Advancing Technology & Innovative Practices in the Capital Projects Industry

Jerry Gipson, Senior Technology Director, Dow Chemical (retired)
• Board Member and Former Chair, Fiatech
• Chair Fiatech Strategic Direction Committee
Safety Topic
Industry Perspective - My Experience

- 32 years in industry (Dow)
- Consistent focus on technology discovery, development, and adoption
- Organization and resource accountability for engineering and manufacturing technology
- Significant, on-going external engagement (industry peers, suppliers, academia, institutes)
Industry Perspective - What I Learned

• Deep knowledge, fundamentals, and long-term perspective add premium value for industry

  -IF-

• Technology is incorporated in strategy
• Technology projects are well-planned and expertly managed
• Reward and risk are quantified
• The right and necessary external know-how + resources are engaged
Challenges … Opportunities

• Engagement --- Across Communities

• Facilitating the Technology Life-Cycle
  • Invention >>> Adoption (>>> Retirement)

• Bringing Benefits to Industry
  • Managing risk, real and perceived
  • Awareness, what is out there
  • Feasible and proven technology
Fiatech – Driving Industry Solutions

**Fiatech Mission**

- Global Industry Organization, Capital Facilities
- Technology and Innovative Practices to Drive Productivity and Efficiency
- Members - Owners, EPC’s, Academia, Technology Providers and Stakeholders
- Industry R&D, Development
- Develop, Demonstrate & Deploy
- Enable Member Deployment

http://www.youtube.com/watch?v=94WnqQYsMN4
Holistic Approach to Realizing Productivity Improvement in the Capital Projects Industry

Fiatech Strategic Roadmap Elements

1. Scenario-Based Project Planning
2. Automated Design
3. Integrated Automated Procurement and Supply Network
4. Intelligent & Automated Construction Job Site
5. Intelligent, Self-Maintaining & Reporting Operational Facilities
6. Real-Time Project & Facilities Management, Certification & Control
7. New Materials, Methods, Products & Equipment
8. Technology & Knowledge-Enabled Workforce
9. Lifecycle Data Management & Information Integration
Fiatech Strategic Plan

1. Industry leading, technology based solutions and innovative practices
2. Compelling value propositions
3. Robust business model
4. Implemented in project portfolio
5. Strong and diverse membership
Fiatech Leadership Initiatives, 2015

- Planning, Voice of the Owner
- Mobile IT
- Automated Design & Construction
- Integrated Project Management
- Integrated Materials Management
- Advanced Work Packaging
- Interoperability & Lifecycle Information Management
- Handover and Asset Management
- Application of Big Data, Analytics, Cognitive Computing
- New Technologies – AR, VR, Internet of Things, Robotics
- Automating Code Processes, Regulatory Streamlining
- Workforce, People
Fiatech Driving Industry Solutions

- Project (Research and) Development
- Networking and Partnerships
- Technology Exchange
- Industry Recognition Award Programs
Scenario Based Planning, Voice of the Owner

**Over 80 Owner Companies Across a Range of Industries**

**VoO Purpose:**
- Enabling Exclusive Owner to Owner Discussions
- Sharing Vision, Challenges, Practices and Strategies
- Building Consensuses and Setting Priorities
- Identifying Solution Enabling Fiatech Projects with Tangible and Compelling Benefits

**Example Sessions:**
- #2 Handover Asset Management Conversion & Integration Challenges
- #3 Southern Company Approach to Asset Life Cycle Information Management
- #4 DuPont Balancing Owner Deliverables with Contract Execution
- #6 Dow’s Plans for Improving Project Performance
- #7 Eastman’s Approach to Bridging Boundaries through Integrated Project Controls
- #9 Phillips66 Counterfeiting Impact on Project Integrity

**Staff Lead:**
Reg Hunter, Fiatech
Integrated Materials Management - RFID

Purpose
- Provide detailed understanding of Radio Frequency Identification (RFID) technology and related systems

Maturity/Readiness

Industry Relevance/Impact
- Provides a comprehensive reference document to facilitate industry adoption of RFID based system solutions
Purpose

- Provide methodology for identifying and organizing information to enable Advanced Work Packaging (AWP)
- AIM Phase 2 will strengthen linkages to Material Flows

Maturity/Readiness

Development  POC/Demo  Adopt/Deploy

Industry Relevance/Impact

- Supported by Shell, Chevron, Dow, Hatch, Zachry and more than 20 other organizations
- Enables realization of CII/COAA AWP providing benefits of up to 25% productivity improvement

Drafts complete, release Q1/2015
Mobile IT Community 2014 Webinars:

- Over 600 participants to date
- 30 Owner Operator Participants
- 150 Contractors, Solution Providers, Academics, Consultants and SME’s Participated
- Sharing of Technology Applications
- With Benefits/ Value
- And, Lessons Learned

- Dow – Mobile hardware analysis
- Crossrail – Mobile Strategy
- Costain – Implications of Health & Safety Regulations on Use of Mobile Devices
- Ford, Bacon and Davis – End-User Performance in the Field
- Balfour Beatty – Mobile Site Forms testing
- Bechtel – RFID adoption study
- DPR & BIManywhere – End-user analysis for use of BIM tools in the field
- Crossrail – iBeacons for Safety Management
- Bechtel – Augmented Reality in Infrastructure
- Skanska – Use of Interactive Design Boards to improve Safety Management and Coordination
Fiatech Regulatory Streamlining Initiative – A Step Change Improvement in the Review Process

Guideline for Replicable Buildings – cut plan review time by 80%, TARGET deployment on over 150 Stores saved an average of $150,000 in plan review time per store

ePlan Review – goal: cut permit application time by 60%, can save industry $15 billion/year

Digital Signatures – support growth of ePlan review

Automated Code Checking (Autocodes) – goal: reduce plan review time from months to minutes

Steve Makredes, Target “Through Fiatech’s Replicable Buildings Guidelines Project, Target has been able to expedite the permitting process for our stores in the US reducing the permit time from months to weeks and saving the corporation millions of dollars on our construction programs.”

Testimonial, Chicago e-Plan Review
http://www.youtube.com/watch?v=t-n84G1GYfQ
Structural Steel Interoperability for the Building and Process Plant Industries (SSI)

- Migrating AISC CIS/2 to BIM Industry Foundation Classes (IFCs).
- Review the AISC Information Delivery Manual (IDM), and translate the EM7 Structural Contract Model into corresponding model view definitions.
- Develop enhanced workflows so steel detailer is able to design/detail final steel structure layout

Opportunity
- Significant schedule savings
- 10% savings in erection tonnage
- 3% less misfits
- Reduce lifts/day during construction
Advancing Asset Management Systems with Augmented Reality

Purpose
• Improve operations planning, resourcing, efficiency and effectiveness
• Integrate Avatars in augmented reality work environment to demonstrate and evaluate operations
• For nuclear space, use Avatar for assessing and planning “As Low As Reasonably Achievable” (ALARA) Radiation Exposure Levels

Maturity/ Readiness

Development | POC/Demo | Adopt/Deploy

Industry Relevance/Impact
• Already advanced by software suppliers in Operations Training with Avatars

“The benefits in having a 3D virtual environment is now you can do your planning on the computer rather than going down to the actual site.” EPRI
Scanning the Horizon

Scanning the Horizon: Identifying and tracking global technologies & processes

Horizon-360 Team

Academic Members:

- Dr. Fernanda Leite, Univ. of Texas (Co-Chair)
- Dr. Steven Ayer, Arizona St. Univ.
- Dr. Mani Golparvar-Fard, Univ. of Illinois Champaign
- Dr. Ming Lu, Univ. of Alberta
- Matthew Sanfilippo, Carnegie Mellon Univ.
The H-360 Team

Charter is to develop a mechanism to carry out Strategy One in Fiatech’s Three Year Strategic Plan

• **Strategy 1 – Seek and identify technology-based solutions and innovative practices that are implementable and cost-effective for both incremental and breakthrough industry advancement. This will lead to Fiatech’s constant renewal.**

• Team composed of twelve members, 6 from industry and 6 from academia
## Scan Matrix to Technology Maturity Graph

### IDEA SUBMITTER

<table>
<thead>
<tr>
<th>UID</th>
<th>Technology</th>
<th>Source</th>
<th>Other Industry</th>
<th>Incremental or Game Changing</th>
<th>Watch</th>
<th>Learn</th>
<th>Pilot</th>
<th>Idea (Full scale deployment in industry)</th>
<th>Business Value Prop. Defined</th>
<th>Industry value recognition (0=0 None)</th>
<th>Pilot in industry</th>
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<tbody>
<tr>
<td>1</td>
<td>Autonomous Vehicle</td>
<td>Magic Leap</td>
<td>Manufacturing</td>
<td>Game Changing</td>
<td>X(Y)</td>
<td></td>
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<tr>
<td>2</td>
<td>3D Printing</td>
<td>Stratasys</td>
<td>Advanced Manufacturing</td>
<td>Incremental</td>
<td>X(Y)</td>
<td></td>
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<tr>
<td>3</td>
<td>Active Bridge Monitoring</td>
<td>Magic Leap</td>
<td>Construction</td>
<td>Innovative</td>
<td>X(Y)</td>
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<tr>
<td>4</td>
<td>NCI RDG</td>
<td>Various</td>
<td>Capital Projects</td>
<td>Game Changing</td>
<td>X(Y)</td>
<td></td>
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</tbody>
</table>

### H360

- **Watch**
- **Learn**
- **Pilot**

### Diagram

- **LEARN**
  - ISO 16946
  - iRing / RingTools
  - 3D Virtual Reality
  - AutoCodes

- **USE**
  - Not Relevant
  - Autonomous Vehicles
  - Active Bridge Monitoring
  - 2018
  - Exo-skeleton

- **WATCH**
  - New (Emerging)
  - 2010

- **PILOT**
  - Relevant
  - AutoCodes
  - 3D Virtual Reality
  - In Operation

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#fiatech
H- 360 Sample Technologies being tracked

- Exo-skeletons
- 3D Printers – Polymers, Concrete
- Smart Vehicles – Autonomous navigation
- Energy Storage – Fuel cells, batteries
- Artificial Intelligence
- Telematics
Construction Robotics
Camera-Equipped UAVs for As-built Data Collection

**TYPICAL SPECS:**
- **Dimension:** 1m × 1m × 0.4m
- **Aircraft:** Battery Operated
- **Flight Time:** 15-20 minutes
- **Temperature:** -10° to 40° C
- **Wind speed:** <20 mph
- **Navigation:** with/without GPS
- **Setup Time:** 5 min
- **Payload:** 11 kg
Idea Submission - Horizon 360

Technology *
Please describe the novel technology or process you'd like to propose for the Horizon 360 team to review.

Submitter's name *
Your full name

Organization *
The name of the company you work for

Other Industry *
in which industry has this technology been applied before?

Incremental or Game Changing? *
Does this technology make an incremental contribution to industry advancement or does it change an existing work paradigm?

Submit

Never submit passwords through Google Forms.
How to Get Involved

- Fiatech Webinars
- Fiatech Membership
- Annual Conference & Leadership Forum
- Provide input to H-360 Scan Matrix & engage in possible project development
Fiatech’s Members are united by a common goal “…….make a step change improvement in productivity and efficiency in the capital projects industry by advancement of technology and innovative practices.”

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