IMPLEMENTING BIM THROUGHOUT THE PROJECT LIFECYCLE - 3D DESIGN
4D/5D CONSTRUCTION
6D FACILITY MAINTENANCE

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BEXEL Consulting

- Founded in 2005
- Around 100 engineers of various trades
- 3 million m² / 5 billion €
- Autodesk / Microsoft partners
- National Medical, Legal, Scientific & Corporate centres, Residential & Commercial blocks, Sport venues, Infrastructure, Factories
- Europe, Middle East, North & Central America, Russia, North Africa
OVERVIEW

- Introduction
- BIM Case Studies
- Lessons Learned
BIM INTRODUCTION

- Challenges
- Standards and Framework
**CHALLENGES - INEFFICIENCY**

- **72% of projects are completed over budget**
- **75% of all late projects are at least 50% over initial price**
- **70% of projects are completed behind schedule**
- **600 billion USD in yearly losses due to non-optimized construction projects**

Source: The Economist

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**Graph:**

- **Construction Productivity Index (1964 = 100%)**
- **Non-Farm Productivity Index (1964 = 100%)**

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**BEXEL CONSULTING**

**BIM 2015 - 3rd Annual Conference**
Current Industry Practice

Communication between teams:
- Mail
- Shipping services
- Fax
- Email
- File transfer protocol (FTP)
- Internal servers configured for access through a firewall

Owner Team
Tools focused on the owner team:
- Capital planning software
- Financial software
- Operations software

End Result
- Potential delays
- Unexpected costs
- Non-environmentally friendly (paper & shipping)

Design Team
Tools focused on the design team:
- Project Information Management (PIM) software
- Design software
- Office management software

Construction Team
Tools focused on the construction team:
- Project management software
- Bid management software
- Estimating software

Source: BuildPedia
STANDARDS AND FRAMEWORK

- BUILDING SMART
- INDUSTRY FOUNDATION CLASSES - IFC 4 => IFC 5
- IDM, IFD
- LOD - American Institute of Architects
- CoBie
- Uniformat, Master Format, Omni Class
- BIM Project Execution Plan

- VARIOUS BIM APPLICATIONS
  - BIM AUTHORING TOOLS (Autodesk Revit, ArchiCAD, Bentley...)
  - BIM ANALYSIS (Navisworks, Synchro, BEXEL Solution, ...)

Source: BuildingSMART
BIM MATURITY LEVEL

Source: Bew E. Richards
TECHNOLOGY VISION

- Enter each information only once - snowball effect and natural project flow

- Manage changes seamlessly
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BIM CASE STUDIES

- Implementing BIM poses a lot of challenges
- Best practice - start with the end in mind - BIM Project Execution Plan
- Best results - implementing BIM during the entire project lifecycle - 3D/4D/5D/6D
- BIM is a universal language - Middle East, North America, Russia, Slovenia, Serbia
- Framework - BIM LOD, IFC 4, Uniformat, MasterFormat, OmniClass, COBie, BSI 1192, Scan To BIM
**BIM CASE STUDIES**

- **MATREX COMPLEX, Skolkovo, Business, 100 mil $, 26 500 m²**
- **Tunnel Log, 12.5 mil € Slovenia**
- **Hypercube, Skolkovo Moscow, Russia**
- **Jahra Court Complex, 200,000 m² Kuwait**
- **West 65, 150,000 m² Belgrade, Serbia**
- **Jahra Hospital, 720,000 m² Kuwait**
3D BIM - MATREX, SKOLKOVO

• Fast Track
• Clash Detection
• Design Control
• Cost
3D BIM - HYPERCUBE, SKOLKOVO MOSCOW

- Design Review
- Clash Detection
- Quantity Takeoff
- Project Management
- 4D/5D Construction Simulation
- 6D FM Solution
3D BIM - WEST 65, 150,000 m² Mixed use, Belgrade

- Project Management
- Design Review
- Subcontractor coordination
- Clash Detection
- Site supervision
- Financial Analysis
4D / 5D BIM - BEXEL SOLUTION

- 3D BEXEL DESIGN ENGINE
- 4D + 5D BEXEL PROJECT MANAGEMENT ENGINE
- BEXEL REPORTING ENGINE
- DMS & MOBILE

- Design Review
- Spatial Conflicts
- QTO & Budget
- Tendering
- 4D/5D Construction Simulation, Cash Flow
- Planned vs. Actual
- Resource Usage & Productivity

- Design review - screenshot
- 5D Construction Simulation
4D / 5D BIM - BEXEL SOLUTION

- Schedule grouping by any criteria
  - Bid / Tender
  - Building
  - Storey
  - Zones / Location based
  - Assembly
  - Worktype
  - Selection sets
  - Any property
4D / 5D BIM - JAHRA COURT, 200,000 m², KUWAIT

- Design Review
- Clash Detection
- Project Management
- 4D/5D Construction Simulation
4D / 5D BIM - NEW JAHRA HOSPITAL, 720,000 m², KUWAIT

- 1,200,000 elements
- 16,000 tasks
- Design Review
- Clash Detection
- Project Management
- 4D/5D Construction Simulation
4D / 5D BIM - TUNNEL, SLOVENIA

- Design Authoring Tool for Infrastructure
- 4D/5D Construction Simulation
**6D BIM - BEXEL SOLUTION**

- **3D BEXEL DESIGN ENGINE**
  - IFC
  - 3D MODEL
- **4D + 5D BEXEL PROJECT MANAGEMENT ENGINE**
  - Construction Database
  - Construction Methodology
  - 4D/5D Construction Simulation, Cash Flow
  - Planned vs. Actual
  - Resource Usage & Productivity
- **6D BEXEL FACILITY MAINTENANCE ENGINE**
  - Design Review
  - Spatial Conflicts
  - QTO & Budget
  - Tendering
  - Visual Document Management
  - Maintenance Plans
  - Reports
  - BEXEL REPORTING ENGINE
  - DMS & MOBILE

- **Design review - screenshot**
- **5D Construction Simulation**
- **Report diagram**
6D BIM - HYPERCUBE, SKOLKOVO MOSCOW

- Design Review
- Clash Detection
- Quantity Takeoff
- Project Management
- 4D/5D Construction Simulation
- 6D FM Solution
OVERVIEW

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LESSONS LEARNED

- People
- Technology
- Processes
- Benefits vs. Efforts
LESSONS LEARNED - People

- Reluctance towards new technologies
- Focus on Quality
- Education / On-site Training
LESSONS LEARNED - Technology

- Ease of use
- Scaling up
- Integration/Standards - IFC
LESSONS LEARNED - Processes

- Paradigm shift - integrating BIM into the entire workflow

- BIM Requirements

- Quantum Leap
LESSONS LEARNED - Benefits vs Efforts

- Clash detection
- QTO vs Bill of quantities for tenders
- 4D/5D simulation - changes/updates
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Thank you for your attention!
Questions?
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