



BIMTEC – BIM for Technology, Engineering and Construction



Engineering Management Office for the Whole Lifecycle of Construction

Engineering Management is a specialized form of management that is concerned with the application of engineering principles to business practice. An Engineering Management Office is a niche requirement of State of the Art Clients that understand what true construction and information management requires. It is the ability to cartel in house engineering, value engineering, information management, site construction management and process management in a unified environment to yield the most efficient and cost effective outcomes that benefits the construction operations' lifecycle. Our company was based on this platform and has excelled to be come one of the most sought after EMO companies in the region.

Key Statistics



Savings

An Estimated 1.1 Billion Qatari Riyals in Savings over the BIM Management of 49 Billion Qatari Riyals worth of Projects



11 Languages, 80 Engineers and growing

All Modelling and Engineering happens with Engineers only, no drafters but all experienced and handpicked personnel that made BIMTEC what it is today



Company Locations

Qatar

- Jaber Engineering
Lusail City – Fox Hill
- Al-Jaber Tower
Al-Mathaf Street

Jordan

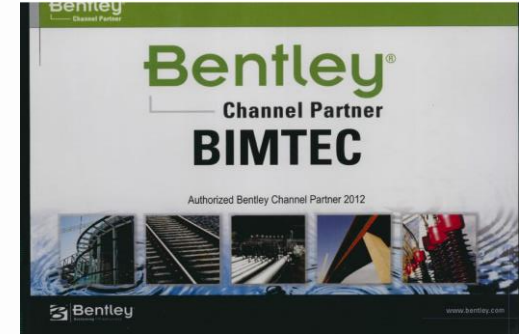
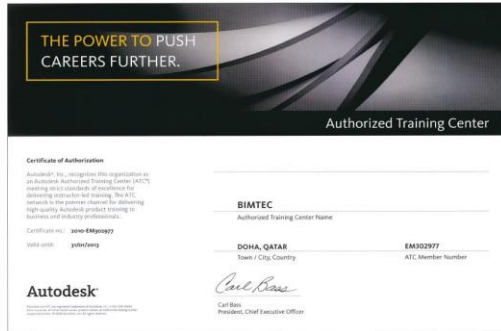
- Zahran Gates
Office 304
- Zahran Gates
Office 205/204

Satellite Office in South Korea

- Yeoksam-Dong,
Gangnam



Certifications and Awards



CONSTRUCTION WEEK

Hosted
Twice !

Go BIM or Go Home
Beyond BIM, Beyond Debate (Laser Scanning Edition)

Awarded Best BIM Services Provider by Stanford University Representative

Key Note Speaker at:

- GeoBIM
- Jordan University
- iTwo World 2014
- And more !



Services Overview



Virtual Design construction / Value Engineering

With a VDC portfolio of more than 3 Million SQM of projects completed or on-going, BIMTEC can handle all types of projects with uniform and non-uniform shapes and apply engineering and value engineering services while utilizing state-of-the-art technology.



Vertical Planning Verification

The ability to foresee and analyse all planning errors, furnish solution to optimize project execution whilst enabling better communication between all project stakeholders. Millions can be saved with accurate vertical planning. Our staff has vast knowledge in project planning



Project and Cost Management

Enabling, setting up, advising or implementing end-to-end project management is our core strength. The ability to invert projects from traditional project management into a virtualized one is where most clients seek our expertise.



Facilities management Integration

Building performance and information capturing is the opportunity of the owner to foresee potential savings while running the building erected from an OPEX perspective, eliminating unforeseen costs associated to Facilities Management. Capturing the correct information from design or during construction through a verified single point of truth database that can be simply handed over to operators with maximized ROI strategy. BIMTEC's COBIE certified applications and workflows is the answer to capture usable data without concerns about the operator appointment and their requirements.



Services Overview

Health and Safety



When a model is generated, the opportunities to utilize those models are in essence limitless. Our engineers have utilized those models to generate an educational 3D game simulating real conditions, resulting as a tool for HSE managers to optimize their plans, train labour in a more cost effective manner and enabling clients to approve plans without the need to read through manuals. HSE BIM is what makes BIMTEC yet another consulting expert ahead of the competition.

BIM Consultancy



With the majority of the contractors looking to become BIM capable, we have successfully implemented and assisted the needs of many organizations. Our clients enjoy the seamless delivery of various services including and not limited to BIM Model Audits, BIM Health Benchmarking, Detailed Modelling, BIM Standards and Workflow Management, Implementation and Process Mapping, Sustainability Engineering, IFCs and Shop Drawings, Virtual Reality and more.

Training



Whether it is software training from vendor specific or general BIM workflow training, we have it all. BIMTEC is an Authorized Training provider to large Vendors such as Autodesk, Bentley, Tekla, RIB, Synchro and more.

Site to BIM / BIM to Site



The ability to capture millions of scan points in matter of seconds is what makes Site to BIM so fascinating, at the accuracy of 2 mm the as-built can never be more precise. This is the next era of construction advancement brought to our clients today with our state-of-the-art laser scanners, delivering highest

Al Ain Hospital

Arabtec Sanjose JV
Al-Ain, UAE

GFA: 340,000 SQM
Usage:

- Hospital

Deliverables

Value Engineering
VDC Services

Services

VDC

4D

5D

6D

Scan to BIM

Training



700 Bed State of the art Hospital with a gross area of
340,000 SQM

Dubai Tower – Doha, Qatar

JEC-HLG JV
Doha, Qatar

Dubai Tower
GFA: 292,000 SQM

Usage:

- Hotel
- Residential
- Retail
- Offices

Deliverables

Laser Scanning
BIM Services

Services

VDC

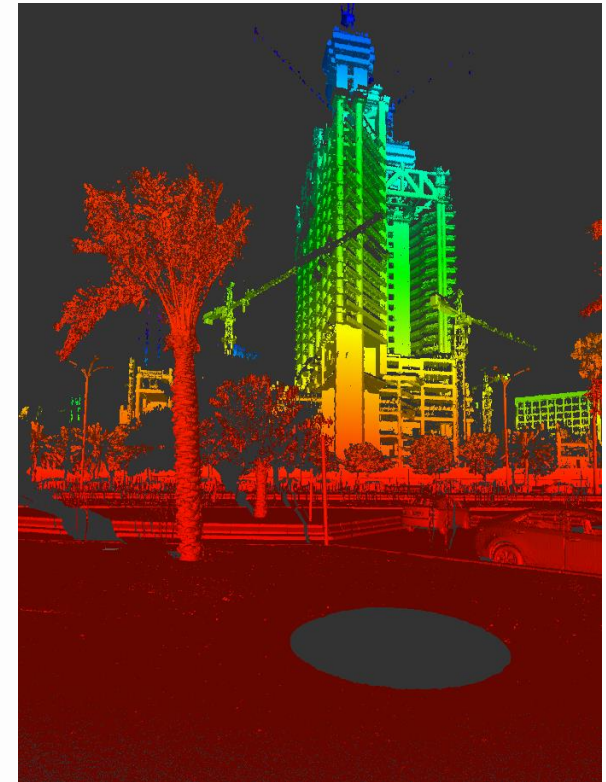
4D

5D

6D

Scan to BIM

Training



Tallest Tower in Qatar and the 18th Tallest tower in the world featuring the only multipurpose tower on the prime location of Cornish

Qatar Rail – Gold Line Package

ALYSJ Joint Venture
Doha, Qatar

GFA: 250,000 SQM + 32KM
Tunnel

Usage:

- Railway

Deliverables

Laser Scanning
BIM Services

Services

VDC

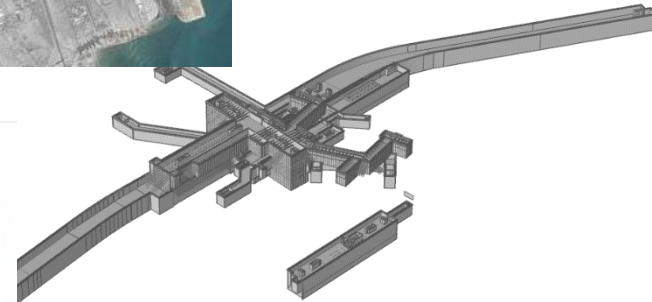
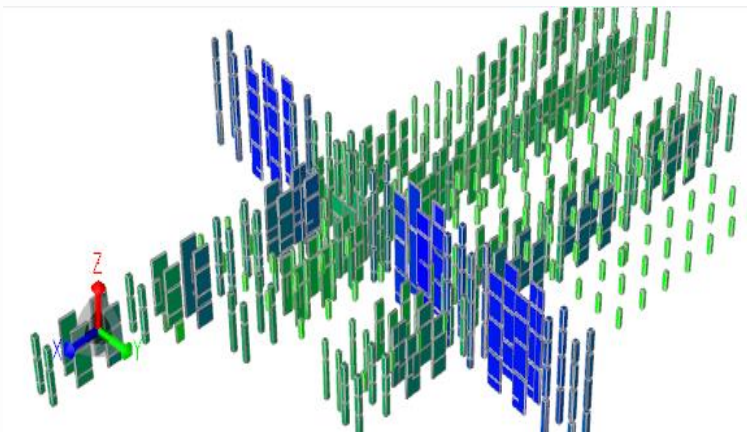
4D

5D

6D

Scan to BIM

Training



Largest Rail
Contract
Package to date
with 13 Stations
and 32 KM TBM
Tunnel

Doha Oasis Mixed Use Development

HREIC
Doha, Qatar

GFA: 500,000 SQM

Usage:

- Hotel
- Residential
- Retail
- Theme Park
- Offices

Deliverables

Laser Scanning
BIM Services

Services

VDC

4D

5D

6D

Scan to BIM

Training



The Largest privately invested multipurpose project in Qatar with the most luxurious attractions in Town that possibly combines the features of a complete city in an exquisite setting

New Kuwait International Airport

Arabtec Construction
Abu Dhabi, UAE

Kuwait Airport
GFA: 140,000 SQM

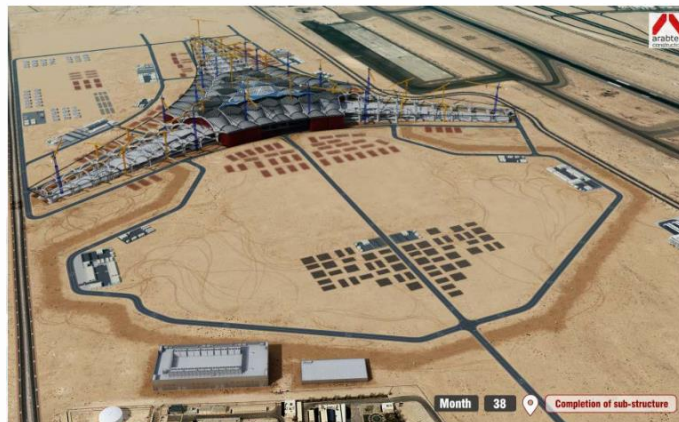
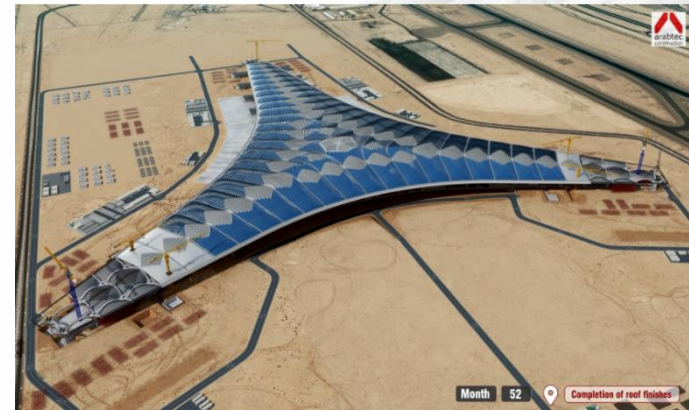
Usage:
- Airport

Deliverable

BIM Services / Tender Works

Services
VDC

4D
5D
6D
Scan to BIM
Training



The latest addition to exquisite airports in the GCC portfolio

Dead Sea Hotels

Century Hotels Amman, Jordan

GFA: 95,000 SQM

Usage:

- Hotels
- Spa
- Rehabilitation Center

Deliverables

BIM Services
Value Engineering
Project Management

Services

VDC

4D

5D

6D

Scan to BIM

Training



A Rehabilitation Center, A 5
Star Hotel and the Largest
SPA in the world

Lusail Mixed Use Development

Jaber Group
Doha, Qatar

GFA: 76,000 SQM

Usage:

- Hotel
- Office
- Retail

Deliverables

BIM Services
Value Engineering

Services

VDC

4D

5D

6D

Scan to BIM
Training



A Multipurpose LEED
Certified building with the
(Guitra) Style Facade

Hamad Medical Corporation – Operation Theater Extension

Khatib & Alami +
MIDMAC
Construction
Doha, Qatar

GFA: 67,000 SQM

Usage:

- Hospital

Deliverables

BIM Services
Value Engineering

Services

VDC

4D

5D

6D

Scan to BIM
Training



Multibillion Contemporary Hospital and
Operation Theaters (5 Packages)

Qatar Rail – Major Stations

Samsung / OHL / QBC
Joint Venture
Doha, Qatar

GFA: 105,000 SQM
Usage:

- Railway

Deliverables

BIM Services

Services

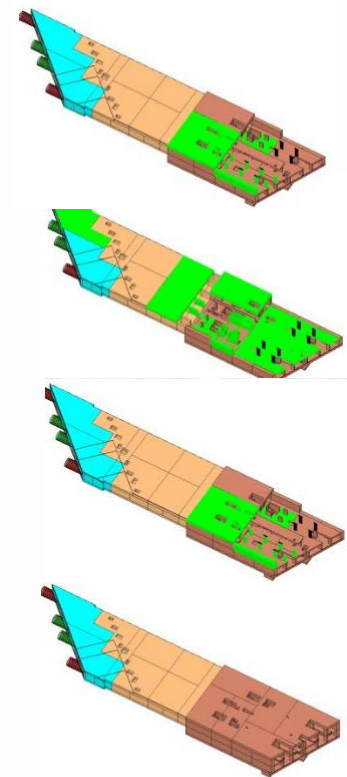
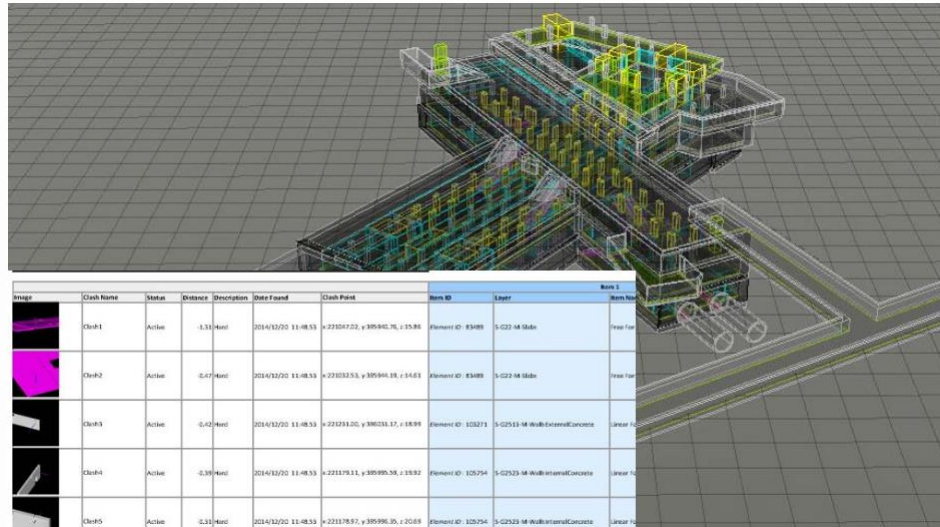
VDC

4D

5D

6D

Scan to BIM
 Training



Largest Stations
 in the Qatar Rail
 Program

Qatar University – College of Engineering

Al Darwish Contracting
Doha, Qatar

GFA: 73,000 SQM

Usage:
- University

Deliverables

BIM Services
Value Engineering

Services

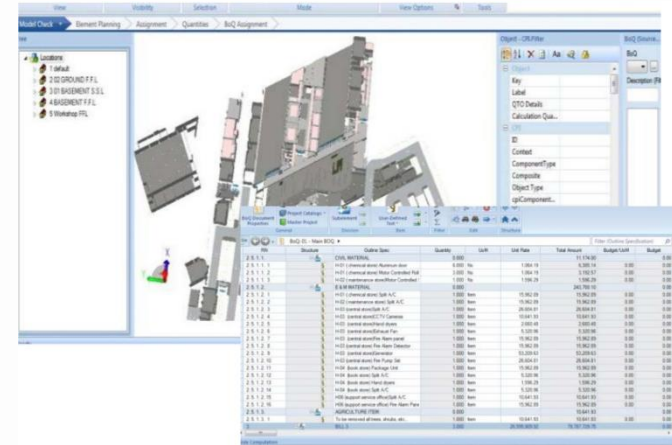
VDC

4D

5D

6D

Scan to BIM
Training



Award Winning
design and state-
of-the art
University

Lusail Yacht Club

Jaber Trading and Contracting
Doha, Qatar

GFA: 4,000 SQM

Usage:

- Social

Deliverables

BIM Services
Value Engineering

Services

VDC

4D

5D

6D

Scan to BIM
Training



A distinct landmark for the newest city of Qatar

Internal Security Forces – CPC07A

QD-SBG
Doha, Qatar

Usage:
- Barracks

Deliverable

BIM Services

Services

VDC

4D

5D

6D

Scan to BIM
Training



Orbital Highway – Package 3

Al Jaber Engineering
Doha, Qatar

Usage:

- Roads

Deliverable

Laser Scanning
Quantity Take-off

Services

VOC

4D

5D

6D

Scan to BIM

Training



55 km of a 12 lanes high-way

New ADNOC Medical Center

Arabtec
Abu Dhabi, UAE

Usage:
- Hospital

Deliverable

BIM Services

Services
VDC

4D

5D

6D

Scan to BIM
Training





INFORMATION MODELLING

INVESTMENT FEASIBILITY & PROJECT FINANCING

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Agenda

- Information Modelling in the context of the Construction Industry
- An overview of Building Information Modelling
- Mega Projects - PPP's, Joint Ventures and Special Purpose Vehicles
- TELOS – Technical, economical, legal, operational and scheduling studies
- Economical Feasibility and Financial Feasibility through BIM
- From project feasibility to project performance
- Advantages and Limitations



Information modelling

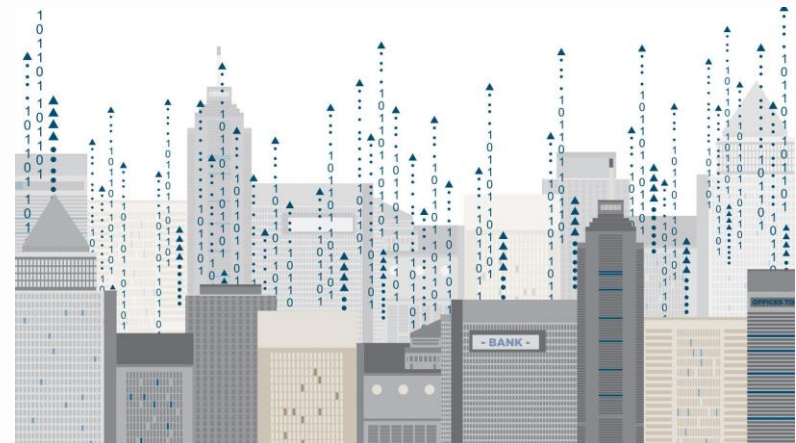
- We live in an information ERA – media, social media, statistics, metrics, numbers...
- The future is all about BIG DATA
- Data lives in Technology: Clouds, Servers, Hard disks, Flash Disks, Tablets, Mobile Phones...

But how can we benefit from all this Data?

- Information Modelling & Information Management & Information Maintenance

BIG DATA

INFORMATION MODELLING



Information modelling in Construction

ADD DRONE VIDEO

Project Life-cycle

- Feasibility
- Conceptual
- Preliminary
- Design
- Construction
- Operations
- Demolishment



Information modelling in Construction

BIM

Building Information Modeling is an integrated process for exploring a project's key physical and functional information

'Explore it digitally – before it's built'

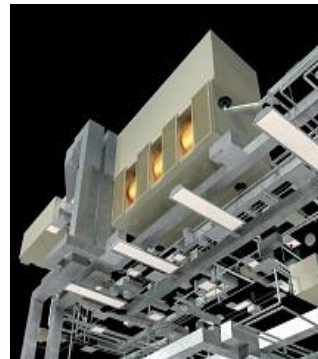
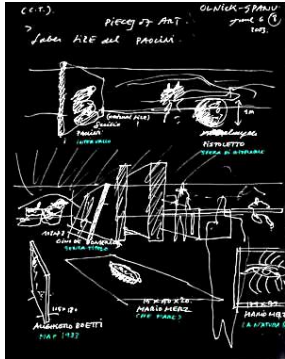
Concept

Design

Implement

Construct

Own/Operate



Architect
Contractor
Civil Eng.

Client
Architect

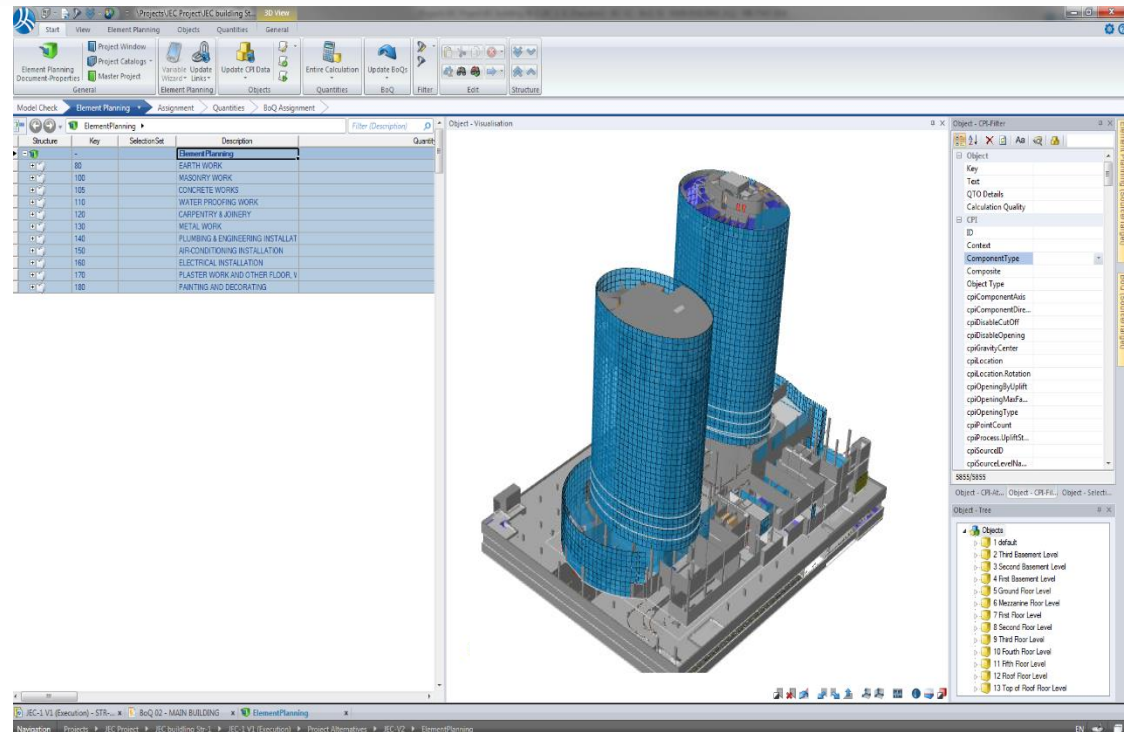
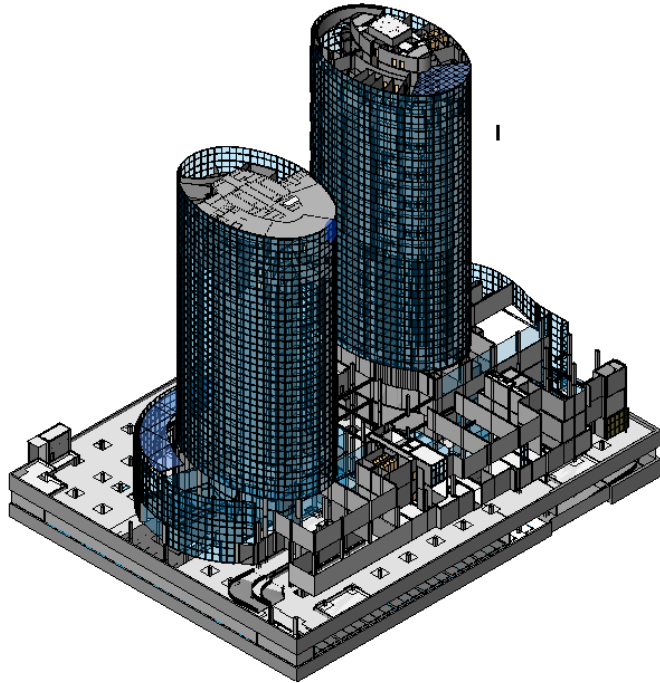
MEP Eng.
Structural Eng.
Fabricator

Contractor

Facilities
Operators



BIM Model

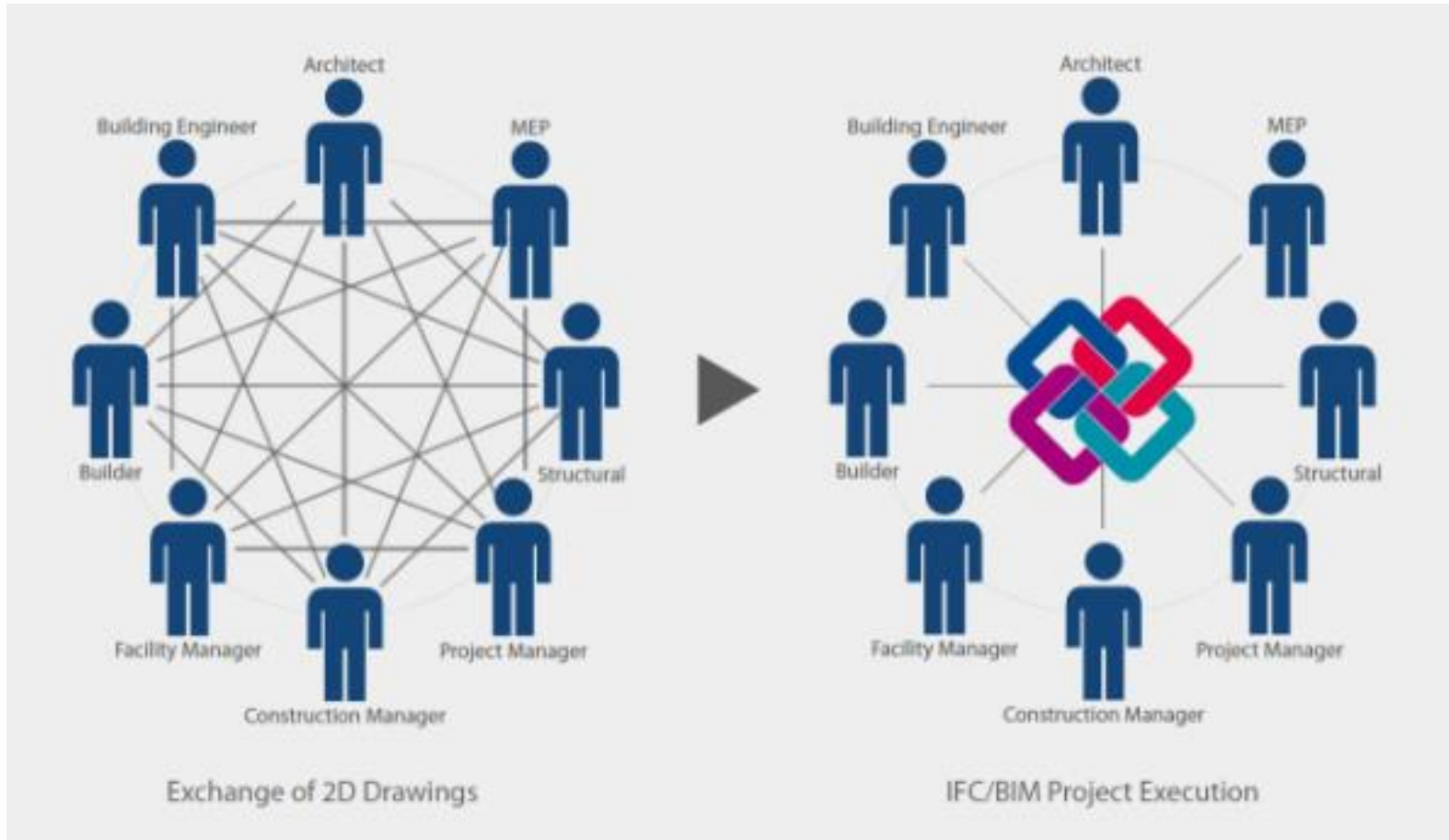


One single source of truth, all project information on the same platform

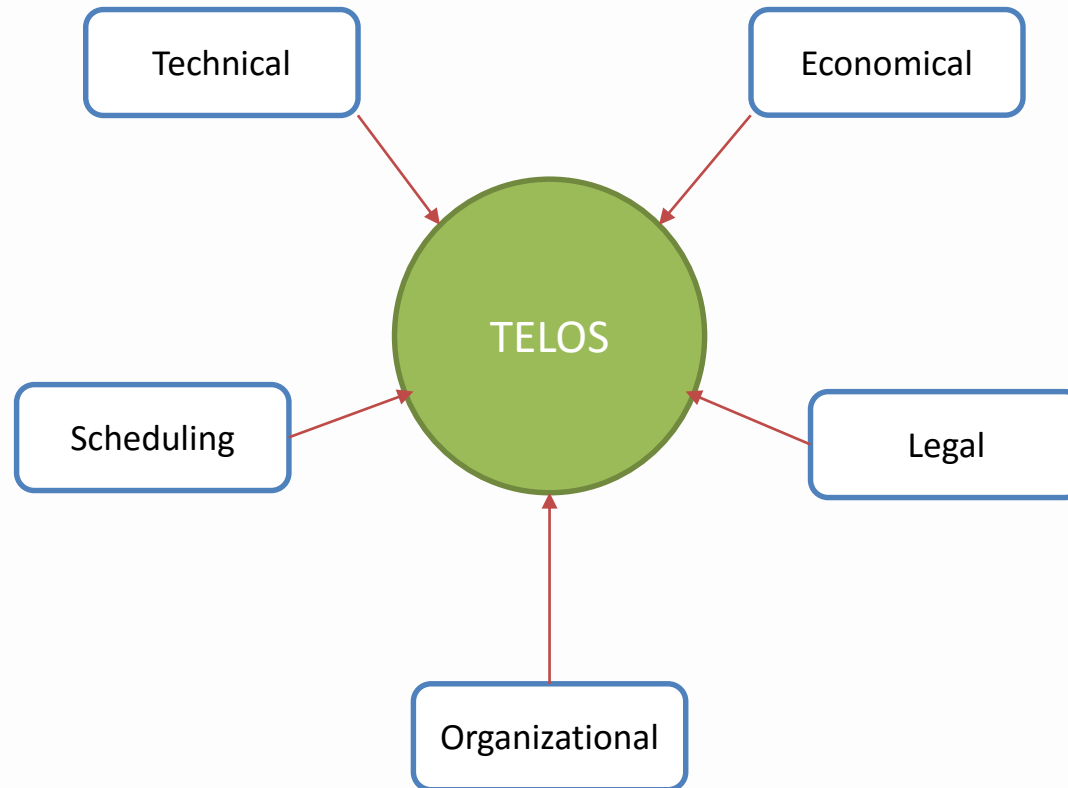
Virtual environment linked to an extensive database for the project's life-cycle information

Traditional Methods Vs. BIM

Graph by Building Smart Alliance



TELOS approach



TELOS approach

- Put the plan into writing
- Method to force the team to think through logistics, planning, costs and implementation timetable
- Discover opportunities to improve the initial plan, lower costs, manage forecasted problems and enhance marketability
- To connect distinct realities and dimensions in one purpose
- To report the feasibility of the project to potential funders



Mega Projects – Financing of PPP's and Joint Ventures

Public-Private Partnerships + Joint Ventures



Large up-front capital intensity during the construction phase,
with relatively smaller operational costs

+

Projects must be able to repay interest and principal to
commercial lenders, and produce **acceptable dividends to
owners**



Mega Projects – Financing of PPP's and Joint Ventures

The onus is on governments to attain broad financial sustainability of infrastructure projects through clearly identifying and developing good projects that they can afford in the long run.

It is this initial assessment that is crucial—the financing will come. Furthermore, the regulatory environment, policy frameworks and investment protections that create confidence in the stability of the schemes will ultimately come from the public sector.

Feasibility studies and financial modelling, must be conducted thoroughly, and the long-term finance implications of a PPP adequately addressed.



Economical feasibility vs Financial feasibility

- Economical feasibility explores the benefit-cost analysis and determines whether the direct social benefits of a proposed project or plan outweigh its social costs over the analysis period.
- The objective of financial analysis is to determine financial feasibility (that is, whether someone is willing to pay for a project and has the capability to raise the necessary funds).

Economical analysis are demanding in terms of information modelling but preliminary financial analysis can be easily obtained from our information model!



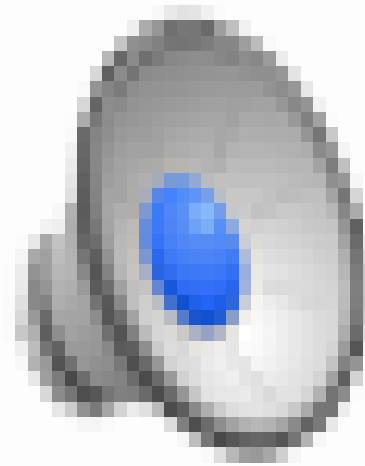
Mega Projects – Why information modelling?

- Information modelling allows through technology to many advanced financial simulations.
- Simulations can be generated from short to long term.
- Since Legal considerations are controlled by the government side, all the other variables can be analyzed in space, time and money dimensions
- The simulation of a 3-Dimensional environment linked to a schedule and time is usually called 5D BIM

‘Everything is possible given the time and the money’

3D+TIME+MONEY=5D

Mega Projects – Financing of PPP's and Joint Ventures



From feasibility to performance of the project

The 5D framework allows us to generate virtually enough information to simulate at the early stages and to carry on during the project and assess and simulate the performance of the project

Report dashboards can simulate indexes as:

- Return of Investment (ROI)
- On-time
- On-budget
- Stakeholder Support
- Stakeholder Engagement



Advantages and Limitations

Advantages

- Improved communication
- Improved coordination
- Virtual environment for data management
- Possibility of reuse of information for progress
- Automatic generations of KPIs

Disadvantages

- Increased effort at early stages
- Specialized knowledge required
- Common data environment required between stakeholders
- Lacks the analysis of external factors



Thank you!





INFORMATION MODELLING

FINANCIAL RISK MANAGEMENT

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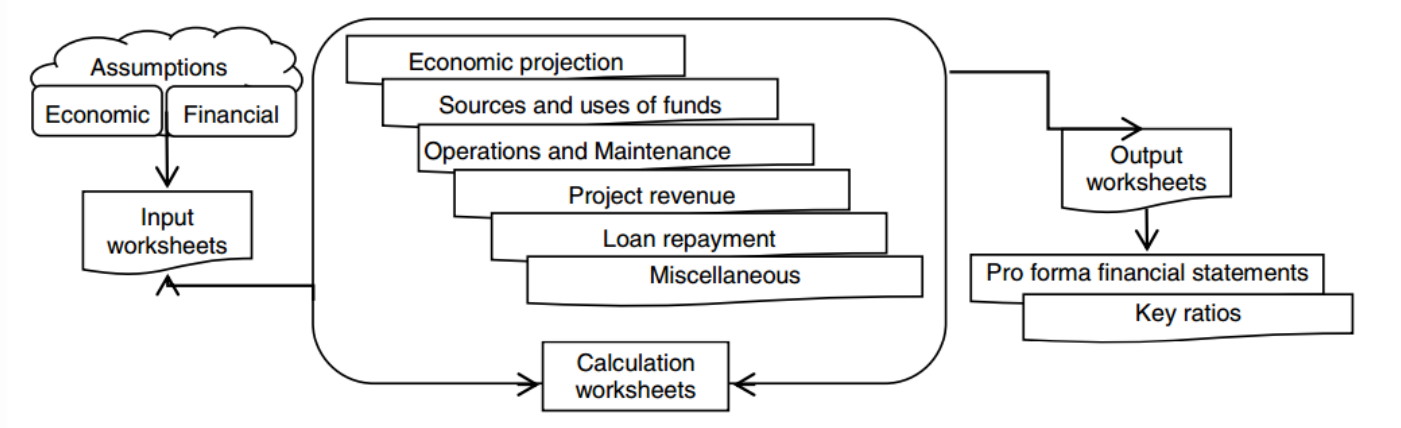
Agenda

- Financial modelling for infrastructure projects
- Causes of failure for infrastructure projects
- Understanding the impact of Information Modelling on data input for financial models
- Classical approach vs Information Modelling approach
- Example of an information model for an Infrastructure Project
- Information modelling through construction and operation stages
 - Environmental risks
 - Safety risks



Financial modelling for Infrastructure Projects

- The financial model is the tool for evaluating a new project and facilitating negotiations among lenders, sponsors and a government authority



Architecture of a Financial Model
Source: Modified from Khan and Parra (2003)

- The complexity of project financing transactions and the diversity of stakeholders' interests are the major reasons that make financial models hard to understand and error prone

Causes of failure on Infrastructure Project with Financial Impact

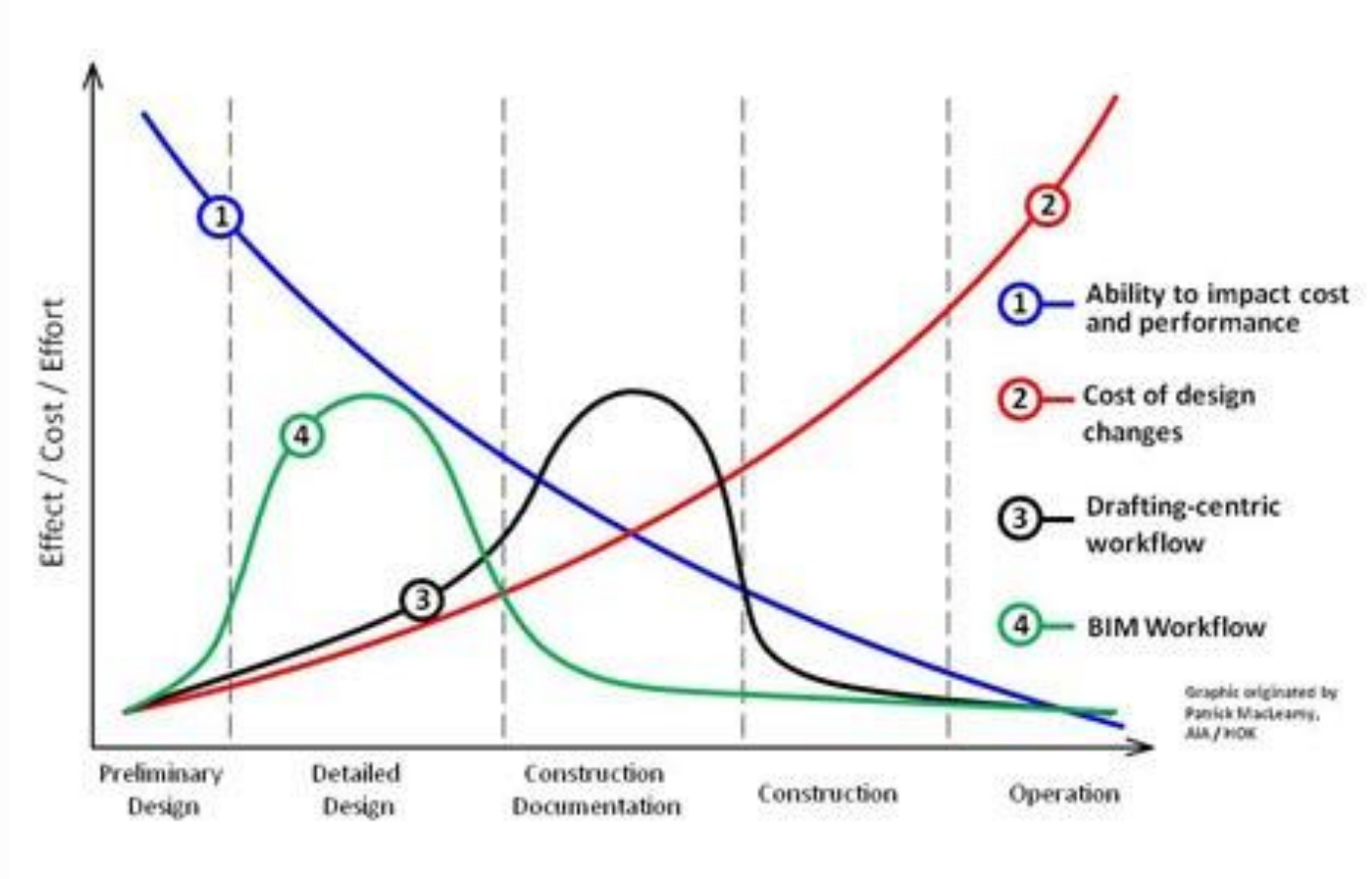
- Overestimating revenue and growth potential due to skewed incentives among project originators
- Sponsors and developers fail to plan delivery and stakeholder and project management in a sufficiently professional way
- Engineering and construction companies pay insufficient attention to mitigating and controlling risk during the design phase
- Financiers lack confidence in the ability of sponsors and other stakeholders to manage risks professionally and are not able to monitor developments and emerging risks themselves



Can BIM help?



Classical input from Engineering and Construction vs Information Modelling Risk Mitigation Through Information Modelling



Classic approach is:

- Decentralized
- Bases on statistics, metrics and 2D representations
- Disconnected between stakeholders and peers
- Existing conditions are usually limited to 2D representations
- Final solution is usually error-prone

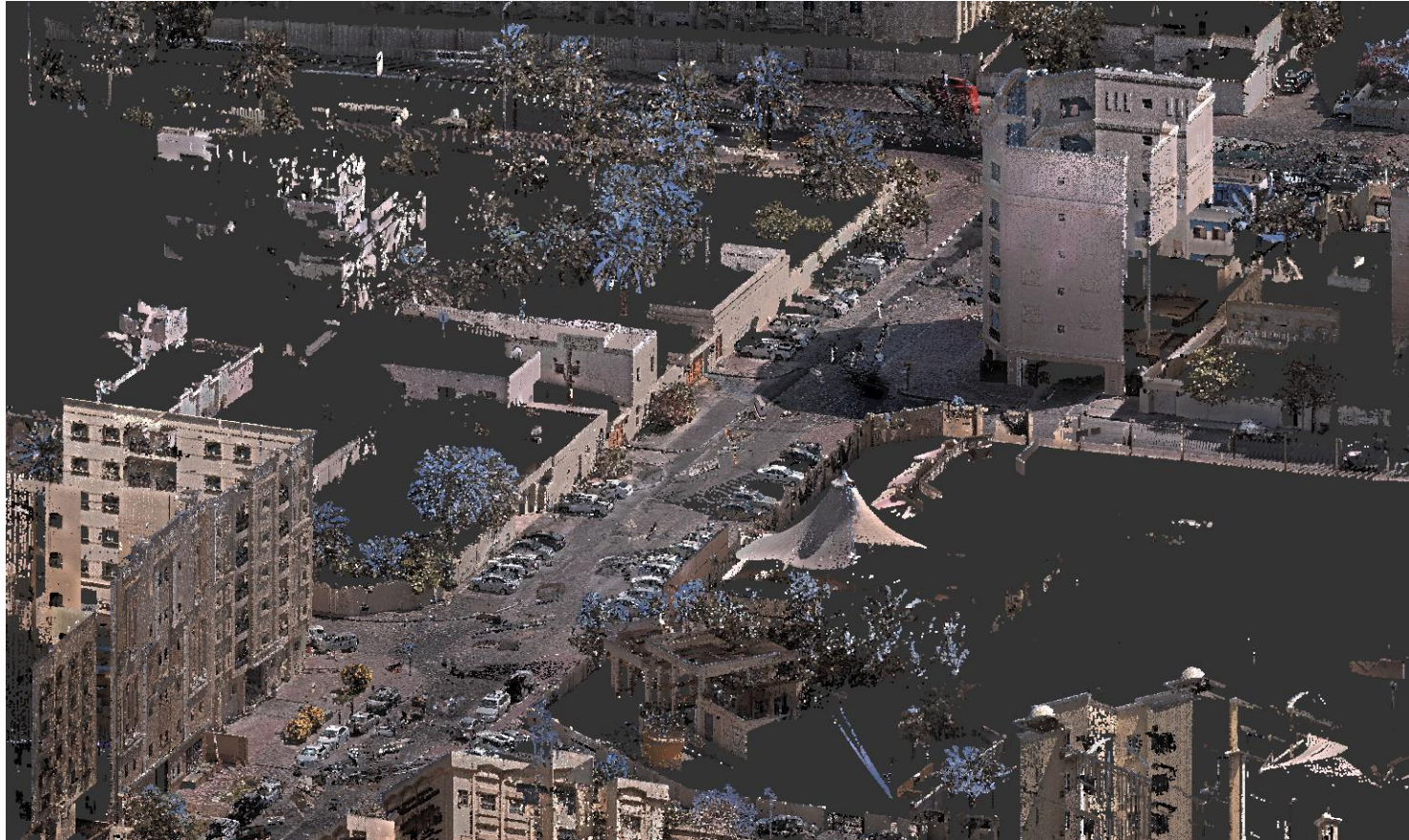
Information models provide:

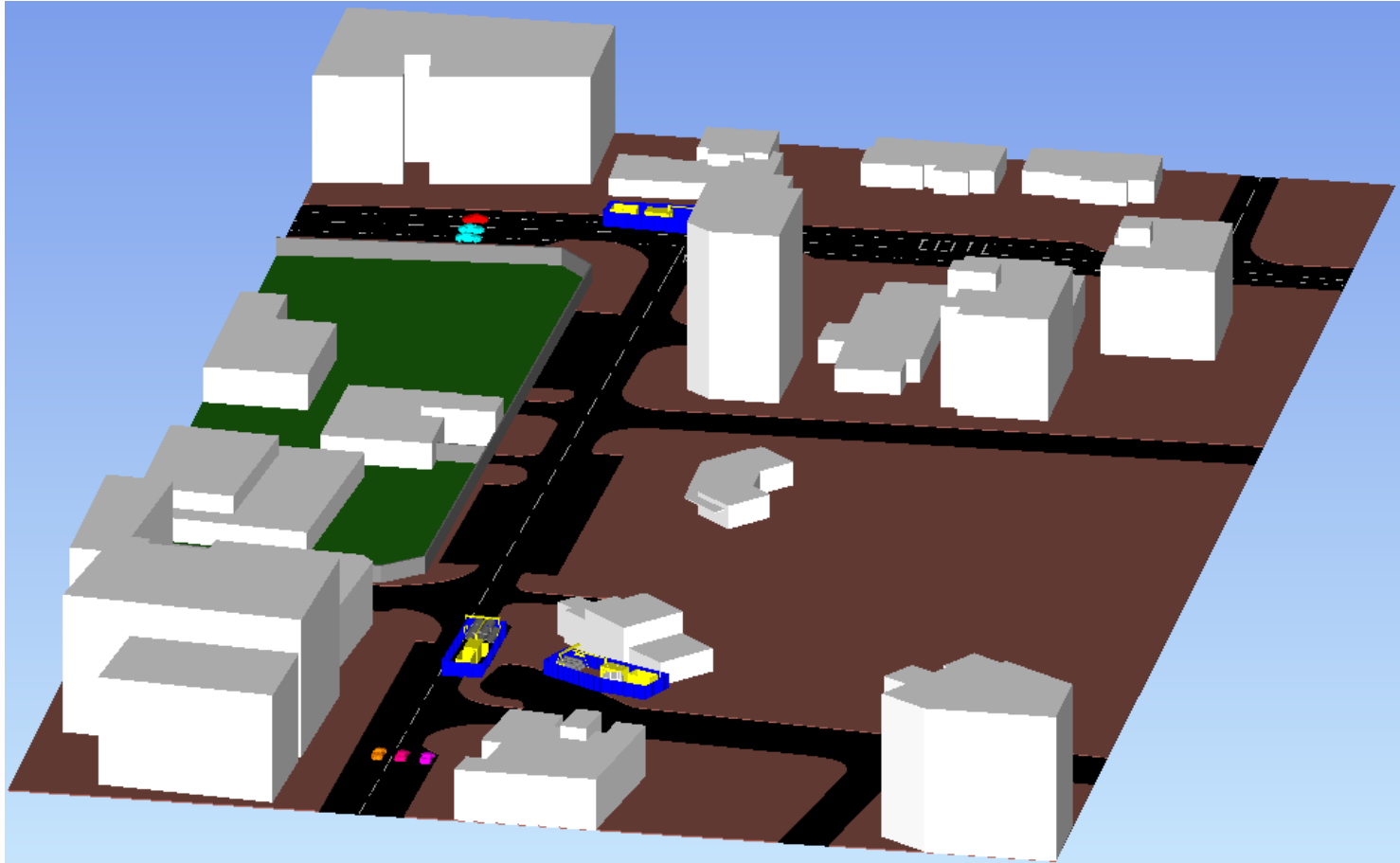
- Central model
- Virtual representations and simulations
- Results from the collaboration of all parties
- Final solution can be verified on a virtual environment
- Existing conditions can be brought in into the system
- Information models can be integrated in financial platforms as SAP

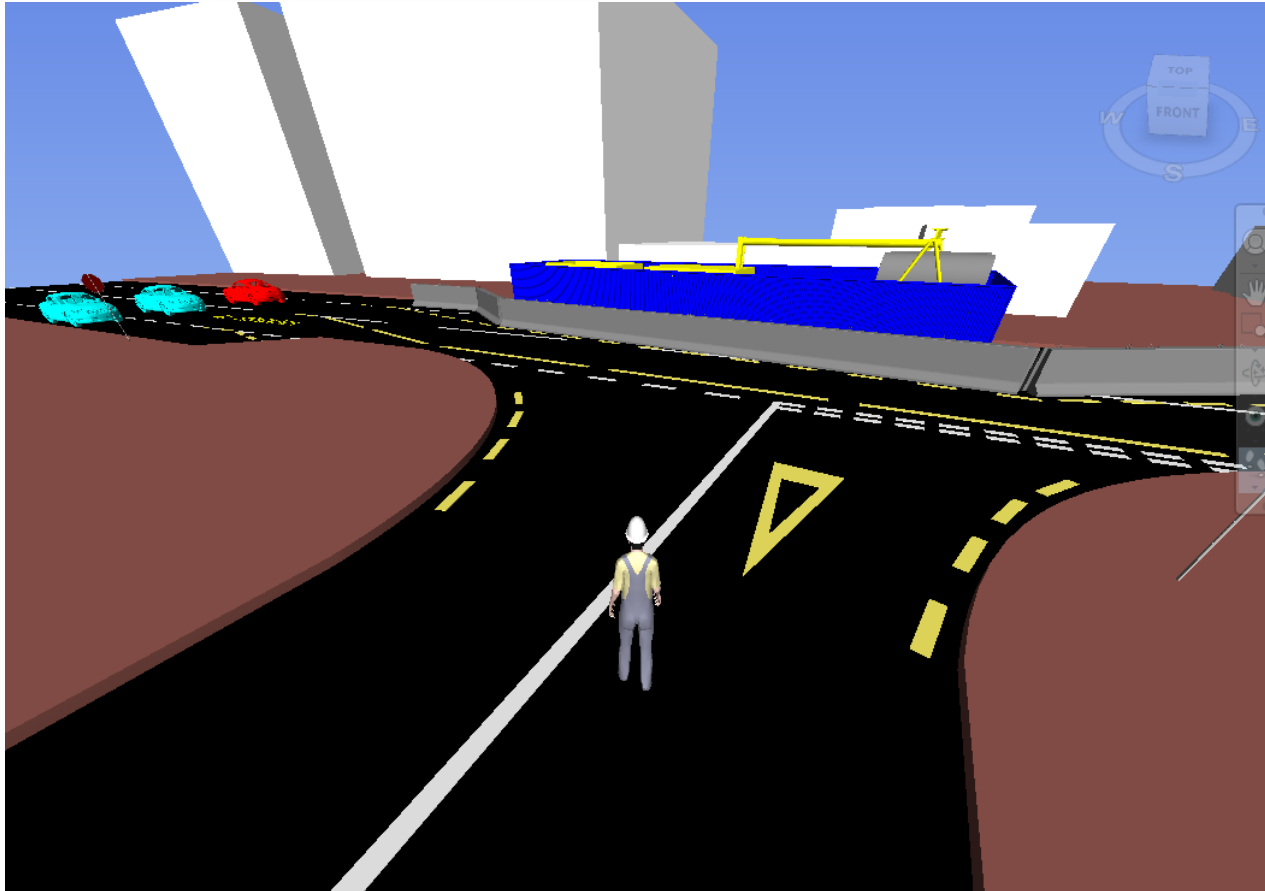
Reality is forecasted in several connected dimensions

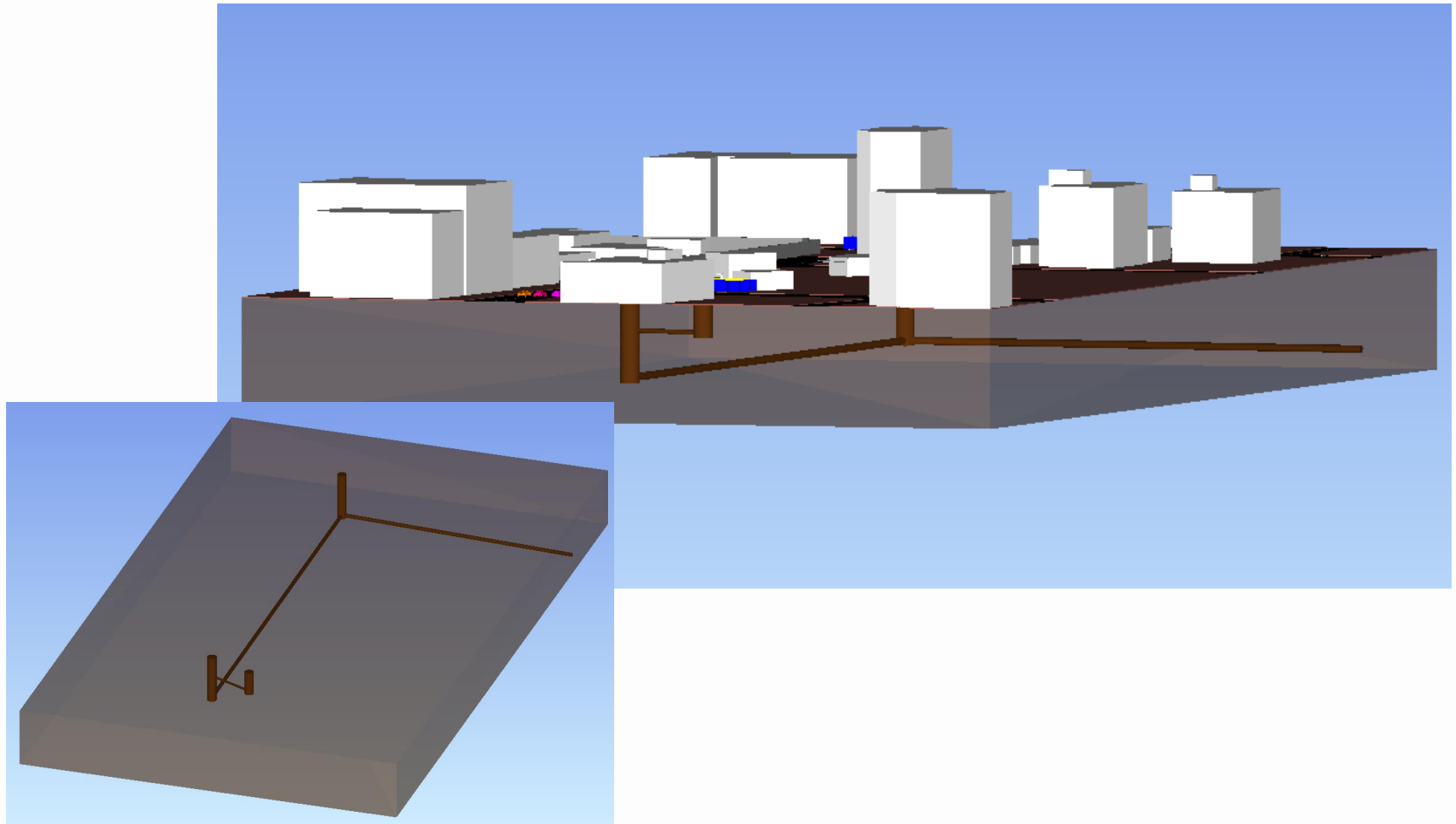
Existing Conditions + 3D+TIME+COST

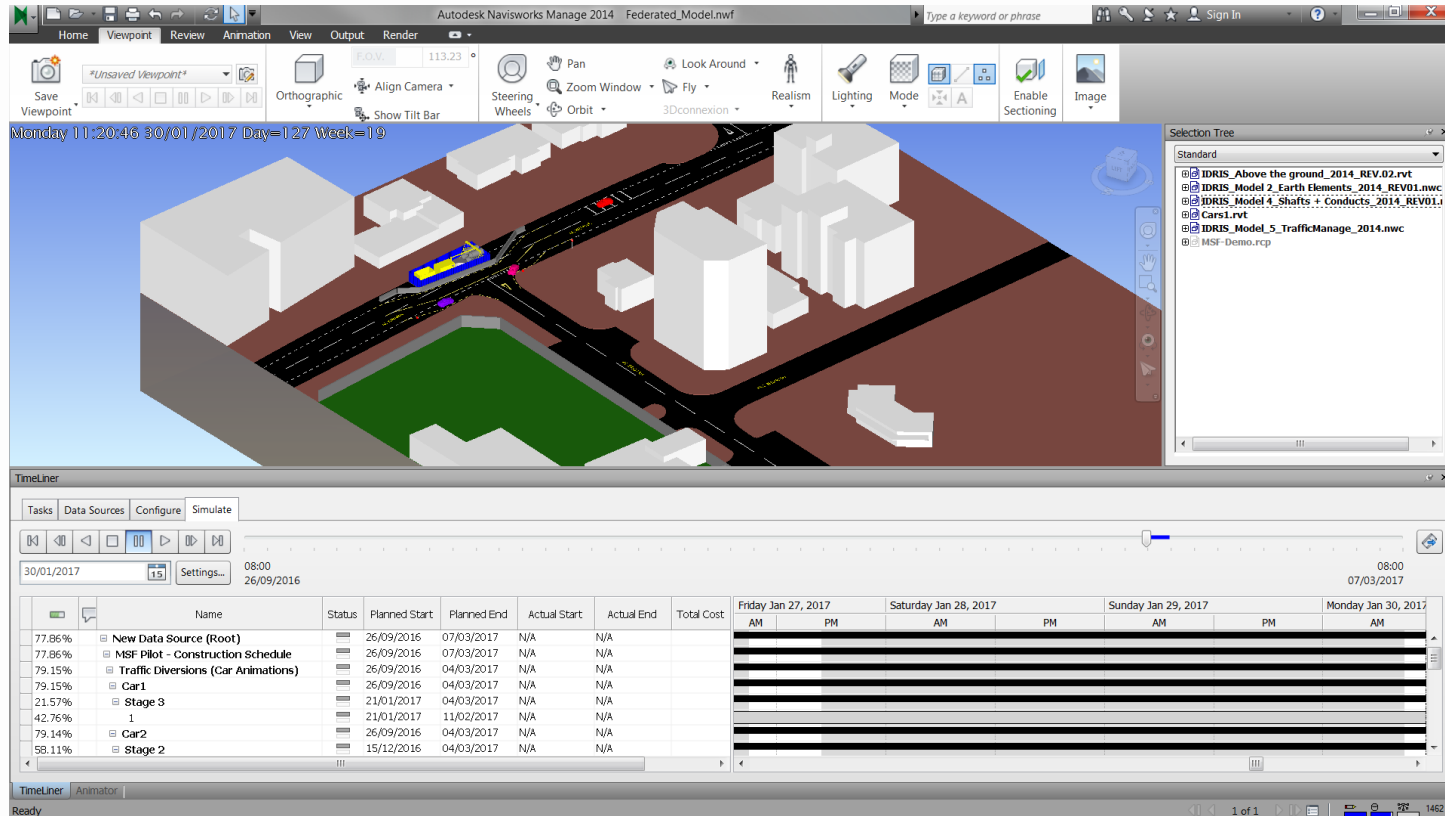












Integrated Design / Schedule / Traffic Management (Sample)

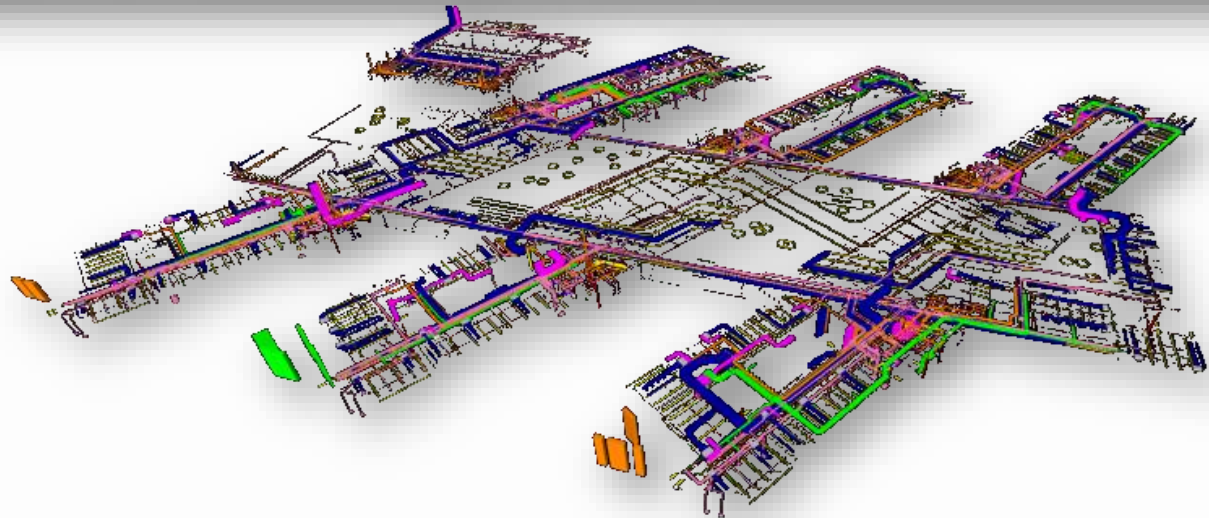
ADD ANIMATION EXISTING CONDITIONS +
CONSTRUCTION AND TRAFFIC
MANAGEMENT



Design and construction optimization through information coordination

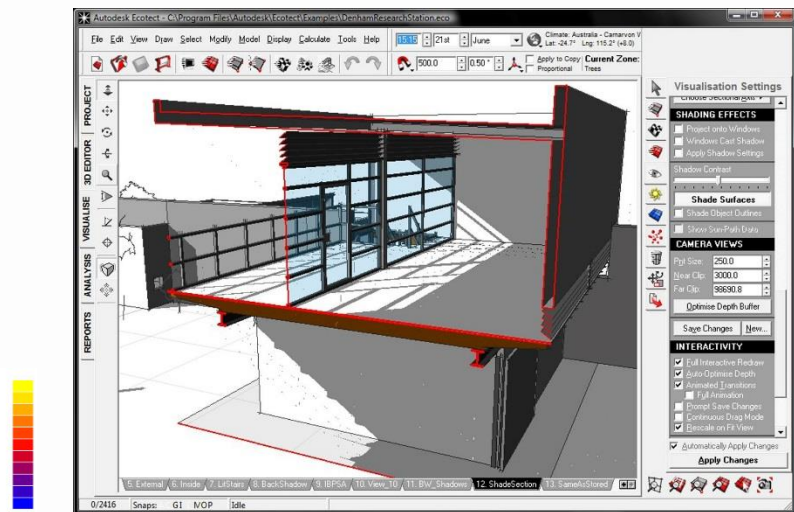
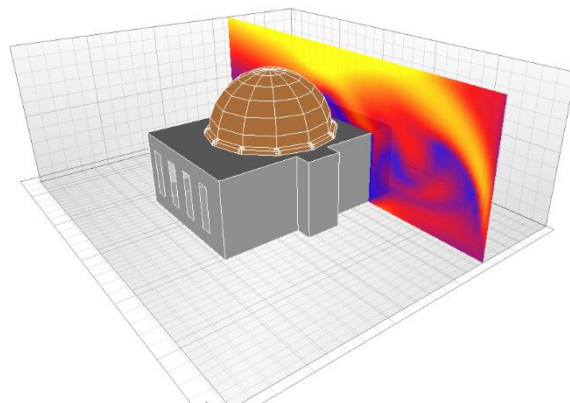
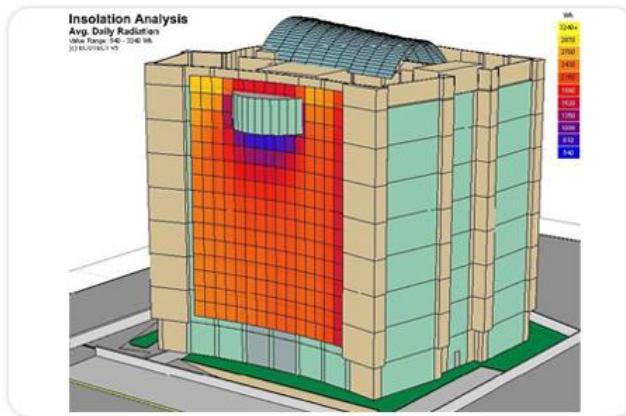
- Clash free schemes, design models

Name	Status	Clashes	New	Active	Reviewed	Approved	Resolved
Electrical	Old	0	0	0	0	0	0
Mechanical	Old	1	0	0	0	0	1
Mechanical Vs Electrical	Old	1	0	0	0	0	1



Analysis of Insulation, CFD, Solar, Shading, Energy and Acoustic

- Mitigation of environmental risks



Information is usually limited to a confined environment and may represent a limitation!

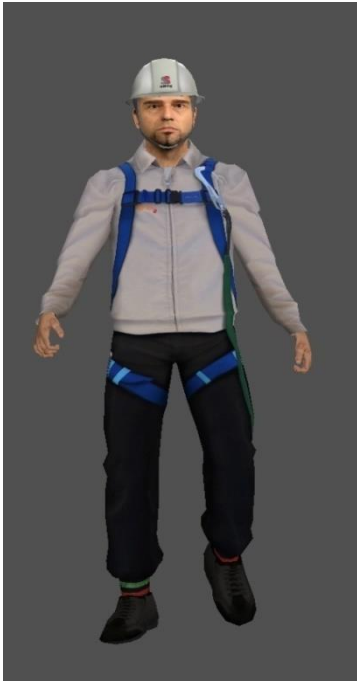
What about Risk Management after design?

- Construction stage is the next challenge after the Design of an Infrastructure Project
- Construction faces many risks as:
 - Cost risks
 - Time risks
 - Quality risks
 - Environmental risks
 - Safety risks
- While Cost, Time, Quality and Environmental are a continuation of variables previously assessed during the early stages from a financial perspective, Safety risks become an important variable to guarantee the success of the project!



Safety risks managed through information modelling

- Creation of Game like Avatars within the Project which shall be placed at labor camps. Laborers shall play the game and get training at the same time in their own language



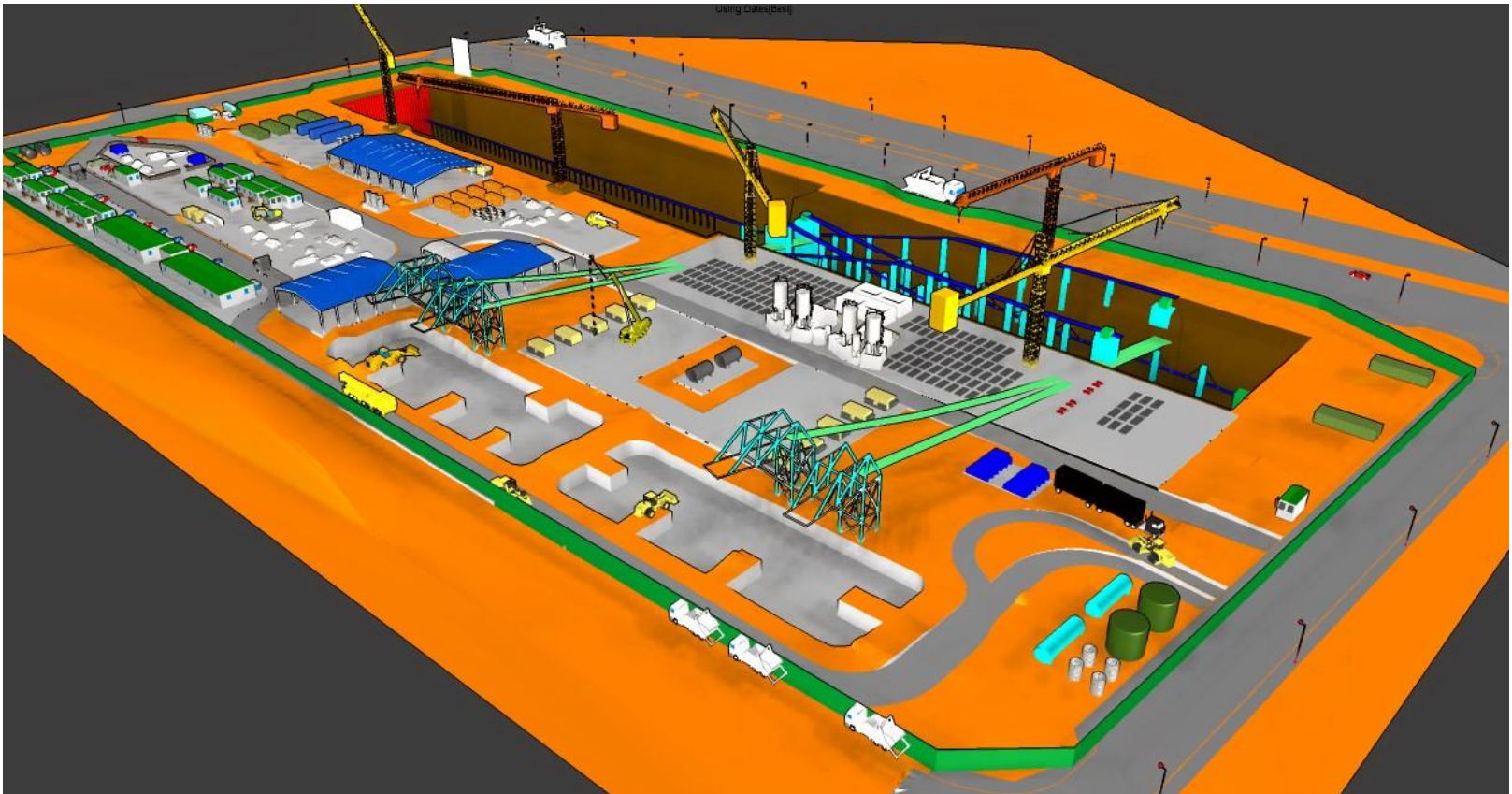
Safety risks managed through information modelling

- Logistics and construction management



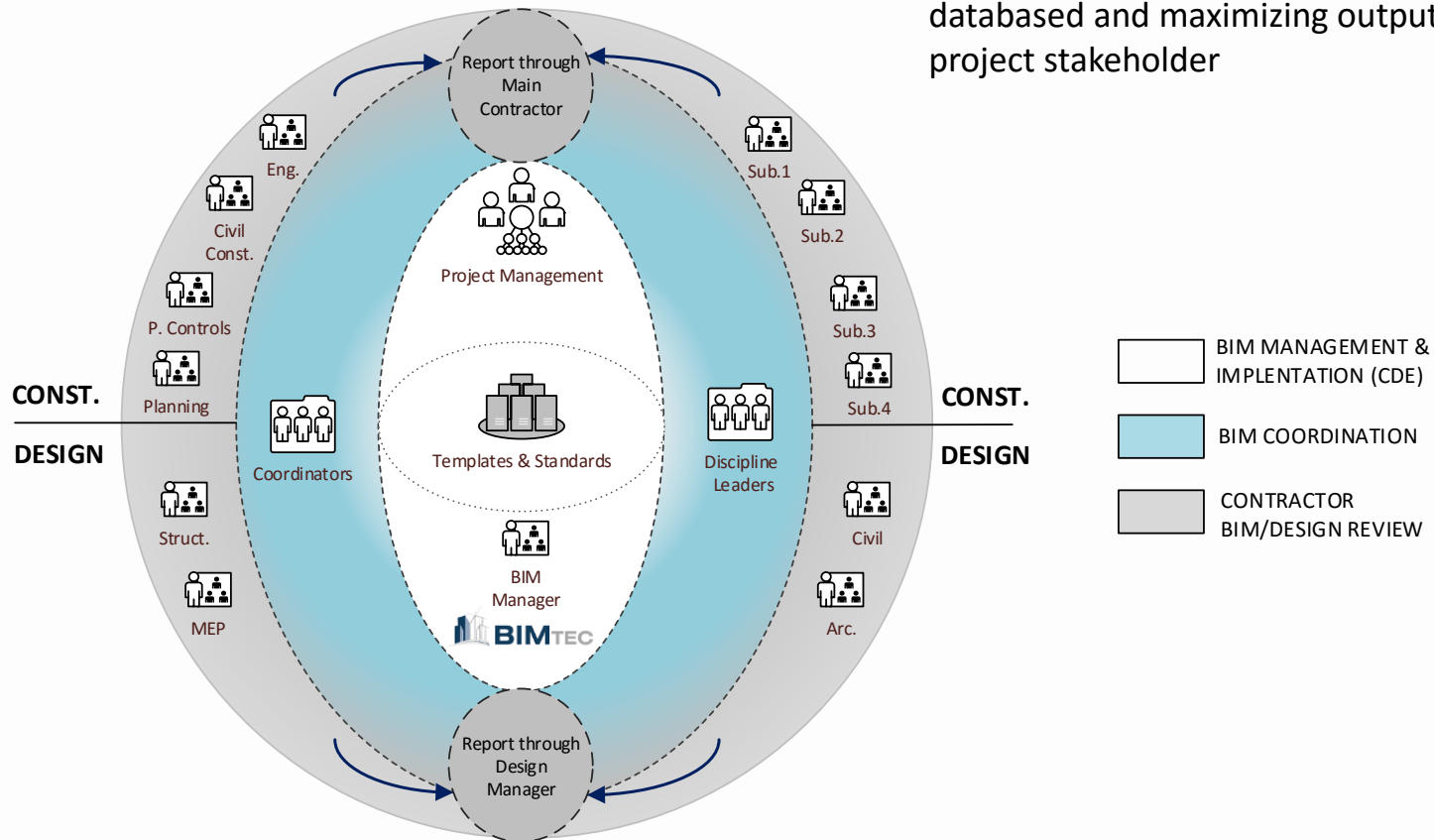
Safety risks managed through information modelling

- Logistics and construction management



Coordination and information exchanged as result of information management

- Integrating Project Lifecycle into a unified databased and maximizing outputs for each project stakeholder



Conclusion

- Direct and indirect financial risk management is a need through preliminary and conceptual stages
- Financial risk management can be assessed through the integration of financial information in the models or through the mitigation of errors, delays and other disruptive realities in a project based in construction
- Risk analysis with financial impact can be extended through the project life-cycle based on the information stored in the same model
- Simulation and visualization are key strengths in Building Information Modelling allowing mitigation of Risks
- BIM and reliable analysis need an upfront investment to support data input and coordination between all stakeholders



Thank you!





INFORMATION MODELLING

INTERNATIONAL PRACTICES OF INFORMATION MODELS FOR INVESTMENT RAISING

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Agenda

- Investment raising - Financing considerations and strategy
- CAPEX and OPEX Analysis
- Standardization of estimation and cost planning for investors
- Example of standards NRM1 and NRM3
- The impact of a TOTEX analysis for the decision making of the investors



Investment raising – finance considerations and strategy

- Investment raising or financing represents a complex process for:
 - Definition of sources of financing:
 - Project financing
 - Financial lease operations
 - Major syndicated and club deals
 - Bond issues
 - Bridge financing
 - Investment funds and strategic investors
 - Others
 - Selection of potential investors
 - Development and documentation of investment plans
 - Improve debt servicing terms
 - Consideration and approval of the deal by lenders
 - Conducting negotiations and finalize the deal.

Triggerpoints for Investment Raising in Construction

- Communication and availability of information for lenders/investors
- Standardized and reliable approach for the calculation of OPEX rather than CAPEX
- Considerations on the TOTEX would make sense, since the optimization of CAPEX doesn't mean a lower OPEX ... and vice-versa!

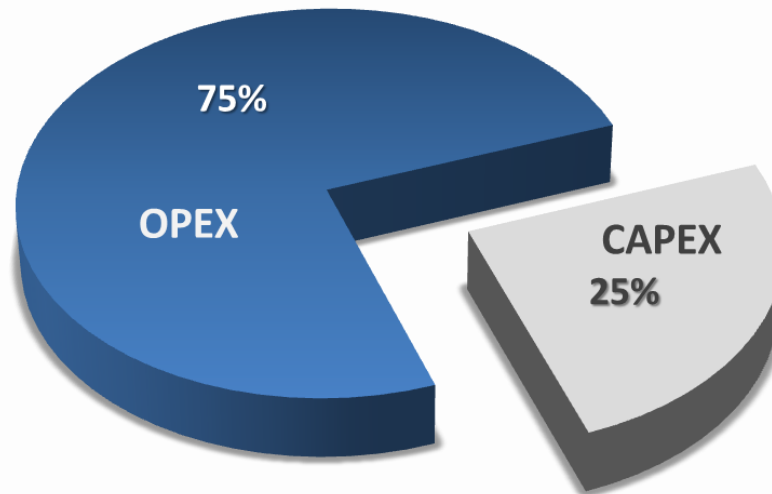
BUT HOW CAN BIM EASE THIS ANALYSIS?

CAN WE RELATE CAPEX and OPEX?



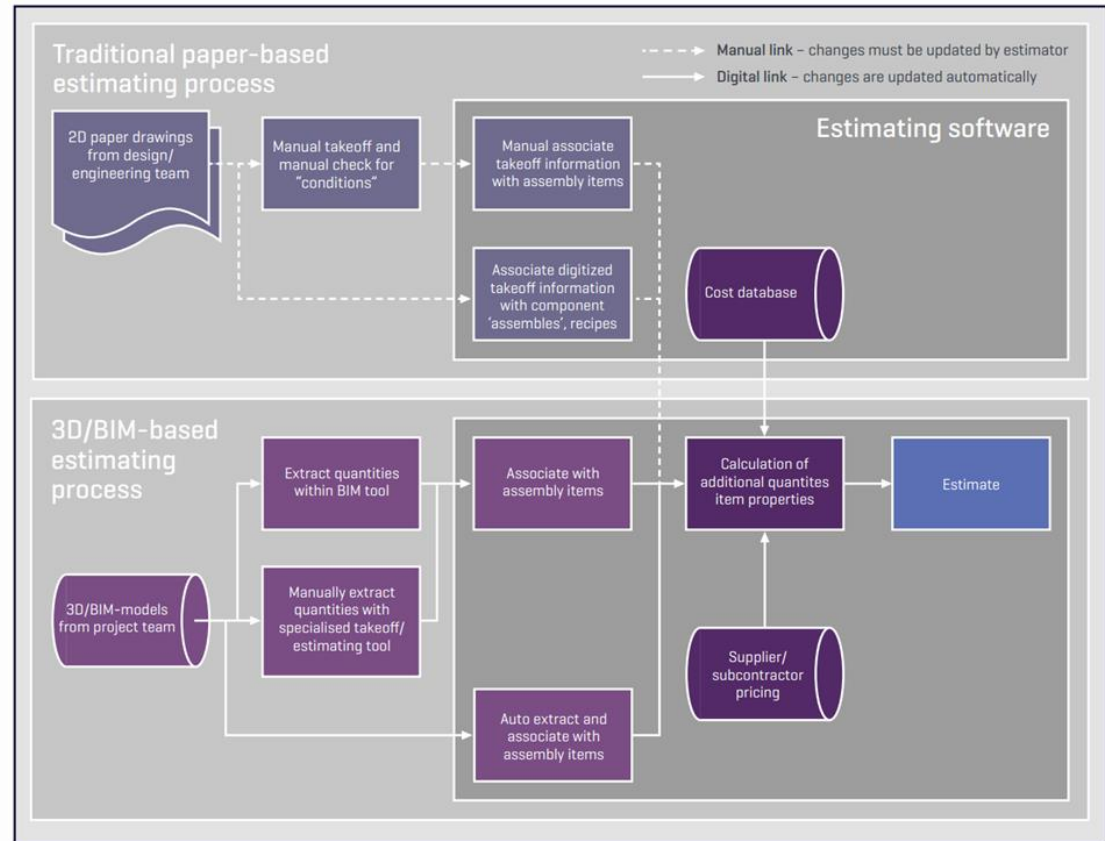
Understanding CAPEX and OPEX

- Capital expenditures (CAPEX or capex) are expenditures creating future benefits. Capex are used by a company to acquire or upgrade physical assets such as equipment, property, or industrial building
- OPEX, operating expense, operating expenditure or operational expense is an on-going cost for running a product, business, or system.



Inefficiencies in traditional cost estimating practices

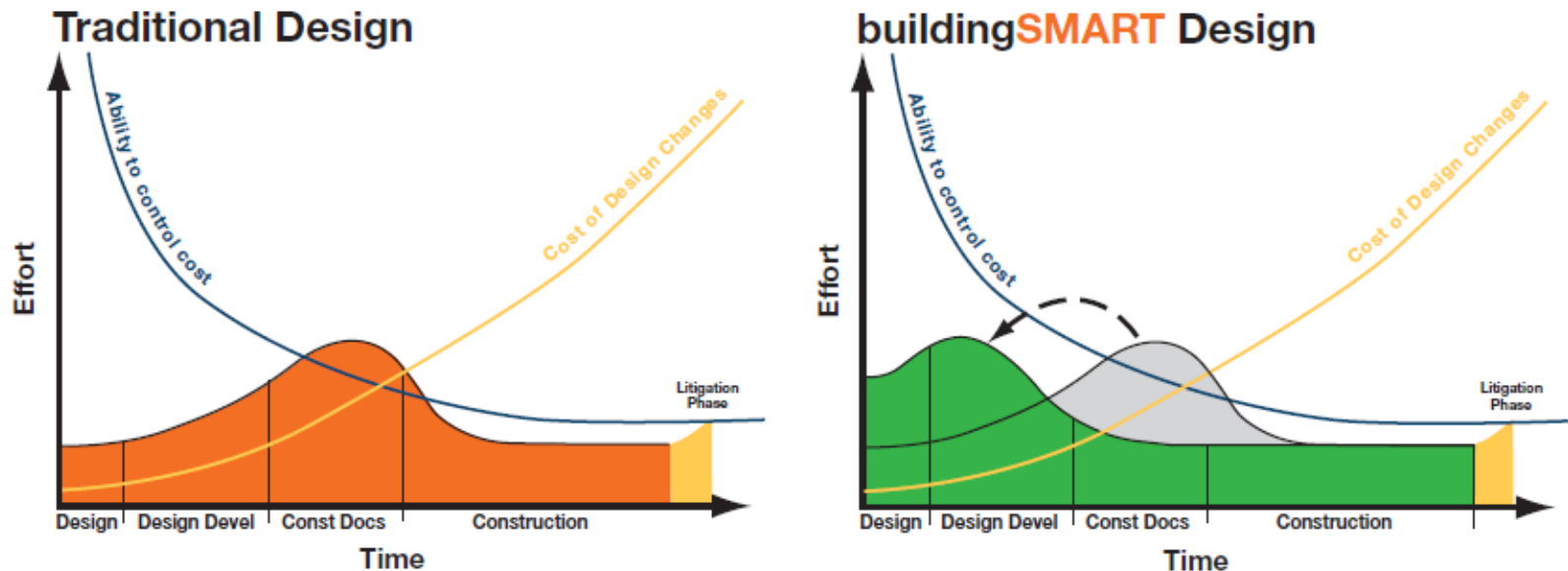
- Traditional measurement procedures are error-prone and time consuming
- Data is not usually connected between different studies/analysis/ stakeholders
- Feasibility is based on conceptual assumptions and fragmented processes



Information Models Impact on CAPEX and OPEX

- Direct

Information modelling promotes a common, structured and coordinated data source of information with direct impact on planning and designing phase



Information Models Impact on CAPEX and OPEX

- Indirect

Information indirectly creates a more informative and reliable package of information for the decision makers, creating new opportunities to attract investors that can be more or less related with the construction industry, since the information is sent through a friendly format

Packages can be composed of:

- 3D Models and Visual Presentations
- Animated Construction and Operation Schedules
- Model-based Bill of Quantities
- Environmental studies and simulations



Examples of an information model output for decision support



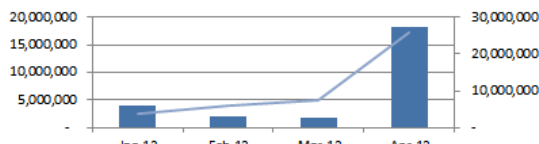
Examples of an information model output for decision support

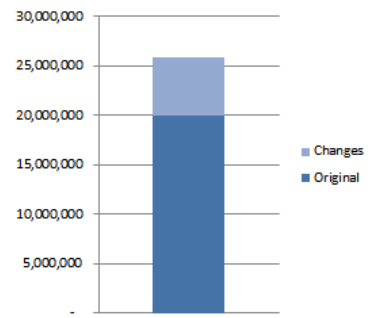
Budget Dashboard

Project Building Program		Budget Total \$ 25,841,000	Releases 5	Budget Changes
Project Detail		Original Budget \$ 19,911,000	Budget Changes \$ 5,930,000	Change % 30%
Start Date	1-Jan-2012			
End Date	15-Nov-2013			
Scope	2 New Buildings, Parking and Site improvements			
Number	123			

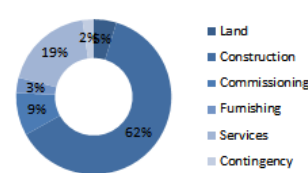
Budget Releases			
Title	State	Date	Amt
Planning Phase	Approved	Jan-12	\$ 3,930,000
Procurement Phas	Approved	Feb-12	\$ 2,000,000
Design Phase	Approved	Mar-12	\$ 1,675,000
Construction Phas	Pending	Apr-12	\$18,236,000

Budget Releases

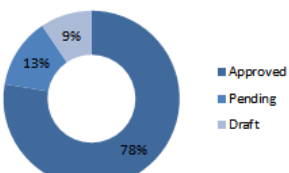




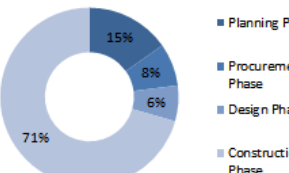
Budget by Grouping 1



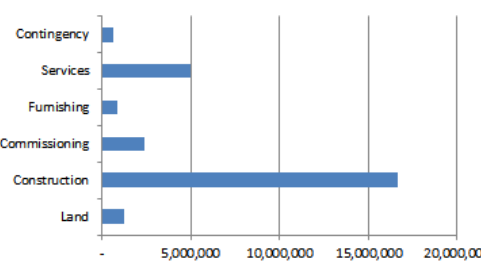
Budget Status



Budget Phasing



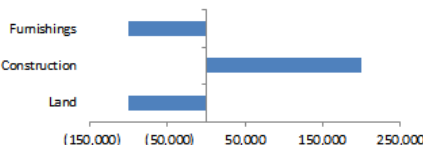
Budget By Grouping 1



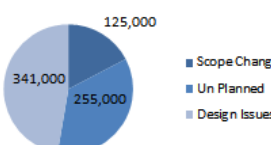
Transfers

Cost Account	Net Amt
Land	(100,000.00)
Construction	200,000.00
Furnishings	(100,000.00)

Transfer Chart



Budget Changes By Reason



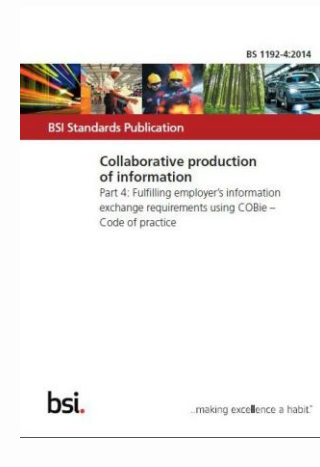
Challenges of BIM/Information Models based Estimating

- **Substandard BIM models and inadequate information**
Quantities and other information important for cost planning is directly dependent on the quality of the information (BIM) model. Whether the model is more or less developed, the definitions and contents of models shall be defined as per the required outputs
- **Issues related to data exchange**
The processes are usually fragmented, unidirectional and the link between a model and its database varies depending on the type of software used. This usually leads do inconsistent information from different stakeholders
- **Lack of standardization and inappropriate pricing format**
Good quantities calculation from models don't necessarily mean a good pricing format. It is fundamental that the information model shall be linked to an appropriate cost estimating format

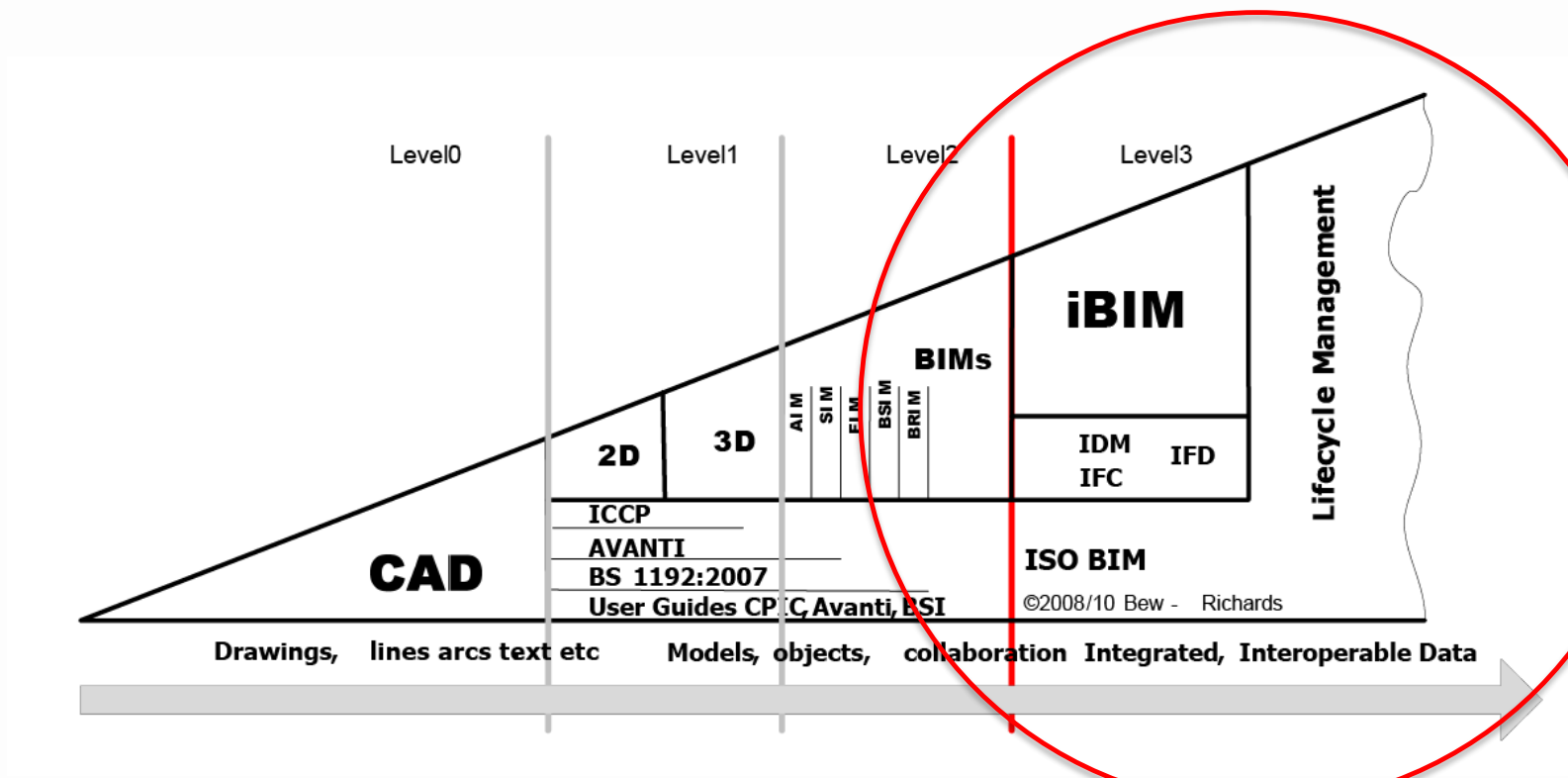
(source: How can BIM support NRM1)

RICS and British Standards suggest a standardized approach

- **NRM 1** - Order of Cost Estimating and Cost Planning for Capital Building Works
- **NRM 3** - Order of cost estimating and cost planning for building maintenance works
- **BS8544:2013** - Guide for life cycle costing of maintenance during the in use phases of buildings
- **BS1192-4:2014** - Fulfilling employer’s information exchange requirements using COBie – Code of practice



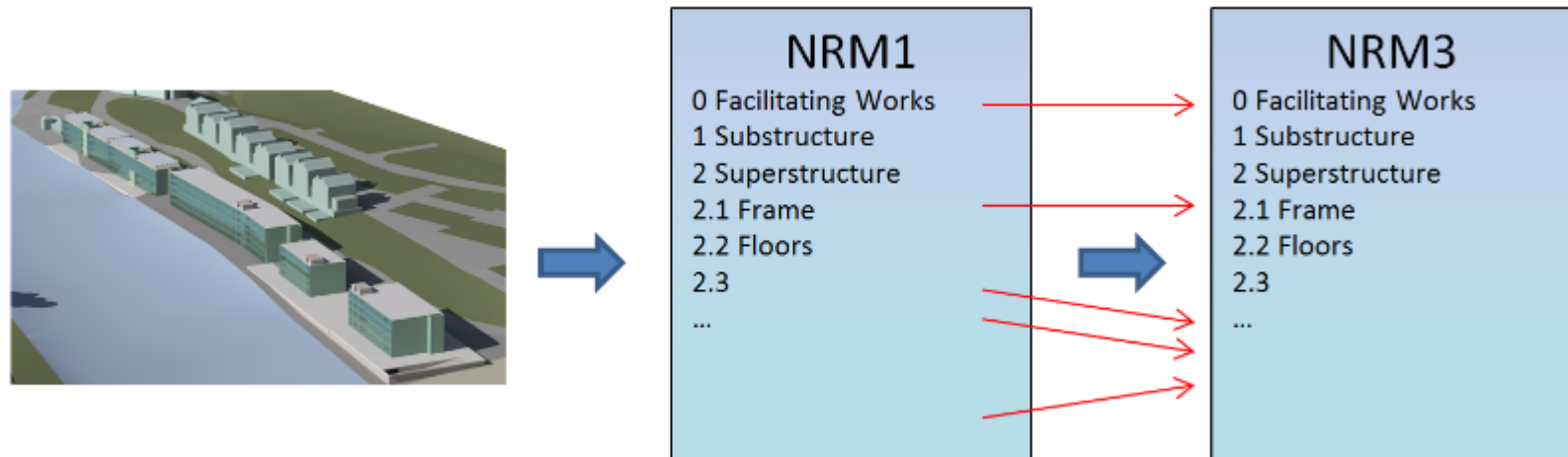
RICS and British Standards suggest a standardized approach
 The maximum goal is to achieve a fully Integrated Lifecycle Management



Advantages of following the standards

- **Single-interlinked source of information**

"To provide a consistent work breakdown structure, cost breakdown structure, codification system and methodology for benchmarking, the group elements, elements, sub-elements and components are fully aligned with those defined in NRM 1." (source: NRM3, p102)



Advantages of following the standards

- **Clear specification of data needed for life-cycle management**

ExtSystem	<i>Authoring Application</i>	application
ExtObject	<i>IfcFurnitureType</i>	application
ExtIdentifier	<i>1ITs7iOoDD\$830Kgut03mv</i>	application
ReplacementCost	2760	requirable
ExpectedLife	15	requirable
DurationUnit	year	pick
WarrantyDescription	<i>Onsite warranty and advanced replacement warranty</i>	requirable
NominalLength	2105	expected
NominalWidth	50	expected

[source: BS1192-4 p36]

Data specification for the COBie file

*COBie stands for Construction Operations Building information exchange and represents an open source database of O&M relevant information

Conclusion

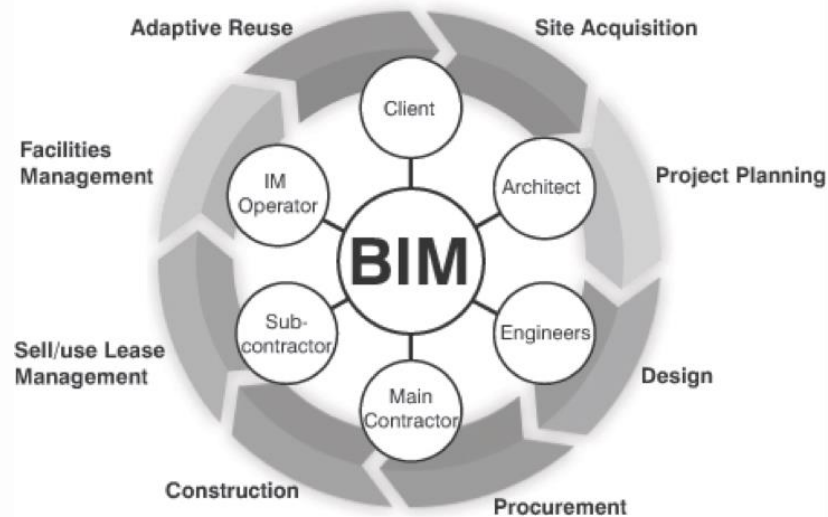
Information models allow:

- A structured and standardized analysis for CAPEX and OPEX
- CAPEX and OPEX can be related, resulting on time savings during early analysis
- When generated from CAPEX information, the effort to model OPEX data can be extremely lowered through the use of standards
- A TOTEX analysis make sense, since CAPEX and OPEX behave differently and together may provide a more informed decisions for investors
- CAPEX and OPEX data can be carried one through COBie data, for further integrations with GIS, FM and other systems.



Conclusion

‘By enabling the reliable accurate information to be generate and exchanged from a complete digital model using different BIM tools through single information exchange mechanism, it enables effective and transparent decision making processes to be executed in the project lifecycle (BIM Industry Working Group, 2011)’



The ‘I’ in BIM is the information, which is where the opportunities and value comes from *(source: How can BIM support NRM1)*

Conclusion

- Limitations rely on how demanding are the early stages of designing in BIM and the effort the entire supply chain at this stage need to put in the project
- As usually in any BIM process, outputs are extremely enhanced in terms of communication and reliability
- The time and effort needed to setup an adequate information model for CAPEX and OPEX analysis may clash with decision makers in what is the traditional funding process of projects



Bigger benefits from Information Models require an adaptation process of the market, industry and supply chain. It is time to change the mindset!



Thank you!

