Establishing Practice Guidelines for Using Building Information Modeling (BIM) Information in Construction

Joseph Betit, Bechtel Construction
Construction Digital Project Delivery

Vision

- Leverage Technology to Improve
  - Project internal and cross-functional communication
  - Safety and environmental processes
  - Lean work processes
  - Model driven scheduling
  - Material logistics and quantities tracking and reporting

- Key Elements of Success for Deployment
  - Communication
  - Data Integrity
  - Integration
  - Scalable
The Modes of Digital Project Delivery in Bechtel – a Global Company

- BIM
- Virtual Design Construction
- Virtual Work Front
- Virtual Project Delivery

Digital Project Delivery in Bechtel Must Be Designed to Support Projects and Local Staff on Every Continent
Construction Benefits of Deployment

Areas of Interest

- Model Requirements
- Visualization and Augmented Reality
- Construction Sequence (4D) and Work Packaging
- Construction Installation Planning
- As-built Information Integration with Model
- Data Access and Integrity
- Competency and Capability
Changing the Processes – Discussion and Communication Across Functional Groups is a Key Activity for Success

- Vision
- Value
- Roles and Responsibilities
- Software Programs

Path Forward
- How do we get there?
- What are the first steps?
- How do we evaluate maturing vendor programs?
- What is the timeline and future near term milestones for BIM implementation by construction?
BIM as vehicle for improved communication of Construction requirements
Relative Value of BIM to Participants

- Is Bechtel receiving appropriate compensation for BIM creation?
Productivity Baseline – Where Is It?

Global Staff Demographics

Our Project and Company Workforce Dilemma

Arc of Compensating Actions
Formalized:
- Procedures
- Processes
- Hierarchical Structures

Scale & Complexity of Projects
Density of Talent

TECHNOLOGY
Demographics of Global Construction Companies With Staff on All Continents – Years With the Company – Will BIM Help Bridge the Experience Gap?
Construction BIM Goals – Merger of Design Models With Laser Scan and Laser Tracker Field Data

- Smart Plant Review (SPR)
- Tekla design detail models merged
- Static laser scanner and laser tracker point cloud field data information
  - LNG Modules
  - LNG Tanks
  - Turbine Deck Dimensional Control
This is What the Real Work Front Looks Like
Tools for Virtual Work Front Delivery at the Work Face – Move From Desk To Field
Tunnel Cut and Cover Laser Scan
Data Fusion – Laser Scan and Models
3D Tunnel Model - Tunnel Invert Boxes - Support Structures
What Form Will the Virtual Work Front Tools Take That Will Aide The Constructors at the Work Face?
How Will Technology Change Quality and Productivity? ROI?
Hand Held Portable Scanners for Field Engineer Materials Tracking and Quality Assurance – ZEB1

- Tekla model + hand held 3D Laser Mapping ZEB1 laser scanner
  - Training of scanning process is quick
Low Cost Hand Held 3D Imaging Devices Will Drive Software Data Interoperability – Dotproduct image synthesis
BIM Long Term Construction Focus Areas

- Evaluation areas:
  - Via model point and click ability with direct access to information; vendor data, fabrication documents, inspection and test data, etc.
  - In the model identify Construction work sequences and work packages (electronic Work Package development)
  - Use model for temporary construction;
    » Temporary utilities and facilities
    » Test and Hazard boundaries
    » Construction equipment including rigging activities
    » Scaffold planning
  - Construction completion status identified and tracked in the model
Path Forward - Partners

- BIM and CAD Software Partners
  - Smart Plant 3D (Intergraph - Hexagon)
  - MicroStation (Bentley)
  - Revit, BIM 360, Glue (Autodesk)
  - Tekla, Sketchup (Trimble)
  - Synchro 4D

- Survey, Machine Control and Laser Scanning Partners
  - Trimble (survey)
  - Leica - Hexagon (survey and laser scanning)
  - MDL (mobile laser scanning)
  - 3D Laser Mapping (mobile laser scanning and ZEB 1 hand held scanner)
  - DotProduct (hand held 3D Imaging)
Path Forward – COTS Interoperability
Direct Hire and Project/Contract Mgmt

SUPPLIERS
(populate BIM)

SATCONTRACTORS
(populate BIM)

iRING
(ISO 15926)

PARTNERS
(software suites)

INFOWORKS

TEAMWORKS
BPS