Emerging Construction Technologies

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Agenda

• The need and UT’s organizations
• Example Projects
• Scaling up
• A new approach
We are uniquely capable of putting research into practice.
Collectively creating our digital future....

- nD models
  - Design, Construction, Operations
- Automation
- Digital fabrication and construction
- Surveying and mapping
- Utility identification
- Mobile technology
What’s Hot: Productivity

Fact: Historical step-change productivity gains are possible (e.g., manufacturing and ship-building)

What’s Hot: Alignment / Interface Management

- 2012 CII Benchmarking Study Found:
  - 97 Projects - $250M each, 225 weeks, 100% FEP complete at procurement start
  - 53 Projects - $250M each, 190 weeks, procurement started during FEP
The consequences of poor quality information

Clients
- Increased capital & operational cost
- Programme delays
- Loss of revenue
- Reduced profit

Suppliers
- Increased risk
- Damage to reputation
- Loss of Profit / Bankruptcy

Individuals
- Frustration searching for information (time)
- Inefficiency (over processing)
- Abortive work (over production)
- Reduced earning potential
- Put people in harms way!

The UK Gov. estimated 20% waste in all Construction Projects.
(Australia 25%, US 35%)
75% of designers claim they have to wait for information 50% of the time……
BIM the drivers – the (client) Benefits

- 90% saw improved quality and site productivity
- 78% saw improved milestone achievement
- 66% saw improved accuracy of cost estimates
- 65% were able to compress schedules
- 45% saw a cost reduction of 5-10%
- Active clients do better than passive

*UK & USA Client Survey, Dodge Data Analytic 2013-14*
Specific Projects: CEPM

CIM Guide for DOTs
Living BIM
ClM: Large Scale Modeling – Dallas Horseshoe
CIM – NCHRP Guide for DOTs (TRB 831)

Workflow

Guidebook

Maturity Model
Living BIM

Sophisticated information systems like BIM are currently too inconvenient to upkeep and so

Facility operators are stuck spending $4.8 billion dollars annually searching for, validating, and recreating facility information
LivingBIM
Scaling Up: Fiatech

Case Study: $334 million potential savings out of $1.3 billion capital spend
Productivity Advancement Targets (PATs)

**Industry Owners & Operators**
- PATs Related to Enhancing Change Readiness, Change Order Reduction & Interactive Project Planning

**Project Management**
- PATs Related to Enhancing Integrated Project Management & Regulatory Review

**Design**
- PAT Related to Enhancing Construction Performance

**Materials Management**
- PAT Related to Realizing Integrated Materials Management

**Construction**
- PATs Related to Advancing Field Data Collection & Advanced Work Packaging

**Lifecycle Information Management**
- PAT Related to Enabling Productivity Improvement

**Handover to Operations**
- PAT Related to Accelerating Commissioning and Rollover

**Emerging Systems & Technologies**
- PAT Related to Accelerating Identification & Adoption
What do PATs mean to an Owner?

Achieve 70% reduction in Owner initiated Change Orders
Industry Owners and Operators

Decrease construction costs by 15%
Information Mapping & Integrated Materials Management

Reduce regulatory review time by at least 80% - “from months to minutes”
Codes, Regulations, & Approvals, Boosting BIM Performance

Deliver 33% reduction in construction schedule & cost
Construction & Advanced Work Packaging

Improve construction productivity and reduce schedule delays by 20%
Integrated Materials Management

Reduce transitions costs and schedule by 50%
Handover & Asset Management

Improve construction productivity by 10%
Automated Design

Enable 40% improvement in efficiency of field data collection
Mobile Information Technology

Increase productivity improvement success by 35%
Interoperability & Lifecycle Information Management

Realize 25% improvement in project cost & schedule predictability
Integrated Project Mgmt and Interactive Project Planning

Accelerate identification of technology new to construction by 40%
Emerging Systems & Technologies

Improve sustained innovation adoption by 55%
Change Readiness

Show us the money!
Rethinking Projects: CII

A new operating system for projects
Operating System 2.0

- Operating System 2.0 (OS2)
  - Hypothesis: plan the work, work the plan doesn’t work
  - Open system for continually planning / executing work
  - New delivery and commercial model
- OS2 comprised of 7 elements (research projects)
- Open Alliance model (industry groups, companies)

Industry 4.0
(manufacturing)
(Digital Design AND Digital Fabrication)
7 Elements

1. Corporate Governance
2. Commercial Model
3. Design
4. Production Systems
5. Technology and Systems
6. Human Resources
7. R&D Joint Venture
Element 3: Design

- Modular, preassemblies (standardization and customization, refute 6/10ths factor)
- Design reuse and improvement / innovation
- New process chemistry, new materials
- Supplier-led design (developers / 787)
Element 5: Technology and Systems

- Digital mapping, GPS, BIM, collaboration / connectivity, RFID,
- Integrated transaction platform (suppliers, etc.)
- Standards and data collection (lifecycle monitoring, energy use, inventory tracking, etc.)
- Multifunctional equipment / disposable (recyclable)
- Automation and robotics / human assist and mobility, safety
Wrap Up and Q&A
Thank you!

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