delivery

- Does your organization’s quality management system deliver the results you expect?
Lean Construction Action Research at UC Berkeley’s P²SL Academic Committee

Learning Objectives

• Learn key concepts that support lean construction.
• Hear about roots of lean construction.
• Learn about findings of action research on selected research projects done by P²SL researchers.

Abstract

The presenter will first define a few key concepts that have driven the development of lean thinking in the construction industry, then illustrate them using simple examples. She will also show how lean thinkers create tension—and use it to their advantage—to design, manage, and continuously improve project production systems.

The presenter will share experiences and raise questions for the audience that challenge current thinking on project management. Accepted project management practices will be compared and contrasted with lean practices to illustrate the application of the latter. This comparison will be based on findings from several action-research projects conducted with P²SL member companies. The session will conclude with a discussion of the relationship of P²SL research to CII research on lean construction, and will leave participants with open research questions.
Plenary Session Presenter

Iris D. Tommelein, Director, Project Production Systems Laboratory (P²SL); Professor, Civil & Environmental Engineering – University of California, Berkeley

Iris D. Tommelein is Professor of Engineering and Project Management in the Department of Civil and Environmental Engineering at the University of California, Berkeley. She teaches and conducts research on lean construction, developing the theory and principles of project-based production management for the architecture-engineering-construction industry. Together with Dr. Glenn Ballard, Dr. Tommelein directs the Project Production Systems Laboratory (P²SL), a research institute dedicated to developing and deploying knowledge and tools for project management. P²SL also serves as a learning lab for the northern California construction industry. She is an active participant in the International Group for Lean Construction and serves on the Board of Directors of the Lean Construction Institute. Dr. Tommelein was the lead researcher on CII’s Project Team 172 for Improving Capital Projects Supply Chain Performance. She holds an engineering degree from the Free University in Brussels, Belgium (VUB), and two Master degrees as well as a Ph.D. from Stanford University.

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Implementation Session Moderators

Jesús M. de la Garza, Vecellio Professor, Department of Civil Engineering – Virginia Tech

Dr. Jesús M. de la Garza holds the Vecellio Professorship at Virginia Polytechnic Institute and is the former Director of the Information Technology and Infrastructure Systems program at the National Science Foundation. He obtained his Ph.D. and MSCE degrees from the University of Illinois at Urbana-Champaign. He received a civil engineering degree from Monterrey Tec, Mexico. Dr. de la Garza has served as the Eminent Scholar at the Del E. Webb School of Construction at Arizona State University.

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Iris D. Tommelein, Director, Project Production Systems Laboratory (P²SL); Professor, Civil & Environmental Engineering – University of California, Berkeley

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Lean Construction Action Research at UC Berkeley’s P^2SL

Plenary Session Slides

Lean Construction Research
at the Project Production Systems Laboratory
at UC Berkeley

Professor Iris D. Tommelein
http://p2sl.berkeley.edu/

Thank you P^2SL Members!

Project Production Systems Laboratory - P^2SL

Leadership
Next Generation
Lean Project Delivery System™

What is this thing called “LEAN”?

Not mass, not craft, but a third form of production system design...

the LEAN IDEAL is to

“Give customers what they want, deliver it instantly, with no waste.”

After slide from the Lean Construction Institute – http://www.leanconstruction.org
Construction is...

- COMPLEX
- UNCERTAIN
- DYNAMIC

Lean Concepts

There is

PRODUCT variation and PROCESS variation

GOOD variation and BAD variation but...

Most variation is bad!

Lean first tries to eliminate variation, then manages remaining variation

Lean Approach

Reduce lead time and improve reliability of SUPPLY

Improve reliability of DEMAND workflow on site
Lean Construction Action Research at UC Berkeley’s P3SL

Notes

Last Planner™ System - PULL

(Slides from Ballard and Howell 1994 - slide from Lean Construction Institute – http://www.leanconstruction.org)

Cathedral Hill Hospital

- Owner: CPMC/Sutter Health
- Architect: Smith Group
- GC: HerreroBoldt
- ~ $1.0 Billion Project
- 26 Story Hospital
- ~100,000 m²
- 555 Beds
- 555 Parking Spaces
- High Tech Facilities

Downtown San Francisco Site

- Tower Core Primary Pk Radus: 2 EA
- Tower Core Secondary Pk Radus: 7 EA
- Tower Core Mat: 2 EA
- Tower Mntl/Mtrl: Core: Decrease 1 EA
- Tower Mntl/Mtrl: Core - Steel: 1 EA
- Tower Mntl/Mtrl: Core - Tile: 1 EA
- Tower Mntl/Mtrl: Core - As: 1 EA

CMH - Preliminary Crane, Personnel & Material Hoist Plan
07/2006
HerreroBoldt

Leadership
Next Generation
Developing Shared Understanding

The Validation Document
Creating the “yes it” scenario

Target Value Design (TVD)
The cardinal rule of Target Value Design is:
The Project’s Target Cost shall never be exceeded without express approval of Owner.
The budget becomes an influence on design and decision-making rather than an outcome of design.

Lean Construction Action Research at UC Berkeley’s PSL
Lean Construction Action Research at UC Berkeley’s P2SL

Notes

Opportunities for Target Value Design
Within Project Phases

- Planning and Programming – The Right Fit
- Design – Optimizing Systems
- Detailing – Optimizing Parts
- Construction and Assembly – Productivity, Work Flow, Prefab.

Ongoing P2SL Research - Implementation Session

- Relational Contracting
- Self-assembled Teams
- Target Value Design
- Set-based Design
- Use of the Design Structure Matrix
- Cost Modeling
- Virtual Design and Construction (VDC)
- Streamlining the Permitting Process
- Value Stream Mapping
- Supply Chain Management
- Logistics Centers
- Built-in Quality
- Standardization of Products and Processes
Global Procurement and Materials Management: An Integrated Process for the Next Generation

Global Procurement and Materials Management for Effective Project Execution Research Team

Learning Objectives

- Understand the current status of global procurement and materials management within the CII membership.
- Learn the functions of an effective materials management program.
- Identify current and projected challenges to global procurement and materials management.
- Learn guidelines for improving global procurement and materials management programs.

Abstract

The presenter will show the current status of global procurement and materials management among the CII membership companies, with a focus on the major changes that have occurred within the past 10 years. He will also outline the critical functions for implementing a successful materials management program. The discussion will then turn to research deliverables and conclude with a look at current and foreseen issues affecting global procurement and materials management.

In the implementation session, the presenter will provide an overview of Implementation Resource 257-2, *The Global Procurement and Materials Management Handbook: An e-Guide for Effective Project Execution*. He will give a demonstration to show the audience how to use this guide. Panelists will give testimonials on their materials management programs, and voice their views on the challenges facing global procurement and materials management and on what the future holds. The remainder of the session will be devoted to audience questions, shared experiences, and feedback on the implementation of materials management programs.
Plenary Session Presenter

Gene Budler, Vice President, Dick Worldwide Building Group – dck Worldwide

Gene Budler, Vice President of the Dick Worldwide Building Group, has been with Dick Corporation for 28 years and has worked on some of the firm’s largest and most important projects. Throughout his career, he has functioned in all project roles, beginning as a field surveyor and progressing to higher positions, including project engineer, superintendent, project manager, project director, and operations manager. Mr. Budler has either led or worked on over $2 billion worth of projects, many of which were located overseas. This experience has given him insight into the challenges of working in logistically challenging settings, where access to resources, materials, and skilled craftsmen is less than optimal. His language and cultural skills have enabled Mr. Budler to become an effective leader in these environments. A graduate of North Platte High School in Nebraska, Mr. Budler is a certified contractor in Florida and a USVI Construction Contractor. He is LEED AP Certified with AAAE, and is a member of the Florida Airport Council (FAC), the Construction Executive Association (CEA), SAME, USGBC, American Solar Energy Society (ASES), and the Construction Industry Institute (CII)

e-mail: gbudler@dickcorp.com
Implementation Session Moderator

Mark E. Hodson, Global Sourcing Director for Engineering – Eli Lilly and Company

Mark E. Hodson is Global Sourcing Director for Engineering at Eli Lilly and Company. He joined the firm as an engineer in 1977 and, since then, has held positions in process engineering, human resources, performance improvement, project management, program management, and sourcing management. He earned his bachelor’s degree in chemical engineering from the Rose-Hulman Institute of Technology in 1977 and his MBA from Indiana University in 1987. Mr. Hodson and his wife Ann have three grown children—two of whom are engineers—and two grandchildren.

e-mail: hodson_mark_e@lilly.com

Panelists

Carlos H. Caldas, Assistant Professor – The University of Texas at Austin

e-mail: caldas@mail.utexas.edu

Glenn L. Gundy, Senior Director, Materials Management – Fluor Corporation

e-mail: glenn.l.gundy@fluor.com

James Sullivan, Project Procurement Manager – WorleyParsons

e-mail: james.sullivan@worleyparsons.com
Global Procurement and Materials Management: An Integrated Process for the Next Generation

Plenary Session Slides

Why Materials Management?

- 50-60% of cost of capital projects
- Schedule / Quality / Productivity driver
- Early involvement for 10-20% improvement

Empire State Building: a Success

- **Cost of building:**
  - $24,718,000
  - Expected cost $50 million

- **Construction:**
  - Framework rose at a rate of 4.5 stories a week
  - One of the first commercial construction projects to employ fast-track techniques

- **Total Time:**
  - 7 million man hours
  - 1 year and 45 days of work
Notes

Washington Monument... not so good

- Construction from 1848-1884 (36 years)
- 25 year hiatus: lack of funds and the Civil War
- Original marble quarry could not be found

[Image: Change in color at 152]

What is Materials Management?

An integrated process through which materials and equipment are effectively identified, acquired, received, and delivered.

[Image: Oil rig]

RT257: Mission

Update CII’s 1999 materials management handbook:

*Procurement & Materials Management: A Guide to Effective Project Execution*

- Achievements
  - Identified current state-of-the-art and best practices
  - Identified effective methods and technologies
  - Analyzed recent developments in the field
  - Provided recommendations for a comprehensive Mgmt. program
  - Developed an interactive electronic Materials Management tool
Global Procurement and Materials Management: An Integrated Process for the Next Generation

Research Strategy

- 2 surveys
- 55 organizations
  - 27 owners
  - 28 contractors
- Case studies with 9 organizations and 32 Subject Matter Experts
- Involvement of the Procurement Executives Group

Key Findings

- Formal supplier qualification and evaluation systems
- Materials Management integration
  - From early involvement through O&M turnover
- Emerging techniques in 1999 are now mainstream, such as
  - Contractor use of alliances
  - Integrated Materials Management automation tools
  - Use of metrics to set plan, track progress, and record results

Comparison of Survey Results: 1999 vs. 2008

- Metrics to measure the effectiveness of the MRP process
- Integrated materials management computer systems
- Supplier alliances
- Formal supplier evaluation systems

Leadership
Next Generation
Global Procurement and Materials Management: An Integrated Process for the Next Generation

Notes

Products of Research

Global Procurement and Materials Management: an e-guide to effective project execution

Materials Management Planning Guide

Research Summary Research Report

Materials Management Roadmap

<table>
<thead>
<tr>
<th>Business Planning</th>
<th>Front-End Planning</th>
<th>Engineering</th>
<th>Procurement</th>
<th>Construction</th>
<th>Handover</th>
<th>O&amp;M Mgmt</th>
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</thead>
<tbody>
<tr>
<td>Personnel and Organization</td>
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<tr>
<td>Materials Requirements Planning</td>
<td>Process Map</td>
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<td>Project Acquisition Strategy</td>
<td>Process Map</td>
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<td>Purchasing</td>
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<td>Subcontracting</td>
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<td>Transportation and Logistics</td>
<td>Process Map</td>
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<td>IT Systems</td>
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</table>
Global Procurement and Materials Management: An Integrated Process for the Next Generation

Research Team 257

- Gene Budler (Co-Chair)
  Deloitte
- Stuart Rettie (Co-Chair)
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  CBKL
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  The Shaw Group Inc.
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  The University of Texas at Austin
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  The University of Texas at Austin
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  Baylor University

Participating Organizations

- ABB Lummus Global Inc.
- Alcoa
- AES Corporation
- Air Products and Chemicals, Inc.
- Alstom
- Ammonia-U.S. Companies, Inc.
- AECO, Inc.
- BESK, Inc.
- Becktel, Inc.
- BP America, Inc.
- Cargill, Inc.
- CBKL
- CH2M Hill
- Chapman Corporation
- Chevron Corporation
- Conshohocken
- CSA-Group, Inc.
- Deloitte Corporation
- Eastman Chemical Company
- E.I. Lilly and Company
- Emerson Process Management
- Fluor Corporation
- GS Engineering & Construction Corp.
- Harper Industries Inc.
- HNT Corporation
- International Paper Company
- J.Ray McDermott, Inc.
- Jacobs
- JRL/Associates
- Kerr Energy Company
- Kiewit
- Marathon Oil Corporation
- Mustang Engineering, L.P.
- NASA
- Nova Chemicals Corporation
- Oregon Power Generation
- Paltfinder
- Patronix
- Procter & Gamble Company
- Progress Energy Service Company
- P.R. Mckinley
- S&ampB Engineers & Constructors
- US
- Sensotec Technology
- Smithsonian Institution
- SNC-Lavalin
- SNC-Lavalin
- Technic USA, Inc.
- Tennessee Valley Authority
- The Industrial Company
- US General Services Administration
- Walsh
- Wabash Aldinger
- Washington division of URS
- Workforce Limited
- Zachry
Implementation Session

- Stuart Rettie – Project Manager, EP
- Glenn Gundny – Executive Director, Fluor
- Mark Haddock – Director of Procurement, Eli Lilly
- James Sullivan – Senior Procurement Manager, WorleyParsons
- Carlos Caldas – Assistant Professor, The University of Texas at Austin
Abstract

Each year, Chevron Corporation plans and executes a project portfolio that includes hundreds of capital projects ranging in scope from large to megaproject. Because Chevron is an integrated company operating in more than 100 countries, developing and executing its projects requires significant organizational capability. This strength lies in the company’s structure and in the expertise, mobility, and skill of its employees. As with most integrated oil companies, Chevron’s current organizational capability comes from a mature workforce—one that will soon be replaced by the next generation. Thus, the rapid integration of a properly skilled next generation is critical to Chevron’s sustained success.

Mr. Illanne will describe the attributes of the next generation at Chevron relative to the existing mature workforce. He will then analyze the techniques for integration and skill-building now being used by the company, including its systems, programs, and technologies. He will also focus on the potential role of organizations such as CII in developing this workforce. Finally, Mr. Illanne will address some of the myths about people in the next generation, and some of the concerns they express at Chevron.

Keynote Speaker

C. Michael Illanne, President & General Manager – Project Resources Company, A Division of Chevron

C. Michael Illanne is currently President and General Manager of Chevron’s Project Resources Company (PRC) in Houston, Texas. In this capacity, he is responsible for Chevron’s project development and execution work processes, providing oversight of the execution of the Corporation’s worldwide major capital project portfolio. Mr. Illanne joined Chevron’s North America Exploration and Production Company (CNAEP) as a Design & Construction Engineer in New Orleans, Louisiana and held numerous technical and management positions in New Orleans and Houston during the 1980s. In 1990, he worked as a construction manager and as a project manager for capital projects in Papua, New Guinea. In 1997, he became Upstream Coordinator for the Project Resources Company in Houston. Here he coordinated project staffing and major capital project management services for Chevron Overseas Petroleum business units in Australia, Papua New Guinea, Indonesia, South America, and Angola. He returned to CNAEP in 2000 as New Technology Ventures Manager, and then moved on to serve as General Manager of Project Commercialization for Chevron’s Global Power & Gasification Business Unit. After the company’s gasification technology licensing business was sold, he became General Manager of Strategic Planning for Chevron’s Corporate Strategic Planning group in California. In 2005, he moved to Nigeria as general manager of all of Chevron’s deepwater assets in the Gulf of Guinea. Mr. Illanne graduated in 1980 from Mississippi
State University with a bachelor’s degree in civil engineering. He and his wife Julie reside in Houston. They have three children and two grandchildren.

*e-mail: cmilan@chevron.com*
Integrating the Next Generation at Chevron

Keynote Slides

Mike Ilanne
Reno, Nevada
July 29, 2009

Safety Over the Generations

Outline
- Chevron Overview
- The Challenge
- The Generations, Myths and Expectations
- Chevron Skill Building and Integration Techniques
- Role of CII
- Q&A
Notes

Chevron by the Numbers

- **62,000** employees
- **2.7** million BOE daily net production
- **2.1** million BPD refining capacity
- **17** fuels refineries
- **3** popular consumer brands: Chevron, Texaco and Caltex
- **25,000** service stations

Chevron’s History—Multiple Generations and Integrations

**1879**
Pacific Coast Oil Company was founded in the San Joaquin Valley of California.

Project Resources Company
Global Project Management

- **65** Upstream projects
- **15** Downstream projects
- **103.5** MM workforce hours in 2008
- **600** PRC employees—overall project management
  - Technical management by Chevron business units and technology companies
  - Leveraged with several thousand worldwide contractors and vendors
Integrating the Next Generation at Chevron

The Challenge Facing Chevron and the Industry...

- Aging workforce
- Globalization of the work
- Increasing complexity of projects

The Challenge—The Loss of Experience

Example of the US Workforce

Current Industry Challenges—Resources, Experience, and Competency

- Industry faces challenges
- Economic conditions cause uncertainty
- Potential shortfall in resources
- The experience level is decreasing

Notes
Integrating the Next Generation at Chevron

Notes

The Challenge—Globalization of the Work

1999 Total Workforce: 21,417
9,000 non-U.S. Employees
71%
2008 Total Workforce: 55,748
31,461 non-U.S. Employees
67%

More U.S. Employees by Home Country

- Indonesia
- Angola
- United Kingdom
- Philippines
- Mexico
- Thailand
- South Africa
- Brazil
- Canada
- Singapore
- Australia
- France
- India
- Europe
- Other (~480)

The Challenge—Today’s Complex Megaproject Environment

Who are the Next Generation?

<table>
<thead>
<tr>
<th>Category</th>
<th>G3</th>
<th>Golden Age</th>
<th>Baby Boomer</th>
<th>Generation X</th>
<th>Generation Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>74+</td>
<td>58-73</td>
<td>39-57</td>
<td>27-38</td>
<td>4-26</td>
</tr>
<tr>
<td>% of Population</td>
<td>6%</td>
<td>13%</td>
<td>25%</td>
<td>30%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Description: G3 (the Greatest Generation). Note that “the greatest” is not meant to mean "best," but rather "biggest."
The Next Generation—
Assets and Liabilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Baby Boomer</th>
<th>Generation X</th>
<th>Generation Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the Job</td>
<td>Driven, Good team players</td>
<td>Techno-literate, Independent</td>
<td>Collective Action, Technological savvy</td>
</tr>
<tr>
<td>Liabilities</td>
<td>Uncomfortable with conflict: May put process ahead of result, Overly sensitive to feedback.</td>
<td>Impatient Poor People Skills Inexperienced Cynical</td>
<td>Need for Supervisors and structure, Inexperience, particularly with handling difficult people issues.</td>
</tr>
<tr>
<td>Messages that Motivate</td>
<td>“We need you”</td>
<td>“Do it your way”</td>
<td>“You can help turn the company around”</td>
</tr>
</tbody>
</table>

Myths About the Next Generation

1. Low organizational commitment
   - Multiple jobs make the career
2. Money Talks
   - Fit with personal interests and career development
3. Little respect for authority
   - Freedom and feedback are part of the deal
4. Marginal work ethic
   - Balance work and play

Expectations/Concerns of the Next Generation at Chevron

- Questions that XYZers have:
  - Will the baby boomers ever retire?
  - What is it like to work during a recession?
  - Can I wear my nose ring to work?
  - When 2 weeks of vacation a year is just not enough...
  - Do you think I can become a manager on my second assignment or will it be my third assignment?
Notes

Chevron’s Response to the Challenge
- Talent Management Framework
- Skill Building Programs
  - Horizons
  - Pathways
- Integration Programs
- Chevron Way Values
- Professional Behaviors
- Mentors

Chevron’s Talent Management Framework
The five core focus areas define programs needed to source, develop, manage, and retain world class talent

Developing Skilled Employees
- Past Experience
- Technology/Societies, etc.
- Degree
- Measured Results
- Mentors
- Common Classes
- Field Orientation
- Functional Classes
- Multiple Assignments
Skill Building Techniques—Horizons Program

- 0-5 years
- Degreed disciplines
- Technical training
- Petroleum business training
- Culture of Chevron training
- 3 assignments
- Mentors

Pathways Program (years 6-20)—Skill Building Techniques

Skills Assessment Profile

1. Update Plan
2. Discuss Gaps
3. ID Activities to close gaps
4. Develop Professional Development Plan
5. Execute Development Plan
6. Skills Assessment Profile

Notes

Skill Assessment Profiles—Competency Mapping

This is an example of a few skill capabilities in the CAT and what it looks like after an employee and supervisor have completed it.
Integrating the Next Generation at Chevron

Notes

Integrating into the Chevron Culture—Values

- Embody The Chevron Way
  - Integrity
  - Trust
  - Diversity
  - Ingenuity
  - Partnership
  - Protecting People and the Environment
  - High Performance

- Supporting Programs
  - Anti-Harassment Policy and Training
  - Employee Networks
  - Drug and Alcohol Compliance
  - Hotlines, Ombuds, Steps to Employee Problem Solution (STEPS)

Integrating into the Chevron Culture—A Professional Corporate Environment

- Follow the Ground Rules
  - Treat others with respect
  - Be non-judgmental
  - Respect confidentiality
  - The classroom should be a safe zone
  - Everyone participates
  - Arrive on time for class, from breaks and stay until the end
  - Pay attention, be engaged
  - Behave in a professional manner (dress, attendance, behavior)
  - Contribute to the dialog if you have expertise in an area of discussion, it is a great way for others to learn
  - Be a good representative of your company both in class and after hours

Mentors and their Role

- Core role – Knowledge transfer
  - Technical expertise and skills
  - Career development opportunities
  - Help in understanding the Chevron culture

- Secondary role – Coaching
  - Coaching on soft skills
  - Coaching and personal development
  - Coaching on building work relationships
Role of CII...

- Training
- Research programs:
  - RTS 4 – PM skills of the Future
  - RTS 5 – Knowledge Transfer and Retention of the Near Retirement Generation
  - RS 200-1 – Recruiting and Retaining Future Engineering and construction leaders
- Conferences and forums for networking
- Others...

Integrating the Next Generation at Chevron is Essential to Business Success...

- The challenge is real
- We can’t just hope it away
- The Next Generation offers much
- Requires skill building
- Requires focused integration
- CII has a role

Q&A?
Information Integration to Improve Capital Project Performance

Learning Objectives

• Understand current state of information integration.

• Learn to use the Maturity Model Tool to position a company within an IT and business capability growth path.

• Learn to use the Integration Opportunity Assessment Tool to assess and plan for implementation of specific integration opportunities.

• Understand current leading practices for effective implementation of integration technologies on capital projects.

• Leave with an understanding of a number of IT success cases from CII member companies.

Abstract

This project leverages current industry implementation knowledge to provide two tools to help CII member companies assess and improve their capital projects performance with information integration tools. The first is the Maturity Model Tool, a resource by which companies can map their current integration of IT and business capabilities, and then identify opportunities and pathways for improvement. The second tool helps companies evaluate specific integration opportunities in terms of business drivers and implementation hindrances. These tools will be presented in the context of case studies with member companies.

The moderator will ask for audience “pain points” at the beginning of the session to generate interest. These issues will be used by the panelists as touchstones for their discussion of the case studies and tools.
Plenary Session Presenter

Bruce A. Strupp, Technology Director, Center for Project Excellence – Design – CH2M HILL

Bruce Strupp is the Technology Director for CH2M HILL’s Center for Project Excellence – Design (CPE-D). At the center, he directs engineering technology development and standards, and new technology deployment and integration.

CPE-D works with BG Engineering Leads and Automation coordinators to align best practices used by BG to develop enterprise-wide (CH2M HILL-Way) best practices. In the 39 years Mr. Strupp has worked in the engineering and construction industry, he has led engineering and automation teams in all forms of projects. These include power plant design, industrial facilities design, federal facilities design, and environmental recovery. He has held the lead role on project teams that develop and deploy integrated project management and design tools for planning, finance, scheduling, and engineering design. Mr. Strupp sits on research teams for CII (Construction Industry Institute), FIATECH (Fully Integrated and Automated Technology), and NSF (the National Science Foundation). He has a B.S. in computer science from Albright College in Pennsylvania and has completed engineering coursework at Pennsylvania State University.

e-mail: bruce.strupp@ch2m.com
Implementation Session Moderator

William J. O’Brien, Assistant Professor, Department of Civil Engineering – The University of Texas at Austin

William O’Brien specializes in lifecycle cost and information modeling to support construction industry efforts at supply chain management, design effectiveness, and information management. He is currently an assistant professor in the Construction Engineering and Project Management Program in the Department of Civil Engineering at The University of Texas at Austin. From 1999–2004, he taught both in the Department of Civil & Coastal Engineering and in the M. E. Rinker, Sr. School of Building Construction at the University of Florida. Prior to his work in academia, Dr. O’Brien led product development and planning efforts at Collaborative Structures, a Boston-based Internet start-up focused on serving the construction industry. He holds Ph.D. and M.S. degrees in civil engineering and an M.S. degree in engineering-economic systems from Stanford University. He also holds a B.S. degree in civil engineering from Columbia University.

e-mail: wjob@mail.utexas.edu

Panelists

Hugh L. Fry, Manager, CAPEX Process, Technology & Training, Zone Brewery Support – Anheuser-Busch InBev
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Paul Hughes, Manager of Business Management – Marathon Oil Company
e-mail: phughes@marathonoil.com

Mike Oswalt, Director, Procurement – Fluor Corporation
e-mail: mike.oswalt@fluor.com
Information Integration to Improve Capital Project Performance
Information Integration to Improve Capital Project Performance

Plenary Session Slides

RT 258 Team Members

- Hugh (Tad) L. Fry, III, Anheuser-Busch InBev
- Dan W. Hodges, Intel Corporation
- Paul Hughes, Marathon Oil Company (co-chair)
- Youngcheol Kang, The University of Texas at Austin
- Sujal Lagovala, Bechtel Corporation
- Kathryn L. Luet, Mustang
- William J. O’Brien, The University of Texas at Austin
- James T. O’Connor, The University of Texas at Austin
- Diane F. Osdom, Jacobs
- Mike T. Oswald, Fluor Corporation
- Gabriel Saenz, Shaw
- Garrett D. Sever, DuPont
- Bruce A. Strupp, CH2M HILL (co-chair)
- James Thorne, Worley Parsons
- Matthew E. Wheeler, Autodesk, Inc.

Information Integration is about...

...seamless exchange of data
...support for business processes and transactions across project participants
...more than just IT
Notes

Where is your Information....

Common Problems
- Lack of clarity and tools to analyze integration challenges
- Inability to identify process gaps
- Inability to prioritize numerous integration opportunities
- Confusion about where to begin
- Uncertainty over decision drivers
- Lack of knowledge about industry trends

Where Is CII Membership Today?

<table>
<thead>
<tr>
<th>Category</th>
<th>Contractors (n=24)</th>
<th>Owners (n=52)</th>
</tr>
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<tbody>
<tr>
<td>Overall</td>
<td></td>
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<tr>
<td>Project Management</td>
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<td>Front End Planning</td>
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<td>Detail Design</td>
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<tr>
<td>Construction</td>
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<tr>
<td>Start-up/Commissioning</td>
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<tr>
<td>Automation</td>
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<tr>
<td>Internal Integration</td>
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<tr>
<td>External Integration</td>
<td></td>
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</tbody>
</table>

CII BMSM (2008-2009 data)
CII Owner Integration Case Study

Results:
- Paper & handling: $1 million reduction
- Administrative staff: From 6 to 1 person
- Contracts issued: From 60 to 10 days
- RFI turnaround: From 10 days to 24 hours
- Project approval: From 3 weeks to 2 days

How can I achieve these benefits in my organization?

RT 258 Helps by:
- Maturity Model Evaluation Tool – assesses current organization status
- Integration Opportunity Assessment Tool – evaluates integration opportunities
- Case studies of CII members
- Guidance for implementation

Assessment and Selection Process
Information Integration to Improve Capital Project Performance

Notes

Information Integration Maturity Model

Level 1: Business Efficiency
- Silo operations
- Limited understanding of integration

Level 2: Business Effectiveness
- Integrated internal processes
- Speed, reliability of established processes

Level 3: Business Transformational
- Seamless exchange of data
- All stakeholders aligned; high value execution

Assessment and Selection Process

- Assess organization status with Maturity Model
- Gap Analysis: identify areas for improvement within Maturity Model
- Portfolio of Integration Opportunities
- Conduct IOP assessment with Integration Opportunity Tool
- Select specific IOPs for further analysis
- Refine IOP-value assessments with hindrances and benefits

Integration Opportunity Assessment Tool

Integration Opportunity Assessment Summary
- Benefit Share Score: 87.7%
- Hindrance Score: 18.4%
Interpreting the IOP Tool Output

Integration Opportunity Assessment Tool: Comparative Analysis of Three IOPs

Integration Opportunity Assessment Tool: Hindrance Mitigation Improves Likelihood of Success

Information Integration to Improve Capital Project Performance
Notes

In Closing

- Industry has improved information integration, but many challenges remain
- RT 258 provides a structured focus and disciplined approach
  - Determine your status
  - See your opportunities
  - Understand leading drivers and hindrances
Don’t Gamble with Your Project’s Performance
Benchmarking & Metrics Committee

Learning Objectives

- Recognize that a strong performance culture is mandatory in today’s project world.
- Understand benchmarking and metrics as the quantitative underpinning of a performance culture.
- Learn how automated data entry of project performance information to CII is available through XML.
- Learn how high-level (level 1) productivity metrics are available now for both engineering and construction productivity.
- See how the CII Benchmarking questionnaire has become shorter, easier to use.

Abstract

CII Benchmarking and Metrics can be a leading source of quantitative information in any effort to establish a performance culture. Several tools developed in 2008 and 2009 are making it much easier for CII members to access and use CII’s Benchmarking Program. These include automated data entry using XML protocols, a Tier 1 questionnaire with 70% fewer questions, and Level 1 productivity metrics that give an overall score for engineering and construction productivity. These tools can engender a robust project performance culture in any organization engaged in capital projects. Companies need not gamble on the performance outcomes of their projects.

In the implementation session, the panel will make short presentations about the new tools and explain how these can be integrated into a program to promote a culture of project performance in a capital projects organization. The audience will use both the anecdotal and benchmarking evidence presented to bet on certain projects in gambling-type games during this session.
Plenary Session Presenter

Daniel Scott, Chief Scheduler – BE&K Engineering & Construction (A KBR Company)

Danny Scott is the Chief Scheduler for BE&K Engineering & Construction, a KBR Company. He has over 20 years of engineering and construction experience on heavy industrial and process-intensive projects, both domestically and internationally. His roles at BE&K have included manager of engineering project controls, project engineer, subcontract coordinator, project scheduler, and project cost analyst. Danny has been involved with CII for the past nine years and is currently the Co-Chair of the CII Benchmarking and Metrics Committee. He is also BE&K’s trainer for Primavera’s P6 product. He holds a bachelor’s degree in Business Administration from the University of Montevallo and an MBA from Samford University.

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Implementation Session Moderator

Daniel Scott, Chief Scheduler – BE&K Engineering & Construction (A KBR Company)

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Panelists

Harold L. Helland, Manager, Project Management – Abbott

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Robert A. Herrington, Manager of EPC/CM Work Process, Southern Region – Jacobs

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Stephen P. Mulva, Associate Director– Construction Industry Institute

e-mail: smulva@cii.utexas.edu
Don’t Gamble with Your Project’s Performance

Plenary Session Slides

Gambling on a Football Game

Line
Visiting team favored by three points

Game Day Forecast
Clear, 24°F

Gambling on a Football Game (continued)

Gambler 1: Bob Benchmarker

Considerations:

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<tr>
<th>Site Conditions</th>
<th>Home team wins 83% of games played when temperature &lt; 32°F</th>
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<tr>
<td>Productivity</td>
<td>Home team allows only 8.7 points per game</td>
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<tr>
<td>Resource Availability</td>
<td>Sports page says visiting team's QB is hurt and listed as questionable</td>
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</table>
Don’t Gamble with Your Project’s Performance

Gambling on a Football Game (continued)
Gambler 2: Will Chansit

Considerations:

Likes the colors of the visiting team’s uniforms

How Would You Bet?

CII Benchmarking Isn’t Gambling

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<th>1995</th>
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</table>
Industry Safety Culture

77.3% Reduction in TRIR!

*OSHA Construction Division, MACE 200-220, BC 10-17 -- REF: OSHA Reporting Change

What If…

We Developed a **Performance Culture**

That…

Rivaled Our Industry’s **Safety Culture**?

What Tools Would We Need?

- Data Mining Capability ✓
Don’t Gamble with Your Project’s Performance

Notes

An Executive ‘Dashboard’

- High-Level Attention, Priority, Understanding 
- Overall Project Performance: 20 Projects

![Pie chart showing project performance distribution]

Executive Dashboard “Drill-Down”

- Project Schedule Performance: 20 Projects

![Pie chart showing project schedule performance distribution]

Project-Level Productivity 

DISCIPLINE-LEVEL PRODUCTIVITY

- Electrical Engineering Productivity
- Instrumentation Engr. Productivity
- Concrete Engineering Productivity
- Structural Steel Engr. Productivity
- Piping Engineering Productivity
- Equipment Engr. Productivity
- Structural Steel Field Productivity
- Scaffolding Field Productivity
- Equipment Field Productivity
- Insulation Field Productivity
- Electrical Field Productivity
- Concrete Field Productivity
- Piping Field Productivity

![Diagram showing discipline-level productivity]

ENGINEERING PRODUCTIVITY

CONSTRUCTION PRODUCTIVITY
Project-Level Productivity

- 11% Improvement (4th to 3rd Quartile)
- 26% Improvement (4th to 1st Quartile)

CII Needs Lots of Data...

Traditional Three-step Process

- Online Questionnaire
- CII Benchmarking Database
- Data Mining and Reporting Engine

Response: CII is Investing

- NextGen Benchmarking System
  - 80% less questions
  - Internal (Business Unit, Product Line) Benchmarks
  - Automated Data Entry (XML)
  - Worldwide University Benchmarking Labs

- CII Summer Intern Program
Don’t Gamble with Your Project’s Performance

Notes

You Know the Value – You Have to Use It...

Value of External Benchmarking

Projects’ Use of External Benchmarking

Can A Performance Culture Improve Performance?

Yes!

Pharmaceutical and Biotechnology Owners Benchmarking Program

Cost Performance (4.7% Less) Schedule Performance (42.1% Less)
How Do We Build a Performance Culture?

- Include CII Benchmarking In Work Processes
  - Owner’s Gated Asset Development Processes
  - Contractor’s Operating Procedures Guidebook

USE CII BENCHMARKING HERE

How Do We Build A Performance Culture?

- Start by Attending Our Implementation Session!
- Learn More about:
  - Project-Level Productivity Measures
  - Executive-Level Reporting and Data Mining
  - CII’s NextGen System and Automated Data Entry
- Don’t Gamble with Your Project’s Performance ANYMORE – Benchmark with CII
Don’t Gamble with Your Project’s Performance

Learning Objectives

• Understand the use of the PHI tool in complex projects.
• Improve the ability to analyze and manage complicated projects.
• Achieve early understanding and predictions of project status to initiate corrective actions.
• Improve project performance.
• Improve quality, meet schedule, and control budget.

Abstract

The Hanford Waste Treatment Plant (WTP)—a nuclear waste treatment and immobilization facility in southeastern Washington state—is the largest project in the U.S., with a cost of over $12 billion and a projected design and construction schedule of 18 years. The WTP facility consists of five multibillion dollar subprojects with first-of-a-kind technical issues. By 2006, the estimated cost had tripled and the schedule had been extended by seven years. Not long after, the U.S. Department of Energy (DOE) decided to adopt the CII PHI tool to obtain an independent assessment of the health of the WTP and to identify project areas requiring management attention. In the year following its adoption, the PHI’s output dials indicated that performance at the WTP was rapidly deteriorating. Using the PHI gauges, DOE was able to take strong management action to bring the WTP back on track. The PHI tool will continue to be used on the project to monitor progress and focus management attention.

In the implementation session, the presenter will explore the complexity of the WTP from both technical and management perspectives. He will discuss how to apply the PHI tool’s Leading Indicators and how to understand the data sources it uses. He will also examine performance trends with a focus on the way the PHI indices were used by DOE to appraise its performance and WTP contractors’ performance. Discussion with the audience will address the use of the tool in cost reimbursable DOE contracting, and the presenter will answer audience questions on the value of the tool to DOE and its ability to forecast progress. Audience members will be able to explore the potential use of the PHI tool on their projects.
Plenary Session Presenter

John R. Eschenberg, Project Manager, Waste Treatment and Immobilization Plant Project – U.S. Department of Energy

John R. Eschenberg manages the design, construction, and eventual operation of the Hanford Waste Treatment Plant, the world’s largest and most complex nuclear waste treatment facility. Mr. Eschenberg has 20 years of industrial experience in a variety of defense, commercial, and Department of Energy settings. Prior to his work at the Hanford plant, he held several positions in project management, design, and operations at major nuclear facilities across the country. He has also worked for major defense contractors and for the Department of the Navy. Mr. Eschenberg holds a B.S., Summa Cum Laude, from the University of Maryland. Having also graduated from the Federal Executive Institute in Charlottesville, Virginia, he is now completing executive management coursework at the Sloan School of Management in Cambridge, Massachusetts. He is certified as a Registered Environmental Manager by the National Registry Radiation Protection, and is a Project Management Career Development Program Level IV Project Manager. Mr. Eschenberg and his wife Bonita, reside in Kennewick, Washington with their two sons, Mason and Evan. In his spare time, he enjoys motorcycles and a variety of outdoor sports. He also loves restoring old cars, having recently completed a 1963 Ford Galaxie fastback.

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Implementation Session Moderator

David J. Ashley, Vice President – Hill International, Inc.

David J. Ashley manages Hill International’s scope of work at the Hanford Waste Treatment Plant, the world’s largest and most complex nuclear waste treatment facility. Mr. Ashley has 40 years of engineering, construction, and project management experience in commercial nuclear and Department of Energy (DOE) settings. Prior to working at Hill International, he managed nuclear projects both at Hanford and Oak Ridge. Before this, Mr. Ashley ran a utility consulting business and managed the engineering of commercial nuclear projects. He holds a B.S. with honors in chemical engineering from the University of Surrey, and is a registered Professional Engineer in Washington and Colorado. He and his wife Reece reside in Richland with their son Colton and daughter Brilee. In his spare time, he enjoys reading, photography, hiking, and tennis. Mr. Ashley is also restoring a 1967 Jaguar XKE roadster, when time allows.

e-mail: davidashley@hillintl.com

Panelist

John R. Eschenberg, Project Manager, Waste Treatment and Immobilization Plant Project – U.S. Department of Energy

e-mail: john_r_eschenberg@orp.doe.gov
Use of the CII Project Health Indicator at the U.S. DOE Hanford Waste Treatment and Immobilization Plant Project

Plenary Session Slides

Use of the CII Project Health Indicator at the U.S. DOE Hanford Waste Treatment and Immobilization Plant Project

2009 CII Annual Conference
Reno, Nevada

Waste Treatment and Immobilization Plant Project

Mission: Treat radioactive waste generated during Cold War
- Located in Hanford, WA
- 53 million gallons in volume
- 190 million curies of radioactivity
- Will convert waste to glass

Waste Treatment and Immobilization Plant Project

Scope
- EPC, including start-up

Design Life
- 40 years

Budget
- $12.26 billion

Schedule
- 2001–2019

Effort
- 80 million work-hours
Notes

Largest nuclear construction project in U.S.

Major Commodities

- Concrete: 267,000 cubic yards
- Structural steel: 34,000 tons
- Piping: 80,000 feet
- Ductwork: 2,055 tons
- Electrical raceway: 946,000 feet
- Electrical cable: 4,281,000 feet

Historical Project Challenges

Original (2001) Project Baseline:
$4 billion, operational in 2011

- Enforceable clean-up agreements drove fast-track EPC approach
- Construction began with <10% design
- Plant design requirements not firm
- Vendor and supply chain atrophy
- Customer-driven design changes
- Contractor performance issues
- Volatility in materials pricing
- Underestimates of unit rates and quantities
Historical Project Challenges

New (2006) Project Baseline:
$12.263 billion, operational in 2019

Contemporary Project Challenges

- Rapid use of management reserve
- Cost growth continued
- New technical uncertainties identified
- Challenged to meet unit rates
- Struggling to finalize design
- Continued difficulties with supply chain

Solving the Problem

New CII PHI Tool adopted in 2007
- Got advance warning of problem areas
- Engaged independent third-party assessment of project health
- Adopted best industry practices for management
Notes

Application of CII PHI Tool

- Unique plant needed careful review of leading indicators. Used all 43 leading indicators.
- Every area individually assessed:
  - Pretreatment
  - High Level Waste
  - Low Activity Waste
- PHI output dials customized for color ranges
- Assessment conducted quarterly

Project Health Assessment Benchmark Outcomes
Fiscal Year 2008

Project Health Indicator Results

In combination with other leading metrics, PHI flagged several underlying causes:
- Design efficiency and finalization
- Organizational structure and integration
- Acquisition and procurement processes
- Contract management
- Cost control
Solving the Problem

• Results allowed project team to focus on specific areas
• Provided specific feedback (good/bad) on corrective measures

Stakes to the Industry

• Hanford is the first nuclear plant to be designed and constructed in decades.
• Lessons are being learned at Hanford, many painful.
• The reemerging commercial nuclear power industry is planning new projects.
• New commercial projects can reap the rewards of the Hanford experience.
• PHI is a useful tool for such complex projects.

Implementation Session

Learn more about applying PHI to complex projects
Use of the CII Project Health Indicator at the U.S. DOE Hanford Waste Treatment and Immobilization Plant Project
Improving Your Innovation Potential Using the Innovation Maturity Model

Enhancing & Expanding Innovation in the Construction Industry

Research Team

Learning Objectives

• Understand the need for innovation.

• Learn how to begin a move toward innovation.

• Use the Innovation Evaluation Model.

• Learn how to evaluate current innovation status in an organization.

Abstract

RT 243 will introduce the innovation maturity model it developed and the innovation case studies it is using to test the evaluative power of this index. The maturity index is based on the team's study of innovation in the EPC industry, and includes both a weighted evaluation survey and recommendations for improving the innovation scores based on survey responses. To obtain an index input that accurately represents the industry, the case studies were chosen to include both design and construction organizations. The team will also introduce the completed and ongoing case studies it is using to determine the potential for the index to guide innovation enhancement activities.

The implementation session will provide attendees with the opportunity to hear how organizations have introduced the Innovation Index and implemented its recommendations into their operating environment. Additionally, presenters will explain how participants can obtain and use the index in their own organizations.
Plenary Session Presenter

John P. Strickland, Construction Program Manager – CH2M HILL

John P. Strickland has over 25 years of construction project management experience. He has led major design/build and construction management projects for key IDC-CH2M clients. He has been the lead construction manager on projects totaling over $300 million worth of construction value and over $2 billion worth of installed equipment cost value. His experience includes microelectronics facilities, power plants, and large scale buildings. He is familiar with the logistics demands of large supporting workforces, and his technical background ranges from sitework, concrete and industrial mechanical installations to cleanroom construction and installation of microelectronics tools. He has extensive experience preparing for and installing first-of-a-kind process equipment and understands how to meet schedules and keep budgets on projects involving high degrees of change. Mr. Strickland is committed to establishing highly collaborative project cultures, and has been an advocate of the Injury Free Environment (IFE) concept for many years. He has been a leader in the lean construction movement for over 10 years and has successfully implemented key lean practices on major projects. He has expertise in all phases of construction operations, including safety management, project controls, contract management and field operations. He has successfully developed and implemented innovative contracting strategies, and has extensive experience in subcontractor selection, negotiation and administration. He has played a lead role in craft labor relations on major projects, with no work stoppages or pickets on the projects he has managed. Mr. Strickland received both his B.S. in construction management and his M.B.A. from Boise State University.

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Implementation Session Moderator

Paul S. Chinowsky, Associate Professor, Civil Engineering, Environmental & Architectural Engineering – University of Colorado–Boulder

Paul S. Chinowsky is an associate professor in the Department of Civil, Environmental, and Architectural Engineering at the University of Colorado where he is in the construction engineering and management group. He is currently conducting research in two areas: the management of organizations in the AEC industry and the impact of networks on high performance teams. His book, Strategic Corporate Management in Engineering, introduces civil engineering organizations to the concepts of strategic management. Dr. Chinowsky has helped organizations of all sizes, both public and private, address business and strategic planning. Prior to joining the Colorado faculty, he was a professor of civil engineering at the Georgia Institute of Technology for eight years. Prior to returning to academia, he was a knowledge-based systems consultant for Stone & Webster Engineering in Boston. He has been recognized as CII’s Outstanding Researcher. He received his undergraduate and master’s degree in architecture from California Polytechnic State University in San Luis Obispo and his doctorate in civil engineering from Stanford University.

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Panelists

Matthew Hallowell, Assistant Professor – University of Colorado–Boulder
e-mail: matthew.hallowell@colorado.edu

John P. Strickland, Program Manager – CH2M HILL
e-mail: john.strickland@ch2m.com

T. Michael Toole, Associate Professor, Civil & Environmental Engineering – Bucknell University
e-mail: ttoole@bucknell.edu
Improving Your Innovation Potential Using the Innovation Maturity Model
Improving Your Innovation Potential Using the Innovation Maturity Model

Where Were You 12 Months Ago?

What is Innovation?

Innovation is the act of introducing improvement in a process, product or system that is novel to the organization and results in increased value for stakeholders.
**Notes**

**Why Worry About Innovation?**

- Essential to prosperity and survival
- Clear link between most admired firms and most innovative firms
- New competitors
- Ever-increasing need for greater speed and specific customer needs

**Summary of Initial Findings**

**Forty years of U.S. labor statistics data show a stark contrast in productivity:**

- **Other industries:** 250% rise ▲
- **Construction:** 25% decline ▼

**Findings from Year 1**

**Key Restraints**

- Schedules and budgets are too tight to take a chance on something new
- Lack of resources including staff time
- Lack of a firm strategy for innovation
- Owners do not recognize the value
- Risk perspective does not favor innovation
- Single event thinking
Key Attributes of Innovation Leaders

- Leadership
- Learning
- Processes
- Collaboration

- Culture
- Customer focus
- Resources
- Risk perspective

These key attributes form the structure for the Innovation Maturity Model.

Innovation Maturity Model

- 61 questions in eight key dimensions
- Web-based or spreadsheet collection
- Importance factors identify greatest opportunities
- Diagnostics
- Specific recommendations for each question

Measuring Innovation Attributes

4. Innovations are discussed freely with regard to rank or position.
   - Strongly Disagree
   - Slightly Disagree
   - Neutral
   - Slightly Agree
   - Strongly Agree

6. Our organization is described as "highly collaborative" by employees, customers and suppliers.
   - Strongly Disagree
   - Slightly Disagree
   - Neutral
   - Slightly Agree
   - Strongly Agree
Notes

Measuring Innovation Attributes (continued)

Testing the Innovation Model

Additional data from
- Southland Industries
- WorleyParsons
- CH2M HILL
- Fluor
- CSA
- Black & Veatch
- U.S. Army Corps of Engineers

Testing the Innovation Model

- Hundreds of additional survey responses logged
- Results consistent with initial findings but generally more positive
- Enthusiastic response from at least one participating company
- Clear common patterns
  - Areas of strength
  - Opportunities for improvement
  - Further evidence of systemic factors at work
Case Study Insights

- Don’t be misled by optimistic scoring.
  - Scoring may go down as steps are taken to improve innovation.
  - Scoring is relative to perceptions of possibility.
- Value comes from discussing and challenging issues identified by maturity model.
- Strong connection to lean construction initiatives.

What Systemic Factors May Be at Work?

- Counter-productive risk perspective
  - Risk can be profitable if properly syndicated
  - EPC customs tend to concentrating risk
- Single event thinking
- Lack of effective processes

Acknowledgements

RT 243 Members – Year 1
- Paul Chinowsky, University of Colorado
- Michael Toole, Bucknell University
- Glenn Gilkey, Fluor
- Howard Irwin, AMEC
- Paul Kennelly, M. A. Mortenson
- Garry King, WorleyParsons
- Mauricio Rodriguez, Smithonian Institution
- John Strickland, CH2M HILL
- Bob Ritter, WorleyParsons
- Kenneth Strzepek, University of Colorado
- Adam Timmons, Washington Group International
Acknowledgements (continued)

RT 243 Members – Year 2
- Paul Chinowsky, University of Colorado
- Michael Toole, Bucknell University
- Glenn Gilkey, Fluor
- Howard Irwin, AMEC
- Pauli Kennelly, M.A. Mortenson
- Garry King, WorleyParsons
- Mauricio Rodriguez, Smithsonian Institution
- John Strickland, CH2M HILL

Acknowledgements (continued)

- Countless industry experts and authors
- Research Team 191 – Applications of Lean Manufacturing Principles to Construction
- Research Team 234 – Roadmap for Lean Implementation at the Project Level

Where would you like your company to be?
Business Leadership in the 21st Century

Keynote Address: Ralph Peterson

Keynote Speaker

Ralph R. Peterson, Chairman Emeritus – CH2M HILL

Ralph R. Peterson was appointed CEO of CH2M HILL in 1991, after 26 years of service. Mr. Peterson led the firm's entry into hazardous waste management and remediation and, prior to his appointment as CEO, he managed the company's Industrial Processes Division and served as Director of Technology. He has also been active in sustainable development initiatives around the world, including the World Water Forum, China's National Sustainable Development Conference, the Rio+5 Summit, the World Business Council for Sustainable Development, and the Environment Leadership Council of the Pew Center for Global Climate Change, among others. He serves on the U.S. Secretary of Energy's National Petroleum Council and on the Executive Committee of the Council on Competitiveness. He is a member of the board of StanCorp Financial Group and of the Colorado Association of Black Professional Engineers and Scientists, and is past co-chair of the National Congress for the Advancement of Minorities in the Environmental Professions. He also serves on advisory boards at the Colorado School of Mines, Yale University, Regis University, and the University of Denver. Among his recent awards are the American Society of Civil Engineers President's Medal, the OPAL Award, and the John I. Parcel–Leif J. Sverdrup Civil Engineering Management Award. He has also received the Keystone Center Leadership in Industry Award, the Institute of International Education Corporate Leadership Award, the University of Denver International Bridge Builder Award, the Thorne Ecological Institute Champion of the Environment Award, and the American Jewish Committee's National Human Relations Award. In 2003, he was chosen as a Fellow of the Association of Women in Science (AWIS). Mr. Peterson is last year's recipient of CII's Carroll H. Dunn Award of Excellence. He earned his bachelor's degree in civil engineering from Oregon State University and his master's degree in environmental engineering from Stanford University. He has also received honorary doctorates in engineering from the Colorado School of Mines and from Boise State University. He and his wife Betty live in Denver and have two grown children and five grandchildren.

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Transforming Modular Construction for the Competitive Advantage

Adaptation of Shipbuilding Production Systems to Construction
Research Team

Learning Objectives

- Understand the evolution of modular construction over the decades.
- Learn how the Interim Product Database (IPD) approach has transformed shipbuilding.
- Learn how IPD processes could transform construction by changing the industry approach to modular construction.
- Understand the potential benefits of adapting an IPD approach to modular construction.
- Identify current barriers and potential solutions.
- Shift the current one-off approach to modular construction to a more cost-effective manufacturing-type model.

Abstract

By adapting the Interim Product Database (IPD) approach that is currently used by the shipbuilding industry, construction organizations can make modular construction a highly efficient manufactured process. With its ability to incorporate parametric design rules for sizing and customization, this transformational approach to modular construction will allow contractors to deliver facilities much more quickly and cheaply than current traditional approaches. Such improved delivery will allow them to gain a competitive advantage worldwide.

A teaching presentation will be used to further define and explain the IPD approach and how it can be adapted to construction. Presenters will use a modified Lego set with the audience to show how an IPD approach to modular construction can allow customization of standardized modules. The research team will also review its barrier analysis and the solutions it has formulated to those barriers. Finally, the panel will examine an economic modeling comparison tool.
Plenary Session Presenter

Bill Wright, Director, Water and Infrastructure – Jacobs

Bill Wright, P.E., serves as a Director of Water and Infrastructure for Jacobs Engineering, where he leads the firm’s water and infrastructure services in the Southeastern United States, as well as in other key markets in the Northeast. His career in engineering and construction has spanned over 30 years, with regional projects and programs that include water resources, infrastructure, transportation, and facilities. He also frequently facilitates and participates in value engineering and constructability reviews; most recently, he participated in the 2008 New York City Department of Environmental Protection’s Blue Ribbon Expert Construction Panel to review their $1.4 billion Biological Nitrogen Reduction Construction Program. A 1978 civil engineering graduate from Auburn University, Mr. Wright also obtained a masters degree in civil engineering (Construction Management) from the Georgia Institute of Technology in 1985. He is a registered Professional Engineer in California, Georgia, and Virginia. Mr. Wright also served as an officer in the Navy’s Civil Engineer Corps for more than 22 years, retiring in 2001. His naval career involved work on public works, construction, construction management, and program management.

e-mail: bill.wright@jacobs.com
Implementation Session Moderator

Kenneth D. Walsh, Paul S. Roel Chair of Construction Engineering & Management – San Diego State University

Kenneth D. Walsh is the Paul S. Roel Chair of Construction Engineering & Management at San Diego State University (SDSU). Before joining SDSU, he taught engineering at the Del E. Webb School of Construction at Arizona State University. His industry experience includes engineering work at Huntingdon Engineering and Environmental and at SEA Incorporated, both Arizona-based companies. He has won numerous honors and awards for teaching and research and has published prolifically on engineering topics ranging from soil characteristics to construction supply chain issues. He received his B.S.E., his M.S., and his Ph.D. from Arizona State University, all in civil engineering.

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Panelists

Howard H. Bashford, Professor, Del E. Webb School of Construction – Arizona State University

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David Behrens, BSII Chief Construction Engineer – Bechtel

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Randall A. Fleischmann, Project Manager – GlaxoSmithKline

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Richard Lee Storch, Professor and Chair, Industrial Engineering – University of Washington

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Transforming Modular Construction for the Competitive Advantage

Plenary Session Slides

Transforming Modular Construction for the Competitive Advantage
2009 CII Annual Conference
Reno, Nevada

Construction Industry Institute
Celebrating 50 Years of Success
1983 - 2033
Bridging into the future...

Taking construction IPD to the next level...
Notes

...adapting it across technologies...

...and now using it to build virtually anything.

The Interim Product Database (IPD) Journey
The IPD Evolution and Journey

Only 25 years ago, early in the 21st Century...

U.S. contractors lost ground to foreign competition...

U.S. Share of Global Construction (%)


U.S. and world in deepest recession since Great Depression of 1930’s

The IPD Evolution and Journey

Construction productivity stagnant

• Deep concern over construction industry’s underachievement
• Widespread dissatisfaction among industry clients

Notes
Notes

The IPD Evolution and Journey
Two Choices:
(1) Cling to the belief that construction is so unique that it has no lessons to learn...

or...

(2) Seek improvement through re-engineering construction.

The Eureka Moment

While modular construction was already being used in one-off applications...

...it needed something more.

Thus, the Interim Product Database (IPD) process was born.

The IPD Journey

RT 232 recognized dramatic gains of Interim Product Database (IPD) approach used in shipbuilding:
- Increased shipyard productivity (5–10x)
- Reduced cycle time (4–6x)
- Realized cost reductions approaching 80%
- Maintained safety and quality standards

RT 255 evaluated the potential of IPD for the construction industry and identified a path forward.
The IPD Journey

Essential IPD elements:

- Design-production integration scheme based on distinct functional zones.
- Library of designs for “chunks” or modules of ships.
- Design rules allow rapid resizing of production information using parametric design techniques.
- Resulting design drives a mechanized, automated assembly line to construct those chunks.

Naysayers: “It won’t work because…”

- Customization limitations “…my project has to be unique.”
- Financial constraints “…it will cost too much to build a manufacturing facility.”
- Transportation constraints “…you can’t get there from here.”
- Code issues “…codes won’t allow it.”
- Design issues “…you can’t reuse the design.”
- Interfaces/site assembly “…it won’t fit.”

IPD Journey

Owner requirements

- Size
- Content
- Performance
- Schedule
Transforming Modular Construction for the Competitive Advantage

Notes

An IPD modular approach
Shortens schedule and
Lowers construction costs

5 ½ months

12 months

IPD Overview

Putting it together

• Zone identification
• Modular breakdown
• Module design/build process
• Sub-assemblies
• Parts identification

Sub-assembly database

Module database

Parts database

Design Rules &
Decision-making Criteria

Design Process

Whole Bldg.
Zone definition
Module definition
Assembly/Part definition

Production Process

Minor assemblies (work packages)
Major Assemblies
Module Assembly
Zone Assembly
Whole Bldg.
IPD Overview

Manufacturing vs. Fabrication

Advantages
- Weather independent
- Quality
- Productivity
- Safety
- Ability to use automation/robotics

What made IPD work
- Database of qualified standard module designs
- Parametric Design Rules
- Supply chain optimization
- Lean manufacturing (Six Sigma)
- Automation
- Module logistics

Implementation Session
- Define shipbuilding IPD
- Translate IPD to construction
- Compare IPD to current approaches
- Identify barriers to implementation
- Compare economics of modular vs. traditional approaches
- Show path forward
Transforming Modular Construction for the Competitive Advantage

Notes

RT 255

- Howard Bashford
  Arizona State University
- David Behrens
  Bouchet
- Michael Day
  CB&I
- Randy Fleischmann
  GlaxoSmithKline
- Alexandre L. Garcia
  Petrobras
- Françoise Saliou
  Jacobs
- Richard L. Storch
  University of Washington
- Kenneth D. Walsh
  San Diego State University
- Bill Wright
  Jacobs

See you this afternoon...
Learning Objectives

• Enhance effectiveness and value of your lessons learned program.
• Observe mature lessons learned methodology.
• Prevent common pitfalls from harming your project.

Abstract

This presentation will demonstrate how Saudi Aramco developed a mature "lessons learned" program using CII methodology and then took the program to an even higher level of maturity and value. Presenters will share information about their approach to developing a Project Management Pitfall Prevention Tool – a shortlist of common pitfalls with corresponding pitfall avoidance strategies that is based on years of collected wisdom.

The presenting team will be made up of lessons learned experts as well as members of an ongoing project management team that has used this Pitfall Prevention Tool. A discussion session will give participants the opportunity to exchange insights and success stories about the lessons learned process; particular attention will be given to why lessons are often repeated and how to prevent this costly repetition.

Plenary Session Presenter

Eric J. Richter, Best Practices Specialist – Saudi Aramco

Eric J. Richter is a knowledge management specialist for Saudi Aramco. Since 1998 he has served in diverse key roles in the firm to promote CII best practices implementation in its operations. He has 30 years of broad project management experience with both owners and contractors, having worked in all phases of the project life cycle, primarily in the oil and gas industry. He manages the development and implementation of Saudi Aramco’s internationally recognized lessons learned program, including its latest major advance in value, the Pitfall Prevention Tool. Mr. Richter earned his bachelor’s degree in industrial and systems engineering from the Georgia Institute of Technology.

e-mail: eric.richter@aramco.com
Implementation Session Moderator

Charles M. Green, Engineering Specialist, Engineering Unit – Aramco Services Company

Charles M. Green serves as Engineering Specialist at Aramco Services Company, where he has worked for over 25 years. Mr. Green has more than 35 years of experience in the specification, evaluation, development, and testing of process control and data acquisition systems. At Aramco, these control systems have been installed as part of new oil and gas processing facilities and are incorporated into infrastructure projects. He has been active on the CII Benchmarking & Metrics Committee for nine years. Mr. Green earned his bachelor’s degree from Rice University.

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Panelists

Fayzah A. Al-Habib, General Supervisor, Capital Program Optimization Division, Project Support & Controls Department – Aramco Services Company
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Eric J. Richter, Knowledge Management Specialist, Capital Program Optimization Division, Project Support & Controls Department – Saudi Aramco
e-mail: eric.richter@aramco.com
Pitfall Prevention Tool – Taking Lessons Learned Knowledge to the Next Level

Plenary Session Slides

Pitfall Prevention Tool
Taking Lessons Learned Knowledge to the Next Level

Eric Richter, Saudi Aramco

“How did I get into this mess?”
Notes
Saudi Aramco is helping to write the next chapter

Project Management
Pitfall Prevention Tool

—an innovation created to

→ Help project teams prevent potential pitfalls.
→ Enhance value of lessons learned knowledge.

Refine knowledge to higher and higher value

A pitfall is …

• A potential problem that is easily encountered but not immediately obvious.

Avoiding pitfalls is more valuable than gold.
Notes

How were “Top 100” pitfalls selected?

- Analyzed lessons knowledge base to identify:
  - Frequent occurring problems
  - Highly viewed lessons
- Simplified this data into a short list of pitfalls:
  - 16 categories
  - About six pitfalls per category
- Organized results into a useful hierarchy:
  - Pitfall
  - Avoidance strategies
  - Applicable lessons learned

Pitfall prevention is valuable in many ways

- Helps teams anticipate and avoid common pitfalls
- Expedites competency by reducing learning curves
- Counters the effects of knowledge loss to turnovers and retirements
- Develops leaders and world-class work force
- Expands intellectual capital

Join our implementation session

- Learn how to:
  - Improve your lessons learned program
  - Develop a Pitfall Prevention Tool
- Participate in a discussion about:
  - Why pitfalls are repeatedly encountered
  - Solutions to prevent repeated pitfalls
- Exchange insights and success stories about the lessons learned process
- Learn a little about desert driving
Panel

- Charlie Green, Moderator, Aramco Services Company
- Eric Richter, Knowledge Management Specialist, Saudi Aramco
- Fayzah A. Al-Habib, General Supervisor, Saudi Aramco
- Murad A. Alsayed, Project Manager, Saudi Aramco
- In Hyuk Lim, Project Manager, GS Engineering & Construction Corporation

Notes

Launch your lessons program to the next level
Learning Objectives

- Identify estimating competencies.
- Identify gaps between current and desired competencies.
- Recommend methods of closing gaps in competencies.
- Suggest education and training for developing estimators.
- Identify preferred career paths of estimators.

Abstract

Recognizing the importance of the skills and experience of estimators, the construction industry is confronted with a shortage of cost estimators and how to transfer the knowledge and skills of highly experienced estimators before they retire to young estimators. CII RT 253 collected data that shows 84% of the respondents reported that the construction industry will experience a shortage of cost estimators within the next five years. The RT also collected information from over 200 estimators to identify the competencies of estimators and performed a gap analysis of current and desired competencies. The presentation will also show methods to attract and retain estimators, recommend methods of education and training, and identify the many career paths and the ideal career path into estimating.

A brief skit will lead into a panel discussion which emphasizes the importance of estimating in the engineering and construction industry, with particular emphasis on the competencies and role of estimators as a key member of the project team.
Plenary Session Presenter

John M. Harmon, Corporate Manager, Estimating – Jacobs

John M. Harmon has been Corporate Manager of Estimating for Jacobs Engineering since 2007, coordinating the firm’s estimating initiatives, resources, and capabilities worldwide. Because the company handles large and often complex estimates, he directs the development of estimating work processes, systems, and programs to assure consistency across all lines of business. He has over 30 years of experience in project controls and estimating for heavy industrial applications, including petrochemical, oil and gas, pulp and paper, and power. Experienced at working within multi-company joint venture organizations, Mr. Harmon has served as a project controls manager, a manager of estimating, a senior principal estimator, a cost analyst, a cost and schedule engineer, and a project engineer. He has provided many lump sum and reimbursable project estimates in locations around the world. Mr. Harmon attended Oklahoma State University.

e-mail: john.harmon@jacobs.com
Implementation Session Moderator

Hyung Seok Jeong, Assistant Professor, School of Civil & Environmental Engineering – Oklahoma State University

Hyung Seok “David” Jeong is currently an Assistant Professor at the School of Civil and Environmental Engineering at Oklahoma State University in Stillwater, Oklahoma. Prior to earning his Ph.D. in Civil Engineering at Purdue University in 2005, Dr. Jeong served six years as Project Engineer/Assistant general manager (Cost Engineer), Daewoo Engineering & Construction Company in Seoul, Korea. He has authored and co-authored numerous publications with titles as varied as “Water Rationing Model for Consequence Minimization of Water Infrastructure against Intentional Attacks” and “Applying Process Simulation Technique to Value Engineering Model: A Case Study of Hospital Building Project.” Among other awards and honors, he has been awarded first place in research paper presentation competitions in the physical science area at Oklahoma State University Research Symposia in both 2007 and 2008.

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Panelists

Thomas Cappelle, Director, Regional Engineering Americas – Abbott

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Oswald Chong, Assistant Professor, Department of Civil, Environmental and Architectural Engineering – University of Kansas

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Keith R. Didriksen, Gas, Oil & Chemicals Estimating Manager, Energy Division – Black & Veatch

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John M. Harmon, Corporate Manager, Estimating – Jacobs

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Lora Pinkerton, Estimating Department Manager, Reading Operations – WorleyParsons

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Peter L. Richen, Senior Estimator – Bechtel Group, Inc.

e-mail: plrichen@bechtel.com
Estimating as a Competency in Capital Projects

Plenary Session Slides

Estimating as a Competency in Capital Projects
2009 CII Annual Conference
Reno, Nevada

Related CII Research and Implementation Tools
- RS 131-1, Quantitative Prediction of Estimate Accuracy
- RS 200-1, Recruiting and Retaining Future Engineering and Construction Leaders
- RS 244-1, Global Project Control and Management Systems
- IR 111-3, Core Competency Toolkit
- IR 200-3, Recruiting and Retaining: Company Self-Assessment

Estimating as a Competency in Capital Projects Research Team

Chairs
- John Farnese, Jacobs
- Don Anderson, U.S. Steel

Members
- Conner Bailey, Eastman Chemical Company
- Kim Collin, U.S. Army Corps of Engineers
- Thomas Coppedge, Abbott
- Brian Cole, SRG, Lyman Inc.
- Conorada Frazier, Sandmeyer Institute
- Leigh Forman, Progress Energy
- John Forward, ABB, Lumasys Inc.
- Daniel Kwon, DOH
- Robert C. Kates, Mustang
- Jeffrey P. Land, DuPont
- Pedro Pimentel, Netai, Piersley Brothers Ltd. - Petroleos
- Dennis W. Pochol, Vulcan Oil Corporation
- Laura Politiello, Whitley, Jackson, Lavigne
- Suresh Ramachandran, Fluor Corporation
- Stephen Thomas, CII
- Peter Richlin, Bepchel Group Inc.
- Jonathan Steve Sawall, U.S. General Services Administration
- Mark E. Smialowski, Air Products & Chemicals, Inc.

Academics
- Gerald D. Overmand, Oklahoma State University
- Hyungseok Jeong, Oklahoma State University
- Oswald W. R. Cheng, University of Kansas
- Anwar Alsheu, Oklahoma State University
- Wai-Ping Leung, University of Kansas

Study Advisory Committee (SAC Members)
- Narendra Gupta, DPRA
- Bruce Elliott, CEO-Estimating
- Sandy Wayne, Petroleos
- Keith Dekoven, Black and Veatch
- Bruce Bradley, Flor
- Larry Dwyer, CEO-Estimating
- Jim Walsh, Hudz Energy
- Paul Martin, Hilani Builders
- Michael Gill, Kaiser Foundation Hospital
- Mary Everson, JE Dunn
- Fick Ulrich, Estimating
- Bob Peppel, Peppel and Peppel Inc.
Notes

Why is Cost Estimating Important?
- Estimators put project parts together
- Estimating wins new jobs
- Estimating affects the bottom line

Crisis in Estimating Profession?
- Experienced estimators are retiring
- Junior estimators depend on computers

CRISIS

RT 253 Mission
- Identify estimating competencies
- Identify gaps between current and desired competencies
- Recommend methods of closing gaps in competencies
- Suggest education and training programs for junior estimators
- Identify preferred career paths of estimators
Professional Competencies of Estimators

Estimator Competencies

Skills  Knowledge  Personal Attributes

Notes

Professional Competencies of Estimators (continued)

Skills
- Know how to read and interpret drawings
- Be able to plan and schedule
- Envision big picture
- Apply sound judgment
- Employ quantity take-off
- Others

Skills  Knowledge  Personal Attributes

Professional Competencies of Estimators (continued)

Knowledge
- Design and engineering
- Productivity and labor rates
- Construction protocols and site condition
- What to ask of whom
- How to analyze missing scope
- Other

Skills  Knowledge  Personal Attributes
Notes

Professional Competencies of Estimators (continued)

Personal Attributes

- Open to working in new areas
- Self-confident
- Resolute
- Inquisitive
- Focused under pressure
- Task-oriented
- Others

Skills + Knowledge + Personal Attributes

Good Estimator

Gaps in Estimating Profession

Immediate Shortage of Estimators

- Gaps in Recruitment Methods
- Gaps in Methods to Attract and Retain Estimators
- Gaps in Training Content

Gaps in Competencies

- Skills
- Knowledge
- Personal Attributes

Gaps in Estimating Profession (Industry Survey)

“When do you expect a shortage of estimators?”

- Immediately 67%
- In 5 Years 17%
- In 10 Years 5%
- In 15 Years 1%
- Never 10%
Gaps in Estimating Profession (Industry Survey)
“When do you expect a shortage of estimators?”

84% of respondents expect a shortage of estimators within five years.

Gaps in Estimating Profession

Company-Related Gaps
- Recruitment Methods
- Methods to Attract and Retain Estimators
- Training Programs

Competency-Related Gaps
- Skills
- Knowledge
- Personal Attributes

Methods to Transfer Estimating Knowledge and Skills

Overall Rating
- High—Slightly High
- Slightly High—Neutral
- Neutral—Slightly Low
Estimating as a Competency in Capital Projects

Notes

Education and Training for Estimators

Preferred Career Paths of Estimators

Implementation Session

Detailed summary of research findings

Panel discussion
- John Harrison, Jacobs
- Lora Pinkerton, Wisley Parsons
- Oswald Chong, University of Kansas
- Keith Didricksen, Black & Veatch
- Peter Bohem, Bechtel
- Thomas Cappelle, Abbott
- David Jeong, Oklahoma State University
- Garold Obstlander, Oklahoma State University

Sample topics
- Critical competencies for estimators
- Best methods to recruit, attract, and retain new estimators
- Best methods to train new estimators for each skill
- Preferred career paths for estimators
Maintaining Training During Economic Constraints
Professional Development Committee

Learning Objectives

• Consider stronger emphasis on training during slow times.
• Understand the changing learning styles of today’s and tomorrow’s employees.
• Learn the innovative methods global companies use to deliver training more quickly, more efficiently, and Just In Time.
• Increase awareness of new technology to change or complement training approaches.

Abstract

People are still your best bet! In today’s uncertain economic climate, training budgets are tighter than ever, and organizations must cut costs by finding innovative ways to train and retain both employees and customers. This presentation will show how some companies successfully increase training during business slowdowns by utilizing methods that are more cost effective and accessible than traditional approaches. Additionally, Web-based technology will be presented as a means to address current and future learning styles and just-in-time training.

PDC implementation panel members will first address the continuing demand for training despite straitened economic conditions, and then discuss the need for new approaches to educating today’s workforce. They will also share their approach to supporting their customers’ educational needs with virtual live-instructor classroom training (demo). A member of a second panel will report on another company’s use of mobile training stations to maximize hardware investment and deliver just-in-time training for plant personnel in a large facility. Lastly, a panel member from the University of Texas will introduce current trends in mobile training.
Plenary Session Presenter

Michael R. Peters, Project Management Training Manager – Black & Veatch Corporation

Michael R. Peters is Project Management Training Manager at Black & Veatch Corporation, where he manages international training and development programs conducted in 30 countries. He has extensive experience evaluating enterprise training needs, aligning training strategies with business performance goals, recommending and executing training and development plans, and establishing comprehensive employee development programs. He has developed and managed training programs supporting a broad array of industries and markets; his past clients include Exxon, Conoco/Phillips, Xerox, General Motors, the Department of Energy, and the Department of Defense. His expertise in technical- and relationship-based training program development and delivery makes him an accomplished group facilitator. He received his B.A. in Communications from Drury College.

e-mail: petersmr@bv.com
Implementation Session Moderator

Tamlin C. Antoine II, Construction of Facility Program Manager – National Aeronautics & Space Administration

Tamlin C. Antoine II is the Construction of Facility Program Manager for the National Aeronautics & Space Administration (NASA). In this capacity, he is responsible for the administration of a $50 million annual program. Mr. Antoine began his career with NASA in 1983 as a facility project manager. Prior to joining NASA, he served as a project architect for various architectural firms. Antoine received a bachelor’s degree in architecture from Hampton Institute, a Certificate in Engineering Management for Construction from UCLA, and an MBA from the University of La Verne. He is a Registered Professional Architect in the District of Columbia and the State of Maryland.

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Panelists

Dorothy Hellberg, Director, Educational Services – Emerson Process Management

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Michael R. Peters, Project Management Training Manager – Black & Veatch Corporation

e-mail: petersmr@bv.com

Paul Resta, Director, Learning Technology Center – The University of Texas at Austin

e-mail: resta@mail.utexas.edu

P. Karen Vacca, Director, Training Integration – Washington Group International, Inc., Division of URS

e-mail: karen.vacca@wgint.com
Maintaining Training During Economic Constraints

Plenary Session Slides

Fact or Fiction?
- Training is not important to an organization’s strategy in hard times.

FICTION!
The facts are:
- Training can ease the pain when the going gets tough.
- Younger employees want to rise in the organization at a faster pace.
- Organizations that have effectively aligned all of their talent development functions can more readily assess performance gaps.

CII Research Summary 200-1, Recruiting and Retaining Future Engineering and Construction Leaders
Maintaining Training During Economic Constraints

Notes

Fact or Fiction?
- Developing talent is beneficial to the bottom line.

FACT!
Benefits of Talent Development:

- EBITDA: +11%
- Net Profit Margin: +31%
- Return on Equity: +48%

Source: The Hackett Group, 2008

Fact or Fiction?
- My key talent won’t desert me because they have nowhere to go.
**FICTION!**

The facts are:

- 60% will change companies at least three times to advance their careers.
- Your most skilled employees might be the first to leave.
- High performers thrive on development opportunities.
- Never take your talent for granted.

CII Research Summary 200-1, Recruiting and Retaining Future Engineering and Construction Leaders

---

**Fact or Fiction?**

- Those entering the workforce are *not* adequately prepared.

---

**FACT!**

Organizations struggle to prepare workforce to meet growth demands

- 2006: 64% NOT adequately prepared
- 2007: 86% NOT adequately prepared
- 2008: 94% NOT adequately prepared

Source: Softscape—Results from past three “State of the Global Talent Nation” surveys of HR professionals.
Maintaining Training During Economic Constraints

Notes

Fact or Fiction?
- Career and development plans should take a back seat.

FICTION!
The facts are:
- These are the plans that jumpstart progress.
- Training provides employees with renewed career focus.
- Training helps morale of an organization.
- Show employees you are willing to invest in them regardless of the economics.

What Business Environment Changes Impact OUR Workforce?

CII 2007 Survey Results

- Skill Shortage: 41%
- Business Growth: 21%
- Hiring Needs: 13%
- Changing Processes: 5%
- Staff Demographics: 8%
- Other: 12%
Global Trends Fuel the Need for Training

**Tightening Labor Market**
- 9% fewer workers starting careers than those leaving the workforce through 2011

**Globalization**
- Blending of diverse skill sets

**Changing Demographics**
- Addressing needs of different age groups

---

---

Are You Hitting the Generational Training Target?

---

**Generational Training Puzzle**

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Clash Point</th>
<th>Methods of Engaging</th>
<th>Methods of Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional/Silent Generation (before 1945)</td>
<td>I learned the hard way, let's see if they rise to the top</td>
<td>Lessons learned</td>
<td>Sharpen their skills, instructor-led training</td>
</tr>
<tr>
<td>Baby Boomer (1946-1964)</td>
<td>Train, but don't over train, because they leave</td>
<td>Views training as a perk or way to move ahead</td>
<td>Instructor-led, class-room based training, scenario</td>
</tr>
<tr>
<td>Gen X (1965-1980)</td>
<td>The more I learn, the more I'll stay</td>
<td>Needs to continuously add new skills to their tool belt</td>
<td>Technology-based formats for flexibility (e.g., mobile phone, PDA's) wants continuous access to training, quick and on demand</td>
</tr>
<tr>
<td>Gen Y/Millennial (1981-1999)</td>
<td>Opportunities for continuous learning is a way of life</td>
<td>Collaborative learning centered on environment, hands-on, interactive &amp; fun</td>
<td>Use wikis, podcasts to learn &amp; network with others enjoys being mentored by Traditionalists &amp; Baby Boomers</td>
</tr>
</tbody>
</table>
Notes

CII Educational Resources

- IR200-3, Recruiting and Retaining: Company Self-Assessment
- SP14-2, An Assessment of Education and Training Needs Among Construction Personnel
- RS201-1, Leadership in a Knowledge Era: Achieving the Learning Organization

Do you want to stand?

Don’t gamble with your future...
Professional Development Committee Implementation Session

- Learn how to retain and develop your employees.
- See how member companies are building new and faster learning programs.

Lean Green Training Machine

- Large commercial plane manufacturer challenged with work-hours lost in traveling to training
- Goal: “Bring training” to the worker instead of the worker going to training.
- Introduced the “lean green training machine”.
- This innovative method of taking “training to the wingtip” has saved the company millions of dollars in training time.

Karen Vacca, Washington Division of URS

Blended Learning Approach

- Emerson Process University – serving global employees to expand knowledge and job skill competencies
- Customer platform with product e-courses
- Virtual classroom
  - Online, live instruction and hands-on interaction
  - Learning in a safe environment and just-in-time

Business Value

- Efficiency
- Faster to market
- Maintains quality
- Lowers training costs

Dorothy Hellberg, Emerson Process Management
Notes

Mobile Learning: Professional Development Always at Hand

- New generation of hand-held devices are able to:
  - Deliver Education/Training anytime/anywhere
  - Support communications and collaboration
  - Conduct assessments/evaluations
  - Provide access to performance aids and support knowledge
  - Collect data
  - Access web-based training videos and resources

Paul Resta, The University of Texas at Austin

Training people – still your best bet!
The Economic Outlook: Fasten Your Seatbelts

Economic Forecast

Abstract

Although the recession isn’t at its bottom yet, the pace of decline appears to have slowed. We expect to reach bottom within the next few months, but the recovery is likely to be sluggish, with the unemployment rate not reaching a peak until spring. Consumers need to save more and borrow less, which will keep consumer spending from bouncing back. A sluggish recovery will mean a slow rebound in demand for office and commercial space. It will also limit any rally in the stock market. Moreover, any further financial problems could push the economy back down.

Presenter

David A. Wyss, Chief Economist – Standard & Poor’s

David Wyss has been with Standard & Poor’s since 1992 and is responsible for the firm’s economic forecasts and publications. He also manages the company’s research projects, mostly on financial risk. He came to Standard & Poor’s after having served as an economist for the European Economic Service in London and as Chief Financial Economist for McGraw-Hill. Dr. Wyss has also served as a senior staff economist with the President’s Council of Economic Advisers, as a senior economist at the Federal Reserve Board, and as an economic advisor to the Bank of England. He is on the board of the National Association for Business Economics. He testifies regularly before Congress, is often quoted in the press, and has appeared on many major television programs. He has written many articles for popular and professional publications. Dr. Wyss earned a B.S. from the Massachusetts Institute of Technology and a Ph.D. in economics from Harvard University. Highly sought after as a financial analyst by the media, he has spoken at many CII Annual Conferences.

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The U.S. Economy is in Recession

- Housing has been in recession for three years, subtracting over a percentage point from GDP growth in both 2007 and 2008
- This was offset by strength in nonresidential construction and the closing of the trade gap, each of which added back about a half point in 2007
- Weaker overseas growth will mean less benefit from the trade deficit, despite the declining dollar
- Non-residential construction is plunging
- The fiscal 2008 deficit beat the 2004 record; 2009 may triple 2008
- The Fed has cut rates sharply
- We expect the recession to be long and deep
  - An even deeper recession is possible if the financial markets remain locked up, oil prices rebound, and home prices continue to drop

The Housing Bubble

- Financing was more readily available, thanks to low mortgage rates
- But what happened when rates went up?
  - Ratio of home price to income hit a record high in 2006
  - Could not be maintained at higher interest rates
- We built too many houses at too high prices, thus:
  - Starts and sales have dropped sharply
  - Defaults have soared, cutting back on willingness to lend
  - Prices are down 27% from their peak
  - And the ratio of home price to income is below its historical average
- We expect to hit bottom on starts soon, but prices probably won’t hit bottom until early 2010
Notes

The Economic Outlook: Fasten Your Seatbelts

Home Prices Were Too High
Ratio of Average Home Price to Average Household Disposable Income

Bubbles Were Almost Everywhere
Percent Increase in Home Prices (1997-2005)

Most Weakness is in the Bubble Cities
S&P/Case-Shiller® Home Price Indexes, February

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and U.S. Census Bureau.

Source: Mortgage Bankers Association and Standard & Poor's.

Source: Standard & Poor's, U.S. Census Bureau.
The Economic Outlook: Fasten Your Seatbelts

Notes

Quality Spreads Widened from Record Lows
Credit Spreads and Default Rates
Spread Over Treasury Yields, Percentage Points

- Default Rate (12-month)
- Credit Spread
- Old Spread Series

Source: Standard & Poor’s Global Credit Research.

Credit Default Insurance Rates Jumped
Counterparty Risk Index

CRI
S&P 100

Base Points

Jan-07 Age-07 Jul-07 Age-07 Jan-06 Age-06 Aug-06 Jul-07 Aug-07 Oct-07 Jan-09

Source: Standard & Poor’s Global Credit Research.

The World Is In Recession
The Most Synchronized in Recent Memory

- Industrial countries are in recession
  - Declines in the U.S., Japan, and Europe
  - Weakness in Asia
- The train has more engines attached
  - Thus, the world is less dependent on U.S. growth
- We expect a slowdown in world growth
  - To 1.3% in 2009 from 3.8% in 2007
The Economic Outlook: Fasten Your Seatbelts

Synchronized Sinking
Real GDP of World Economies

Federal Budget Deficits Soar
Receipts and Expenditures as Percent of GDP

The Future Looks Bleak
Government Debt as Percent of GDP

Notes
Notes

**Aging Populations Will Boost Government Spending**

Ratio of Over 65 Population to Labor Force

![Graph showing the ratio of over 65 population to labor force for different countries and the OECD from 2000 to 2020.](image)

*Source: Organization for Economic Co-operation and Development (OECD)*

**U.S. State Budgets Sour**

Receipts and Expenditures as Percent of GDP

![Graph showing the percentage of GDP for receipts and expenditures from 1990 to 2012.](image)

*Source: Bank of America, BCA*

**Weaker Employment Is Hurting Construction**

Employment and Non-Residential Building

![Graph showing the 4-quarter percentage change in employment and nonresidential building from 1990 to 2012.](image)

*Source: U.S. Bureau of Labor Statistics (BLS), Bank of America, BCA*
Can the Consumer Keep Spending?

- Consumer spending has led the expansion... but, wealth is down
  - Because home prices are dropping and stocks are weak
- Borrowing is more difficult, and home equity loans much less available
- Confidence has dropped and unemployment risen
- Consumers are likely to save more
- Rebates will provided some quick cash
  - Most of which has been spent
- And, falling oil prices give back some purchasing power
Notes

The Economic Outlook: Fasten Your Seatbelts

Oil Prices Have Dropped

Oil Prices and Household Energy Purchases

$ (per barrel, WTI) and deflated by CPI

- Oil Price (WTI)
- 2005 Dollars
- % of disp. income (right)

Household energy purchases as % of disposable income

Source: Bank of America Merrill Lynch

Wealth Slides with Home Prices

Net Worth and Financial Asset as Percent of After-Tax Income

Net Worth
Financial Assets

Source: Federal Reserve

High Unemployment Scares Consumers

Consumer sentiment
Unemployment Rate (right)

Source: U.S. Bureau of Labor Statistics (BLS) and the Michigan State University Center for Financial Services
The Economic Outlook: Fasten Your Seatbelts

No Savings, But Lots of Debt

- Saving Rate
- Debt/Income (right)

Source: Bureau of Economic Analysis (BEA) and Federal Reserve.

Debt Burdens Have Risen

Debt repayment as percent of disposable income and percent of households with debt service over 40% of income


Average Median Percent Over 40%

Source: Bureau of Economic Information (BEA) and Federal Reserve.

Bigger than the Average Bear

- A great run from 1982 to 2000
- But, the secular bear began in 2000
- Two largest bear markets since the depression
  - Earnings were negative in Q4 for first time in history
  - Stocks were overdue for a correction
- We think the market will improve, but slowly
- And... the current long-term cycle may have another bear in it
The Economic Outlook: Fasten Your Seatbelts

Notes

**Stocks Cycle**

Annualized Total Return, S&P 500®

![Stocks Cycle Chart]

Source: Standard & Poor’s

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**Everybody’s Down**

12-month Percent Change in Stock Prices

![Everybody’s Down Chart]

Source: Standard & Poor’s

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**Bottom Line: The Economy Is Expected To Recover Slowly**

- The recession is expected to be the longest and deepest since the 1930s
- Fiscal stimulus will support the recovery
  - But, recovery is likely to be slow because of financial markets and switch to higher savings
- If financial markets remain locked up, home prices continue to fall and oil prices continue to rise...
- The recession could be longer and deeper
  - With the risk of a “lost decade” similar to Japan in the 1990s

Source: Standard & Poor’s
The Economic Outlook: Fasten Your Seatbelts

Risks to the U.S. Economy

The Unemployment Rate

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<th>Baseline</th>
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Notes

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The Economic Outlook: Fasten Your Seatbelts
Abstract

Despite a bout of positive economic data from around the world and a recovery in global stock markets, economists remain cautious about the trajectory of global economic growth. Dr. Mansour will discuss how, even though the rate of deterioration in global growth has slowed, a return to healthy growth remains elusive. She will explain how Japan and the Eurozone, in particular, face significant headwinds; a much weaker outlook for global trade, especially in machinery and consumer durables, should further damage prospects for these export-oriented regions. She will also address the limits of the global central bank actions and government rescue packages that have alleviated fears of a full-blown financial meltdown. In her view, the financial sector should still see further strains as persistent economic weakness leads to increasing defaults. Moreover, she will show how commercial real estate, now replacing the beleaguered housing sector, will begin to take significant hits in terms of valuations and fundamentals of demand and supply.

Presenter

Asieh Mansour, Managing Director, Chief Economist, and Strategist – RREEF Alternative Investments

Asieh Mansour currently serves as Managing Director, Chief Economist, and Strategist for RREEF Alternative Investments. In this position, she is the company’s global macroeconomist, supporting investment and acquisition decisions on real estate, infrastructure, and private equity. She is responsible for analyzing the global economy and its effect on RREEF fund offerings. She also plays a key role in advising RREEF clients around the world on the strategic aspects of investing in real estate, infrastructure, and private equity. She has over 20 years of alternative investments research experience and sits on the RREEF Alternative Investments Global Executive Committee (AI EXCO), the RREEF Alternatives Investment Committee (RAIC), the North American Investment Committee, and the Securities Strategic Investment Committee (SIC).

Prior to joining RREEF, Dr. Mansour was a senior regional economist with Standard & Poor’s DRI, where she covered real estate markets and regional economies in the U.S. Prior to working at DRI, she conducted real estate market analysis and modeled property markets for F.W. Dodge. She has written several applied research works on issues related to the econometric specification of hotels and industrial markets, the performance characteristics of infrastructure investments, the non-normality of real estate returns, and government housing policy in developing countries. She has received two manuscript prizes from the American Real Estate Society. Dr. Mansour is a member of the National Association of Business Economists (NABE), PREA’s Research Group, the American Real Estate and Urban Economics Association (AREUEA), and the American Economic Association (AEA). She is a newly appointed board member to RERI (the Real Estate Research Institute), and sits on the editorial board for the 2009...
special issue of the Journal of Real Estate Portfolio Management (JPREPM). She is also a newly elected Hoyt Fellow and is an active member of the Women's Forum West (WFW), the San Francisco-based branch of the International Women's Forum (IWF). She received her Ph.D. in economics from Tufts University.

*e-mail: asieh.mansour@rreef.com*
Financial Crisis and Prospects for the Global Economy

Economic Forecast Slides

Overview

- The Financial Crisis
- Global Economic Outlook
- Regional Economic Forecasts
  - U.S.
  - South America
  - Western Europe
  - Emerging Europe
  - Japan and Asia Pacific
  - Middle East and Africa
  - Long-term Regional Outlook

The Financial Crisis
Financial Crisis and Prospects for the Global Economy

Notes

The Credit Crisis: Big, Bad, Broadly Based
- Perhaps the biggest global housing and credit bubble in history
- Not just "sub-prime in the U.S.A.", credit growth was strong everywhere
- Bank loan losses rising much higher in Europe
- Sub-prime crisis was the first symptom
- Drivers:
  - Loose monetary policies
  - Rapid growth of leverage and shadow banking system
  - Deregulation/poorly implemented regulation
  - Globalization
  - Socially engineered housing policy
  - Lack investor due diligence
  - Outright fraud

---

Proportions of Countries with Banking Crises, 1900-2008
(weighted by their share of world income)

- The Great Depression
- World War I
- 1927: The Panic of 1927
- The First Global Financial Crisis of 21st Century
- Emerging Markets, Japan the Nordic Countries and US/UK

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Impact of Recent Capital Market Crises on Investment Banks
(Severity of Recent Capital Market Crises)

- Sub-prime, Liquidity
  - 2007
- 1990-91
- Japan
- Mexico
- Greece
- Ireland
- Spain
- 1987

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Sources:
- Morgan Stanley, Globalization
- FitchRatings
- Deloitte
- The Global Economy
- International Monetary Fund
- Social Science Research Network

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Financial Crisis and Prospects for the Global Economy

Lessons from Past Financial Crisis

- Markets overcorrect to the downside after major bubbles
- The worst crises have occurred in heavily regulated systems
- Deflation is a longer-term threat than inflation
- Bold, swift actions are needed (Sweden versus Japan)
- Key ingredients of a successful recovery:
  - Ample liquidity
  - Capital infusions
  - Deposit guarantees
  - Fiscal stimulus
- Financial Crisis last an average two years

Source: Global Insight and RGE Research

Notes
Notes

Global Economic Outlook

The Worst Global Recession in Six Decades
- Globalization has created business cycle synchronization
- The U.S., Western Europe and Japan are facing severe downturns
- Growth in emerging markets is slowing dramatically
- A Great Depression or Japanese-style lost decade is unlikely
- Huge fiscal and monetary stimuli will help spurs a recovery
  - Bottom Line
    - 2009 A deep recession
    - 2010 Modest recovery
    - 2011 Strong rebound

The World’s Economy in Recession

Source: BMO Capital and RREEF Research
Financial Crisis and Prospects for the Global Economy

Notes

Regional Economic Forecasts

13. The Financial Crisis and Prospects for the Global Economy

14. The Financial Crisis and Prospects for the Global Economy
Notes

1. This recession will be long and deep, comparable to the worse in the post-war era.
2. The global financial crisis has ended the U.S. export boom.
3. Consumers, businesses and state & local governments will not be as financially deteriorate.
4. Loose money, fiscal stimulus and lower energy prices will help recovery over the course of 2010.

Source: Global Insight and RREEF Research
Art of March 2009

1. The Financial Crisis and Prospects for the Global Economy

1. A Comparison of Peak-to-Trough Declines in Real GDP in U.S. Recessions

- During Great Depression, Peak to Trough Decline = 30%
- Recession

- Percent Change

Source: Global Insight and RREEF Research

1. The Financial Crisis and Prospects for the Global Economy

1. South America: A Temporary Setback

- Exports falling on response to a global slowdown
- Lower commodity prices to hurt several countries
- Currencies under pressure as investors avoid risk
- Long-term prospects bright for countries attracting foreign capital Brazil and Chile
- Policy mismanagement will take a toll on:
  - Argentina and Venezuela

Source: Global Insight and RREEF Research

1. The Financial Crisis and Prospects for the Global Economy
Notes

- The global financial crisis has hit Europe hard, reflecting high leverage and exposure to subprime securities.
- Housing market downturns are affecting Spain, UK, and Ireland most.
- Limits on long-term growth - demographics, policy.

Source: Global Insight, RIEIF Research
19. The Financial Crisis and Prospects for the Global Economy

- Large current account and fiscal deficits make region especially vulnerable to credit crunch.
- The countries at the periphery of Europe (Ireland, the Baltics, Bulgaria) are in deep trouble.
- Recent economic data suggests that the boom is over and there is more downside risks to growth.

Source: Global Insight, RIEIF Research
20. The Financial Crisis and Prospects for the Global Economy

- A sharp drop in exports has sent Japan into recession.
- The yen's appreciation will continue.
- Price deflation remains a problem.
- Population in a long-term decline.
- Trend growth is to slow from 2% to 1% over the next decade.

Source: Global Insight, RIEIF Research
21. The Financial Crisis and Prospects for the Global Economy
Financial Crisis and Prospects for the Global Economy

Notes

Asia-Pacific Region to Lead Growth

- While finances are strong, export dependence is a problem
- Domestic demand will support growth as exports fall
- Japan, Taiwan, Hong Kong and Singapore are in recession
- External and fiscal balances have improved since the 1997-1998 crisis, bringing more resilience to exogenous shocks

Source: Nomura Research
22. The Financial Crisis and Prospects for the Global Economy

Australia: Downside Risks to Growth Have Intensified

- Risks of a systemic crisis in the Australian banking system remain negligible
- High borrowing costs raise concerns about business and consumer spending
- Sharp reversals in commodity markets hurt the external balance of payments
- Significant counter-cyclical stimulus measures deployed
- Australian dollar expected to weaken in 2009-10, owing to poorer economic conditions, lower commodity prices, falling domestic interest rates and high levels of risk aversion among global investors

Source: Nomura Research
23. The Financial Crisis and Prospects for the Global Economy

The Middle East and Africa: The Boom is Over

- The drop in commodity prices will bring a sharp slowdown in economic growth
- Large financial reserves in oil-exporting countries will soften the blow
- Global liquidity squeeze is funding investment projects throughout the region

Source: Nomura Research
24. The Financial Crisis and Prospects for the Global Economy
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Sources of World GDP: Asia Will emerge as Top Producer in 2018

World GDP in 2008
- Middle East, Africa: 1%
- Other Asia, Pacific: 10%
- Japan: 8%
- Emerging Europe: 7%
- Western Europe: 29%
- North America: 28%

World GDP in 2018
- Middle East, Africa: 6%
- Other Asia, Pacific: 21%
- Japan: 7%
- Emerging Europe: 5%
- Western Europe: 24%
- North America: 24%

Source: Global Insight and PwCPE Research
Awards
Outstanding Researcher for 2009
Carlos H. Caldas

Dr. Carlos Caldas earned his Ph.D. in civil engineering from The University of Illinois at Urbana-Champaign in 2003. He joined the faculty of The University of Texas at Austin that same year, and now directs the university’s Field Systems and Construction Automation Laboratory. Based on his research on information technologies and sensing for construction and infrastructure systems, Dr. Caldas develops real-time computer models of job sites that allow project team members to more safely and efficiently plan and deploy resources. His work on best practices for right-of-way valuations and negotiations will help transportation planners more effectively acquire highway right-of-way. He is also developing a method to assess risks during the advanced planning phases of transportation projects. Other projects address lessons learned systems, utility adjustments for highway construction, procurement and materials management, and project management.

Since his introduction to CII in 2005, Dr. Caldas has served on four CII research teams, and has also been on several committees for CII events and initiatives. Most recently, he has become an instrumental part of CII’s project benchmarking and metrics efforts in Brazil. As a researcher, Dr. Caldas always earns the respect and goodwill of his team members by virtue of his thorough research methods, his agreeable demeanor, and his natural ability to lead and organize. Moreover, he has a knack for choosing important topics and for developing high-impact projects that will make a difference to the industry now and in the future. Congratulations to Carlos Caldas. Having completed and submitted highly innovative research within the last two years that has significantly contributed to the industry, and having earned his team members’ highest regard, Dr. Caldas more than met the criteria for this award. Indeed, his scientific perspicacity, his natural collegiality, and his reliable professionalism make him one of the most deserving recipients ever of CII’s Outstanding Researcher Award.

Award Criteria

- The research significantly contributed to the improvement of the construction industry.
- The research is completed and products delivered.
- The researcher’s excellence is recognized by his or her CII team members, the staff, and the membership.
- The researcher’s report to CII is innovative, well written, and timely.
Previous Recipients of the Outstanding CII Researcher of the Year Award

1995 – Michael C. Vorster, Virginia Polytechnic University
1996 – G. Edward Gibson, Jr., The University of Texas at Austin
1997 – Stuart D. Anderson, Texas A&M University
1998 – Garold D. Oberlender, Oklahoma State University
1999 – W. Edward Back, Texas A&M University
2000 – Jeffrey S. Russell, University of Wisconsin–Madison
2001 – Edward J. Jaselskis, Iowa State University
2002 – Carl T. Haas, The University of Texas at Austin
2003 – Jimmie W. Hinze, University of Florida
2004 – G. Edward Gibson, Jr., The University of Texas at Austin
2005 – James T. O’Connor, The University of Texas at Austin
2006 – Awad S. Hanna, University of Wisconsin–Madison
2007 – Paul S. Chinowsky, University of Colorado–Boulder
2008 – Paul M. Goodrum University of Kentucky

Outstanding Researcher Award Panel of Judges

Michael Davis  Manager, Project Management Department – Ontario Power Generation
Jesús M. de la Garza  Vecellio Professor, Department of Civil Engineering – Virginia Tech
Harrold L. Helland  Manager, Project Management – Abbott
Edward J. Jaselskis  Professor, Department of Civil, Construction & Environmental Engineering – Iowa State University
Don A. Leinweber  Vice President, Corporate Services – Mustang
Stephen R. Thomas  Associate Director for Research, Academic, and Breakthrough Strategy – Construction Industry Institute
Gregory A. Kanteres has been selected as the 2009 CII Outstanding Implementer. The award recognizes outstanding achievement in enhancing the implementation of CII Practices within CII member organizations. The panel of judges selected Kanteres for his demonstrated commitment to the betterment of the construction industry.

As the Major Project Manager – Fellow II for Solutia, Inc, Mr. Kanteres’ individual efforts to champion and improve his company have been significant and have made the Solutia’s Best Practices program noteworthy. His singular focus on front-end planning and safety has greatly improved the organization’s project execution, on both domestic and international projects. He has ensured that the ethical standards Solutia maintains in its U.S. operations have not been compromised internationally.

His contribution to CII does not end at the company level; for over seven years, he has given his time, talent, and experience to CII as a member of the Implementation Strategy Committee (ISC).

Mr. Kanteres’ work on the planning committee for Performance Improvement Workshops (PIWs) has also had a big impact on CII. Under his influence, these workshops have grown in depth, breadth, and appeal. Since he joined the committee, attendance rates have increased sharply—clear testament to how much he has improved their value to CII members and to the industry. More generally, his creativity and ingenuity in designing group activities have been instrumental in building interest and participation in other CII programs. Examples of his engaging versatility are the entertaining scripts he has written for two very popular and effective ABC Company videos on CII Best Practice Implementation.

His passionate commitment to making the construction industry better is perhaps best demonstrated in his involvement in implementation and education outreach in his hometown of St. Louis, Missouri. He promotes best practices in the St. Louis area by developing and presenting yearly, CII-based seminars in conjunction with the St. Louis Council of Construction Consumers (SLCCC).

Congratulations to Greg Kanteres. His contributions to his organization, his community, and to CII make him a richly deserving recipient of the 2009 CII Outstanding Implementer Award.
Award Criteria

- The nominee has contributed significantly to enhancing the implementation of CII Practices within one or more member organizations.
- Objective and specific data are available from the nominating organizations that demonstrate the improvements attained through the enhanced implementation of CII practices. Improvements should be evident in the following categories: cost, schedule, safety, quality, and/or process improvement.
- The nominee has demonstrated a personal commitment to the implementation of CII Practices.
- The nominee has developed and/or employed creative and innovative means to enhance the implementation of CII Practices. The nominee has also willingly informed others of these means and has shared the details of their use with those interested in implementation.

Previous Recipients of the Outstanding Implementer Award

2001 – Richard J. Jessop, Ontario Power Generation
2002 – Mohammad S. Al-Subhi, Saudi Aramco
2003 – Bernard J. Fedak, U.S. Steel Corporation
2004 – Melissa Herkt, GlaxoSmithKline
2006 – H. A. (Speedy) Warner, Anheuser-Busch
2007 – Allan J. Johnson, Cargill
2008 – Donald G. Giles, U.S. Steel Corporation

Outstanding Implementer Award Panel of Judges

- W. Scott Cameron  Global Process Owner Project Management, The Procter & Gamble Company
- Manuel A. Garcia  Associate Director for Professional Development and Implementation, Construction Industry Institute
- Robert F. Jortberg  RADM, U.S. Navy (Retired) and former Associate Director, Construction Industry Institute
- Charles I. McGinnis  Engineering Management Consultant and former Associate Director, Construction Industry Institute
- Emmitt J. Nelson  President, Nelson Consulting Inc.
The Benchmarking User Awards, given to both an owner organization and a contractor organization, recognize exceptional use of and contributions to benchmarking.

**Owner: General Motors Corporation**

General Motors (GM) is a two-time winner (2001 and 2009) of the CII Benchmarking User Award for owners. The company has submitted 67 projects since 1996. GM’s impressive gains in the performance of their capital projects were a highlight of the 2008 CII Annual Conference in Keystone, Colorado. In fact, GM has one of the highest rates of improvement in the areas of project safety, cost, and schedule over the past five years amongst all CII member companies. Benchmarking continues to be a key best practice for the company, demonstrated by the fact that in 2008, the company had 26 active participants involved with the program. GM has also served on the Benchmarking and Metrics Committee since 2003. Their commitment to, and use of, benchmarking data and results are commendable – GM clearly recognizes that measurement of its capital projects is a key component of their competitiveness in the global auto industry.

**Contractor: BE&K, A KBR Company**

BE&K is a three-time winner (2001, 2005, and 2009) of the CII Benchmarking User Award for contractors. The company has been involved with CII’s Benchmarking and Metrics efforts since its inception, submitting 80 projects. Since 1996, the company has involved over 50 people in benchmarking. A BE&K employee has served on the Benchmarking and Metrics committee since the committee was formed. The current committee co-chair is also from the company. Notably, BE&K has been at the forefront of the development of CII engineering and construction productivity metrics and continues to be a champion for use of these measures today. With the company’s help, CII productivity measures have been validated as industry standards. BE&K certainly understands the strong links that exist between benchmarking, work process improvement, and project performance. The company’s strong commitment to benchmarking has undoubtedly provided benefits both to itself and to its customers.

**Award Criteria**

- Best application of benchmarking for project system improvement.
- Contributions to benchmarking through active participation (forum, training, project submittal, committee).
- Willingness to share ideas.
Previous Recipients of the Benchmarking User Awards

2000 – Owner: Champion International
Contractor: Jacobs Engineering

2001 – Owner: General Motors Corporation
Contractor: BE&K

2002 – Owner: Aramco Services Company
Contractor: Dillingham Construction Holdings
S&B Engineers and Constructors Ltd.

2003 – Owner: Rohm and Haas Company
Contractor: CDI Engineering Group Inc.

2004 – Owner: GlaxoSmithKline
Contractor: Aker Kværner

2005 – Owner: 3M Company
Contractor: BE&K

2006 – Owner: Eli Lilly and Company
Contractor: Jacobs

2007 – Owner: Abbott
Contractor: Alstom Power

2008 – Owner: Merck & Co., Inc.
Contractor: Jacobs

Benchmarking User Awards Panel of Judges

The Benchmarking & Metrics Committee selects the recipients of the award each year. The committee includes the following individuals:

Carol Allmen Project Planner for Capital Project, WFC, General Motors Corporation
James J. Blaschke Manager, Cost Estimating, ConocoPhillips
Jiukun Dai Research Engineer, Construction Industry Institute
Ralph B. Dove Director, Project Support Services, CH2M HILL
Charles M. Green Engineering Specialist, Engineering Unit, Aramco Services Company
Robert A. Herrington  Manager of EPC/CM Work Process, Southern Region, Jacobs

Emmanuel V. Jimenez  Manager, Engineering Best Practices, Abbott

Noah Kahn  Manager, Finance Metrics, Kaiser Permanente

Howard Kass  Senior Facility Engineer Program Manager, National Aeronautics & Space Administration

Robert C. Kurtz  Director of Project Controls & Estimating, Mustang

T. Kirk Morrow  Manager of Construction Technical Services, S&B Engineers and Constructors, Ltd.

Stephen P. Mulva  Associate Director, Construction Industry Institute

David G. Neale  Director, Project Controls, Fluor Corporation

James T. O’Connor  C. T. Wells Professor of Project Management, The University of Texas at Austin

Gerald R. Oegema  Project Manager, Alstom Power Inc.

Roberto H. Orellana  Global Process Owner - Cost Engineering Technology, The Procter & Gamble Company

David M. Perkins  Acrylates Project Group Leader, Rohm and Haas Company, a Subsidiary of Dow Chemical

Jonathan D. Pitcher  Manager, Project Services, Global Facilities Delivery, Eli Lilly and Company

Daniel Scott  Chief Scheduler, BE&K Engineering & Construction (A KBR Company)

Mark A. Wagner  BCOI, Operations Manager, Bechtel Group, Inc.

Stephen D. Warnock  Construction Manager, URS - Washington Division

Paul N. Woldy  Senior Staff Engineer, Chevron Energy Technology Company

Hong Zhao  Senior Systems Analyst, Construction Industry Institute
Benchmarking User Awards for 2009
CII Professional Development Award for 2009

CII Professional Development Awards recognize exceptional commitment to the development of construction industry professionals by CII member organizations. This award is sponsored by the Professional Development Committee and is awarded this year to **Aker Solutions US, Inc.**

Aker Solutions has recently implemented a unique initiative for learning and development through its *Leaders as Teachers* program. This program's multidisciplinary curriculum encourages all managers to establish a culture of continued learning and development within their organizations.

The program is built around the Harvard ManageMentor e-learning portal, a Web-based tool that engages employees through various interactive modules. Module topics help them maximize their performance, realize their potential, and develop their leadership style. Beyond furthering individual career growth, this system helps build a high-performance culture within organizations.

Harvard ManageMentor incorporates three learning paths:

- Manage Self
- Manage Others
- Manage Projects

Following these paths, individuals within an organization have the opportunity to explore forty-two development objectives, including project management, budgeting, performance management, employee engagement, and team leadership. Highly interactive learning cafés address topics in a classroom environment and are facilitated by the organization’s leadership.

Aker’s program theme for 2008 focused on project execution and employee engagement, using modules aligned with CII's research on engagement, quality management, project execution, and team-building. Fifty Aker leaders were trained in its *Leaders as Teachers* culture-building process.

In 2009, the Aker program will target leading and motivating, team management, and change management. Students will have access to CII's implementation resources, education modules, research reports, and summaries on these topics, in addition to Aker’s internal best practices in the targeted development areas.

The program incorporates the best practice of leadership through hands-on involvement. It has not only fostered an atmosphere of learning, but it has also led to improved employee retention and engagement.

Aker’s *Leaders as Teachers* program is unique not only for its approach, but also for its partnership with Harvard University’s Business School.

Congratulations to Aker Solutions, a very active CII member, for receiving the 2009 CII Professional Development Award.
Award Criteria

The CII Professional Development Awards Program is sponsored by the CII Professional Development Committee. Awards are given annually to CII member organizations that show exceptional commitment to the development of construction industry professionals over the previous calendar year.

- Demonstration of a professional development program.
- Demonstration of incorporation of CII research findings into its professional development program.
- Contribution to the development and deployment of CII initiatives, programs and services.

Previous Recipients of CII Professional Development Awards

2007 – Owner: DuPont Engineering
          Contractor: Washington Group International

2008 – Owner: Smithsonian Institution
          Contractor: CCC Group, Inc.

CII Professional Development Awards Program Panel of Judges

William C. Beck Regional Quality Manager, WorleyParsons
W. Scott Cameron Global Process Owner Project Management, The Procter & Gamble Company
Steve R. Carter Quality Manager, WorleyParsons
Manuel A. Garcia Associate Director for Professional Development and Implementation, Construction Industry Institute
Douglas K. Hampson Knowledge Management Team Leader, Rohm and Haas Company
Timothy B. Martin Construction Manager, ConocoPhillips
P. Karen Vacca Director, Employee Development, URS – Washington Division
CII Curriculum Partner Program Awards for 2009

The CII Curriculum Partner Program annually recognizes higher education programs that have incorporated published CII research findings in their curricula over the previous calendar year. This program is sponsored by the CII Professional Development Committee. This year’s selections are:

**Vanderbilt University**

Vanderbilt University has been selected as a 2009 CII Curriculum Partner. Its graduate degree program leads to advanced degrees in civil engineering (M.S. and M. Eng.) with a concentration in construction management. Built on the fundamentals of civil engineering, this impressive academic program balances the latest developments in construction practices with the management principles necessary to understanding and overcoming the broad range of challenges confronting the industry.

Vanderbilt University’s curriculum includes recent courses using CII Best Practices like Front End Planning, Zero Accidents Techniques (Safety), Constructability, Materials Management, Team Building, and others. Upcoming courses will address building systems and LEED certification.

Vanderbilt’s innovative advanced degree program allows for a concentration in construction management with an emphasis on healthcare construction management. Managing successful healthcare construction projects is a complex process that requires team leadership, an understanding of the organization’s business plan, and detailed knowledge of design and construction project principles. These principles are at the foundation of the Vanderbilt program.

**Virginia Polytechnic Institute and State University**

Virginia Tech has also been chosen as a 2009 CII Curriculum Partner. Its Vecellio Construction Engineering and Management Program (VCEMP) offers students opportunities to acquire expertise in all phases of the construction life cycle through their course work as well as through their participation in faculty research projects. Leading industry trends and technological innovation are hallmarks of this remarkable academic program.

Virginia Tech’s graduate curriculum now includes a required course entitled “CII Best Practices,” slated for a third offering in the fall of 2009. Because senior executives from CII member companies deliver the course lectures, its delivery format is unique—with topics ranging from constructability to materials management to benchmarking.

With the fall 2008 offering of “CII Best Practices,” Virginia Tech effectively established the viability of delivering the course through distance learning technology. Beginning in the fall of 2009, this breakthrough format will enable several institutions to benefit from this vital knowledge.

Congratulations to Vanderbilt University and Virginia Tech, the 2009 CII Curriculum Partners.
Award Criteria

- As of January 1, 2008, the program’s curriculum included at least three published CII research topics.

- A defined plan exists to introduce at least one additional published CII research topic each year.

- The program has introduced at least one published CII research topic each year beginning on or after January 1, 2008.

- The program is certified by the Accreditation Board for Engineering and Technology (ABET); by the American Council for Construction Education (ACCE); or by an equivalent non-U.S. based organization deemed acceptable by the Professional Development Committee.

CII Curriculum Partner Program Awards Panel of Judges

- Tamlin C. Antoine, II CoF Program Manager, Jet Propulsion Laboratory, National Aeronautics & Space Administration
- Manuel A. Garcia Associate Director for Professional Development and Implementation, Construction Industry Institute
- Samantha Gauthreaux Recruiter, Jacobs
- Robert M. Hayhurst Chief – Facilities Engineering, Occidental Petroleum Corporation
- Dorothy Hellberg Director, Educational Services, Emerson Process Management
- Timothy B. Martin Construction Manager, ConocoPhillips
- Christopher Maxson Professional Development & Training Coordinator, CCC Group, Inc.
- P. Karen Vacca Director, Employee Development, URS – Washington Division
The CII Distinguished Professor Awards are given annually to full-time or adjunct faculty at a graduate or undergraduate program that have incorporated published CII research findings in their curricula over the previous calendar year. The award is sponsored by the CII Professional Development Committee. This year’s selections are:

**Carlos H. Caldas**

His 15 years of construction management experience have made Dr. Carlos H. Caldas an important addition to the Department of Civil, Architectural, and Environmental Engineering at The University of Texas at Austin. His research interests are in the areas of information technologies, knowledge management, process improvement, and sensors for construction engineering and project management.

Dr. Caldas’ courses include CII research and publications on constructability, modularization/preassembly, and sustainability. A creative example of his use of CII research involves a course assignment that requires students to conduct research on a CII best practice and present the results to the class.

In future offerings of these courses, Dr. Caldas plans to introduce the concepts of craft productivity, materials management, benchmarking and metrics, and the impact of different construction materials and methods on productivity and project performance. Dr. Caldas’ participation on teams researching both craft productivity and global procurement and materials management will allow him to add new material to his courses as the teams progress.

In addition to introducing CII research topics to undergraduates, Dr. Caldas has conducted several research studies for CII and has taught various CII education modules through UT’s Center for Lifelong Engineering Education (CLEE). Congratulations to Dr. Carlos Caldas for being named 2009 Distinguished Professor.

**Paul S. Chinowsky**

As an integral part of the engineering department at the University of Colorado at Boulder, Dr. Paul Chinowsky is responsible for three courses supported and influenced by CII research and publications. The first course is an introduction to both construction processes and materials that includes CII research findings on constructability, front end planning, team building, alignment, etc. The second course, addressing construction and engineering organizations, evolved over the last 10 years as a result of Dr. Chinowsky’s involvement with CII research on virtual teams, learning organizations, future leaders, among other topics. The third course is a graduate course focused on the issues associated with global markets and expansion.
Incorporating CII research into a curriculum involves an annual review process for each course. Each summer, courses are revised, updated, and expanded as needed. Dr. Chinowsky’s active participation in CII research and his attendance at annual conferences and Product Implementation Workshops give him an advantage when it comes to course development in his department.

Dr. Chinowsky has been active in many aspects of CII for over ten years; he has been on four research teams, worked with the Implementation Strategy Committee, and is a Registered Education Provider in management-related areas of CII topics. Congratulations to Dr. Paul Chinowsky for being named 2009 Distinguished Professor.

**Jesus M. de la Garza**

In his 20 years at Virginia Tech, Dr. Jesus de la Garza has taught undergraduate- and graduate-level courses in construction engineering and management. Among his peers, he is known for being highly effective, creative, and cooperative.

In April of 2007, Virginia Tech and CII committed to a collaboration through which CII and de la Garza chose to develop a graduate-level course highlighting CII Best Practices. This innovative course features guest lectures by executives from CII member organizations and reading assignments directly from CII publications. These industry leaders provide the graduate students with tremendous insight into the workings of the engineering and construction industry and the job market. The course gives students the opportunity to learn about practical applications developed by leading owners and contractors.

The success of the first offering of this CII Best Practices Course led to the addition of a distance-learning component for the second offering. The success of the distance-learning component will allow this important course to reach more graduate programs in the fall of 2009 and beyond.

Dr. de la Garza is active with CII, having served on two research teams, and currently serving on both the Leadership Committee and the Academic Committee. Congratulations to Dr. Jesus de la Garza for being named 2009 Distinguished Professor.

**Sanjiv Gokhale**

Dr. Sanjiv Gokhale is considered one of the most effective teachers at Vanderbilt University’s School of Engineering, where his courses cover CII Best Practices like the Safety, Front End Planning and Project Health Assessment. He depends on CII research and publications to not only provide knowledge to his students, but also real-life examples to his students.
Dr. Sanjiv Gokhale is considered one of the most effective teachers at Vanderbilt University’s School of Engineering, where his courses cover CII Best Practices like Safety, Front End Planning, and Project Health Assessment. He depends on CII research and publications not only to provide knowledge to his students, but also as a way to impart real-life examples to his students. Because Dr. Gokhale believes that research that does not benefit the students is of limited value, he strives to involve students in all aspects of his research.

To emphasize the value of real-life experience, he frequently invites industry experts into the classroom and takes his students out into the field. This helps them acquire and apply skills that will help them become the future leaders of the construction industry.

Looking to the future, Dr. Gokhale is developing a new course about building systems & LEED certification, since “invisible” building systems are critical to the functioning and operation of building facilities. The course helps students develop an understanding and appreciation for the various building system topics and, upon its completion, students are prepared to take the LEED Professional Accreditation certification test.

Dr. Gokhale has been active with CII through his work on three research teams and has participated in three Performance Improvement Workshops (PIWs). He also mentors high school students, helping them explore careers in civil engineering. Congratulations to Dr. Sanjiv Gokhale for being named 2009 Distinguished Professor.

William J. O’Brien

As an Assistant Professor in the Department of Civil, Architectural and Environmental Engineering at The University of Texas at Austin, Dr. William J. O’Brien teaches courses on project management and administration and engineering economy. He is an expert on construction supply chain management and electronic collaboration, and is especially interested in the use of information technologies.

Dr. O’Brien’s primary course using CII materials covers the topic of project controls taught from a holistic perspective. Using CII materials, students in this course gain an understanding of the importance of CII Best Practices like Change Management and Pre-Project Planning. The most effective aspect of the course is its scalable structure, making it straightforward to add additional CII research publications each year. Such additions are made either to support student interest in special topics or to add new materials as part of a continuous improvement program.

Dr. O’Brien has been active with CII since 2004. He has served on three research teams and currently serves as the academic administrator for the newly-formed Information Management Community of Practice. He has taught for the CII Continuing Education program, the Executive Leadership program, and he has participated in CII Performance Improvement Workshops and BOA programs. Congratulations to Dr. Bill O’Brien for being named 2009 Distinguished Professor.
Award Criteria

• As of January 1, 2008, courses being taught included at least two published CII research topics.

• A defined plan exists to introduce at least one additional published CII research topic each year.

• The individual has introduced at least one published CII research topic each year, beginning on or after January 1, 2008.

• The individual is an instructor in a program certified by the Accreditation Board for Engineering and Technology (ABET); by the American Council for Construction Education (ACCE); or by an equivalent non-U.S. based organization deemed acceptable by the Professional Development Committee.

Distinguished Professor Awards Panel of Judges

William W. Badger  Professor, Del E. Webb School of Construction, Arizona State University

Manuel A. Garcia  Associate Director for Professional Development and Implementation, Construction Industry Institute

Samantha Gauthreaux  Recruiter, Jacobs

Robert M. Hayhurst  Chief – Facilities Engineering, Occidental Petroleum Corporation

Dorothy Hellberg  Director, Educational Services, Emerson Process Management

Timothy B. Martin  Construction Manager, ConocoPhillips

Christopher Maxson  Professional Development & Training Coordinator, CCC Group, Inc.

Henri Ohayon  Manager, Learning & Development, Bechtel Construction Operations, Inc.

P. Karen Vacca  Director, Employee Development, URS – Washington Division
Richard L. Tucker Leadership & Service Award

Paul V. Campbell

Paul Campbell is the sixth recipient of the Construction Industry Institute’s Richard L. Tucker Leadership and Service Award.

Paul Campbell currently serves as a Senior Vice President of Mortenson Construction, having been with the firm since 1974. During his tenure at Mortenson, Paul has held positions of increasing responsibility including estimating, project management, operating group management, and senior management. In 1983, he relocated to Seattle, Washington to establish and manage the company’s Seattle office. In 1994, he returned to the firm’s Minneapolis headquarters to assume his current position. As a member of the Senior Leadership Team, Paul oversees a variety of Mortenson’s business services, including risk management, information technology and systems, legal, procurement, equipment and supply management, and labor relations. He received a bachelor’s degree in construction engineering from Iowa State University.

For nearly 13 years, Paul has been involved in many key CII initiatives and has consistently advocated CII principals and practices in his professional life. He has been on the Board of Advisors since 1996, and has held long-term positions on the Executive Committee, the Strategic Planning Committee, and several Core Process Groups and other committees. Paul’s leadership and his contributions to CII have made a lasting and meaningful impact. In his considerable efforts to develop and implement CII products, he has become a role model for CII leadership and membership.

Congratulations to Paul Campbell. His dedication to the industry and to CII sets an example to all and brings added distinction to the Richard L. Tucker Leadership and Service Award.

Award Criteria

The recipient must have:

• Been active in CII programs or have provided significant exceptional service to further the mission accomplishment of CII.

• Demonstrated strong and lasting commitment and support for the mission and the objectives of CII.

• Served as a role model for other CII participants.

• Normally the period of service appropriate for consideration for this award will be three years or more.
Previous Recipients of the Richard L. Tucker Leadership & Service Award

2004 – J. Kent Underwood, Solutia Inc.
2005 – Gerald H. Greene, The Procter & Gamble Company
2006 – James A. Scotti, Fluor Corporation
2007 – William W. Badger, Arizona State University
2008 – James G. Slaughter, Jr., S&B Engineers and Constructors, Ltd.
Carroll H. Dunn Award of Excellence

The Construction Industry Institute established the Carroll H. Dunn Award of Excellence in 1985 to honor an individual for significant achievements in improving the engineering and construction industry. The award is CII’s highest honor and is recognized as one of the most prestigious awards of its kind in the construction industry. A recipient for 2008 has been selected by the CII Executive Committee and will be recognized at the CII Banquet.

Carroll H. Dunn

Carroll H. Dunn was the Project Director of the Construction Industry Cost Effectiveness (CICE) Project, which was sponsored by The Business Roundtable and led to the creation of the Construction Industry Institute. Dunn had a highly decorated career in the United States Army Corps of Engineers, retiring as a lieutenant general. During his military career, Dunn served in World War II and later served as Director of the Titan II Missile Program and was Division Engineer of the Corps’ Southwestern Division.

In 1980, Dunn began work full time on the CICE Project and later was instrumental in the establishment of CII. Dunn’s service to CII was considered so valuable that he was appointed an ex-officio member of all the original committees and research task forces.

Criteria of the Dunn Award

Criteria for the Dunn Award include the following:

- Significant contributions to the construction industry.
- Demonstration of the highest degree of personal dedication to improving cost, schedule, quality, and/or safety of the capital facilities delivery process.
- A level of knowledge and breadth of experience that distinguish the recipient as an eminent authority.
- A leadership position in the construction industry from which others can be influenced by example and direction.
- A record of accomplishment that brings added distinction to the recipient, the organizations with which he or she has been associated, and to the industry at large.
Recipients of the Dunn Award of Excellence

Carroll H. Dunn (1985) – inspiring leader and project manager of the CICE Project who guided the establishment of CII as a principal national forum for construction research.

Charles D. Brown (1987) – early application of cost-effectiveness principles led to stellar engineering career; DuPont representative to CICE study; energetic advocate of CICE findings.

Ted C. Kennedy (1988) – a founder of BE&K; influential member of original CII Board of Advisors; recognized industry leader in education, training, and employee development.

Robert H. Miller (1989) – intense DuPont participant during CICE who later chaired CII, oversaw its first published research, and helped to establish its educational program.

Louis Garbrecht, Jr. (1990) – pioneered “engineering” of the construction process and proved that constructability is cost-effective; early advocate of project management research; original chairman of CII.

Clarkson H. Oglesby (1991) – research pioneer and author of classic construction engineering textbooks who established the first graduate studies in construction at Stanford University.

James M. Braus (1992) – Shell Oil and CICE leader and diplomat who bridged diverse opinions within CII to keep the Institute unified and authored the original CII Strategic Plan.


Jack E. Turner (1994) – originated idea that led to establishment of The Business Roundtable, and later suggested a study of owner-contractor issues that became the CICE Project.
Recipients of the Dunn Award of Excellence


John W. Morris II (1996) – led effort to unite Corps of Engineers, federal agencies, and environmentalists in shaping national water resources policy during turbulent transition era.

Richard L. Tucker (1997) – professor, productivity research pioneer, CICE participant, and renowned industry speaker who personally led efforts to establish CII at UT Austin; served as first director from 1983-1998.


Donald J. Gunther (1999) – hard-driving Bechtel executive whose leadership, dedication, and teamwork influenced others personally and professionally as well as changed Bechtel’s approach to worldwide business.

Arthur J. Fox, Jr. (2000) – long-time editor of Engineering News-Record; traveled around the world to report on more than four decades of industry progress, created ENR’s Engineer of the Year award.

H. B. Zachry, Jr. (2001) – born constructor who led a road contracting firm founded by his father to a worldwide leadership role through dedication to his employees and the principles of quality, safety, and client satisfaction.

Joseph J. Jacobs (2002) – Jacobs Engineering founder who led his company to the top echelons of the engineering world and whose entrepreneurial spirit and ethical beliefs inspire those who work for him.

Alan L. Boeckmann (2005) – inspired by his mining engineer father, used worldwide project experience to initiate global use of 3-D plant design and became a leader in developing and using best practices.

Daniel W. Halpin (2006) – professor, author of classic engineering texts, simulation expert, and CII research pioneer who developed construction-civil engineering program at Georgia Tech before heading up top-notch program at Purdue.

David J. Nash (2007) – rose to serve simultaneously as U.S. Navy Chief of Engineers and Commander of Naval Facilities Engineering Command, then as a civilian answered the nation’s call to run the reconstruction effort to rebuild Iraq.

Ralph R. Peterson (2008) – a pioneer in hazardous waste management and remediation at CH2M HILL who has gone on to promote global sustainable development initiatives.
Appendices
1. “Automated Materials Tracking and Locating”  
   **Duncan Young**, Saiedeh Razavi, Hassan Nasir, and Dr. Carl Haas, University of Waterloo

2. “A Time Series Model for Forecasting Construction Cost Index”  
   **Dr. Baabak Ashuri** and Jian Lu, Georgia Institute of Technology; **Dr. Nicola Chiara**, Columbia University

3. “Automated Generation of Parametric BIMs Based on Hybrid Video and Laser Scanning Data”  
   **Dr. Jochen Teizer**, A. Makhmalbaf, I. Brilakis, M. Lourakis, R. Sacks, S. Christodoulou, and S. Savarese, Georgia Institute of Technology

4. “Examining the Emergent Role of Expatriates in Global Engineering Team Networks”  
   **Melissa Di Marco** and Dr. John Taylor, Columbia University

5. “A Decision Support Tool for Rapid Assessment and Selection of Engineered Equipment Suppliers”  
   **Marcelo Azambuja**, Suudhan Rangarajan, and Dr. William O’Brien, The University of Texas at Austin

6. “Use of Building Information Modeling (BIM) for Sustainable Design and LEED Rating Processes”  
   **Dr. Salman Azhar**, Auburn University

7. “Intelligent & Integrated Sustainable Construction”  
   **Reza Shiftehafar**, Mani Golparvar-Fard, Feniosky Peña-Mora, Leila Hajibabai, and Changbum Ahn, University of Illinois at Urbana-Champaign

   **Paul Chinowsky**, University of Colorado

9. “Assessment of Methods for Adjusting Construction Cost Estimates by Project Location”  
   **Adam Martinez**, Dr. Giovanni C. Migliaccio, and Su Zhang, University of New Mexico

10. “Establishing a Collaborative Environment among Project Stakeholders”  
    **Rebecca Martinez** and Dr. Giovanni C. Migliaccio, University of New Mexico
CII Member Organizations

Owners

Abbott
Air Liquide
Air Products and Chemicals
Alcoa
Ameren Corporation
American Transmission Company LLC
Anheuser-Busch InBev
Aramco Services Company
Archer Daniels Midland Company
BP America
Bristol-Myers Squibb Company
CITGO Petroleum Corporation
Cargill
Chevron
Codelco - Chile
ConocoPhillips
DFW International Airport
The Dow Chemical Company
DuPont
Eastman Chemical Company
ExxonMobil Corporation
General Motors Corporation
GlaxoSmithKline
Hovensa L.L.C.
Intel Corporation
International Paper
Kaiser Permanente
Eli Lilly and Company
Marathon Oil Corporation

National Aeronautics & Space Administration
Naval Facilities Engineering Command
NOVA Chemicals Corporation
Occidental Petroleum Corporation
Ontario Power Generation
Petroleo Brasileiro S/A - Petrobras
Praxair
The Procter & Gamble Company
Progress Energy
SABIC - Saudi Basic Industries Corporation
Sasol Technology
Shell Global Solutions US Inc.
Smithsonian Institution
Southern Company
Sunoco
Tennessee Valley Authority
U.S. Architect of the Capitol
U.S. Army Corps of Engineers
U.S. Department of Commerce/NIST/Building and Fire Research Laboratory
U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of State
U.S. General Services Administration
Vale
CII Member Organizations

Contractors

AMEC
AZCO
Adolfson & Peterson Construction
Aker Solutions
Alstom Power
Atkins Faithful+Gould
Autodesk
BIS Frucon Industrial Services
Baker Concrete Construction
Barton Malow Company
Bateman Engineering N.V.
Bechtel Group
Bentley Systems
Black & Veatch
Bowen Engineering Corporation
Burns & McDonnell
CB&I
CCC Group
CDI Engineering Solutions
CH2M HILL
CSA Group
Day & Zimmermann
dck worldwide, LLC
Dresser-Rand Company
Emerson Process Management
Entech Solar
Fluor Corporation
Foster Wheeler USA Corporation
GS Engineering & Construction Corporation
Grinaker-LTA/E+PC
Gross Mechanical Contractors
Hargrove and Associates
Hilti Corporation
JMJ Associates
Jacobs
KBR
Lauren Engineers & Constructors
McDermott International
M. A. Mortenson Company
Mustang
R. J. Mycka
Oracle USA
Parsons
Pathfinder LLC
Pegasus Global Holdings
S&B Engineers and Constructors
SNC-Lavalin
The Shaw Group
Siemens Energy
Technip
URS Corporation
Victaulic Company
Walbridge
The Weitz Company
WorleyParsons
Zachry
Zurich
Wayne Crew, Director

Kim Allen, Associate Director, Knowledge Management
Manuel A. Garcia, Associate Director, Implementation Strategy and Professional Development
Stephen Mulva, Associate Director, Benchmarking & Metrics
Steve Thomas, Associate Director, Research, Academics, and Breakthrough Strategy

Nuria E. Ayala, Senior Program Coordinator
Christi Buratti, Administrative Associate
Michael Burns, Technical Writer–Editor
Terri Buvia, Executive Assistant
Jiukun “Jason” Dai, Research Engineer
Frances DeCoux, Administrative Associate
Deborah DeGezelle, Senior Systems Analyst
Kristi Delaney, Senior Program Coordinator
Kelly Lenig, Senior Program Coordinator
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Jana Shinn, Administrative Assistant
Jacquie Thomas, Technical Writer–Editor
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Harold L. Helland, Abbott
Timothy B. Martin, ConocoPhillips
Cynthia J. Richartz, Abbott
Kevin S. Rickert, WorleyParsons
P. Karen Vacca, URS – Washington Division
Paul N. Woldy, Chevron Energy Technology Company