CII ... - a unique consortium of owners, designers, builders, vendors, and universities formed to improve the capital project delivery process
CII Mission

To improve the safety, quality, schedule, and cost effectiveness of the capital investment process through research and implementation support for the purpose of providing a competitive advantage to its members in the global marketplace.
# CII Owner Members

<table>
<thead>
<tr>
<th>3M</th>
<th>Chevron</th>
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<tbody>
<tr>
<td>Abbott Labs</td>
<td>CITGO</td>
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<tr>
<td>Air Products &amp; Chemicals</td>
<td>Dow Chemical</td>
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<td>Alcoa</td>
<td>DuPont</td>
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<td>Anheuser-Busch</td>
<td>Eastman Chemical</td>
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<td>Aramco Services</td>
<td>Exxon Research &amp; Engineering</td>
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<td>Atlantic Richfield</td>
<td>FPL Energy</td>
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<td>BP Amoco</td>
<td>General Motors</td>
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<td>Bayer</td>
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<td>Celanese</td>
<td>Intel</td>
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<td>Champion International</td>
<td>Eli Lilly and Company</td>
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</table>
CII Owner Members
(continued)

LTV Steel
Mobil
NASA
NAVFAC
Ontario Power Generation
Phillips Petroleum
Procter & Gamble
Reliant Energy
Rohm and Haas
Shell Oil
Solutia

Tennessee Valley Authority
Texaco
U.S. Air Force Research Laboratory
U.S. Army Corps of Engineers
U.S. Department of Commerce
U.S. Department of State
U.S. Steel
Union Carbide Corporation
The University of Texas System
Weyerhaeuser Company
CII Contractor Members

ABB Lummus Global  Cianbro
BE&K  Day & Zimmermann International
BMW Constructors  Dick Corporation
Bechtel Group  Dillingham Construction Holdings
Black & Veatch  Eichleay Holdings
Burns and Roe  Fisher Controls International
Butler Manufacturing  Fluor Daniel
CDI Engineering  Foster Wheeler USA
Chemtex International  Fru-Con Construction
Cherne Contracting  James N. Gray Company
Chicago Bridge & Iron  Graycor
CII Contractor Members
(continued)

H+M Construction
Hilti
Honeywell
International Technology
Jacobs Engineering Group
J. A. Jones
Kellogg Brown & Root
Kiewit Construction
Kværner
Morrison Knudsen

M. A. Mortenson
Murphy Company
The Parsons Corporation
Praxair
Raytheon Engineers & Constructors
S&B Engineers and Constructors
SAP America
Stone & Webster Engineering
Walbridge Aldinger
H. B. Zachry
## Participating Universities

<table>
<thead>
<tr>
<th>Arizona State</th>
<th>North Carolina State</th>
</tr>
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<tbody>
<tr>
<td>Auburn</td>
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<tr>
<td>Carnegie Mellon</td>
<td>Pennsylvania State</td>
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<tr>
<td>Clemson</td>
<td>Polytechnic University NY</td>
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<tr>
<td>Colorado</td>
<td>Purdue</td>
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<tr>
<td>Columbia</td>
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<tr>
<td>Georgia Tech</td>
<td>Texas</td>
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<tr>
<td>Florida</td>
<td>Texas A&amp;M</td>
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<td>MIT</td>
<td>Worcester Polytechnic</td>
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<tr>
<td>New Mexico</td>
<td>Xavier</td>
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</tbody>
</table>
Construction Industry Institute

Impacts of Design/Information Technology on Project Outcomes
Performance Parameters

- Project Cost Growth
- Project Schedule Growth
- Recordable Incident Rate (RIR)
- Lost Workday Case Incident Rate (LWCIR)
- Field Rework Cost Factor
Construction Industry Institute

Performance Metrics

– Bar Coding
– Integrated Database
– 3D CAD
– Electronic Data Interchange (EDI)
The image shows a bar chart representing the number of projects across different industry groups. The chart is divided into four categories: Buildings, Heavy Industrial, Infrastructure, and Light Industrial. The chart compares the projects handled by Owners and Contractors. The Industry Group axis is labeled with the categories, and the Y-axis represents the number of projects ranging from 0 to 120. The data points for each category are as follows:

- **Buildings**:
  - Owner: 44
  - Contractor: 6

- **Heavy Industrial**:
  - Owner: 101
  - Contractor: 93

- **Infrastructure**:
  - Owner: 13
  - Contractor: 1

- **Light Industrial**:
  - Owner: 14
  - Contractor: 25
Cost Category ($MM)

<$15MM  $15MM-$50MM  >$50MM

Number of Projects

Owner  Contractor

- <$15MM: 101
- $15MM-$50MM: 51
- >$50MM: 31

- <$15MM: 56
- $15MM-$50MM: 34
- >$50MM: 24
Add on Grass Roots Modernization

<table>
<thead>
<tr>
<th>Project Nature</th>
<th>Owner</th>
<th>Contractor</th>
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<tbody>
<tr>
<td>Add on</td>
<td>52</td>
<td>58</td>
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<tr>
<td>Grass Roots</td>
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<td>30</td>
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<td>Modernization</td>
<td>73</td>
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<td>Performance Metric</td>
<td>Owners</td>
<td>Contractors</td>
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<td>-------------------------</td>
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<tr>
<td>Cost Growth</td>
<td>-0.026</td>
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<tr>
<td>Schedule Growth</td>
<td>0.045</td>
<td>0.025</td>
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<td>R.I.R.</td>
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<td>2.203</td>
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<td>L.W.C.I.R.</td>
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<td>0.093</td>
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<tr>
<td>Field Rework Cost Factor</td>
<td>0.054</td>
<td>0.030</td>
</tr>
<tr>
<td>Practice Use</td>
<td>Owners</td>
<td>Contractors</td>
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<tr>
<td>--------------</td>
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<td>-------------</td>
</tr>
<tr>
<td>100%</td>
<td>7.88</td>
<td>8.23</td>
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<tr>
<td>75%</td>
<td>1.79</td>
<td>2.88</td>
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<tr>
<td>50%</td>
<td>0.75</td>
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<tr>
<td>25%</td>
<td>0.00</td>
<td>0.56</td>
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<tr>
<td>0%</td>
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<tr>
<td>Mean</td>
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## Construction Industry Institute

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<tr>
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<td>1st</td>
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<tr>
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<td>C.T.</td>
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<td>Project</td>
<td>Type</td>
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<td>Const. Dur.</td>
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<tr>
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## Construction Industry Institute

<table>
<thead>
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<th>Outcome Metric Owners</th>
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<th>O3</th>
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<td>5.24*</td>
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<td>- Integrated Database</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>- EDI</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>- 3D CAD</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>- Bar Code</td>
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<td>S</td>
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## Construction Industry Institute

<table>
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<tr>
<th>Outcome Metric</th>
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<th>C2</th>
<th>C3</th>
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<tr>
<td>Contractors</td>
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<tr>
<td>• Cost Growth (%)</td>
<td>-8.5*</td>
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<td>• Recordable Incident Rate</td>
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<td>– EDI</td>
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<td>– 3D CAD</td>
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<tr>
<td>– Bar Code</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
Construction Industry Institute

BAR CODING

• Lessons Learned
  – Cost not justified for tracking pipe spool ($/piece)
  – Time card abuse by employees
BAR CODING

- **Standard Use - Current**
  - Employee badging
  - Time sheets – job coding, payroll
  - Material receipt/tracking

- **Limited Use - Current**
  - Inventory control
  - Tool control
  - Job progress reporting
BAR CODING

• Likely Expanded Use
  – Bill of materials coding
  – Job progress reporting/tracking
INTEGRATED DATABASE

• Lessons Learned
  – Software compatibility problems were experienced
  – Provided time & dollar savings for owners & contractors
  – Compatible capabilities by both owner & contractor are key to expanded use
Construction Industry Institute

INTEGRATED DATABASE

• Standard Use - Current
  – For conceptual to final design phase by owners & contractors
  – Material tracking within the organization
  – Internal productivity reports, actual vs budget

• Limited Use - Current
  – During construction by owners & contractors
  – International design “links”
Construction Industry Institute

INTEGRATED DATABASE

• Likely Expanded Use
  – More international design
  – Owner/contractor links
Lessons Learned

- Biggest savings result from reduced rework
- Cycle time was reduced by more concurrent work
- Cost savings were realized from precise material take-offs
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3D CAD

• **Standard Use - Current**
  – Interference checking
  – Material take-off
  – Fabrication drawings

• **Limited Use - Current**
  – Piping
  – Structural
  – Electrical – conduits & cable trays, lighting
3D CAD

• Likely Expanded Use
  – More components being added to design
  – Increased integration with engineering analysis software
  – For virtually all designs regardless of size/cost
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EDI

• Lessons Learned
  – EDI supports successful alliances with suppliers
  – Use promotes design efficiency: more likely to get exact product needed, material take-offs can be done by supplier, only exact inventory is paid for
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EDI

• Standard Use - Current
  – Electronic funds transfer
  – Purchase orders
  – Material releases

• Limited Use - Current
  – Transferring design specifications
  – Supplier alliances
  – Inspection reports to vendors
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EDI

• Likely Expanded Use
  – Drawings & specifications transfer for bids
  – More alliances
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Design/Information Technology Use

- Owner*
- Contractor*

* Controlling for project size
Relative Cost Benefit of Practice Use

Respondent: Contractors
Industry: Heavy Industrial

- Pre-Project Planning: 14%
- Constructability: 15%
- Project Change Management: 19%
- Desing/Information Technology: 16%
- Safety: 23%
- Team Building: 13%

[Pie chart diagram]
Respondent: Owners
Industry: Light Industrial

- Pre-Project Planning: 18%
- Design/Information Technology: 28%
- Constructability: 53%
- % Design Complete at Construction Start: 1%

Relative Schedule Benefit of Practice Use
Importance of Who You Work For

Respondent: Contractor
Industry: Heavy Industrial

- CII Owner: 38%
- Pre-Project Planning: 12%
- Safety: 19%
- Constructability: 6%
- Project Change Management: 3%
- Design/Information Technology: 12%
- Team Building: 10%
Introducing FIATECH
An Overview

October, 2000
Owners, contractors, and suppliers dramatically improving the effectiveness of large capital facilities - engineering, construction and operation - through the integrated application and deployment of the latest computer, automation, advanced communications, and other technologies.
To provide leadership, direction and the forum to undertake collaborative Research, Development and Deployment, RD&D, leading to fully integrated and automated capital project processes, FIAPP, for the purpose of reducing cycle time and costs, and improving the effectiveness of capital facilities in the context of the owner’s corporate enterprise.
FIATECH
Consortium Participants

- CII
- Alliance Partners
- Other Agencies
- NIST
- USACE
- Member Participants
- Academics
- Non-member Participants

Bringing High Technology to Capital Facilities
Who FIATECH is:
Membership in FIATECH is open to Owners, Contractors, Suppliers, and others committed to achieving FIAPP and seamless integration of facilities in improving enterprise performance.

Charter members include:
Air Products & Chemicals, BASF, Burns and Roe, Day and Zimmerman, Dow Chemical, DuPont, Eichleay Holdings, General Motors, Jacobs Engineering, Merck, NASA, Stone and Webster, H. B. Zachry
FIATECH Members

October, 2000

ABB Lummus Global
AE Technology
Engineering Software
ASD International
Air Products and Chemicals
Army Corps of Engineers
Aspen Technology
BASF Corporation
B E & K
Bechtel
Bentley Systems

Burns and Roe Enterprises
Cadcentre
Cyra Technologies
Day & Zimmermann International
Dick Corporation
The Dow Chemical Company
Dow Corning
E.I. DuPont de Nemours
Eichleay Holdings
FileNET
FIATECH Members
October, 2000

- Flour
- General Motors
- ICARUS
- INOVx
- Intergraph
- Jacobs Engineering Group
- Kvaerner
- Lockwood Greene Engineers
- Matrix One
- Merck & Co.
- Millennium Inorganic Chemicals
- NASA
- NIST/Building & Fire Research Lab
- Parsons Energy & Chemicals
- Primavera Systems
- Quillion
- SAP America
- Stone & Webster Engineering
- Union Carbide
- H. B. Zachry Company
• Board of Directors
  The principal policy-making body of FIATECH and the final governing body

• Strategic Focus Areas (SFA)
  The entity charged with developing high level goals and objectives, a strategy for accomplishing those goals and objectives, and oversight of mission accomplishments within a well-defined area of member interest.
• Possible SFAs include:
  
  – Owner-Operator FORUM for User Requirements (Chartered)
  – Capital Projects Integration Software
  – Data Definitions and Structures
  – Field Measurements and Integration
  – Automation Technologies and Integration
SFA Operations

- SFAs function as focus area/interest groups within FIATECH

- Members choose to participate

- SFAs are led by elected Boards to develop high level goals and objectives, and a strategy for accomplishing those goals and objectives
SFA Operations

- Hold annual workshops to develop or initiate projects
- Most SFA activities supported by FIATECH dues
- Develop and seek sponsorship of projects
A Hypothetical FIATECH Leveraged Funding Project

$1.75M Project

Company A
$100K in-kind
$65K cash

Company B
$220K in-kind
$50K cash

Company C
$175K in-kind
$40K cash

Agency X
$700K in-kind

Contractor M

Agency Y
$400K contract

Sub-Contractor N

Bringing High Technology to Capital Facilities
How Activities Are Paid For...

Dues:

- Industry Forums and networking opportunities
- Creating Collaborative Project Concepts
- Workshops
- Government Liaison
- Information Research
Participant Investors/Other Investors:

• Statement of Work/ Work Breakdown
• Structure Preparation
• Proposal Preparation
• Collaborative Project Management
• Technical/ Financial/ Legal
• Deployment and Training
Membership & Dues Structure

• Membership Criteria
  • Committed to FIAPP principles
  • North American manufacturing
  • Board approved

• Dues
  • Small (sales of 0-$50M) $5000/yr
  • Medium (sales of $50M-$1000M) $5000 + .00211% of sales over $50 M/yr
  • Large ($1000M and over) $25,000/yr
Allocation of Intellectual Property

• FIATECH Products
  – Determined by FIATECH participants.

• CII Research Team Products
  – Available to CII members and for sale to non-members.
Summary: FIATECH...

- Makes FIAPP happen - A big step beyond *Best Practices* research

- Brings together all committed parties within and beyond the capital projects industry

- Focuses on results for members
Summary: FIATECH...

• Leverages resources

• **Collaborates** to develop and deploy **standards and protocols** for current IT technologies

• Produces **open architectures**

• Produce **intellectual property for members**