

**Re-Engineering the Construction Industry:
Best Practices and Benchmarking**

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West Lafayette, Indiana
March 24, 1998

Industry Phrases

- Teamwork
- Re-engineering
- Vision
- Paradigm Shift
- Restructuring
- Empowerment



Team Player

**An employee who substitutes
the thinking of the herd for his
own good judgment.**



Re-Engineering

**The principal slogan of the '90s,
used to describe any and all
corporate strategies.**



Vision

**Top management's heroic guess
about the future, easily printed on
mugs, T-shirts, and posters.**



Paradigm Shift

**A euphemism that companies
use when they realize the rest
of their industry has expanded
in Guangdong, while they were
investing in Orange County.**



Restructuring

A simple plan instituted from above in which workers are right-sized, downsized, surplused or, in the business jargon of yore, fired.



Empowerment

A magic wand that management waves to help survivors of restructuring suddenly feel in control of their fortunes.



"Vision" Statements

(Bartlett's Book of Famous Quotations)

"Drill for oil? You mean drill into the ground to try and find oil? You're crazy."

Drillers whom
Colonel Edwin L. Drake
tried to enlist to his project
to drill for oil in 1859.

"Heavier-than-air flying machines are impossible."

Lord Kelvin
President,
Royal Society, 1895

"Louis Pasteur's theory of germs is ridiculous fiction."

Pierre Pachtet
Professor of Physiology
at Toulouse, 1872

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."

Western Union
internal memo, 1876

"Everything that can be invented has been invented."

Charles H. Duell
Commissioner,
U.S. Office of Patents,
1899

"Who the hell wants to hear actors talk?"

H. M. Warner
Warner Brothers,
1927

"I think there is a world market for maybe five computers."

Thomas Watson
Chairman of IBM,
1943

"640K ought to be enough for anybody."

Bill Gates,
1981

"CAD is not applicable to the construction industry."

CII Board of Advisors,
1983

**“We don’t need measurements.
We can tell if it’s a good
project.”**

**Early CII Board
of Advisors**

Vision 2020

CII Strategic Planning

- Globalization
- Information Technology
- Construction Labor
- Manufacturing Logistics
- Contracting Strategy
- Design and Specification Standardization
- Construction Techniques

Vision 2020

CII Strategic Planning

- Material/Process Technology
- Contractor Specialization
- Process Control
- Work Process Improvement
- Partnering
- Supplier Relationships
- Steps Along the Way

Globalization

- Design of a plant done globally to minimize cost.
- Information systems globally compatible within organization.
- Owners able to quickly and effectively ship and move materials worldwide.

Information Technology

- The industry needs to:
 - integrate computational tools and share lessons learned
 - encourage development of open systems
 - improve modeling and simulation knowledge
 - encourage development of expert systems
 - centrally store electronic information on existing plants, use worldwide to speed future plant design

Construction Labor

- Strong international labor unions or social organizations
- Labor prohibitively expensive by today's standard of hourly wages
- Labor less mobile; labor base local to work.
- Craft labor availability critical; design driven by minimizing craft labor.
- Labor reduced by automation; more work done by fewer, more trained people.
- Shop work maximized.

Manufacturing Logistics

- The industry needs to:
 - increase agility in manufacturing, plan facilities that respond quickly to market changes
 - develop new technology for reconfiguring manufacturing plants
 - improve logistics efficiencies
 - use operations optimization tools worldwide

Contracting Strategy

- Manufacturing facilities will be “target priced.”
- Construction will be “fixed priced.”
- Labor will be piece work or paid by value delivered.
- Manufacturing facilities will be owned by owner companies.
- Pre-Project Planning increasingly will be taken on by non-owner personnel.
- Incentives will be in alignment with owner corporate goals.

Design and Specification Standardization

- Engineering will be driven by standardized options, delivers an intended product for a target price and shortening engineering and construction duration.
- Much design will be eliminated by standardization.
- Design codes will need to be reviewed on national or world level, as some are too conservative.

Construction Techniques

- Pressure to shorten time required to design and build plant will force that process to change.
- Standard modular components designed for industry-wide components will be used with increasing frequency.

Material/Process Technology

- The industry needs to:
 - support R&D to generate new knowledge and develop better products and processes.
 - support engineering research into nontraditional reaction and separation systems.
 - support engineering research into numerous concepts for better materials, more reuse of materials, and “smart” processes.

Contractor Specialization

- EPC process’ complexity promotes shift to fewer, more sophisticated contractors.
- E&C people become generalists interfacing with systems and tools developed by specialists.

Process Control

- The industry needs to:
 - work with government and academia to develop process software and real-time measurement tools.
 - develop instrumentation interfacing standards for chemical measurements to enable more efficient control systems.
 - support development of high-performance spectrometers to ensure chemical measurements meet needs of chemical industry.

Work Process Improvement

- Streamline and integrated all participants' review processes to shorten review durations.
- Increasingly use metrics.

Partnering

- The industry needs to create momentum for partnering.
- Owners will often partner with the engineering firm, construction companies, and major equipment suppliers when building new plants.

Supplier Relationships

- Activity outsourcing will continue, requiring strong partnerships to be formed with expert suppliers.
- The industry needs to integrate and execute sourcing strategies globally.

Steps Along the Way

- Front End Loading systems need to be improved to help determine which projects to do.
- Trends:
 - Increased emphasis on early project
 - Continued emphasis on early release of critical equipment
 - Base-line type designs
 - "Design to Capacity"
 - "Design for Plant Life"

**Survival
Means
Getting Better**

How to Get Better?

FORMULA FOR IMPROVEMENT

- Provide Basic Elements.
- Commit to Improvement.
- Develop Improvement Tools.
- Implement Improvement Tools.
- Measure Results.

Basic Elements

- People
- Organization
- Systems

Improvement Commitment

- Resources
- Leadership
- Activities

NOT JUST GOOD INTENTIONS!

Improvement Tools

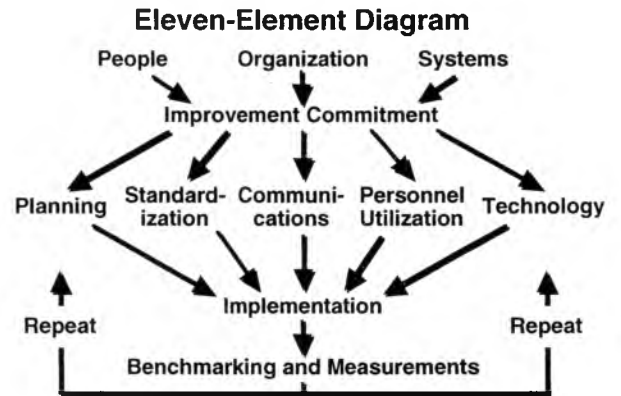
- Planning
- Standardization
- Communications
- Personnel Utilization
- Technology

Implementation

- Company/Project Responsibility
- CII Help Provide Tools

Benchmarking and Measurements

- Company/Project Results
- Best Practices Impacts
- Networking

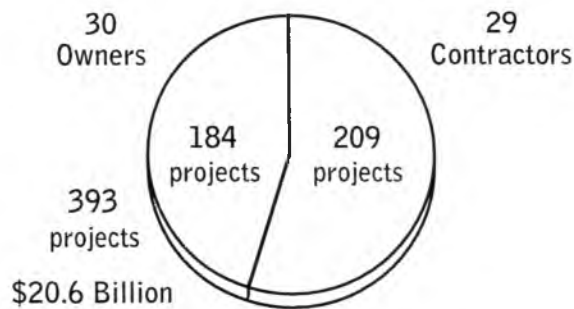


Metrics

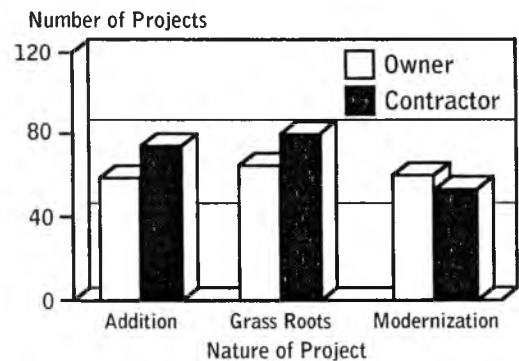
A quantifiable, simple, and understandable measure that can be used to compare and improve performance.

CII *BM&M* Database *1997*

Database by Respondent Type



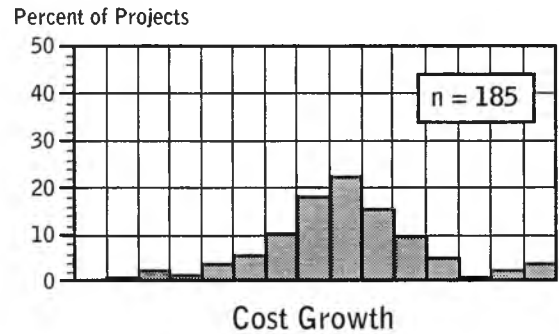
Database by Nature of Project



CII BM&M Objectives

1. Identify *Industry Norms and Trends*
2. Quantify *Use and Value* of Best Practices
3. Provide *Useful Feedback* to Participants
4. Focus CII Research and Implementation Efforts

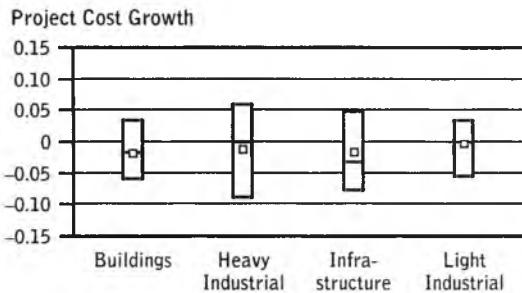
Cost Growth (All Owners)



Cost Growth Comparison Data

Respondent: Owner
Project Nature: All
Project Type: All

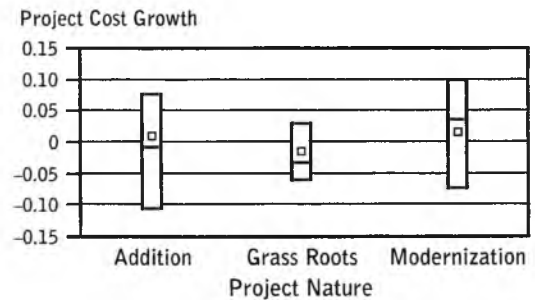
Location: USA & Canada
Industry Group: All
Cost Categories: All



Cost Growth Comparison Data

Respondent: Owner
Project Nature: As Shown
Project Type: All

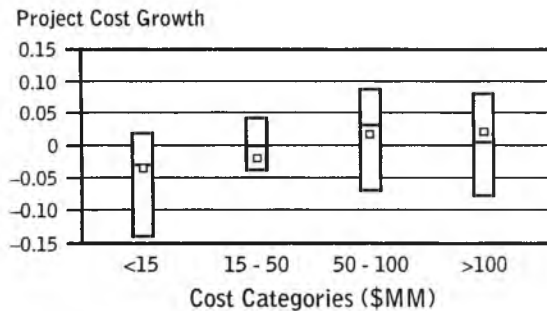
Location: USA & Canada
Industry Group: Buildings
Cost Categories: All



Cost Growth Comparison Data

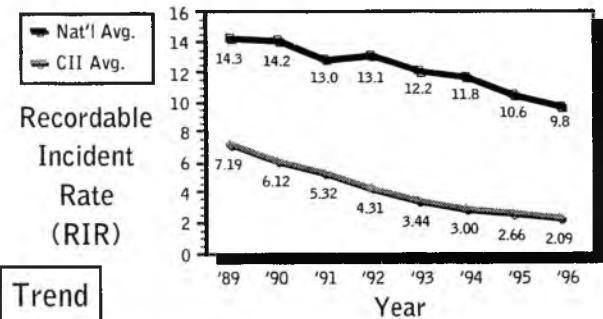
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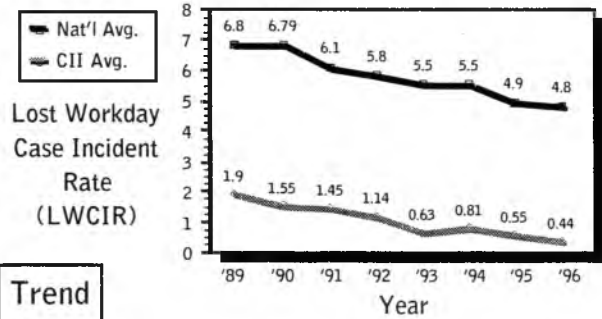
Recordable Incident Rates

National Construction Average and CII Companies Average



Lost Workday Case Incident Rates

National Construction Average and CII Companies Average

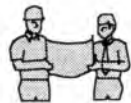


CII
BM&M
Practice
Use
Index

CII Best Practices (1996 and 1997)



Team Building



Constructability



Zero Accidents



Pre-Project Planning

CII Best Practices (1997)



Project Change Mgt.



Strategic Alliances



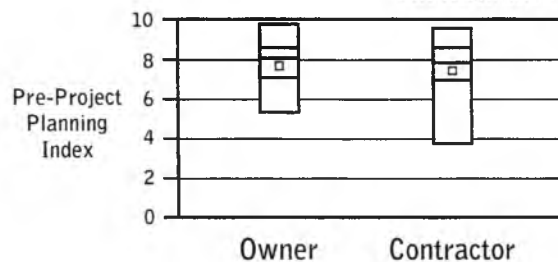
Scope Definition



Design/Information Technology

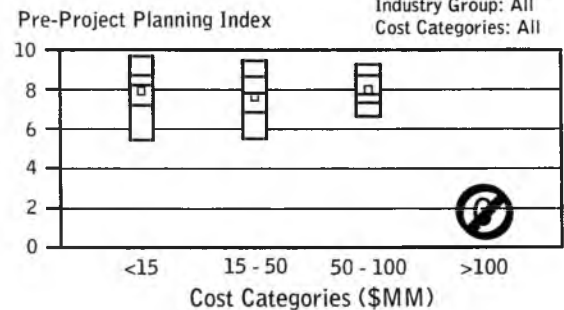
Pre-Project Planning Use Comparison Data

Respondent: As Shown
Project Nature: All
Project Type: All
Location: USA & Canada
Industry Group: All
Cost Categories: All



Pre-Project Planning Use Comparison Data

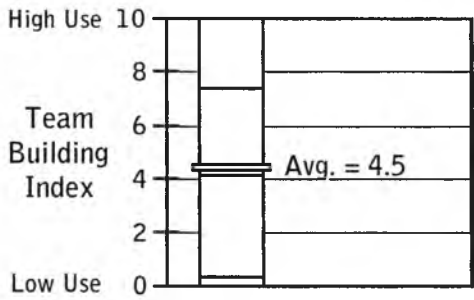
Respondent: As Shown
Project Nature: All
Project Type: All
Location: USA & Canada
Industry Group: All
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Team Building Use

Contractors — Heavy Industrial

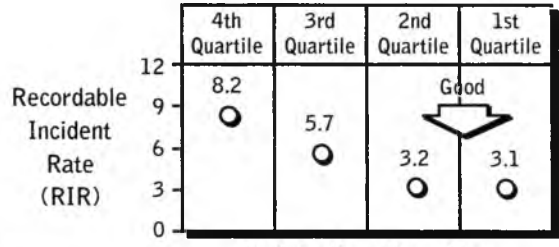
Use



CII
BM&M
Value
of
Practice
Use

Safety Practices Lower RIR

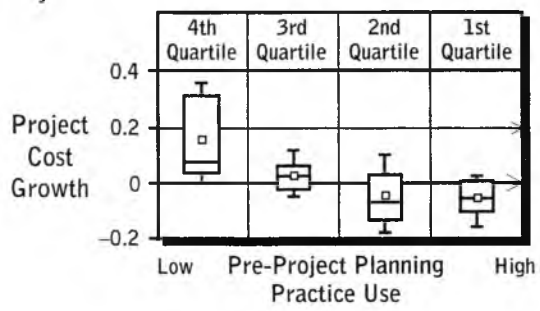
All Projects



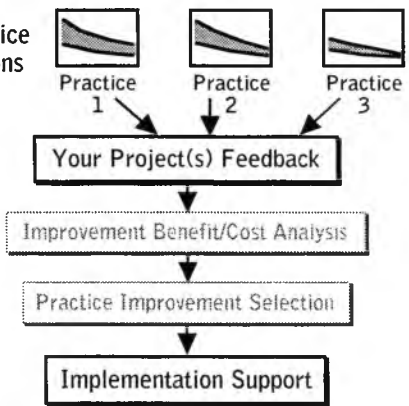
Value

Pre-Project Planning vs. Project Cost Growth

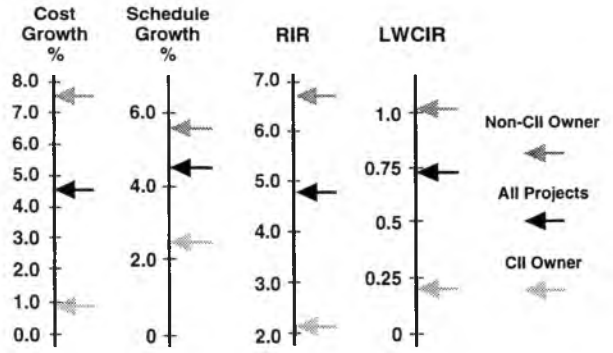
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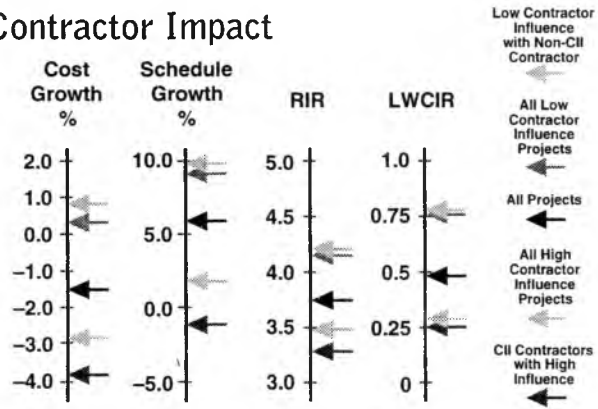
Best Practice Correlations



Owner Impact



Contractor Impact



Summary

- Change is happening.
- Progressive companies are changing with the times.
- Progressive companies have a competitive advantage.