Evolving Directions of Geospatial Technology

Greg Bentley, CEO, Bentley Systems

Dubai: *Smart City*

gulfnews.com

Search Gulf News

Home | News | Business | Sport | Life | Entertainment | Guides | Opinion | Vid

UAE | Oman | Bahrain | Qatar | Kuwait | Yemen | Saudi Arabia | Gulf | Region | Wo

UAE | General

Shaikh Mohammad announces Smart City project to transform Dubai

Project to link city administration, public safety, education and health care sectors

By Janice Ponce de Leon, Staff Reporter

Published: 14:32 October 19, 2013

GULF NEWS

44

Image Credit: Gulf News

Smart City's main aim is to provide better connections and increase cooperation between the emirate and its residents. It promotes the use of government facilities using the largest possible number of smart applications.

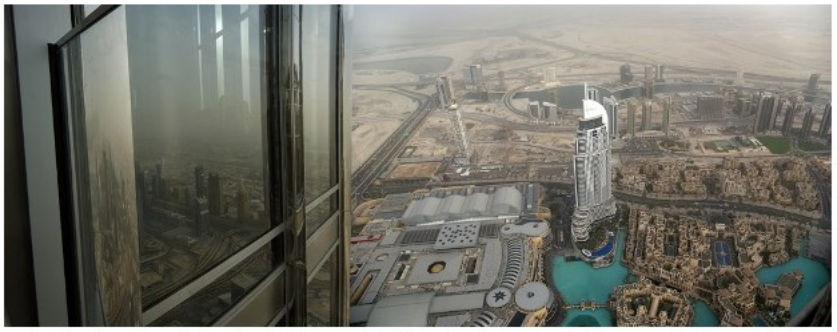
Topic: Networking *Investigate* *Follow via:*

Dubai thinks big with plan to turn itself into a wi-fi connected smart city

Summary: *A plan to blanket Dubai with wi-fi and introduce smart systems to underpin education, healthcare and other public services is getting underway.*

By Robert Jones for Heat Sink | October 24, 2013 -- 07:33 GMT (00:33 PDT)

Comment 1 | Votes 2 | Like 41 | Tweet 114 | Share | more +



The view from the world's tallest building, Burj Khalifa. When it comes to architecture and tech, Dubai thinks big. Image: Shutterstock

Dubai has ambitions to be a connected smart city.

Its 'connectedness' has made huge progress over the past six years. When I arrived, I found myself subscribing at home to a 512Kbps internet connection because, at around the equivalent of £50 a month, I simply wasn't prepared to pay for a 1Mbps line.

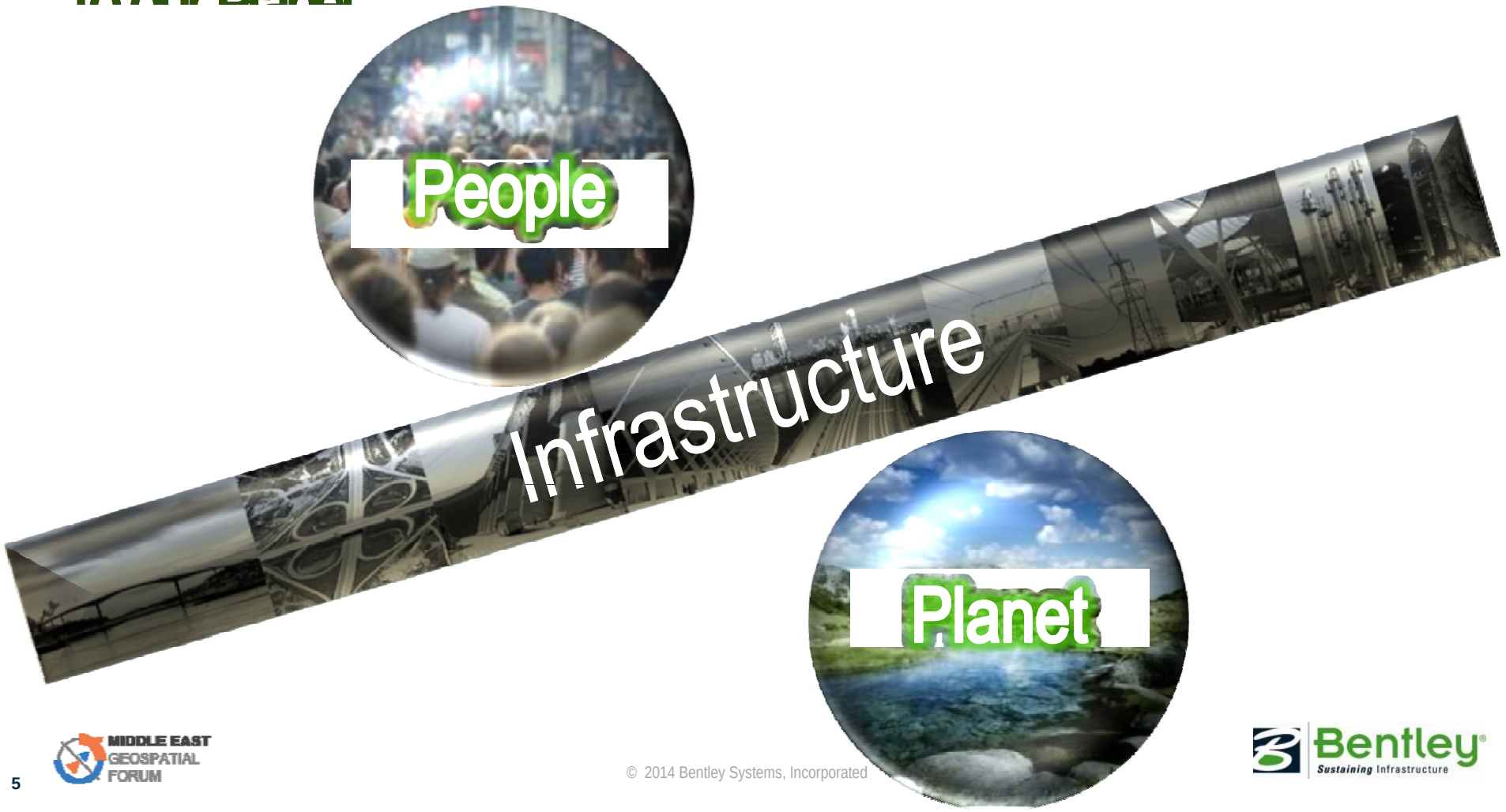
Bentley's mission is to provide innovative software and services for the enterprises and professionals who design, build and operate the world's infrastructure - sustaining the global economy and environment, for improved quality of life.

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Sustaining Infrastructure?

Infrastructure: the improvements made by People to our Planet



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

"Sustainability *Index*"?

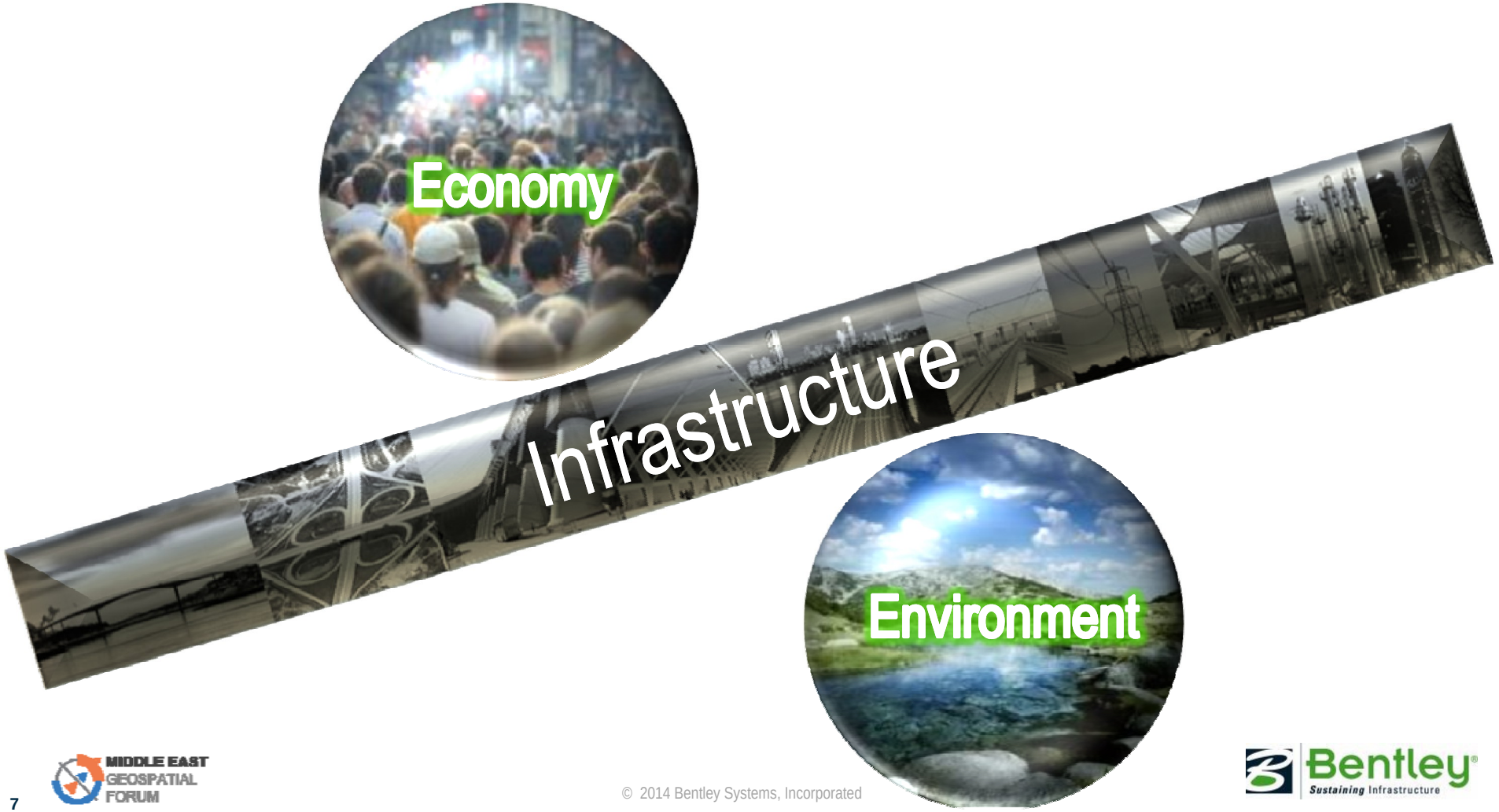
Infrastructure can increase Economic Capacity…

Economic Capacity

Environmental Footprint

…and can (unique) reduce Environmental Footprint!

Responsibility for *Sustaining* Infrastructure?



MIDDLE EAST GEOSPATIAL FORUM

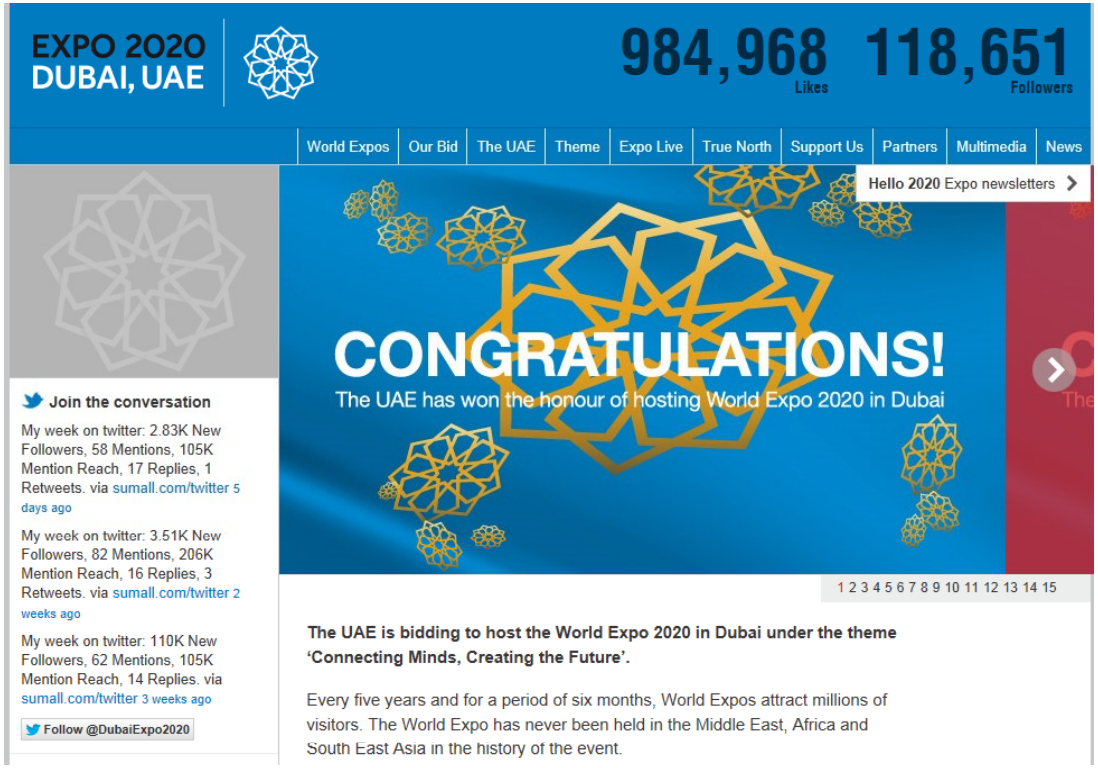
Bentley Sustaining Infrastructure

Working *Smarter*, Together…

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

EXPO 2020
DUBAI, UAE

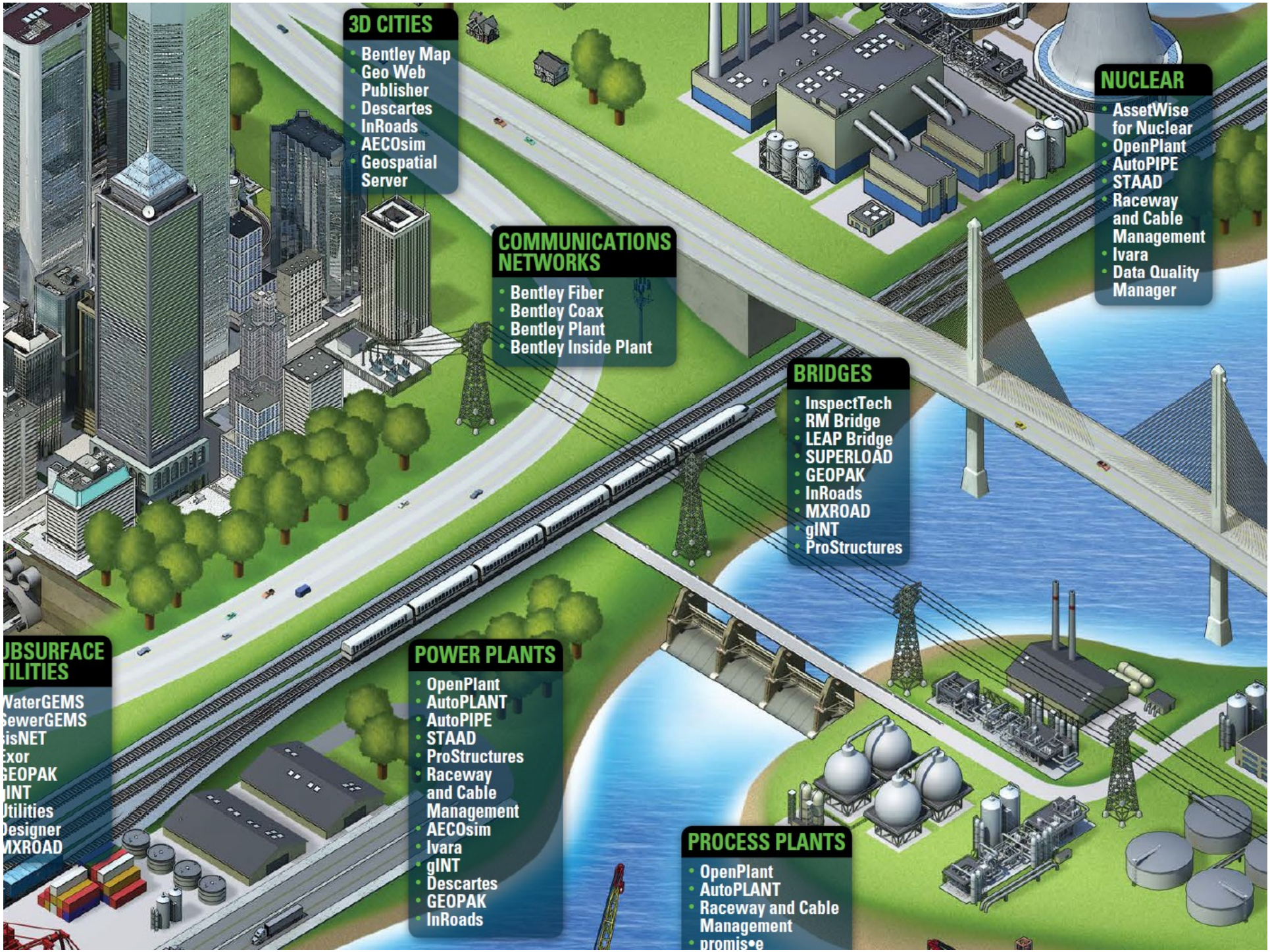


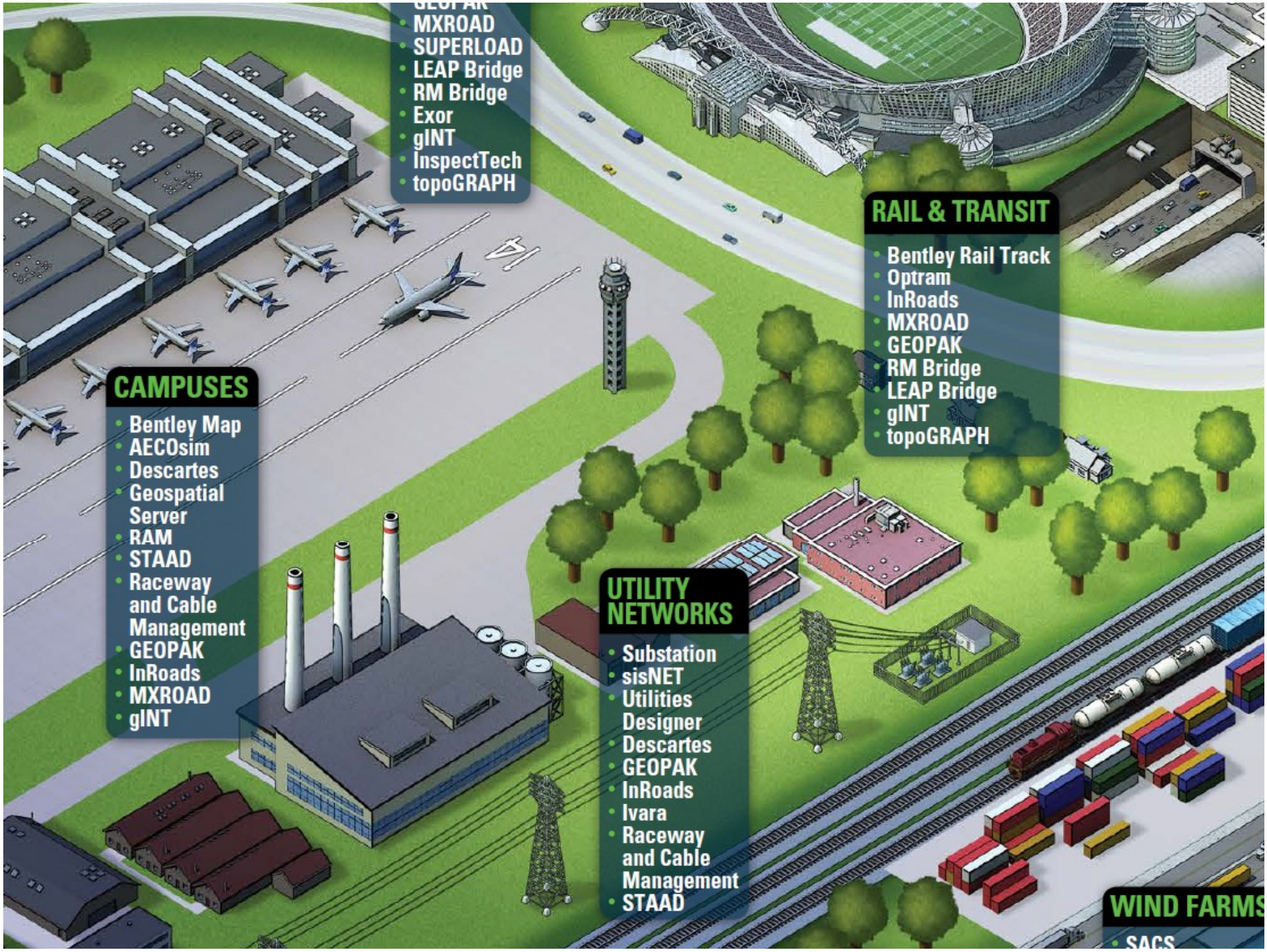
- **Sustainability** - lasting sources of energy and water
- **Mobility** - smart systems of logistics and transportation
- **Opportunity** - new paths to economic development

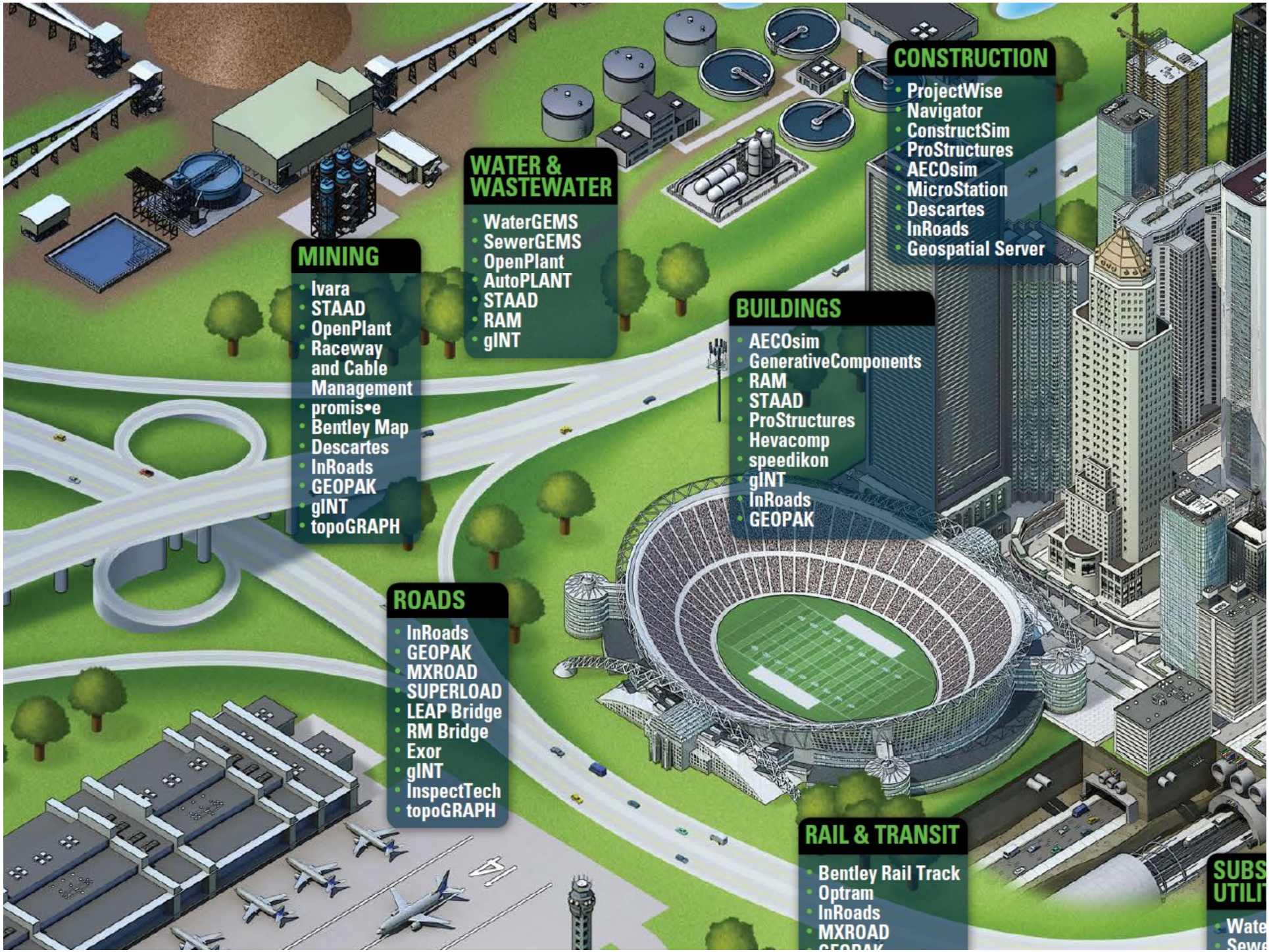
MIDDLE EAST GEOSPATIAL FORUM

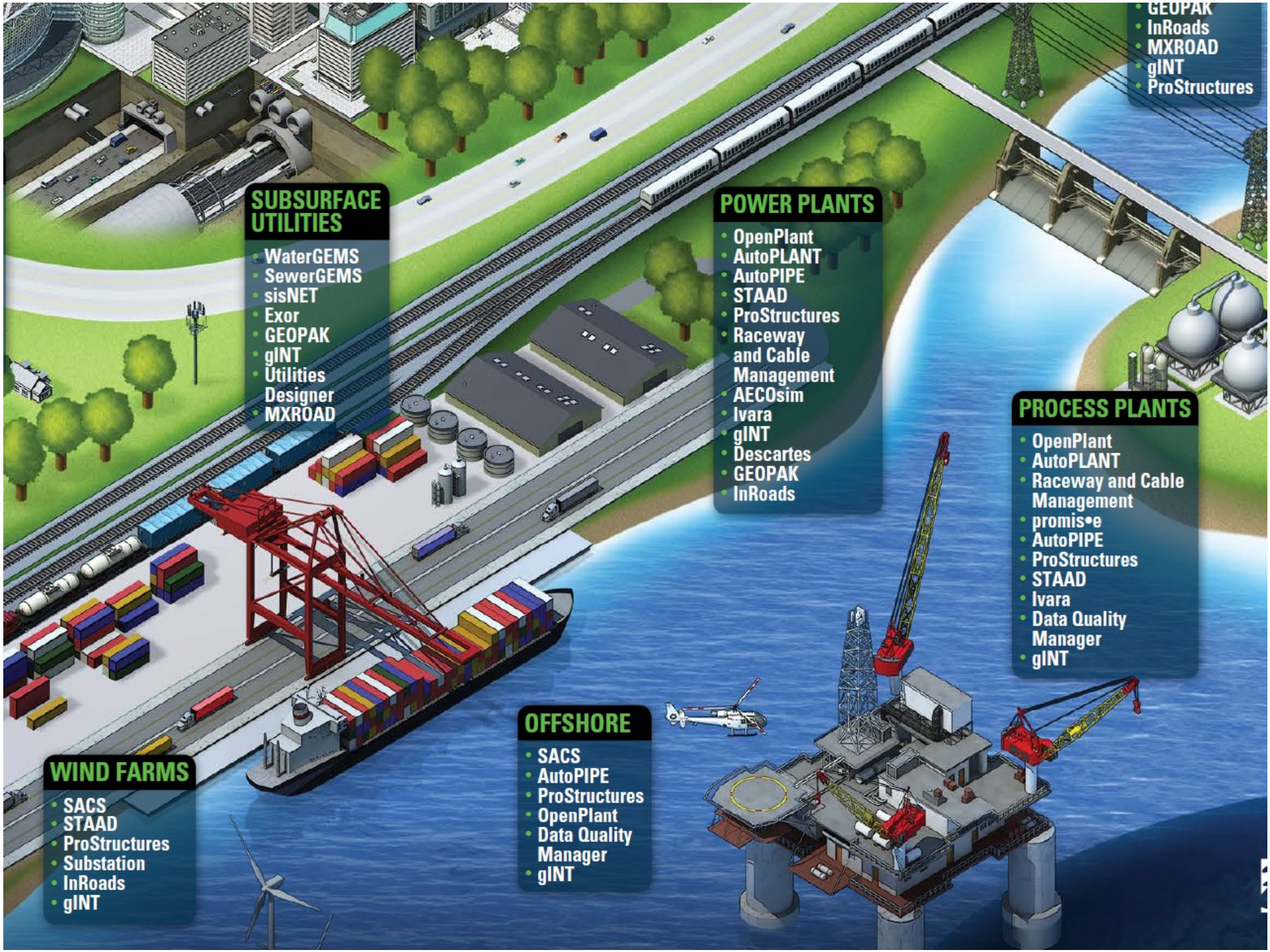
Bentley Sustaining Infrastructure


CONSTRUCTION
ProjectWise
Navigator
ConstructSim
ProStructures
AECOsim
MicroStation
Descartes
InRoads
Geospatial Server
WATER & WASTEWATER
WaterGEMS
SewerGEMS
OpenPlant
AutoPLANT
STAAD
RAM
gINT
MINING
Ivara
STAAD
OpenPlant
Raceway and Cable Management
promis•e
Bentley Map
Descartes
InRoads
GEOPAK
gINT
topoGRAPH
BUILDINGS
AECOsim
GenerativeComponents
RAM
STAAD
ProStructures
Hevacomp
speedikon
gINT
InRoads
GEOPAK
3D CITIES
Bentley Map
Geo Web Publisher
Descartes
InRoads
AECOsim
Geospatial Server
NUCLEAR
AssetWise for Nuclear
OpenPlant
AutoPIPE
STAAD
Raceway and Cable Management
Ivara
Data Quality Manager
COMMUNICATIONS NETWORKS
Bentley Fiber
Bentley Coax
Bentley Plant
Bentley Inside Plant
BRIDGES
InspectTech
RM Bridge
LEAP Bridge
SUPERLOAD
GEOPAK
InRoads
MXROAD
gINT
ProStructures
ROADS
InRoads
GEOPAK
MXROAD
SUPERLOAD
LEAP Bridge
RM Bridge
Exor
gINT
InspectTech
topoGRAPH
RAIL & TRANSIT
Bentley Rail Track
Optram
InRoads
MXROAD
GEOPAK
RM Bridge
LEAP Bridge
gINT
topoGRAPH
SUBSURFACE UTILITIES
WaterGEMS
SewerGEMS
sisNET
Exor
GEOPAK
gINT
Utilities Designer
MXROAD
POWER PLANTS
OpenPlant
AutoPLANT
AutoPIPE
STAAD
ProStructures
Raceway and Cable Management
AECOsim
Ivara
gINT
Descartes
GEOPAK
InRoads
CAMPUSES
Bentley Map
AECOsim
Descartes
Geospatial Server
RAM
STAAD
Raceway and Cable Management
GEOPAK
InRoads
MXROAD
gINT
UTILITY NETWORKS
Substation
sisNET
Utilities Designer
Descartes
GEOPAK
InRoads
Ivara
Raceway and Cable Management
STAAD
PROCESS PLANTS
OpenPlant
AutoPLANT
Raceway and Cable Management
promis•e
AutoPIPE
ProStructures
STAAD
Ivara
Data Quality Manager
gINT
OFFSHORE
SACS
AutoPIPE
ProStructures
OpenPlant
Data Quality Manager
gINT
WIND FARMS
SACS
STAAD
ProStructures
Substation
InRoads
gINT
Bentley's Solutions
• MicroStation
• ProjectWise
• AssetWise
Bentley
Sustaining Infrastructure

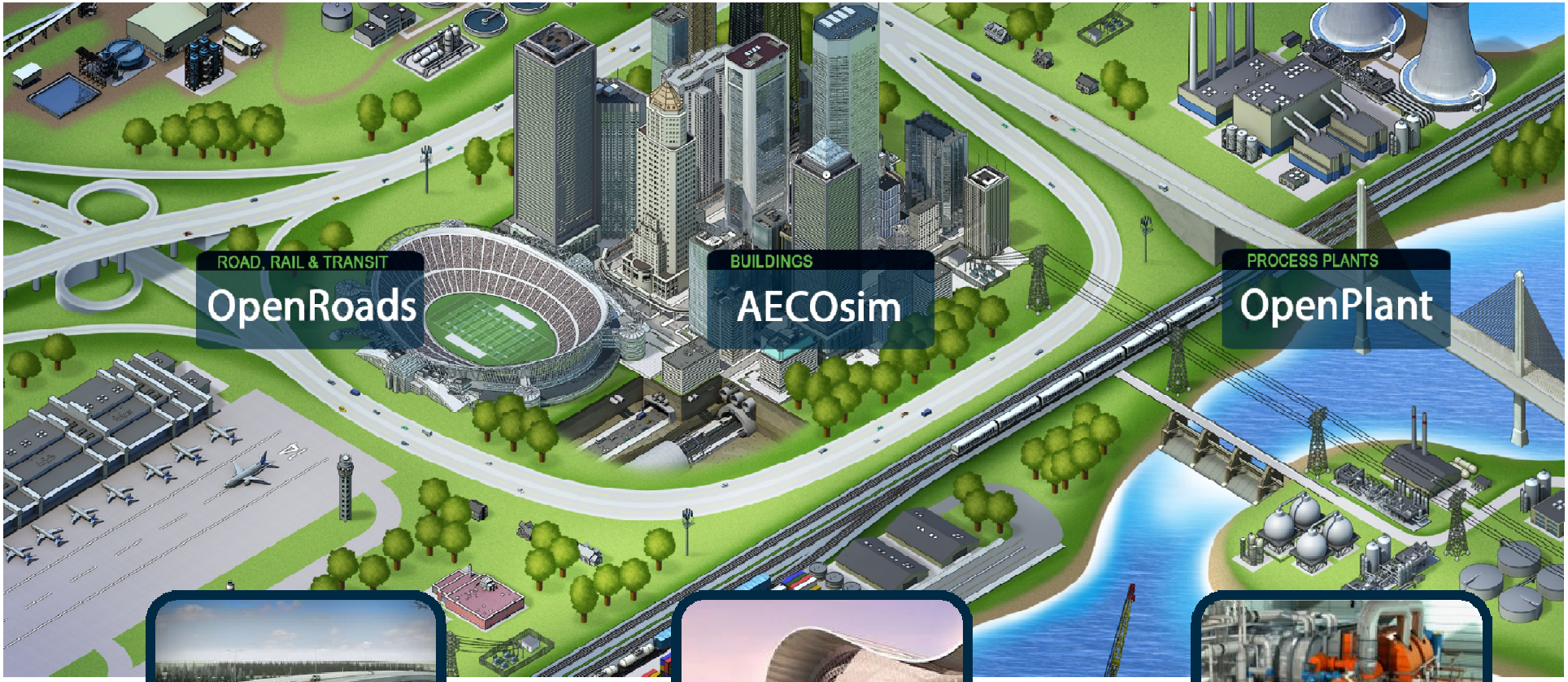

3D CITIES
• Bentley Map
• Geo Web Publisher
• Descartes
• InRoads
• AECOsim
• Geospatial Server
COMMUNICATIONS NETWORKS
• Bentley Fiber
• Bentley Coax
• Bentley Plant
• Bentley Inside Plant
NUCLEAR
• AssetWise for Nuclear
• OpenPlant
• AutoPIPE
• STAAD
• Raceway and Cable Management
• Ivara
• Data Quality Manager
BRIDGES
• InspectTech
• RM Bridge
• LEAP Bridge
• SUPERLOAD
• GEOPAK
• InRoads
• MXROAD
• gINT
• ProStructures
UBSURFACE TILITIES
WaterGEMS
SewerGEMS
isNET
Exor
GEOPAK
INT
Utilities
Designer
MXROAD
POWER PLANTS
• OpenPlant
• AutoPLANT
• AutoPIPE
• STAAD
• ProStructures
• Raceway and Cable Management
• AECOsim
• Ivara
• gINT
• Descartes
• GEOPAK
• InRoads
PROCESS PLANTS
• OpenPlant
• AutoPLANT
• Raceway and Cable Management
• promis•e


MXROAD
SUPERLOAD
LEAP Bridge
RM Bridge
Exor
gINT
InspectTech
topoGRAPH
RAIL & TRANSIT
Bentley Rail Track
Optram
InRoads
MXROAD
GEOPAK
RM Bridge
LEAP Bridge
gINT
topoGRAPH
CAMPUSES
Bentley Map
AECOsim
Descartes
Geospatial Server
RAM
STAAD
Raceway and Cable Management
GEOPAK
InRoads
MXROAD
gINT
UTILITY NETWORKS
Substation
sisNET
Utilities Designer
Descartes
GEOPAK
InRoads
Ivara
Raceway and Cable Management
STAAD
WIND FARMS
SACS


CONSTRUCTION
ProjectWise
Navigator
ConstructSim
ProStructures
AECOsim
MicroStation
Descartes
InRoads
Geospatial Server
WATER & WASTEWATER
WaterGEMS
SewerGEMS
OpenPlant
AutoPLANT
STAAD
RAM
gINT
MINING
Ivara
STAAD
OpenPlant
Raceway and Cable Management
promis•e
Bentley Map
Descartes
InRoads
GEOPAK
gINT
topoGRAPH
BUILDINGS
AECOsim
GenerativeComponents
RAM
STAAD
ProStructures
Hevacomp
speedikon
gINT
InRoads
GEOPAK
ROADS
InRoads
GEOPAK
MXROAD
SUPERLOAD
LEAP Bridge
RM Bridge
Exor
gINT
InspectTech
topoGRAPH
RAIL & TRANSIT
Bentley Rail Track
Optram
InRoads
MXROAD
SUBS
UTILI
Wate
Sewe


SUBSURFACE UTILITIES
• WaterGEMS
• SewerGEMS
• sisNET
• Exor
• GEOPAK
• gINT
• Utilities Designer
• MXROAD
POWER PLANTS
• OpenPlant
• AutoPLANT
• AutoPIPE
• STAAD
• ProStructures
• Raceway and Cable Management
• AECOsim
• Ivara
• gINT
• Descartes
• GEOPAK
• InRoads
• GEOPAK
• InRoads
• MXROAD
• gINT
• ProStructures
PROCESS PLANTS
• OpenPlant
• AutoPLANT
• Raceway and Cable Management
• promis•e
• AutoPIPE
• ProStructures
• STAAD
• Ivara
• Data Quality Manager
• gINT
OFFSHORE
• SACS
• AutoPIPE
• ProStructures
• OpenPlant
• Data Quality Manager
• gINT
WIND FARMS
• SACS
• STAAD
• ProStructures
• Substation
• InRoads
• gINT

Bentley's *Emerging Pacesetters…*



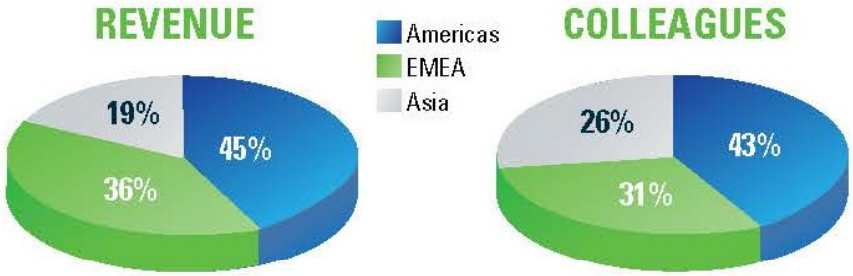
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Annual Reporting…

www.bentley.com/annualreport

Global Balance



>$600m USD

>3,000

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

The Year in Infrastructure 2013

www.bentley.com/yearininfrastructure

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

ARC 2013 Market Research Study

Engineering Design Tools for Plants and Infrastructure

Bentley® is #1 in:

ARC Advisory Group

October 17, 2013

#1 Electric Power Generation

#1 Mining and Metals

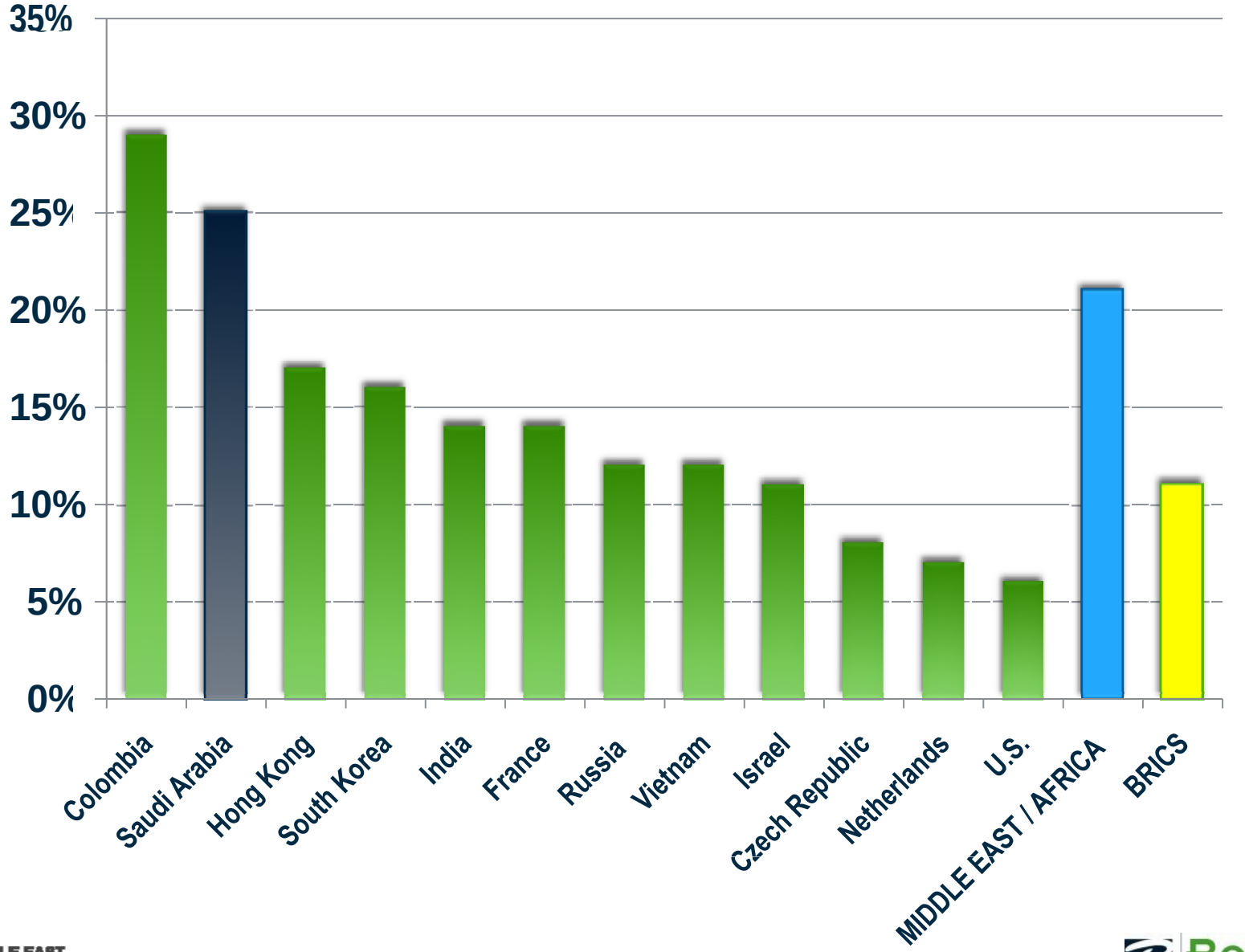
#1 Electric Power Transmission, Distribution & Communications

#1 Water and Wastewater Distribution

#1 for EPC/AEC

www.arcweb.com/market-studies/pages/engineering-design-tools.aspx

Regional y/y Growth!



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

2013 *Bentley Infrastructure 500* Top Owners

www.bentley.com/BI500

The ***Bentley Infrastructure 500*** **Top Owners** operate infrastructure assets valued at over **US$15.9 trillion!**

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

2013 Middle East Infrastructure *Top Owners*

RANK	COMPANY NAME	COUNTRY	INFRASTRUCTURE VALUE (millions USD)
48	**QATAR PETROLEUM**	Qatar	$ 69,059
62	**SAUDI ELECTRICITY COMPANY - SEC**	Saudi Arabia	$ 55,551
89	**SAUDI BASIC INDUSTRIES CORPORATION**	Saudi Arabia	$ 44,117
201	**DUBAI ELECTRICITY AND WATER AUTHORITY**	U.A.E.	$ 23,888
228	**ABU DHABI NATIONAL ENERGY COMPANY**	U.A.E	$ 21,746
359	**SAUDI TELECOM COMPANY**	Saudi Arabia	$ 14,932
		TOTAL	**$229,294**

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

"GeoSmart" Government Goals

- Accelerate infrastructure delivery
- Minimize / mitigate project risks
- Nurture world-class innovation

Khaleej Times

Smart City project to make Dubai a model for others

Wam / 24 October 2013

Hamdan meets with Higher Committee to discuss project progress

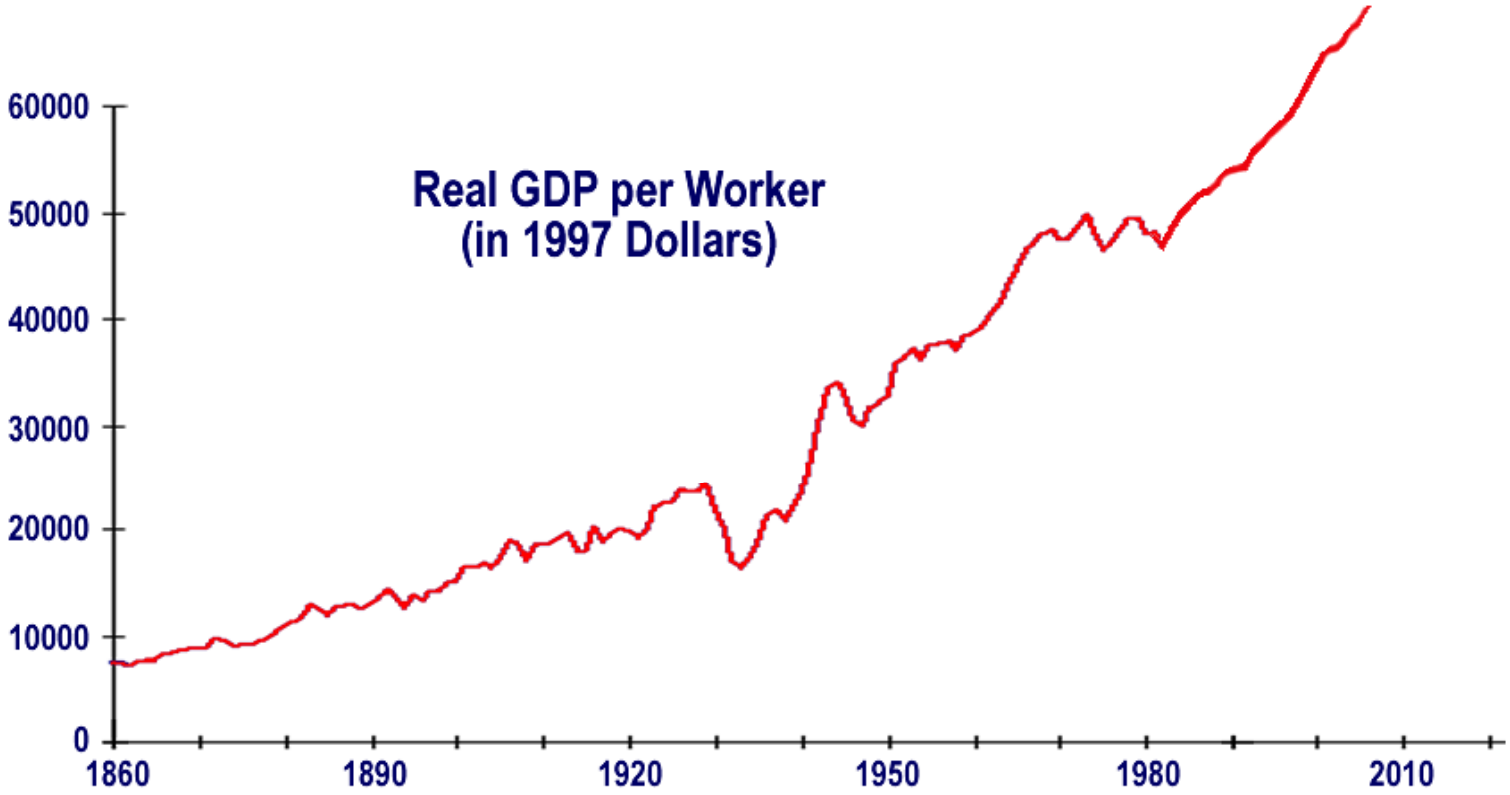
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Middle East "GeoSmart" Advantages

- Long-term (government) orientation
- Global contracting
- Technology "greenfield"…
- "Next Practices!"

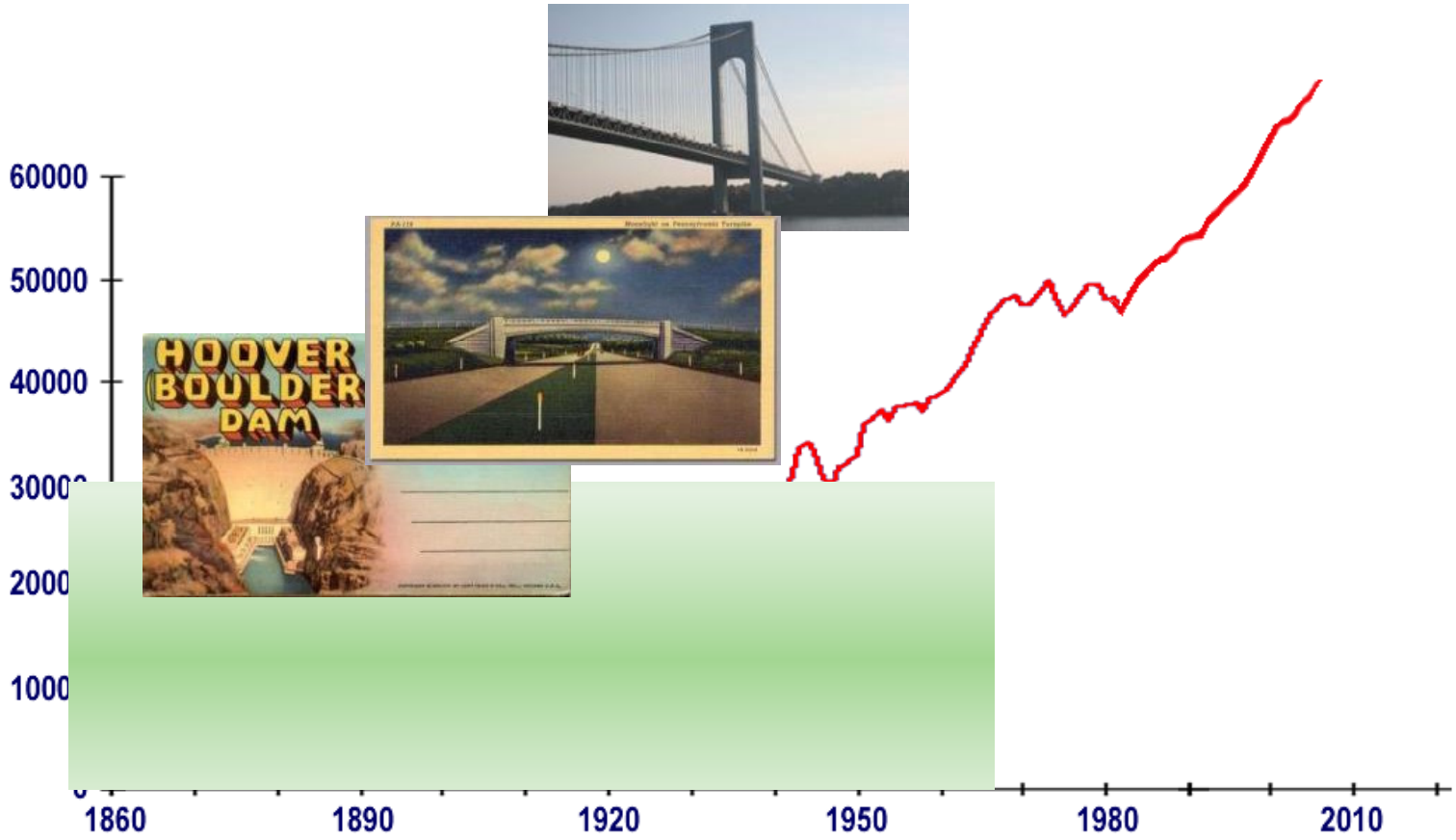
Infrastructure Investment Cycles



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

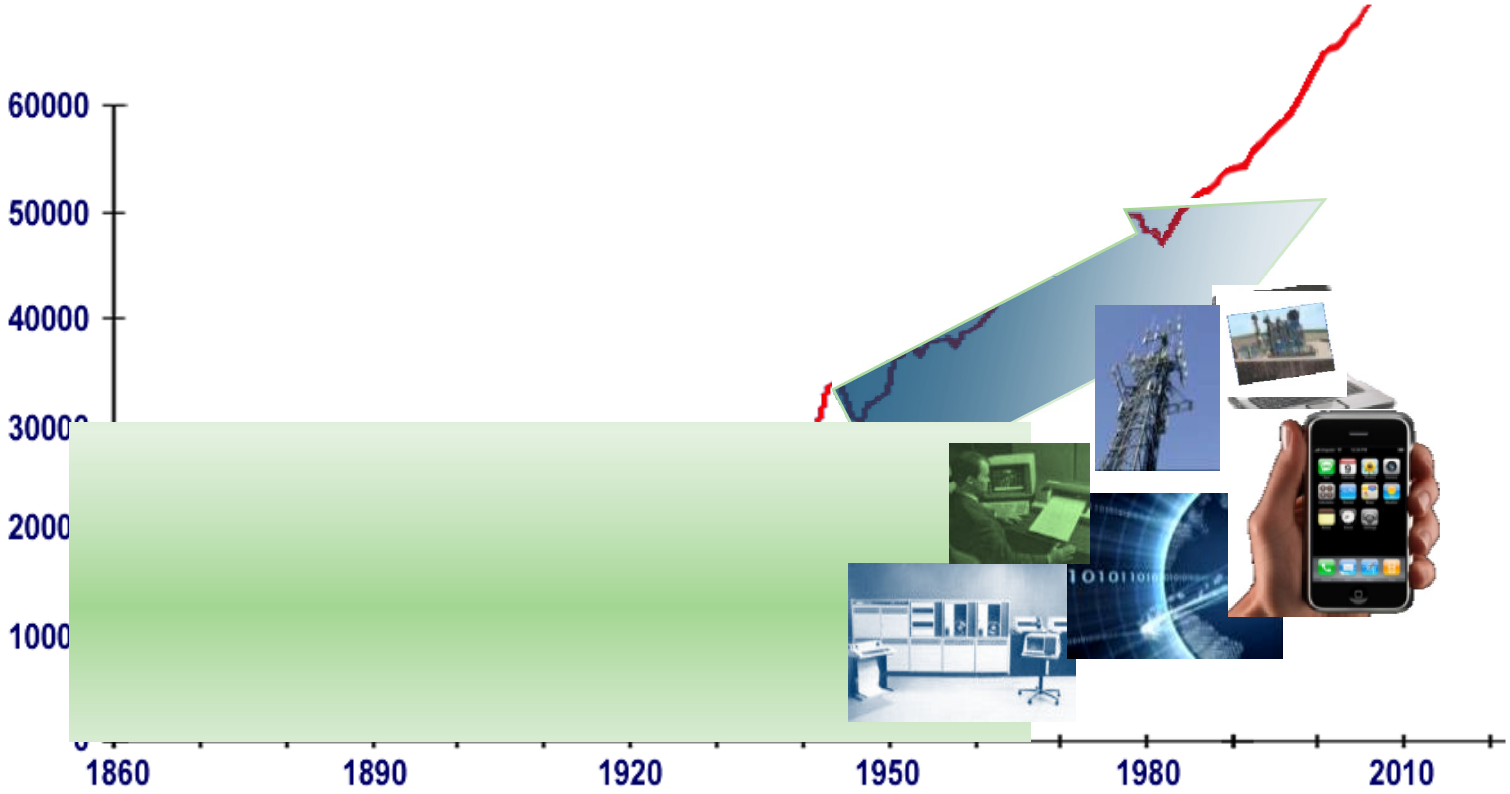
Physical Infrastructure Investment…



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

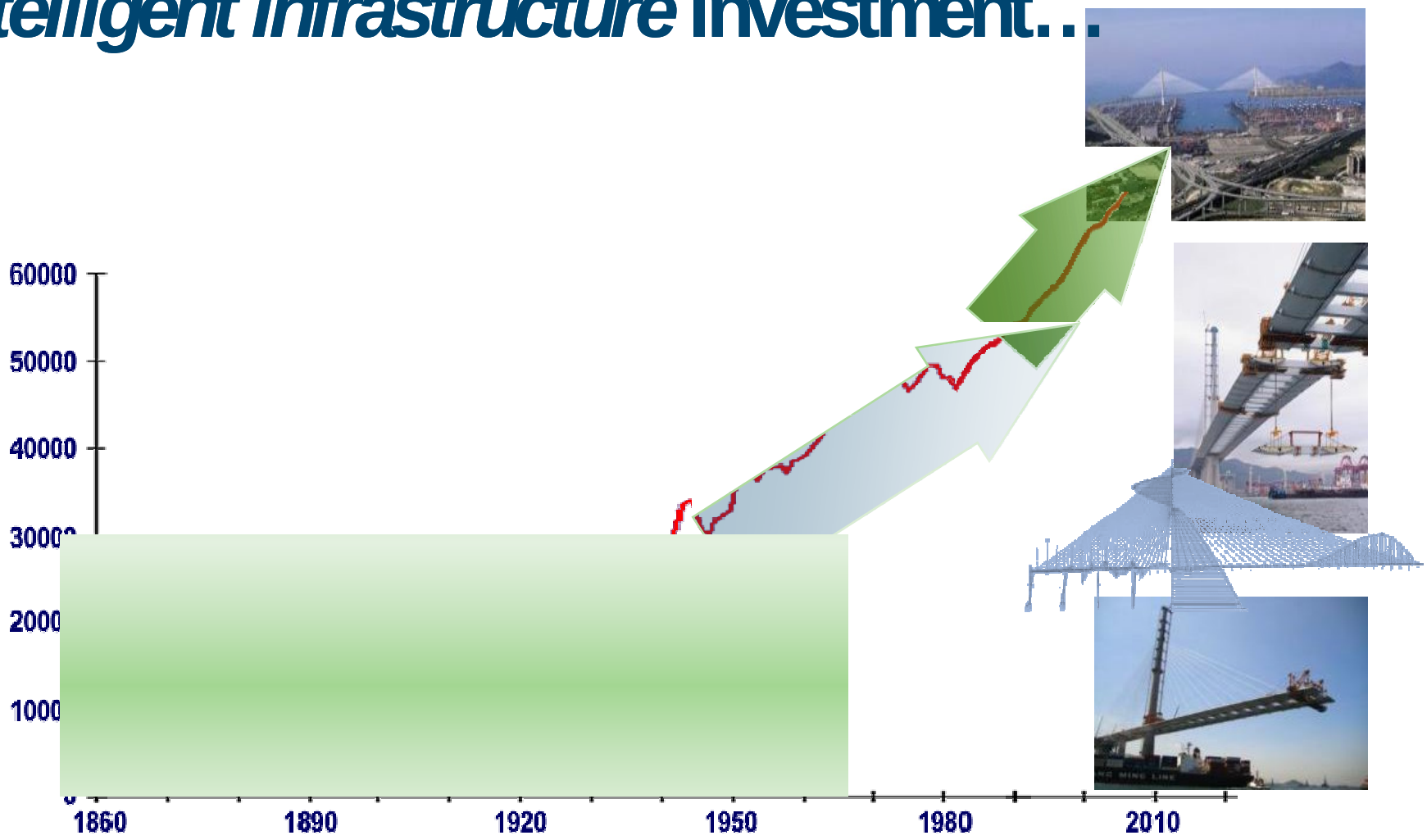
Virtual Infrastructure Investment…



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Intelligent Infrastructure Investment…



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Information Mobility Enablers…

Internet

Professional Workplace

(Virtual)

Project Workplace

(Physical)

Information Mobility Enablers…

Wireless

Professional Workplace

(Virtual)

Project Workplace

(Physical)

Information Mobility Enablers…

Professional Workplace

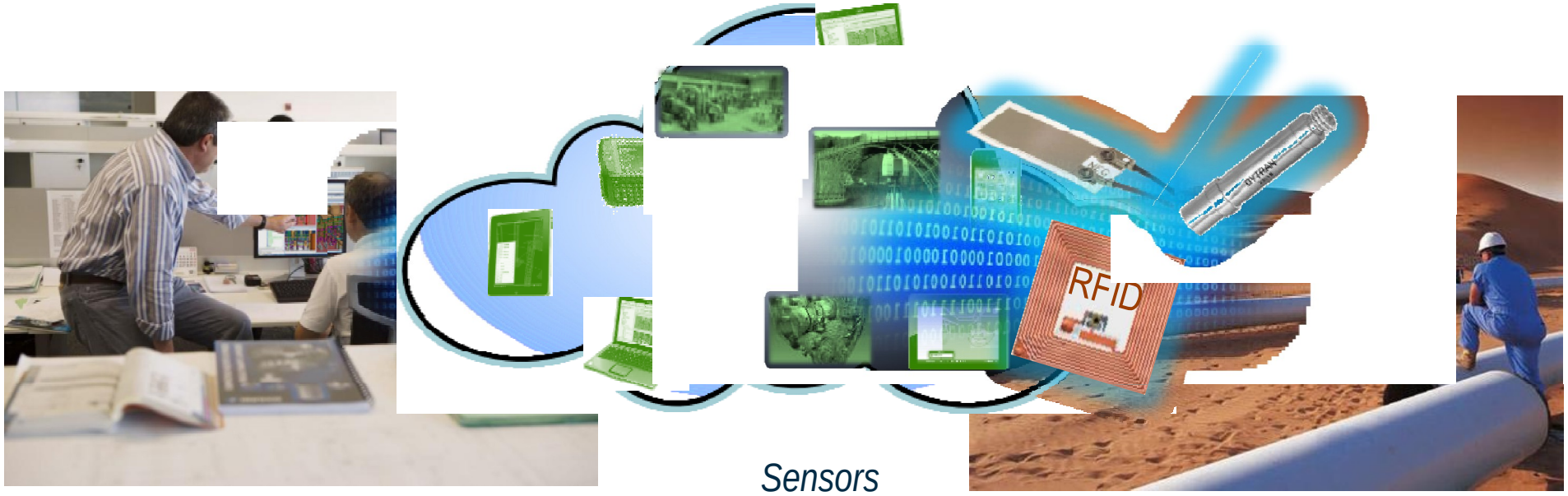
(Virtual)

Mobile Devices

Project Workplace

(Physical)

Information Mobility Enablers…



Sensors

Professional Workplace

(Virtual)

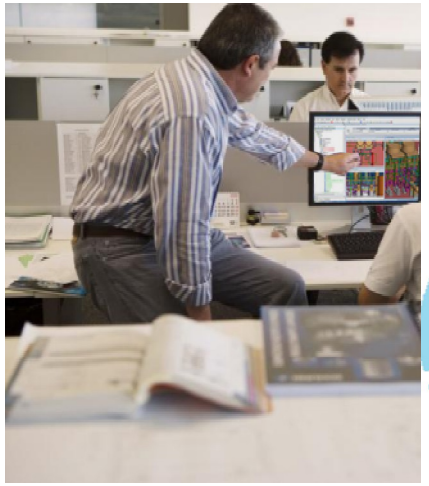
Project Workplace

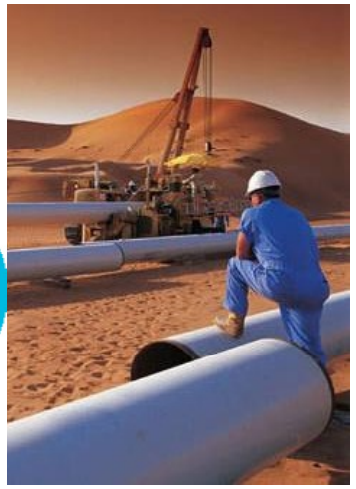
(Physical)

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Information Mobility Enablers…





Professional Workplace

(Virtual)

Ubiquitous Computing

Project Workplace

(Physical)

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Information Mobility Enablers…

Professional Workplace

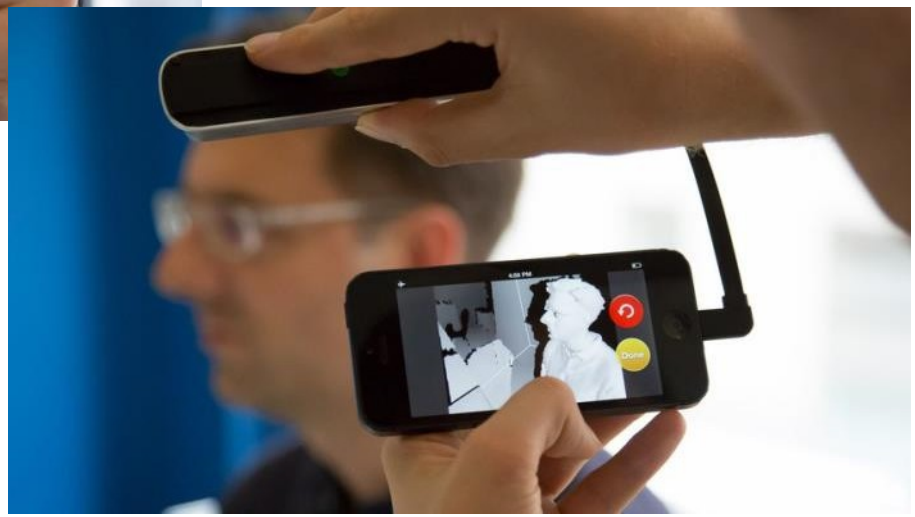
(Virtual)

3D Images

Project Workplace

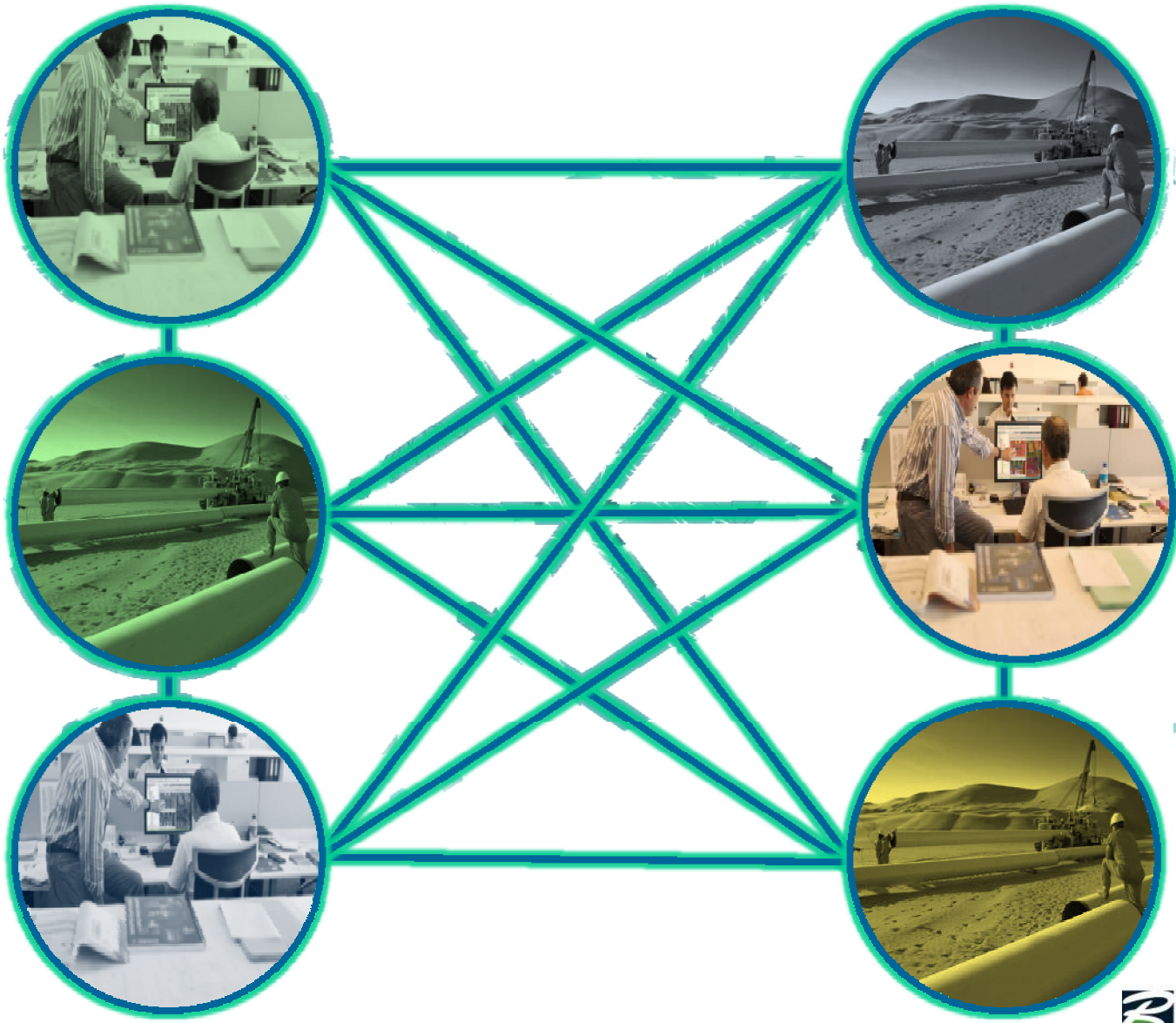
(Physical)

From *Consumerization* to…

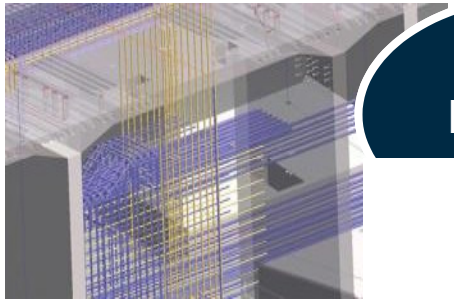


www.occipital.com

Industrialization (Globally)…!

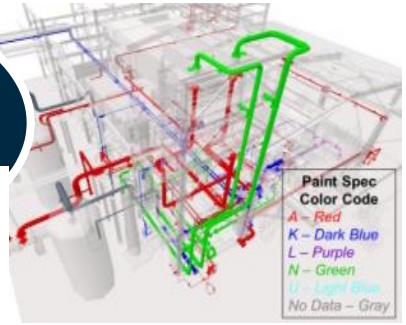


Infrastructure (Information) Lifecycle



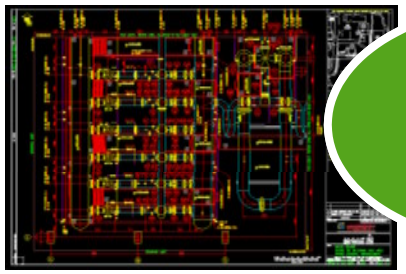
Fabrication

Work Packaging



Simulatio

ormance
agement



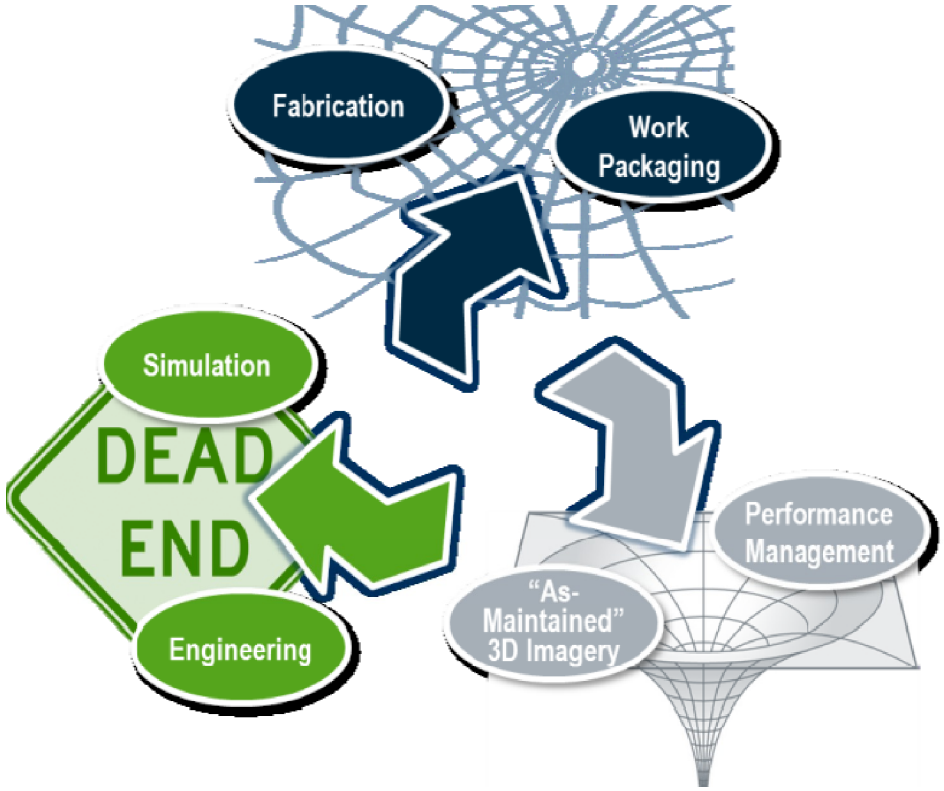
Engineering

"As-Maintained" 3D Imagery

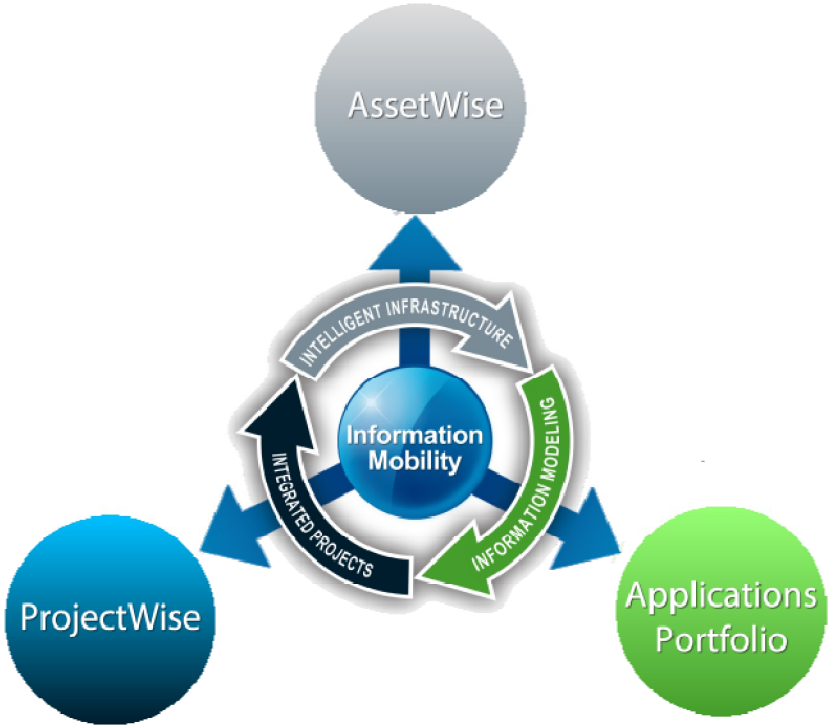
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Information *Mortality*



Information *Mobility*



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

U.K. "GeoSmart" Government Goals

"The initial estimated savings to UK construction and its clients is **£2bn pa** through the widespread adoption of BIM and is therefore a significant tool for Government to reach its target of **15-20% savings on the costs of capital projects by 2015.**"

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

UNCLASSIFIED

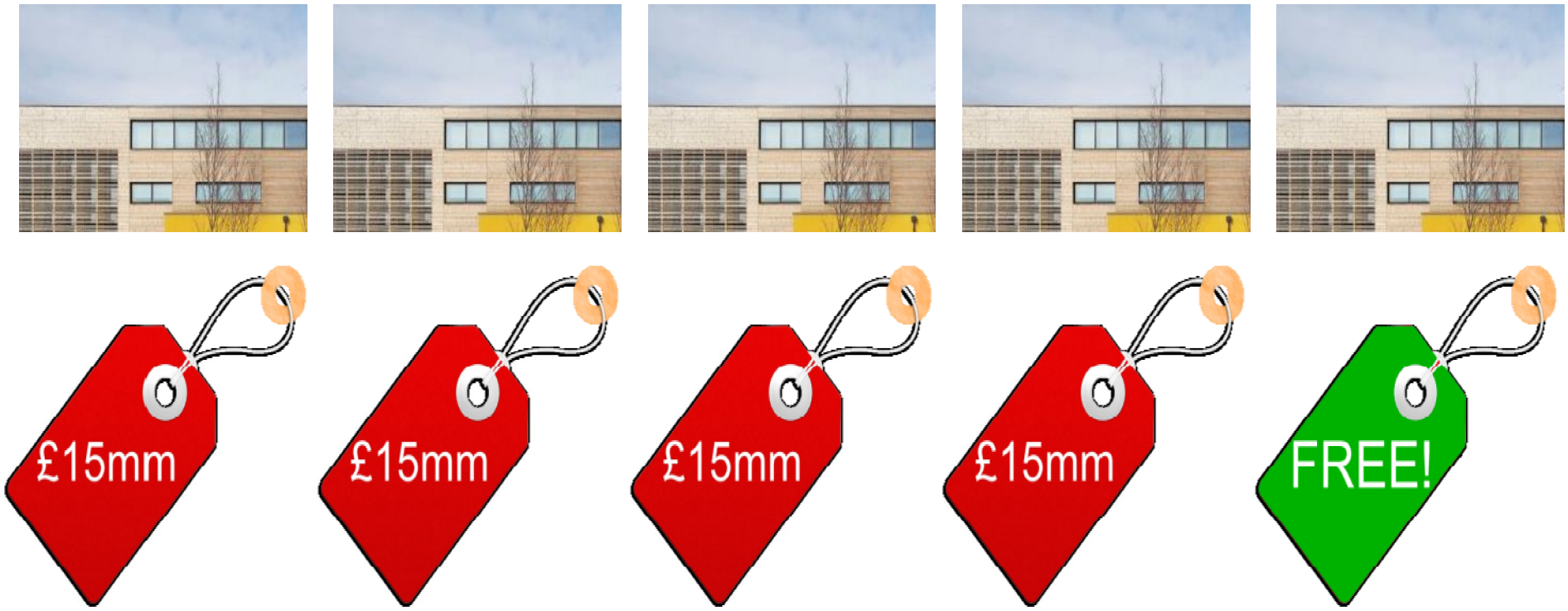
HM Government

CONSTRUCTING EXCELLENCE in the built environment

Trial project: Cookham Wood	New delivery model / procurement route: Two Stage Open Book
Cost savings achieved: 20%	
Other key benefits achieved: Cost and programme certainty, innovation and reduced prospective operating costs	

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure



MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

2016 U.K. BIM (Government) Mandate

2 Strategy Objectives

Modelling (BIM). This will be a phased process working closely with industry groups, in order to allow time for industry to prepare for the development of new standards and for training.

2.32 Government will require fully collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016. A staged plan will be published with mandated milestones showing measurable progress at the end of each year.

Fiatech Award Presented to *Her Majesty's Government* and *UK Construction Industry*

Mark Bew
Chairman
HM Government
BIM Working Group

David Philp
Head of B.I.M. Implementation
at Cabinet Office
Head of BIM, Mace

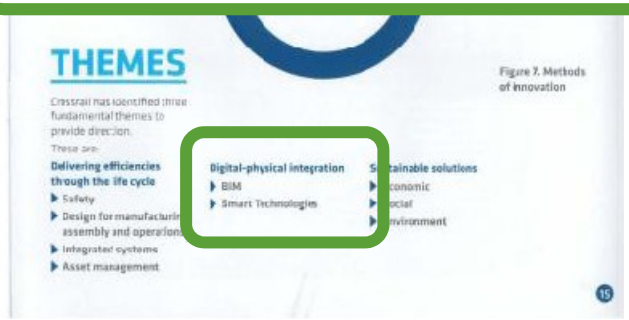
Fiatech™

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Crossrail Leads the Way…

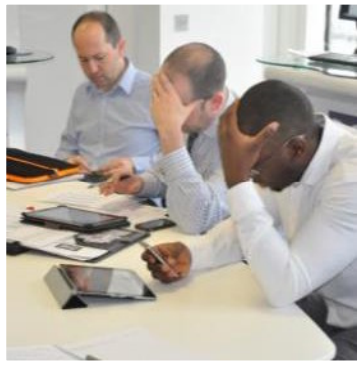
Digital-physical integration
- BIM
- Smart **technologies**

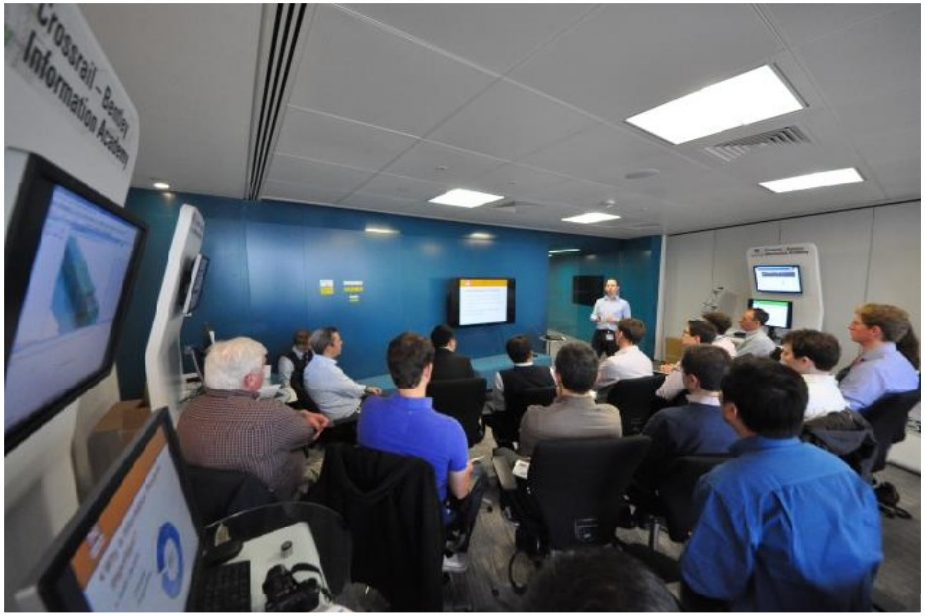


MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Bentley / Crossrail *Academy*…





Visited by:

Netherlands
Italy
Germany
Greece
Russia
Wales
South Africa
Australia
China
Canada
U.S.

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

(GeoSmart) Government Leadership…

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

(GeoSmart) Government Leadership…

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

(GeoSmart) Government Leadership…

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

(GeoSmart) Government Leadership…

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

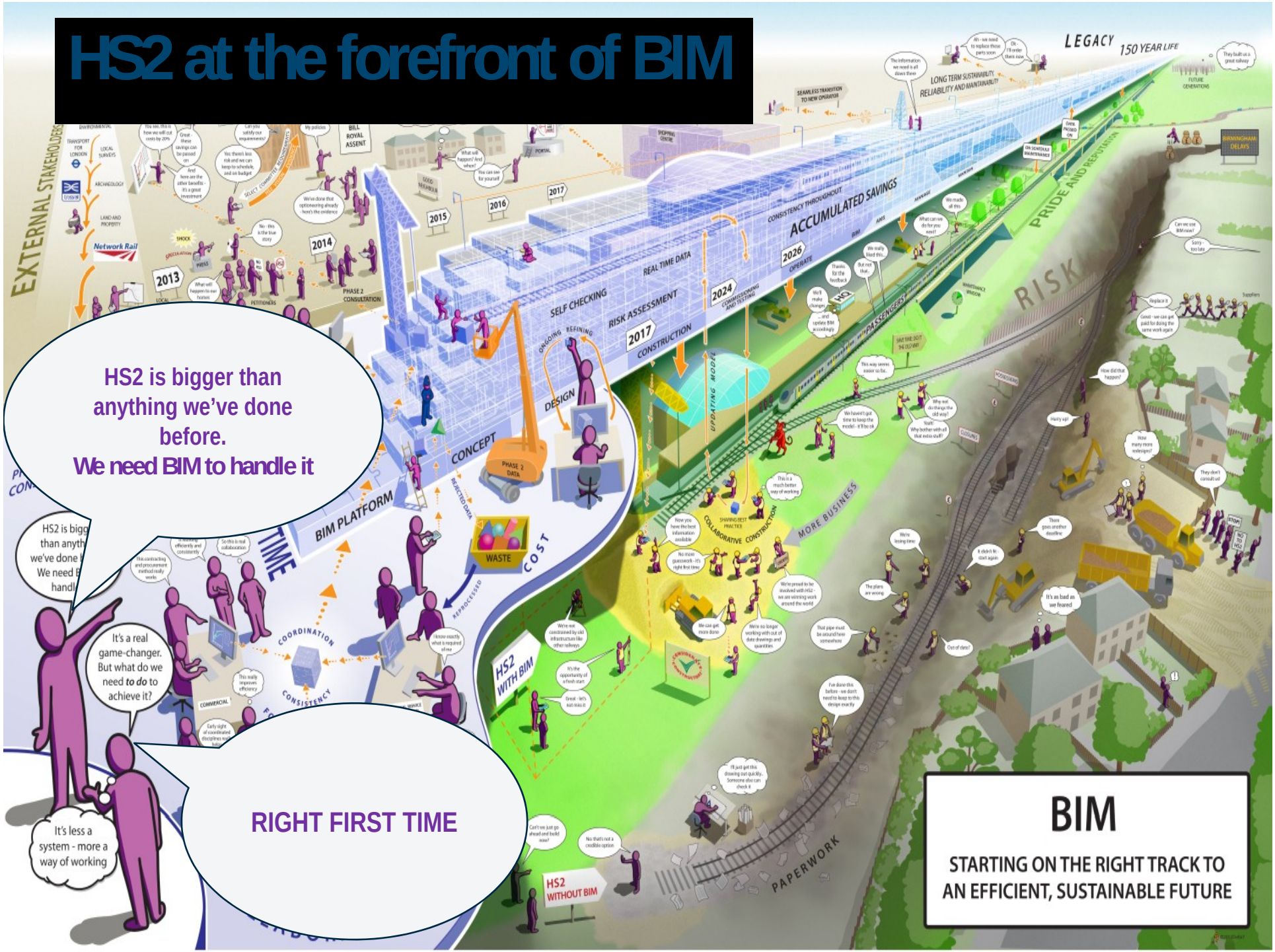
(GeoSmart) Government Leadership…

hs2 High Speed 2

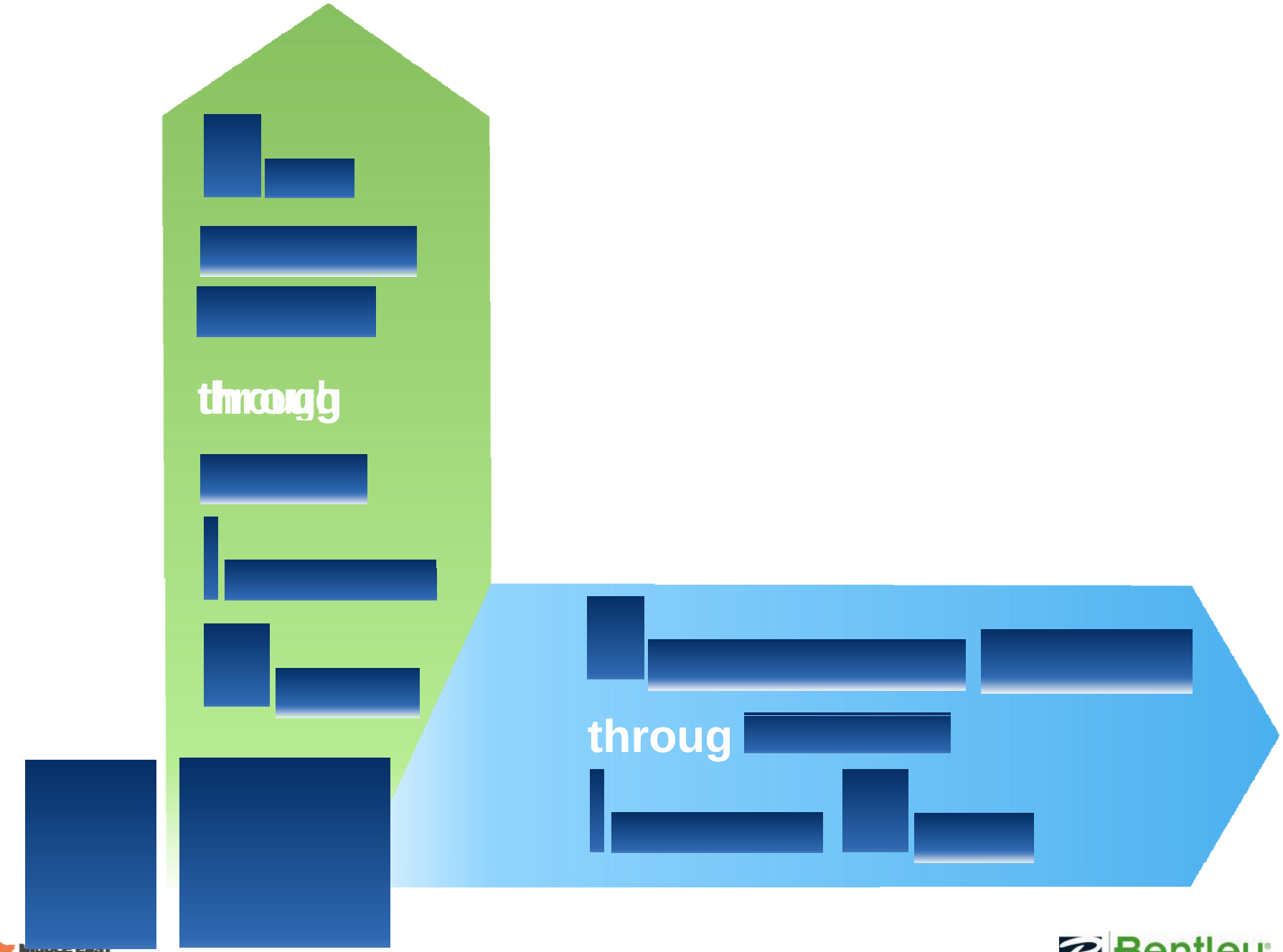
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

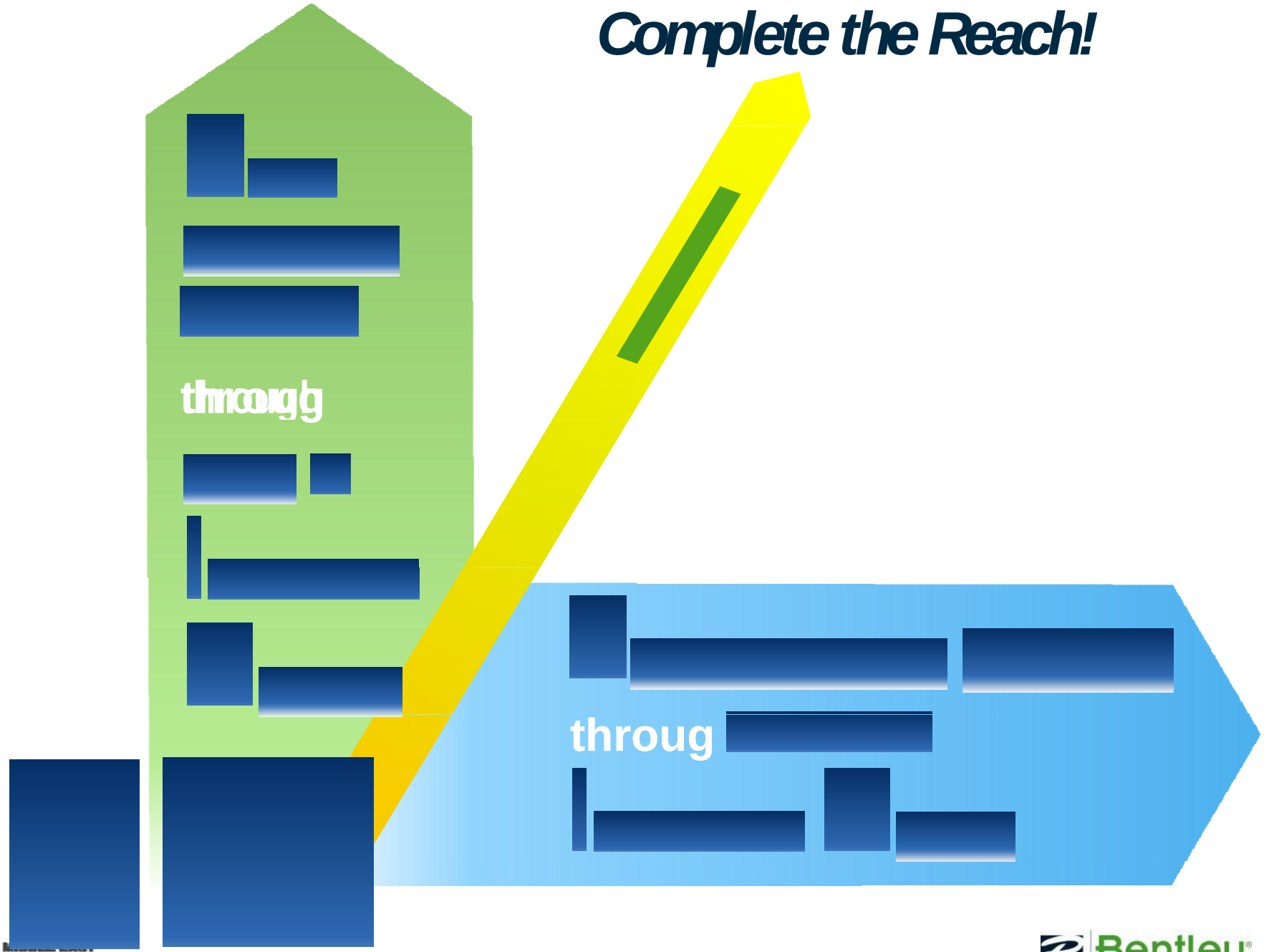
HS2 at the forefront of BIM

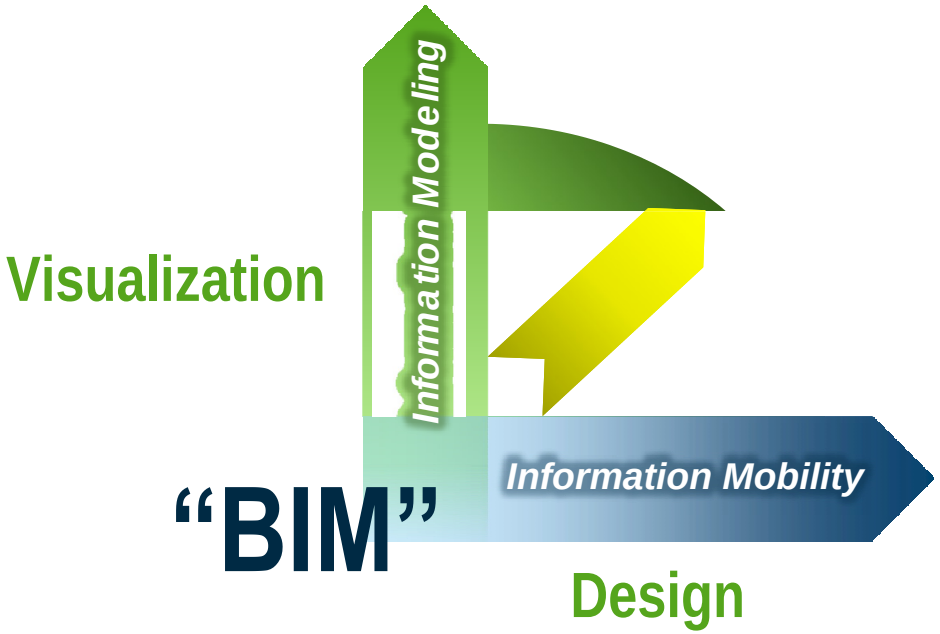


Evolving Directions of Geospatial Technology



Complete the Reach!

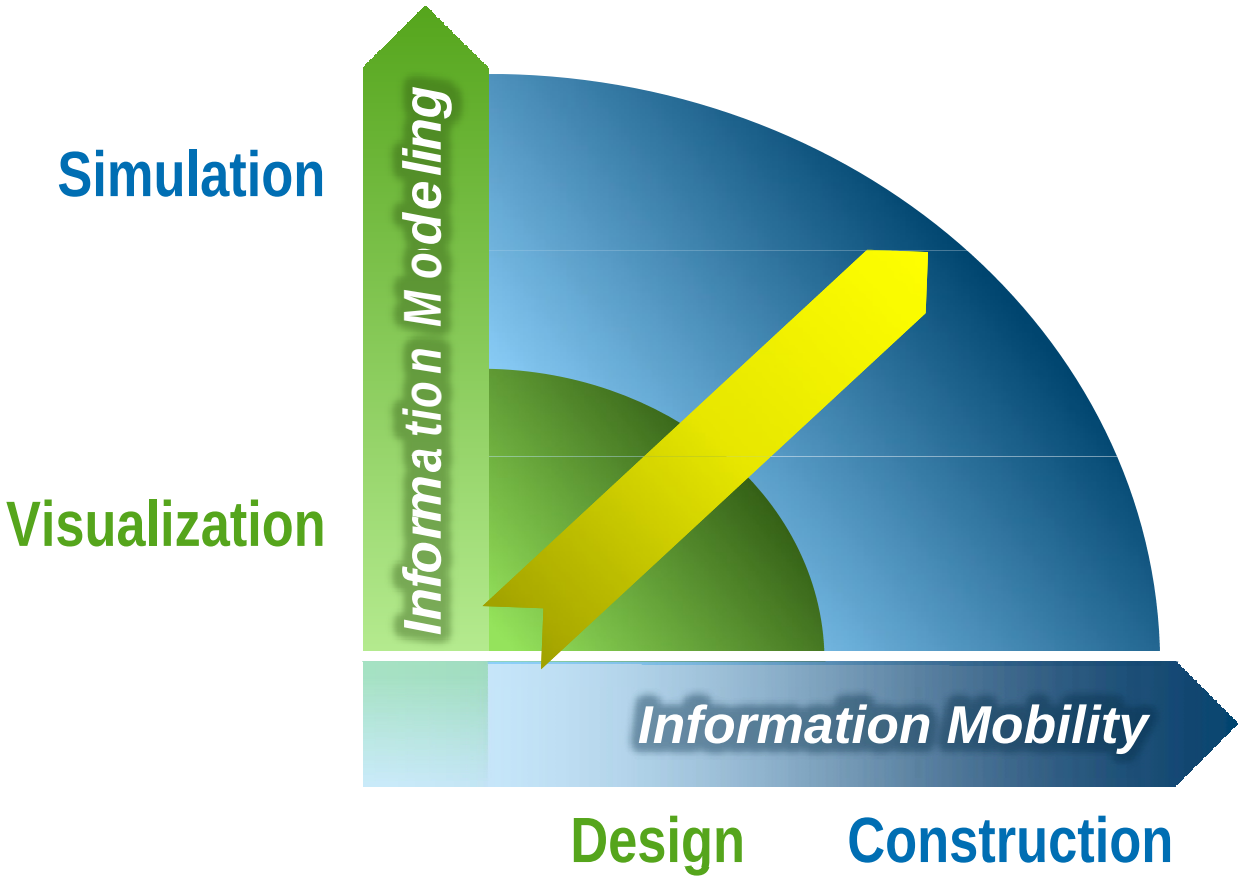


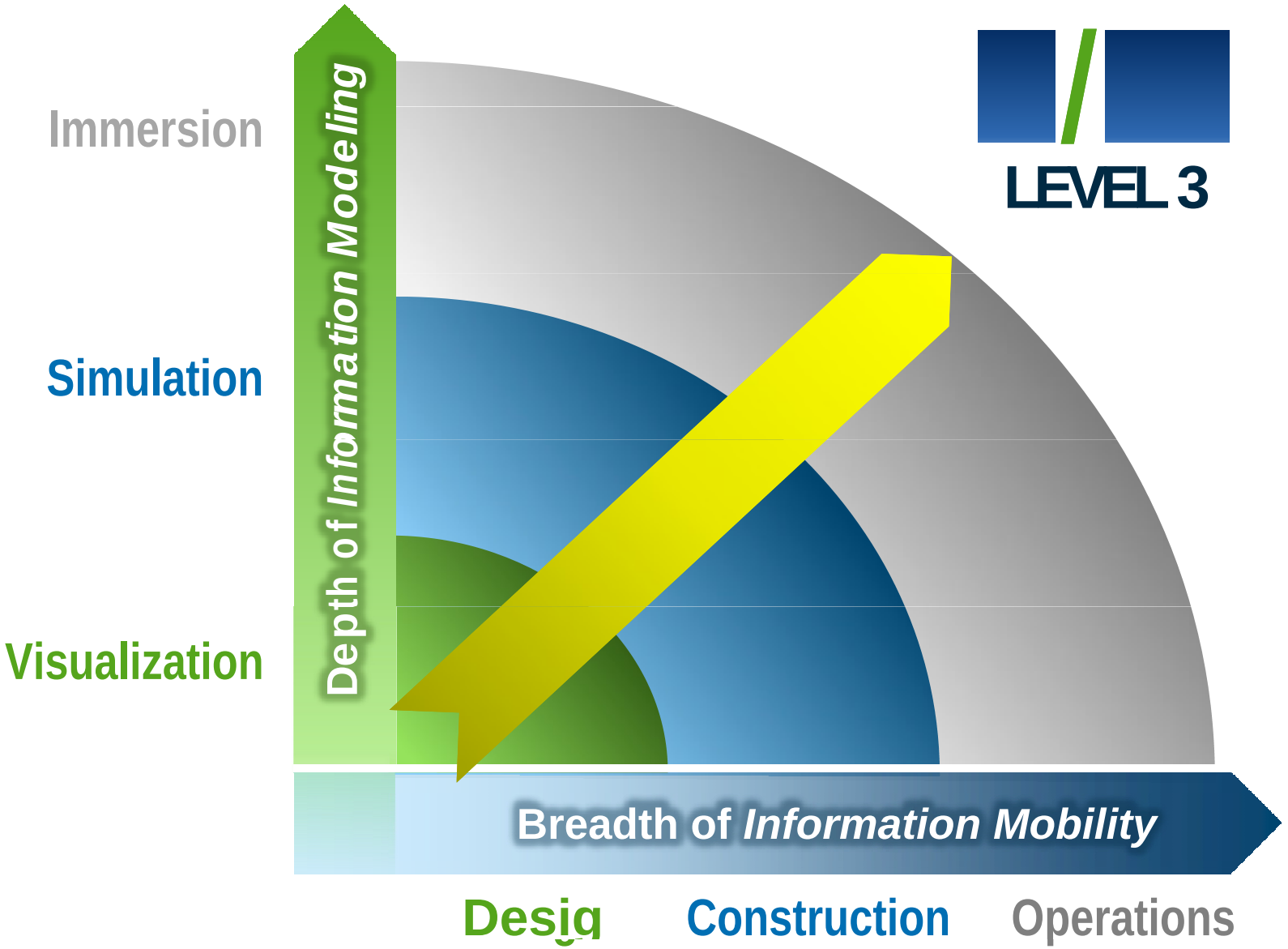


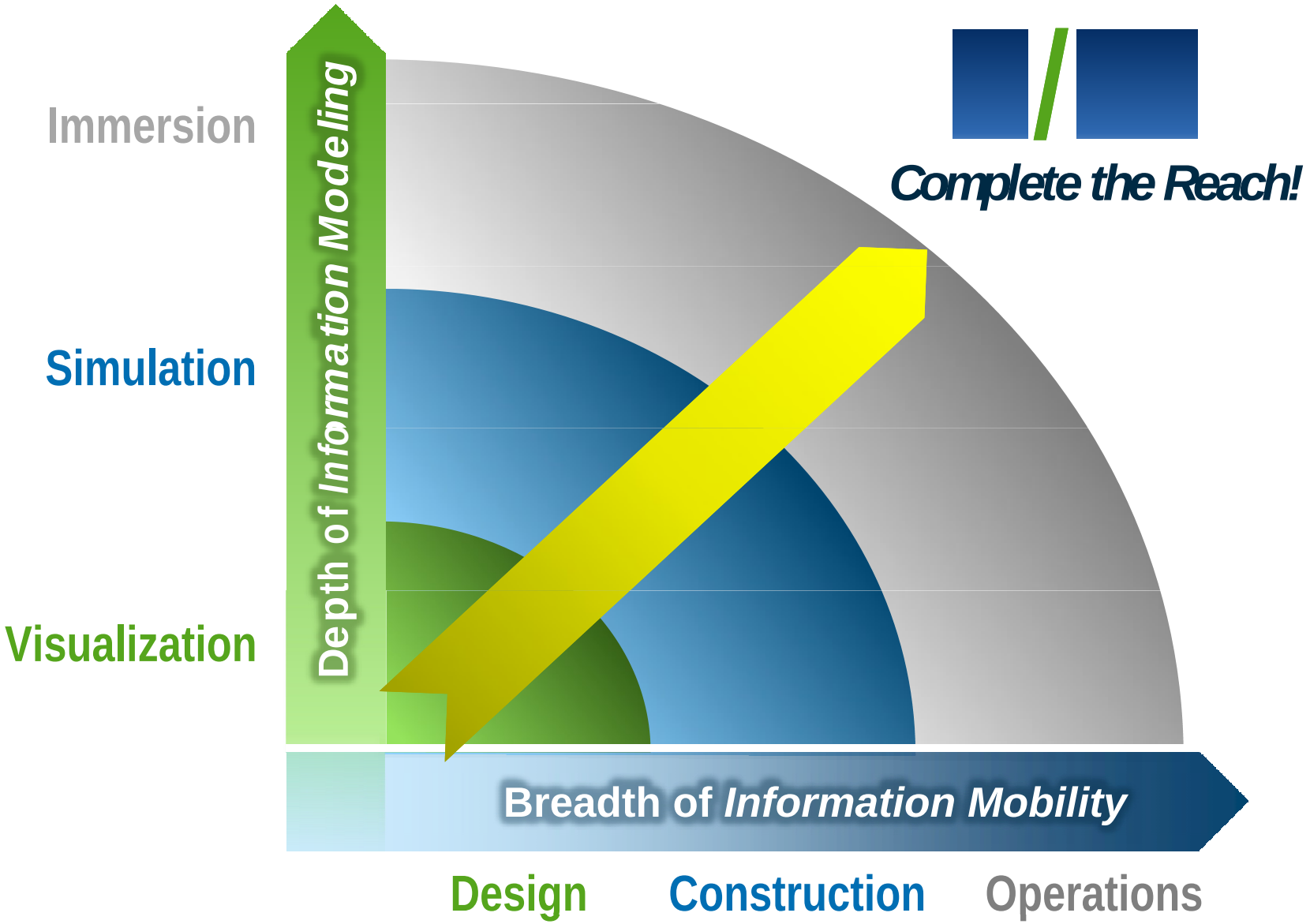
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

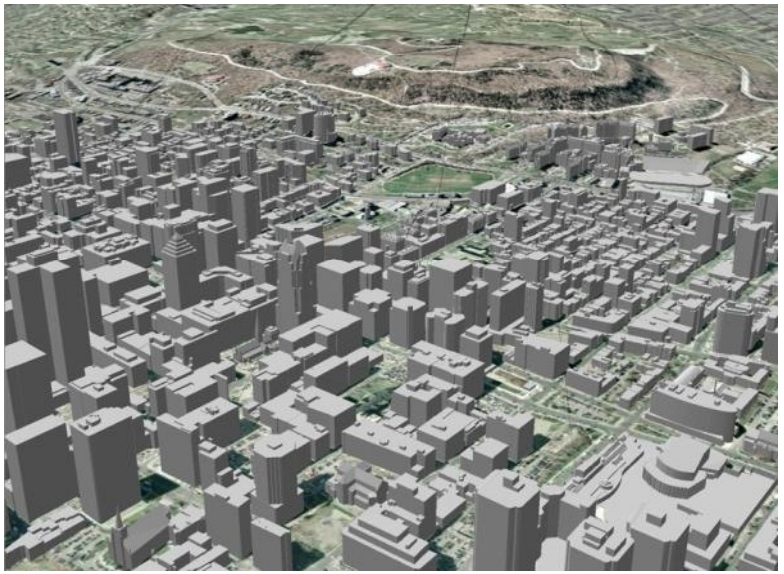
LEVEL 2

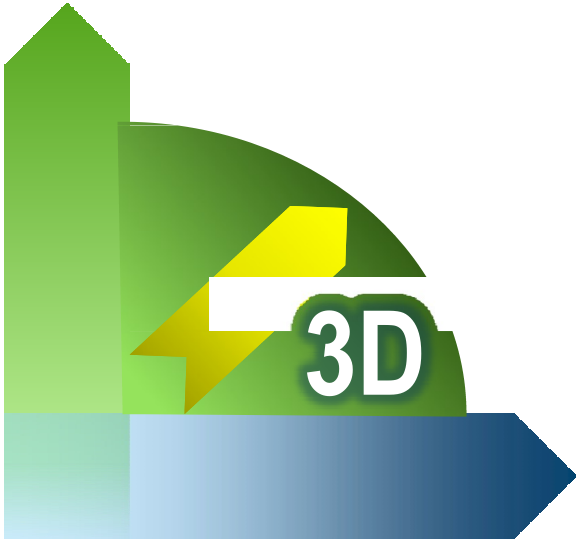






Evolving *Geospatial* Reach…





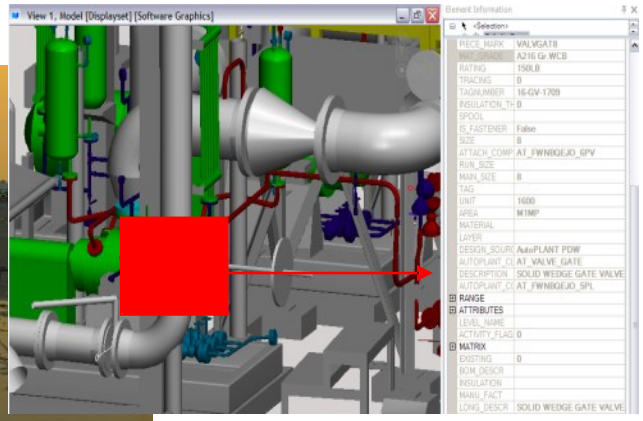
Level 1

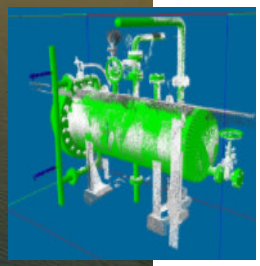
MIDDLE EAST GEOSPATIAL FORUM

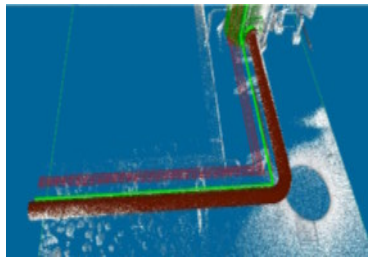
Bentley Sustaining Infrastructure

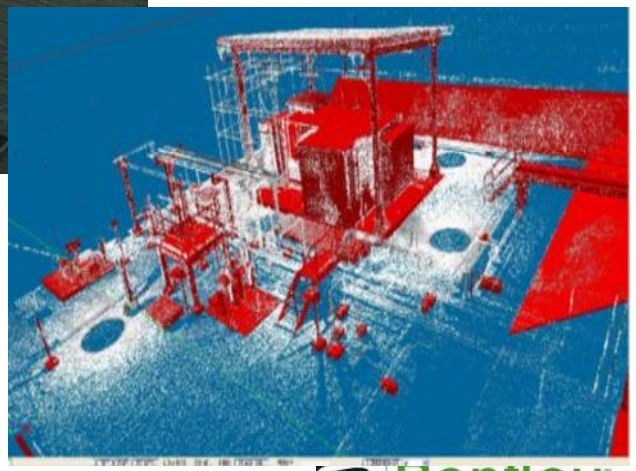
Evolving *Geospatial* Reach: *3D*

2011 *Be Inspired* Winner









Creation of Intelligent 3D As-Built Models Using Laser Scanning

Qatar Petroleum

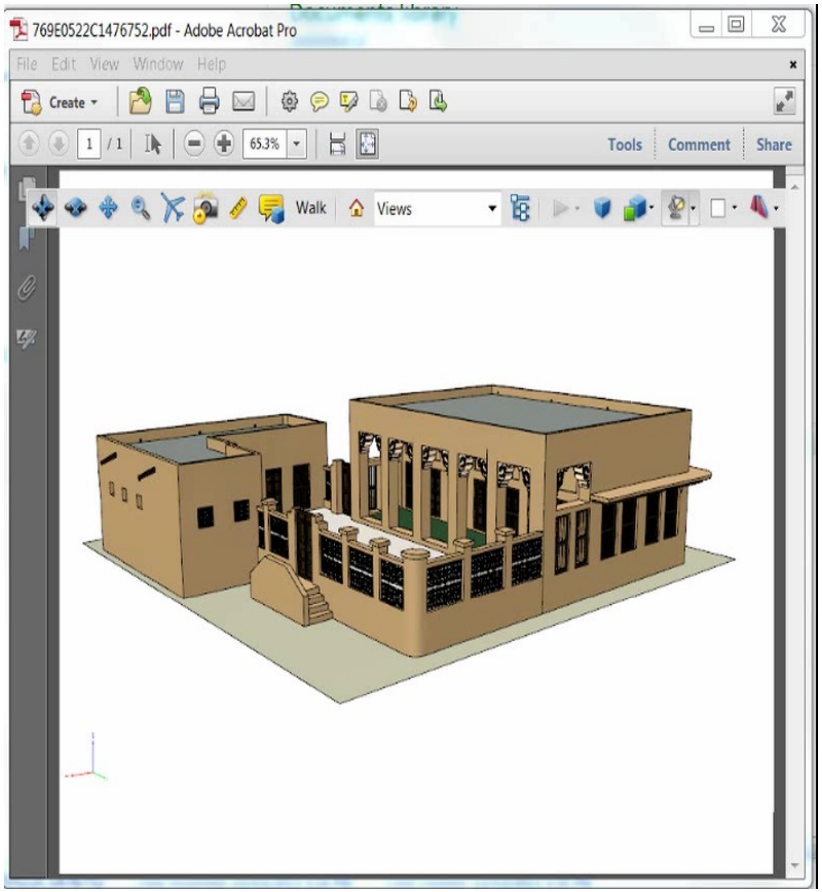
Offshore, **Qatar**

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Evolving *Geospatial* Reach: *3D*

2013 *Be Inspired* Nominee



Laser Scanning and Point-cloud Processing of Dubai Heritage Buildings

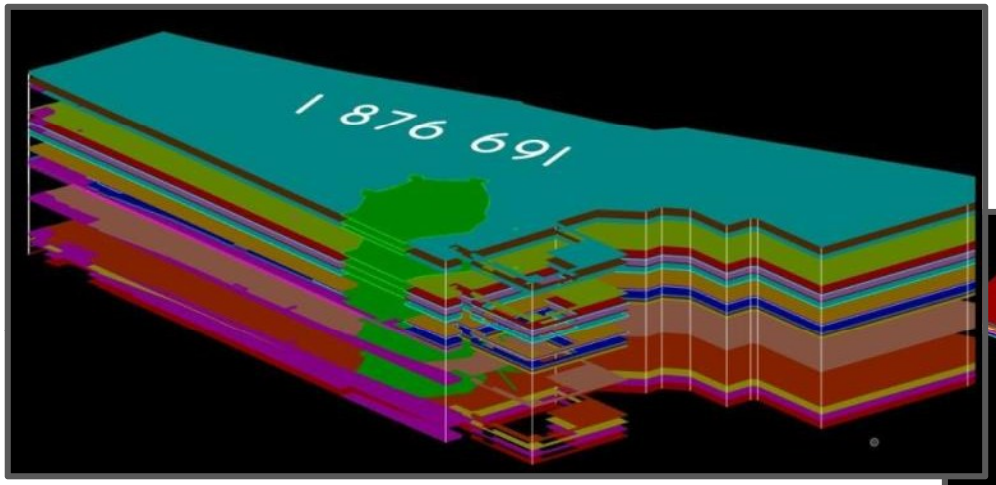
3Deling

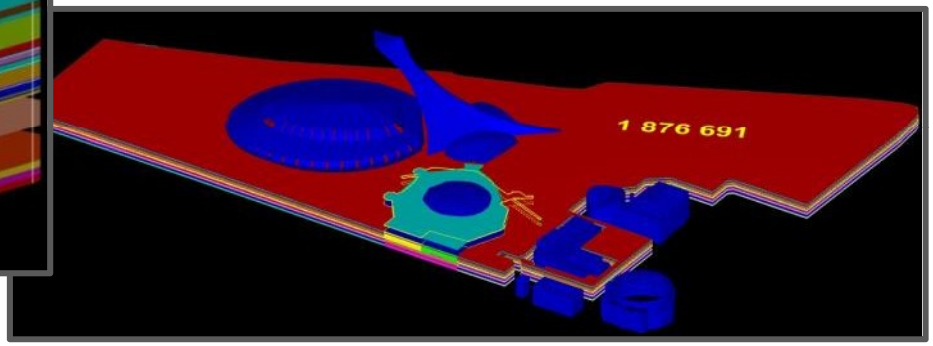
Dubai, **U.A.E**

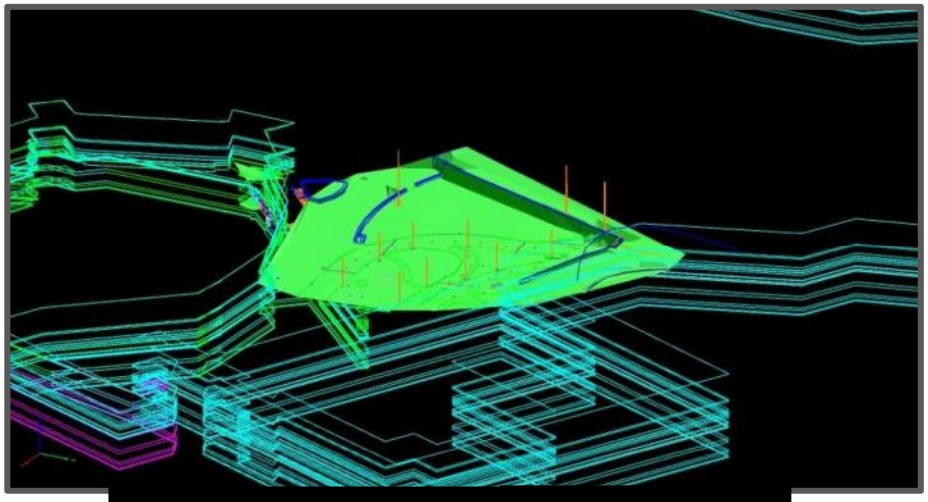
MIDDLE EAST GEOSPATIAL FORUM

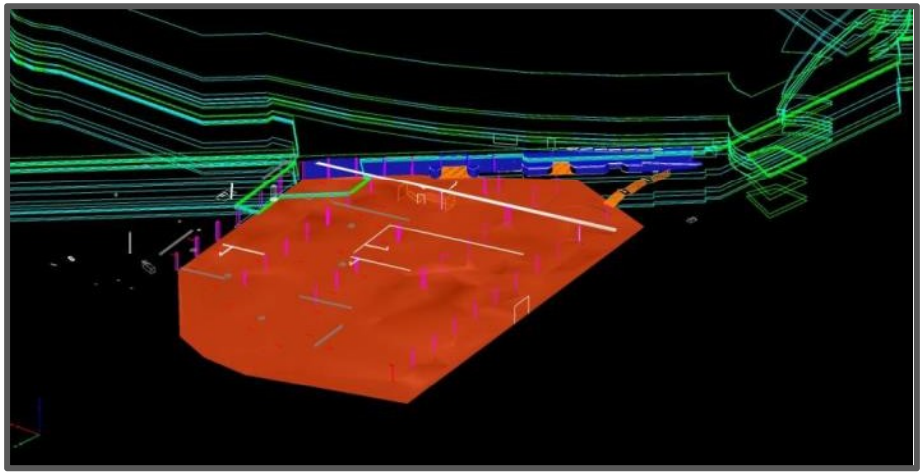
Bentley Sustaining Infrastructure

Evolving *Geospatial* Reach: *3D Cadastre*





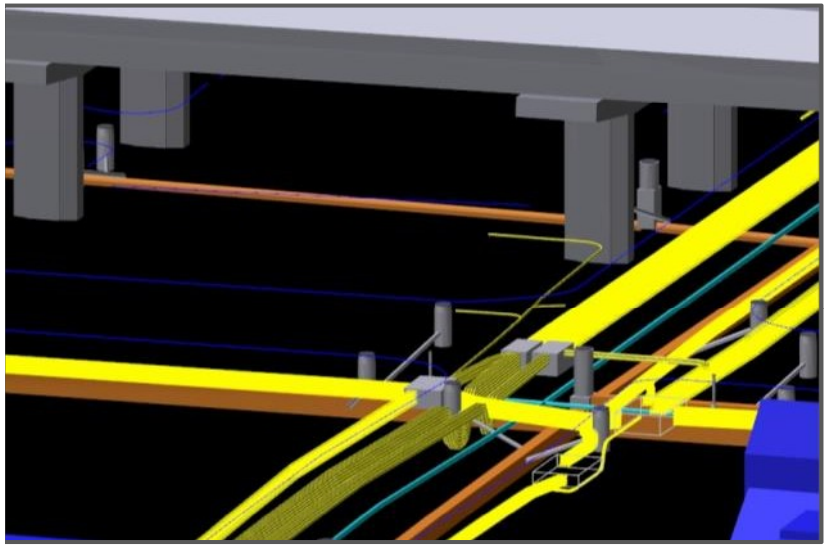


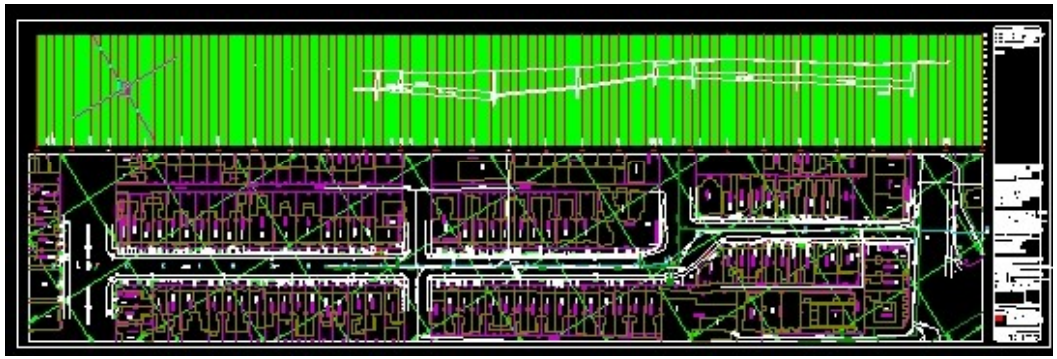


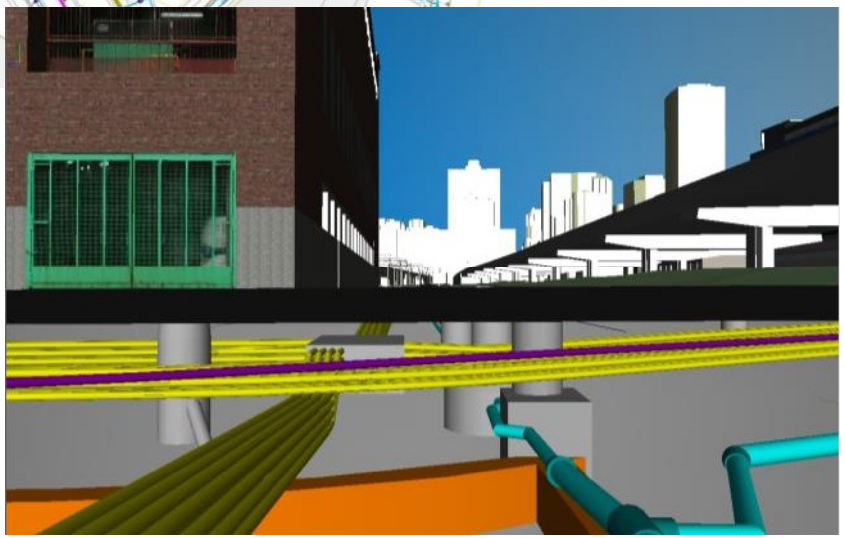
Data Provided by City of

Bentley Sustaining Infrastructure

Evolving Geospatial Reach: *3D Subsurface*





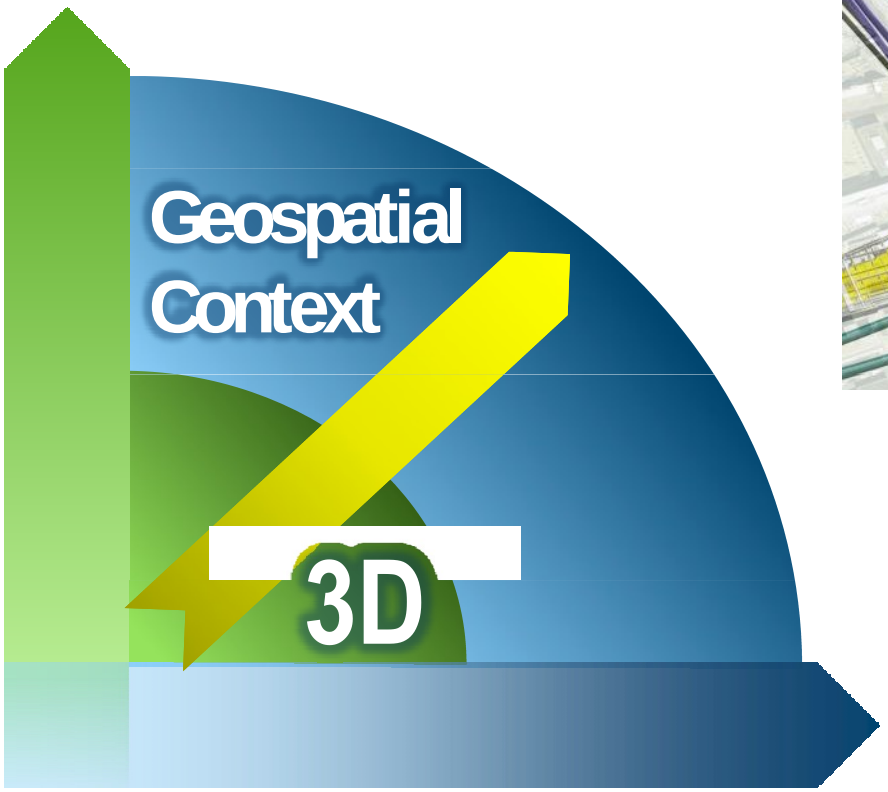


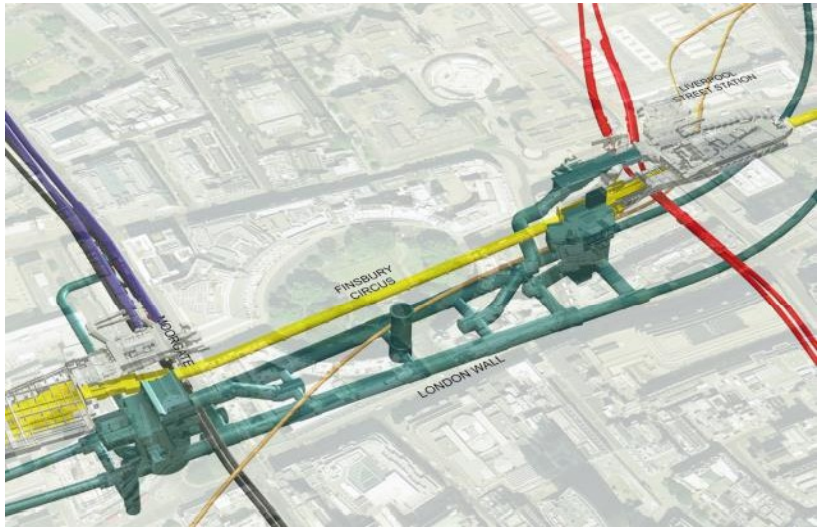
Data Provided by City of

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Evolving *Geospatial* Reach…

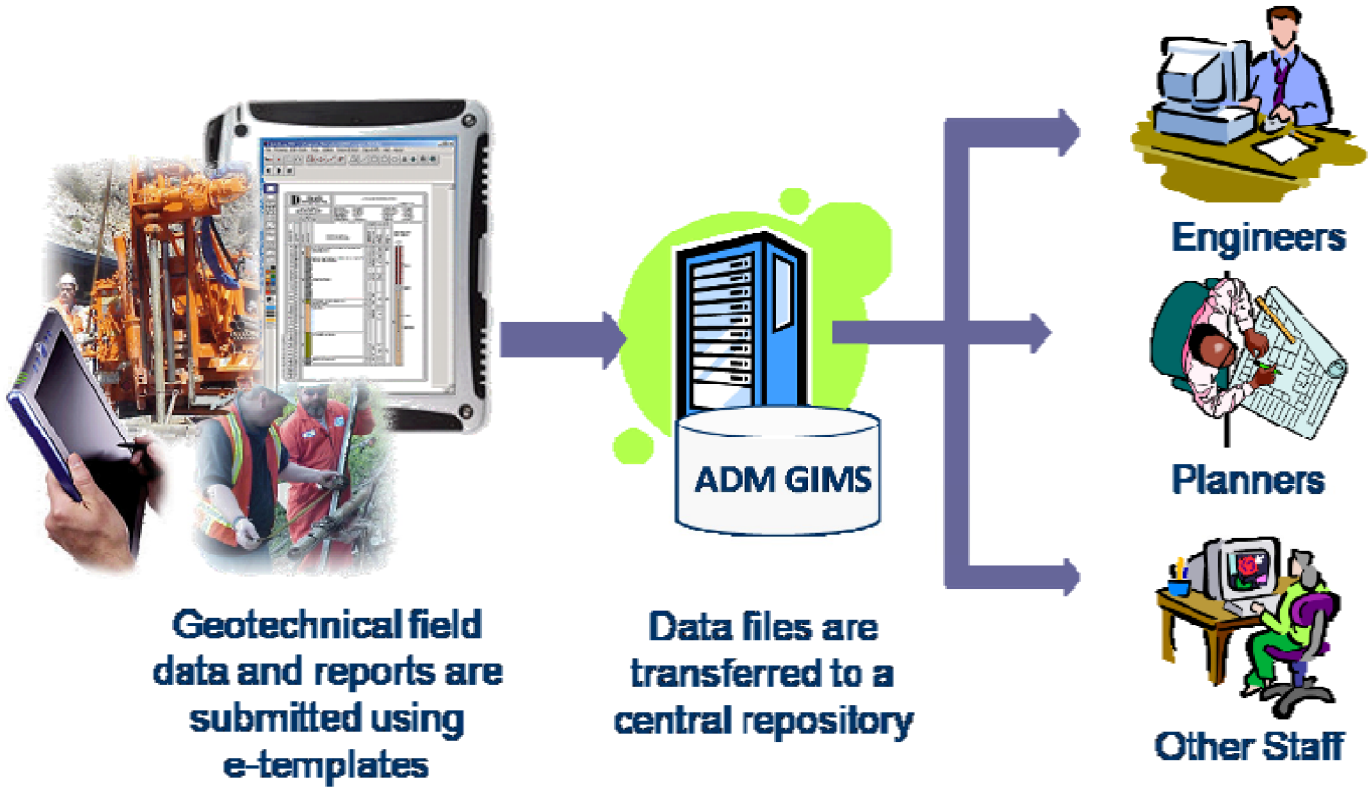




Evolving *Geospatial* Reach: *Geospatial Context*

بلدية مدينة أبو ظبي
MUNICIPALITY OF ABU DHABI CITY

2013 *Be Inspired* Nominee



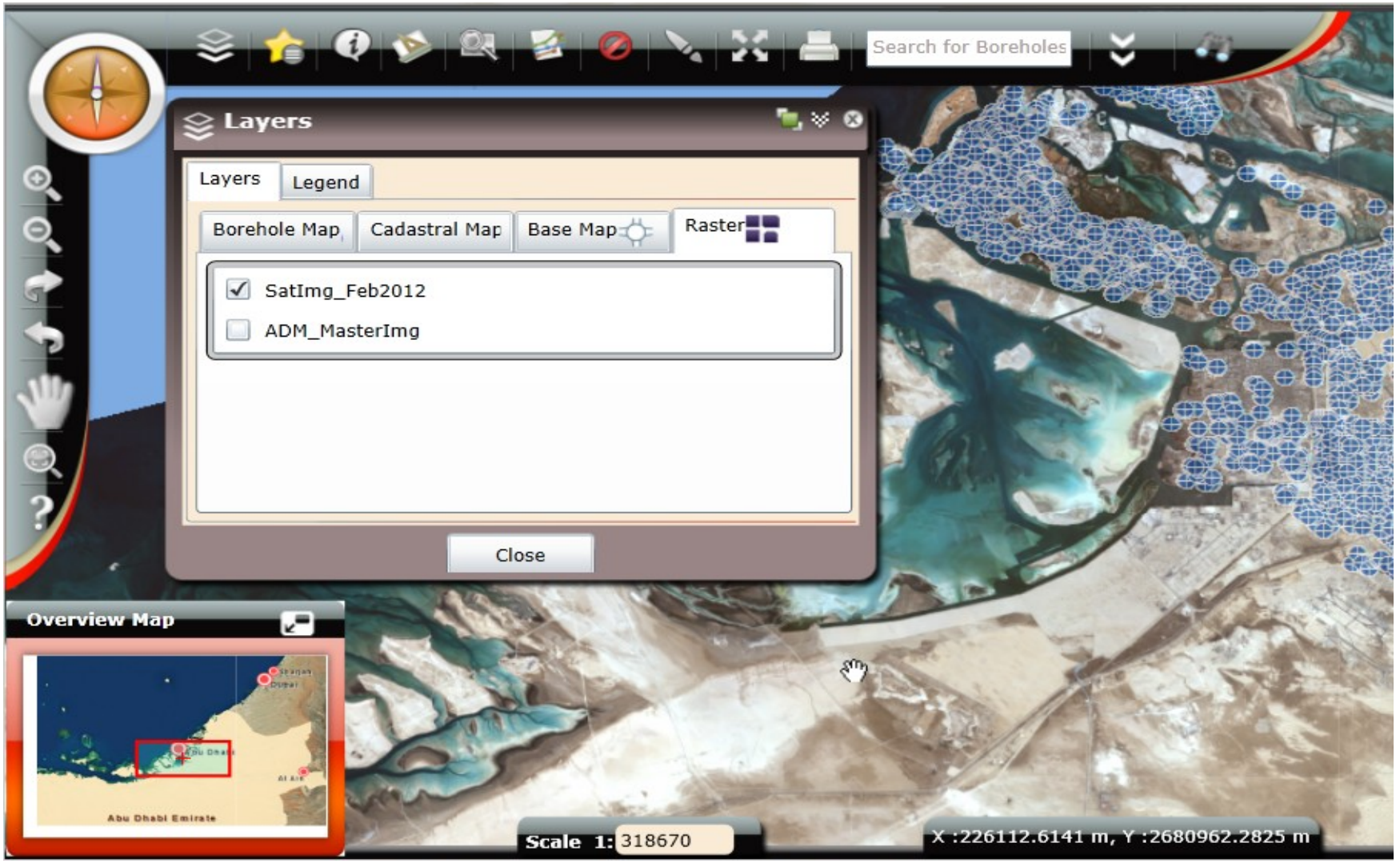
Geotechnical Information Management System (GIMS)

Municipality of Abu Dhabi City.

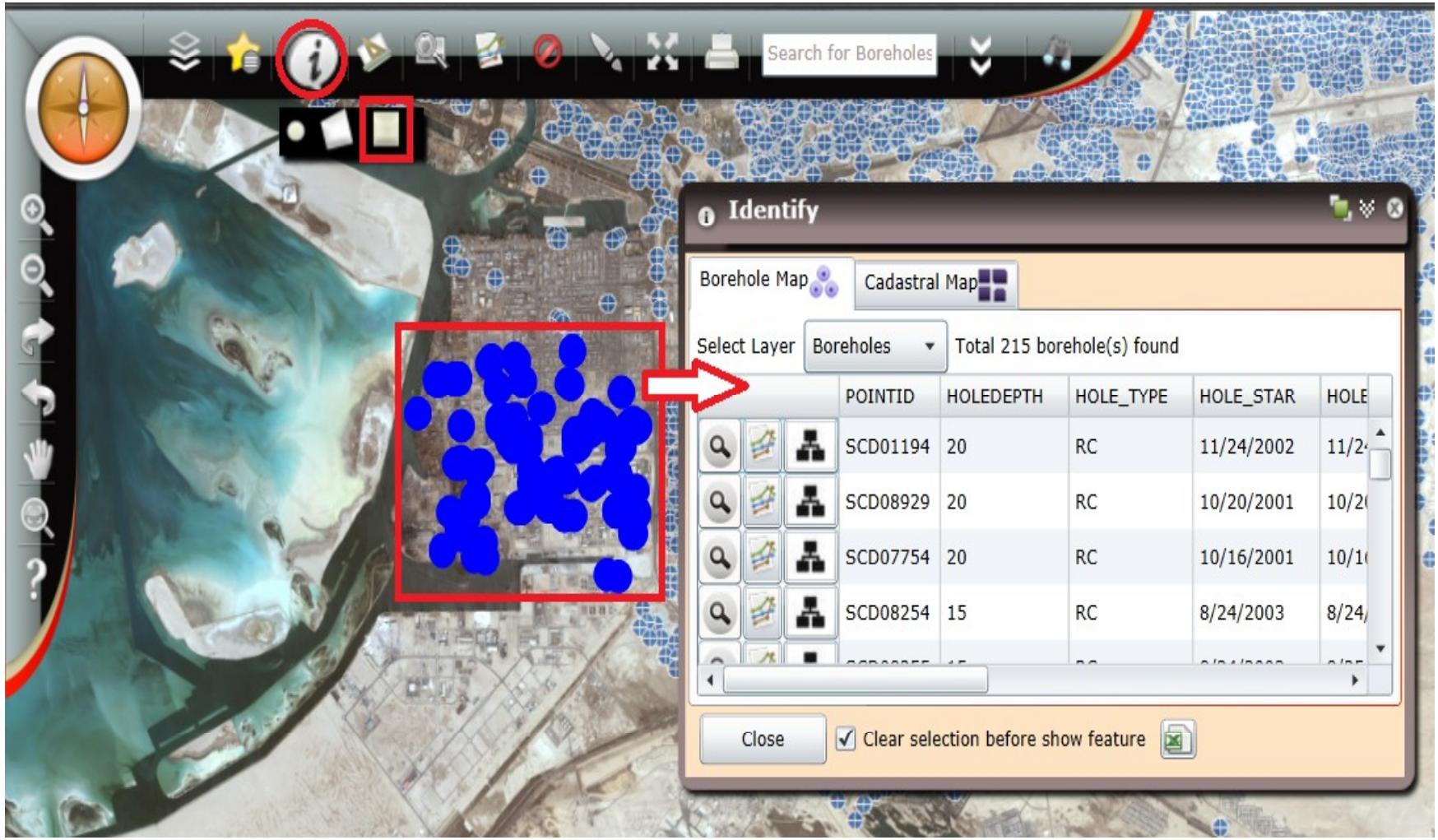
Abu Dhabi, **UAE**

1- User Friendly Application
2- Can be accessed through intranet and internet

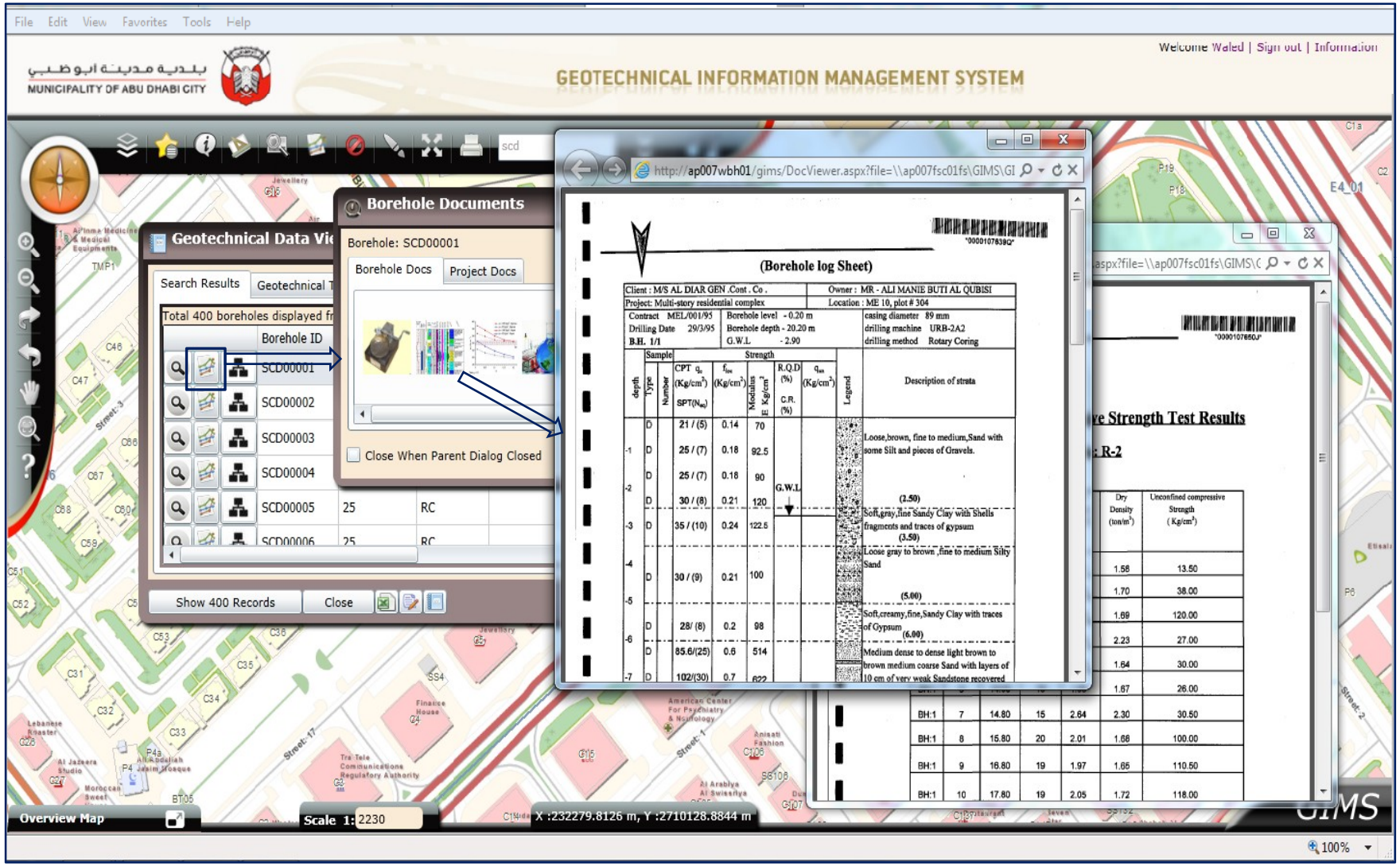
3- Dynamic GIS Layers Addition



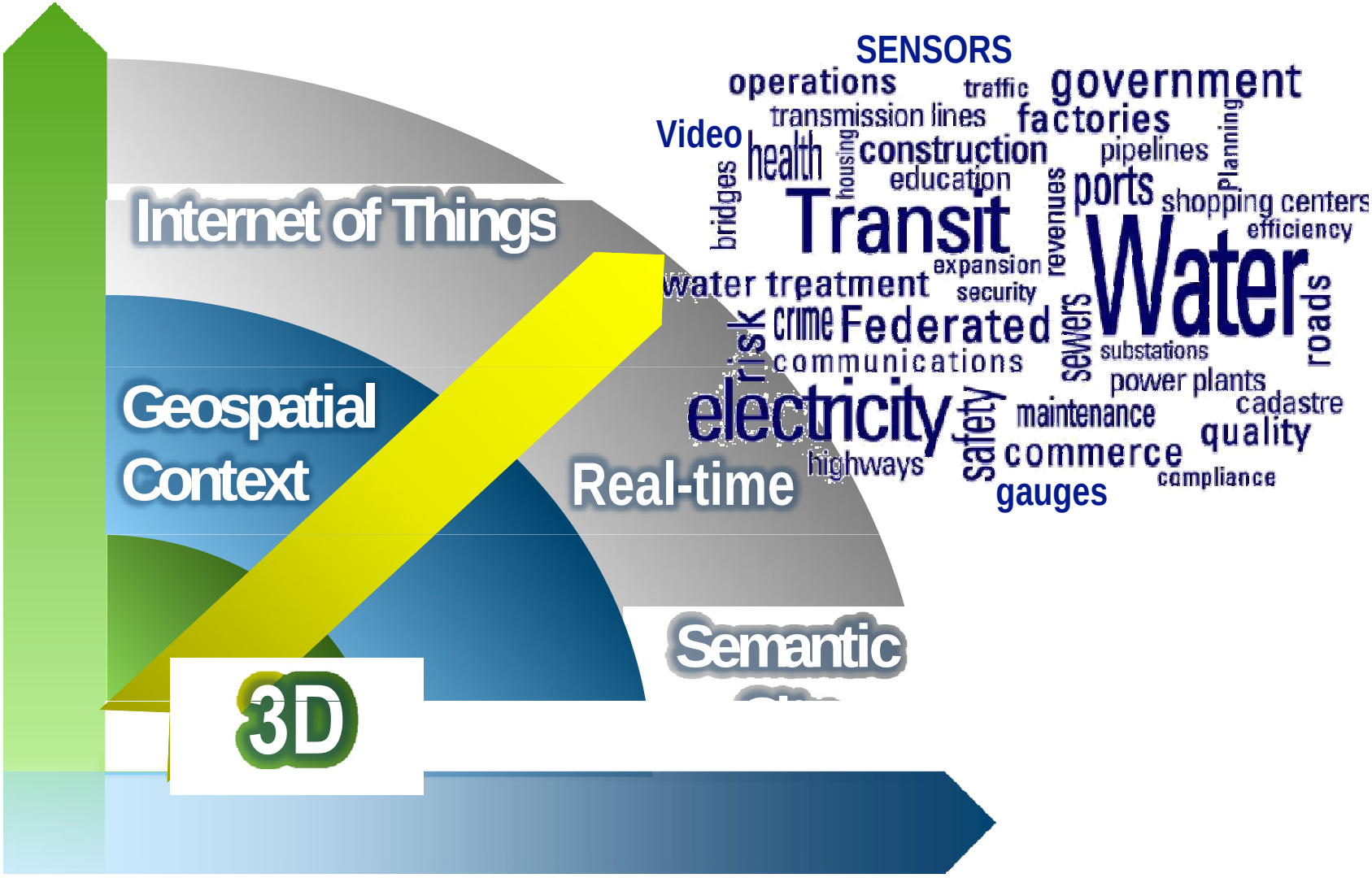
4- Identify Tool to extract boreholes' data and maps details



7- Access and Save original borehole documents from Web Application



Evolving *Geospatial* Reach: *Internet of Things*

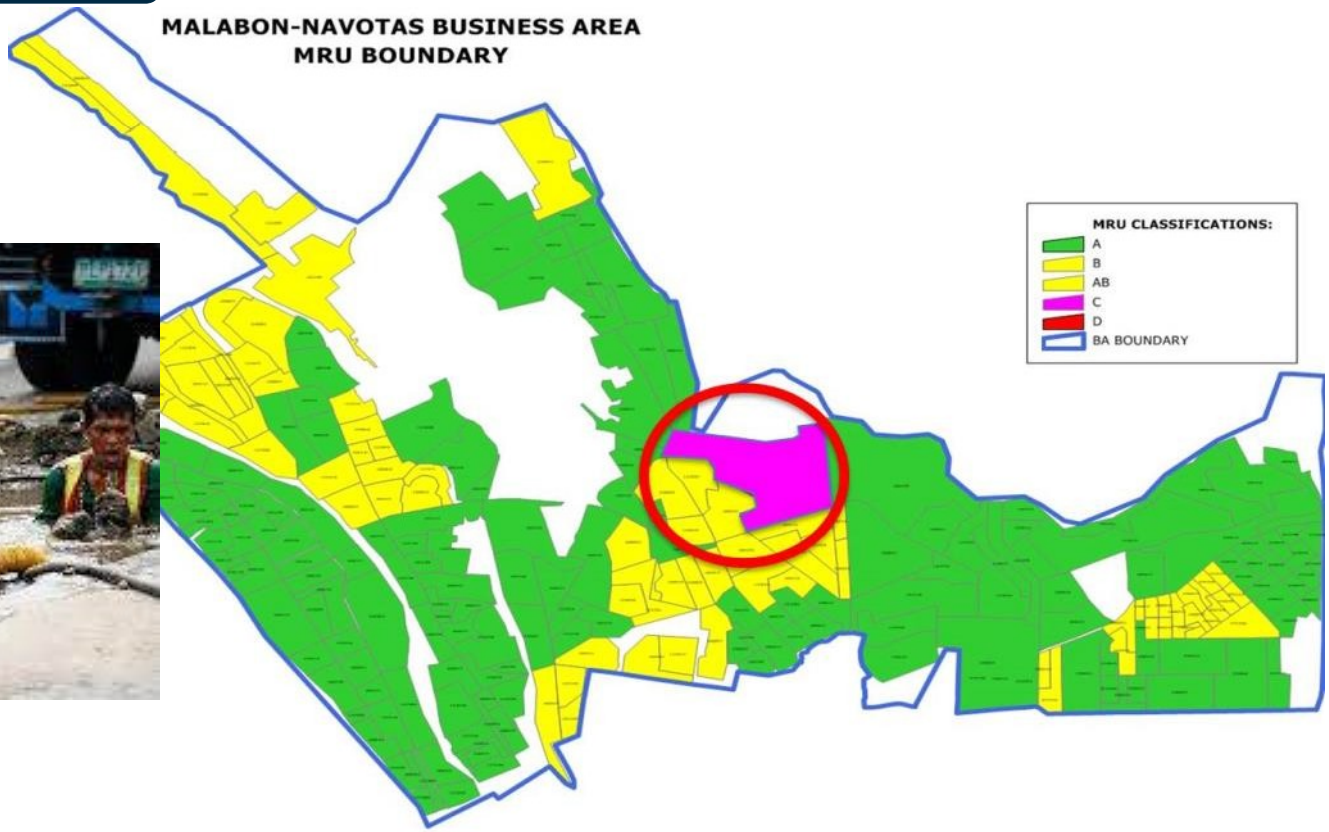


MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Evolving *Geospatial* Reach: *Internet of Things*

2013 *Be Inspired* Winner



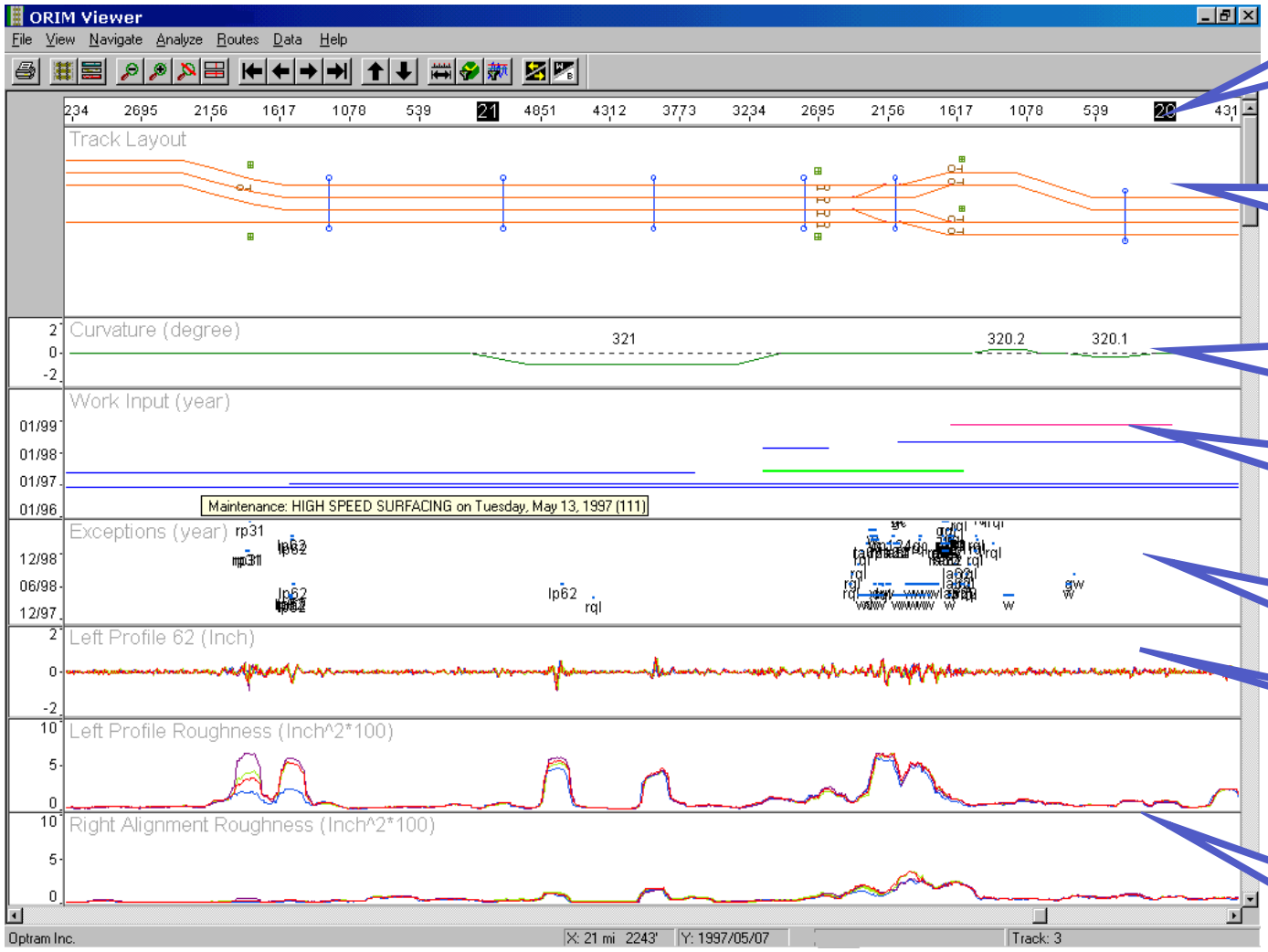
Remote Leak Detection Through Hydraulic Modeling

Maynilad Water Services, Inc.

Malabon City, **Philippines**

Evolving *Geospatial* Reach: *Internet of Things*

Optram



Mile/KM Post

Track Layout

Designed & Measured Curve

Work History

Defect History

Geometry History

Roughness History

Sustaining Infrastructure

Evolving *Geospatial* Reach: *Internet of Things*

NetworkRail ORBIS / LADS

Bentley's AssetWise OPTRAM software is putting a smile on MANY (track superintendent) faces across Network Rail…

Sue Coverdale is head of track asset management

[redacted]

[redacted]

Evolving *Geospatial* Reach: *Internet of Things*

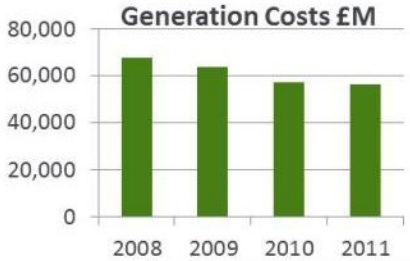
2013 *Be Inspired* Winner

Benefits to date –

Cost Savings to the Business

SCOTTISHPOWER

	2008	2009	2010	2011
Plant Availability	64.5%	77.0%	82.3%	83.0%
EFOR[1]	10.1%	9.2%	6.4%	5%



- 29% reduction in Operations and Maintenance costs
- 19% increase in plant availability
- 50% reduction in plant forced outage rates
- Reduction in Insurance costs and deductable period

Integrated Operations & Maintenance

Alignment with:

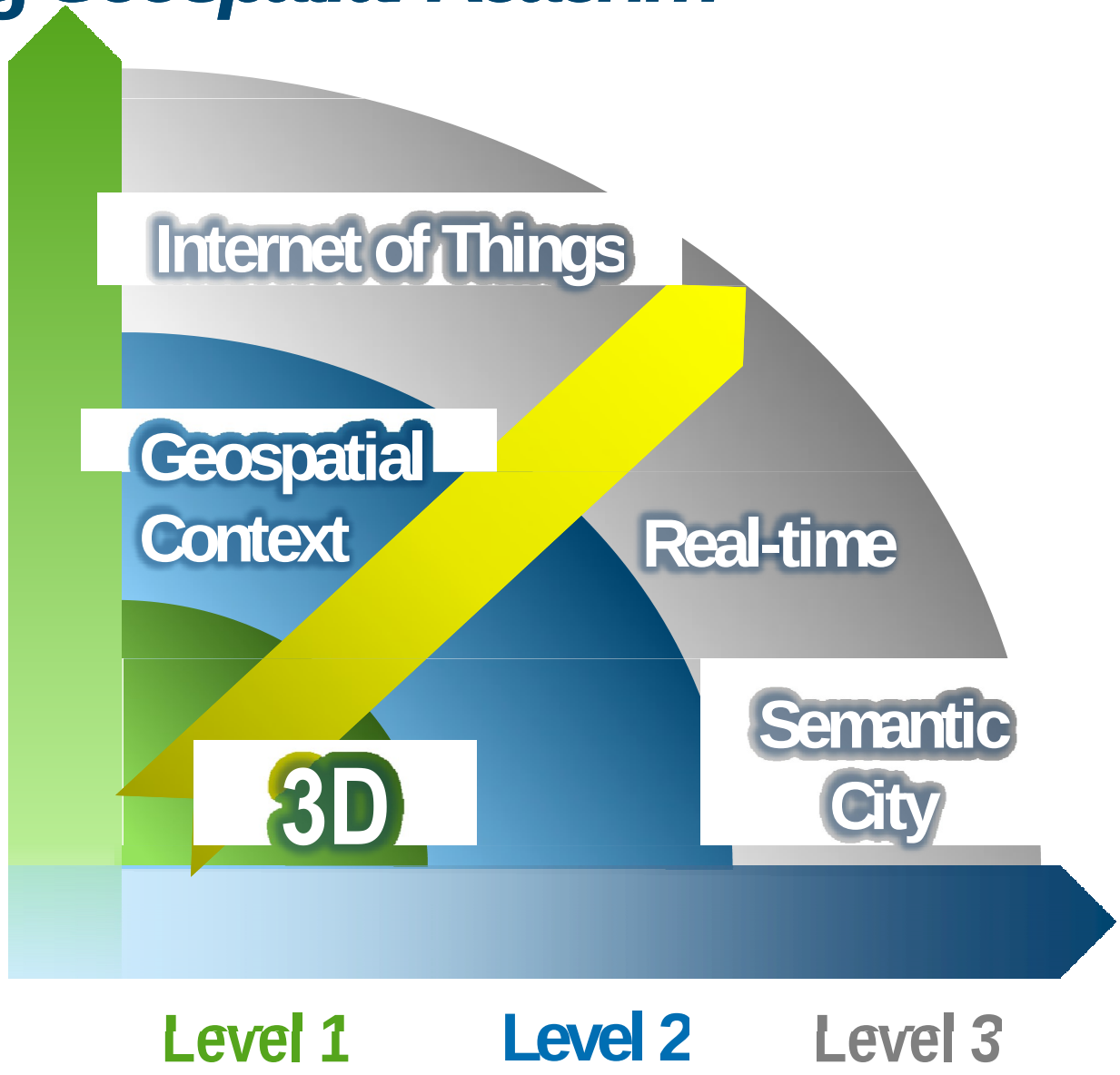
- PAS55; Asset Management
- RR509; Plant Ageing
- HSG254; Developing Process Safety Indicators

ScottishPower Strategy for
Asset Management and Process Safety
ScottishPower
United Kingdom

MIDDLE EAST GEOSPATIAL FORUM

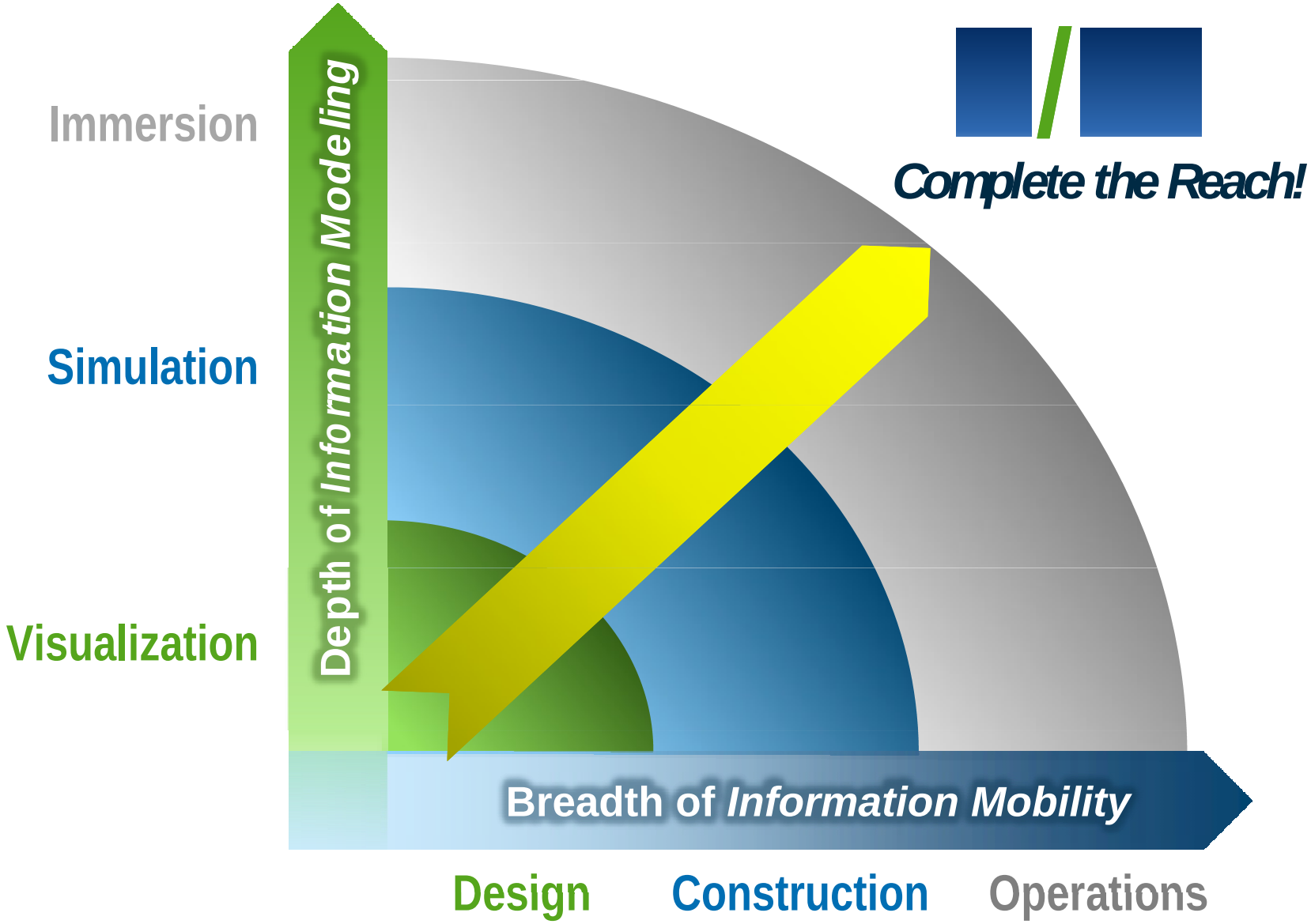
Bentley Sustaining Infrastructure

Evolving *Geospatial Reach…*

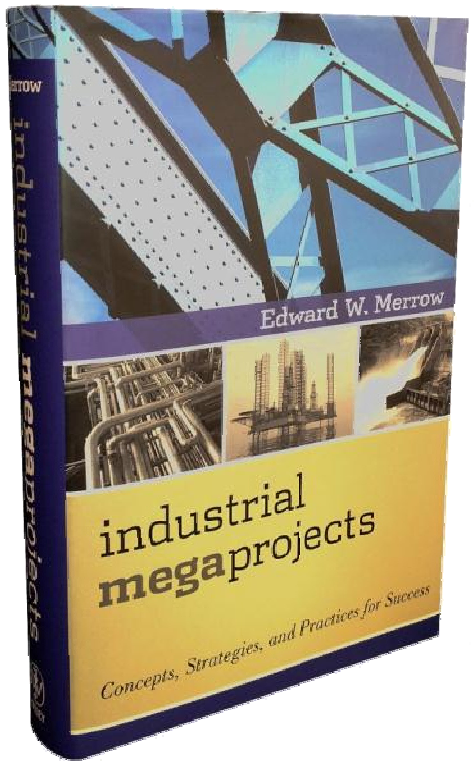


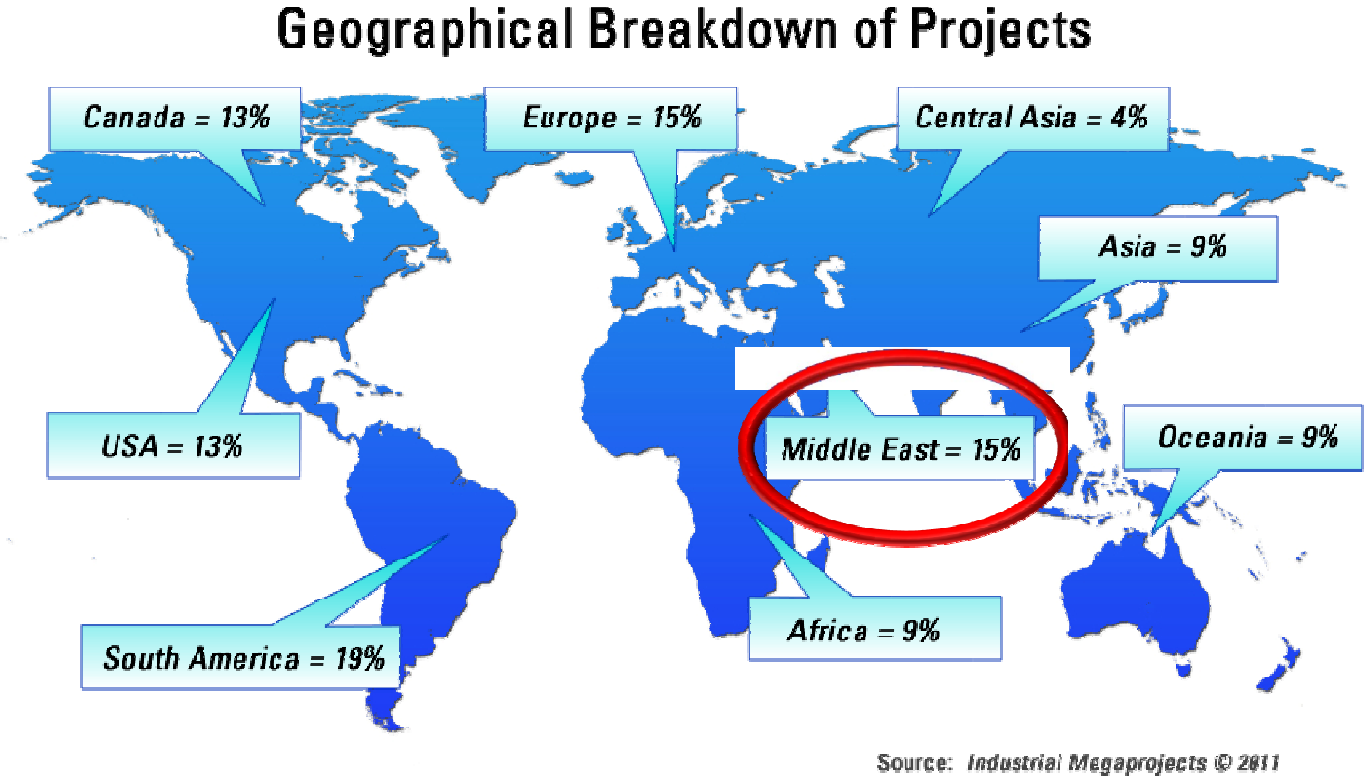
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure



Megaproject Risk…





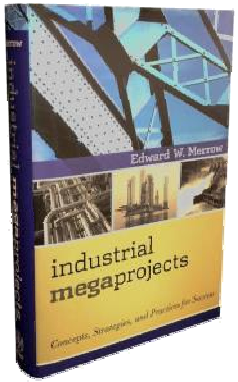
Edward W. Merrow
Founder & President of Independent Project Analysis, Inc. (IPA),

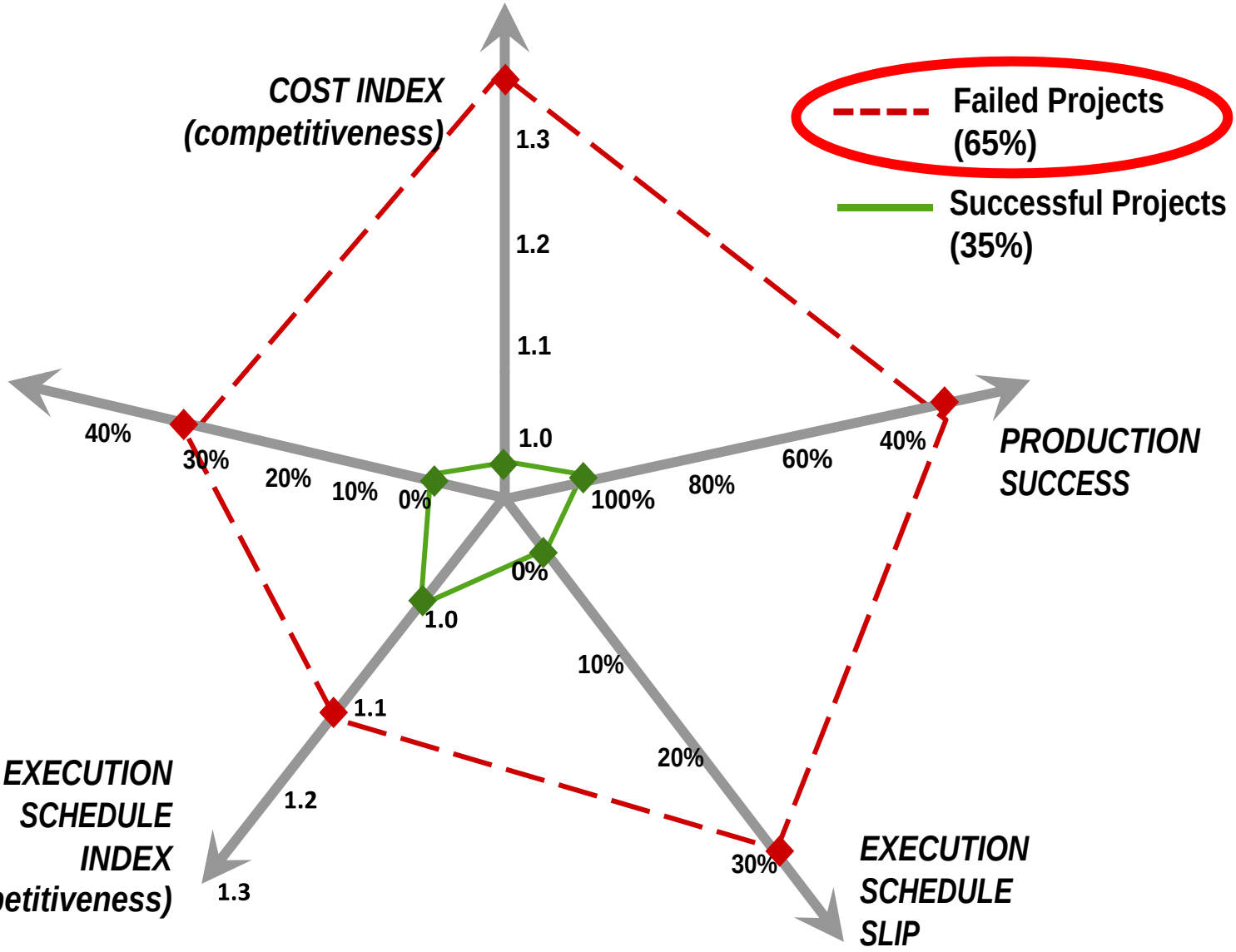
IPA
Excellence through measurement®

MIDDLE EAST GEOSPATIAL FORUM

Bentley
Sustaining Infrastructure

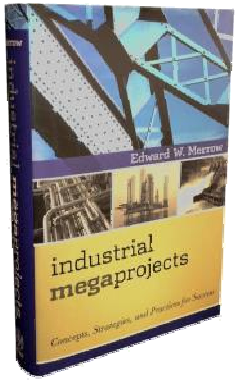
"Megaprojects Split Into Good and Ugly"

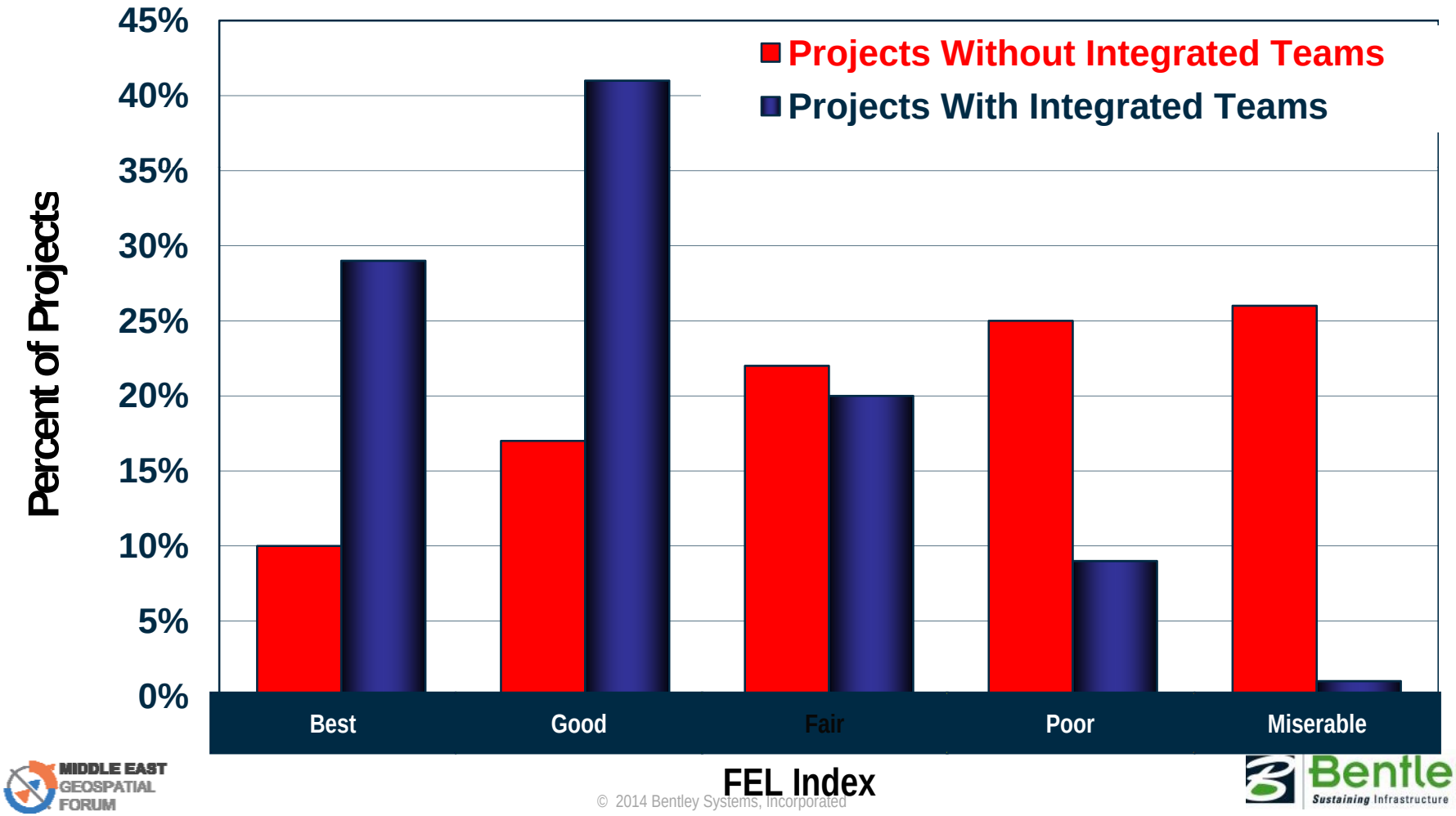




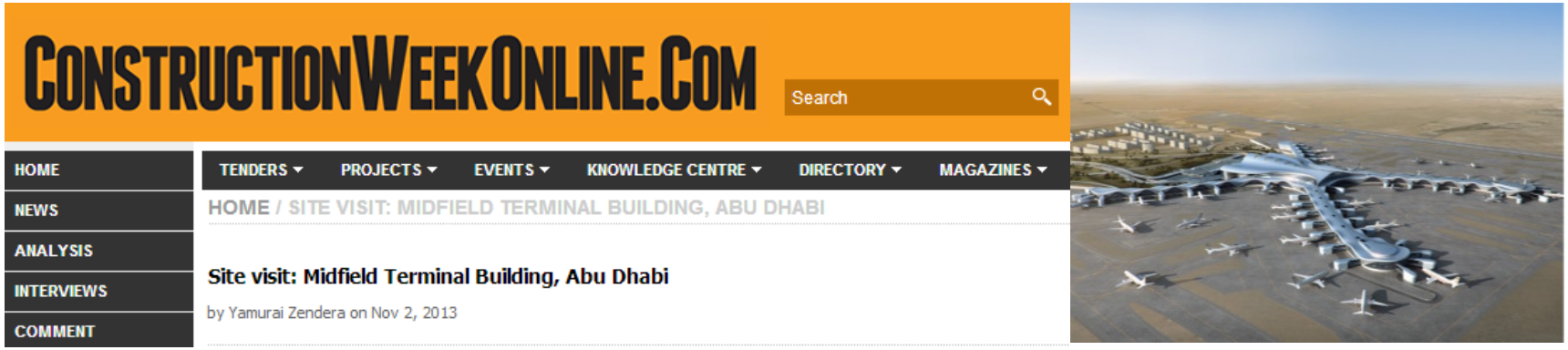
Source: Independent Project Analysis - (IPA)

B/IM Risk Mitigation…!





Middle East Megaproject…

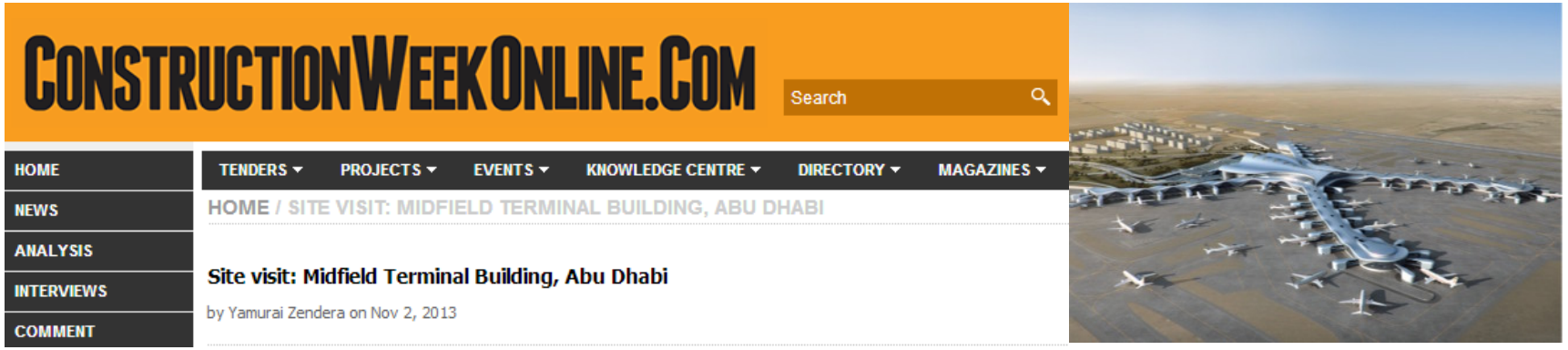


- **Abu Dhabi Airports CEO Tony Douglas** says that very shortly the AED10.9bn ($2.9bn) Midfield Terminal Building (MTB) at Abu Dhabi International Airport is about to go from "being one of the better-kept secrets to a spectator sport."

- …the MTB will be massive when complete in 2017. Reaching 700,000m2 in area, it will be about one-and-a-half times bigger than Terminal 3 at Dubai International Airport and also Heathrow Airport's Terminal 5.

- Around 11% of the MTB is already built, with about 12,000 labourers doing split shifts of 20 hours per day…Over the next 200 days, half of the roof structure and the facade will be erected…

- "…think it's fair to say this has got more in common with building a Nimitz-class aircraft carrier than a construction project. The reason why? Well it's a systems integration project that happens to sit in an enormous building; not to be confused with a big building.



- …[Abu Dhabi Airports CEO Tony] Douglas, in addition, has ensured that everyone is using one single **BIM** (Building Information Modelling) system, which he says is the largest in the world.

- …"When you think about the scale of something like this you simply cannot do it without a model of that type. Even all the as-builts will come in the **BIM** model. We not only developed the **BIM** for that purpose but we've developed the **BIM** so it becomes an integrated planning tool – so we've all got one version now of the sequence of how you put something as complicated as this together."

Middle East B/IM Advancement!

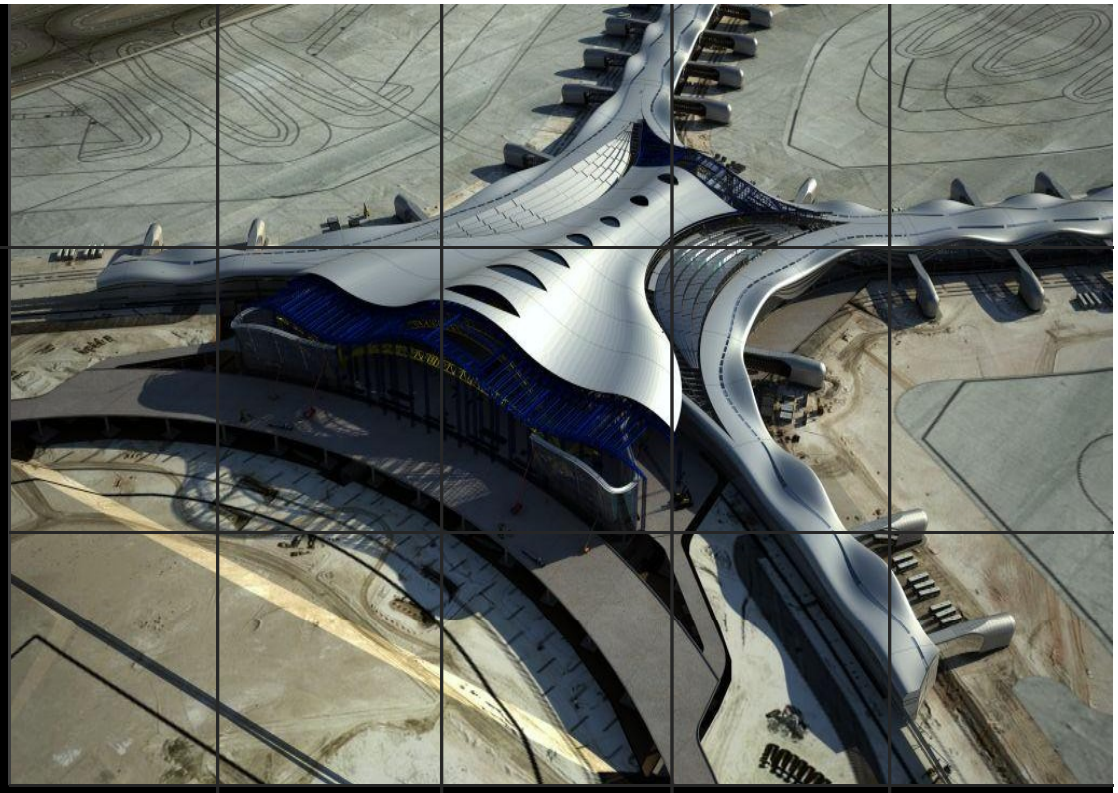
2013 *Be Inspired* Winner

Midfield Terminal Building Abu Dhabi International Airport
Innovation in BIM Implementation
Consolidated Contractors Company / TCAJV
Abu Dhabi, **UAE**

MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

Be Inspired Awards Competition London, UK – 29.October.2013



CONSOLIDATED CONTRACTORS COMPANY

MIDFIELD TERMINAL BUILDING OF THE ABU DHABI AIRPORT

Issam El-Absi, Manager IS-Automation & Engineering (BIM, Civil and GIS) / General Manager BIM Centers - CCC Group / MTB Project BIM Manager

CCC BIM – 5D CENTERS OF EXCELLENCE

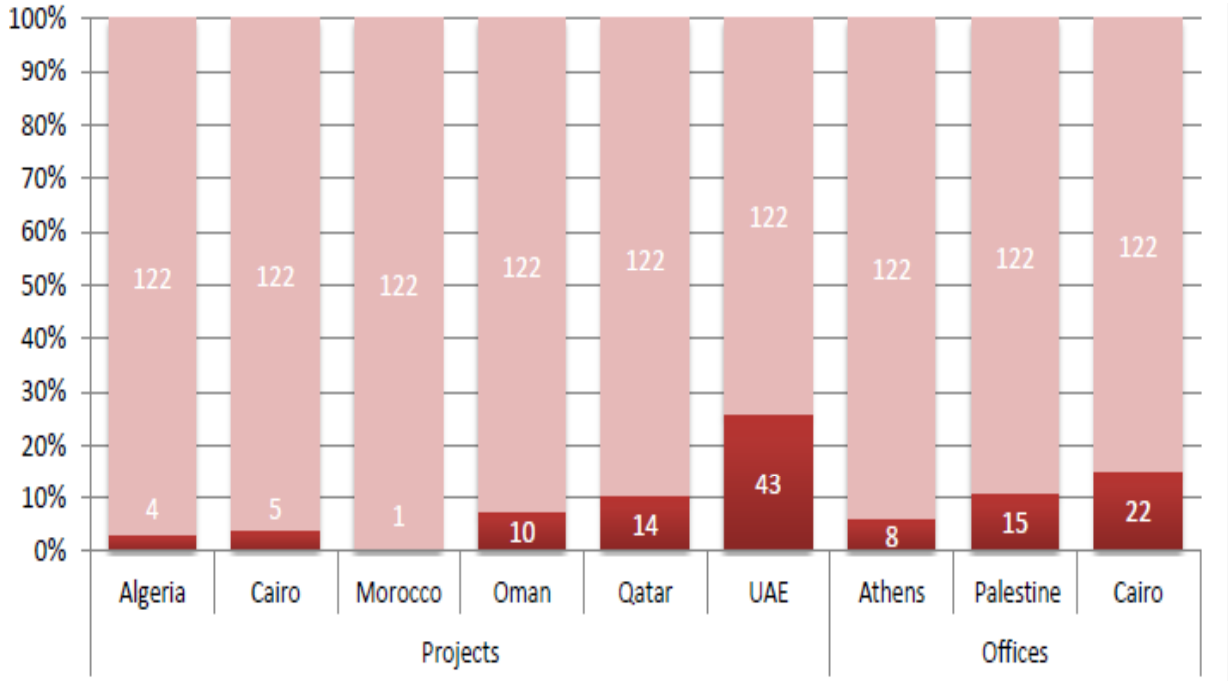
- CCC has established professional BIM Centers - Centers of Excellence, where specialized engineers have been recruited and trained to be able to develop efficiently quality BIM
- CCC BIM department has been utilizing Bentley solutions for the last 17 years

BIM Operations Backbone

Cairo BIM Centre -> 22 Engineers

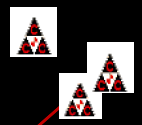
Palestine BIM Centre -> 15 Engineers

Athens BIM Centre -> 8 Engineers



BIM Staff allocation in Projects and Offices (Total 122)

CURRENT PROJECTS



Emiral Project
Moretti, Algeria
Cost: $230 Million
Built up Area: 60,000 m2

Khlifa Bin Zayed Al Nahyan Specialized Hospital
Casablanca, Morocco
Cost: $100 Million
Built up Area: 42,000 m2

The Nile Corniche Project
Cairo, Egypt
Cost: $450 Million
Built up Area: 70,000 m2

Abu Dhabi Plaza
Astana, Kazakstan
Cost: $1.3 Billion
Built up Area: 510,000 m2

Midfield Terminal Building
Abu Dhabi, UAE
Cost: $3.0 Billion
Built up Area: 700,000 m2

Lusail Multi-Purpose Hall
Lusail, Qatar
CMorocco ost: $315 Million
Built up Area: 107,650 m2

F-Ring Road Project
Doha, Qatar
Cost: $230 Million
Road Length: 9 km

Multipurpose Admin Complex
Doha, Qatar
Cost: $205 Million
Built up Area: 34,820 m2

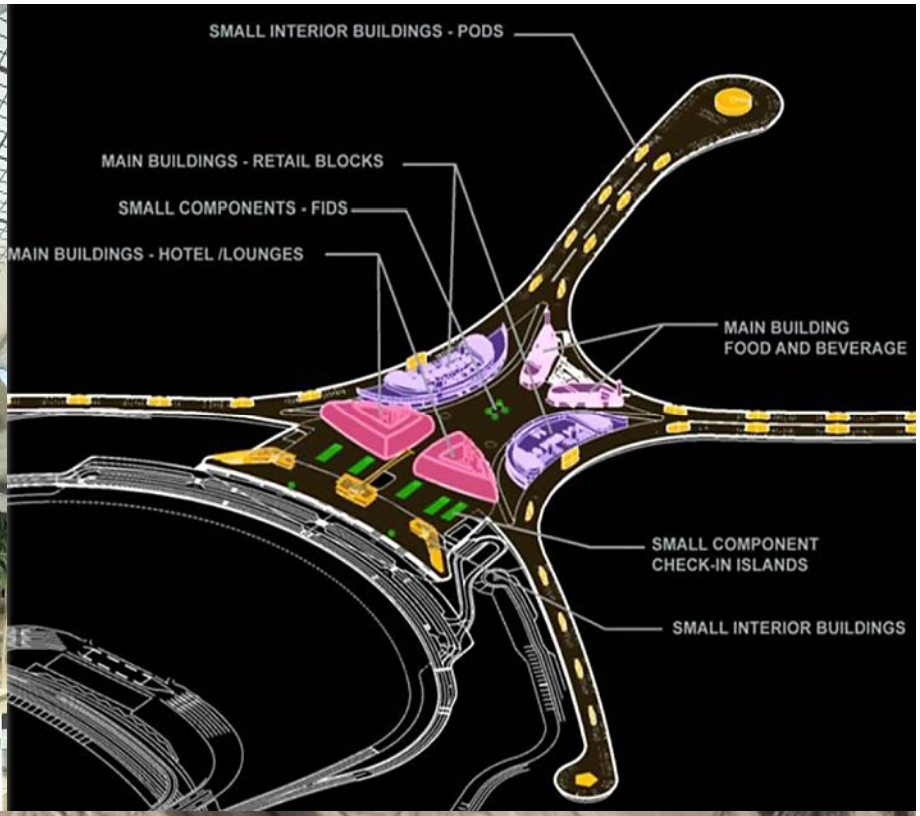
Dukhan Highway Project
Doha, Qatar
Cost: $370 Million
Road Length: 66 km

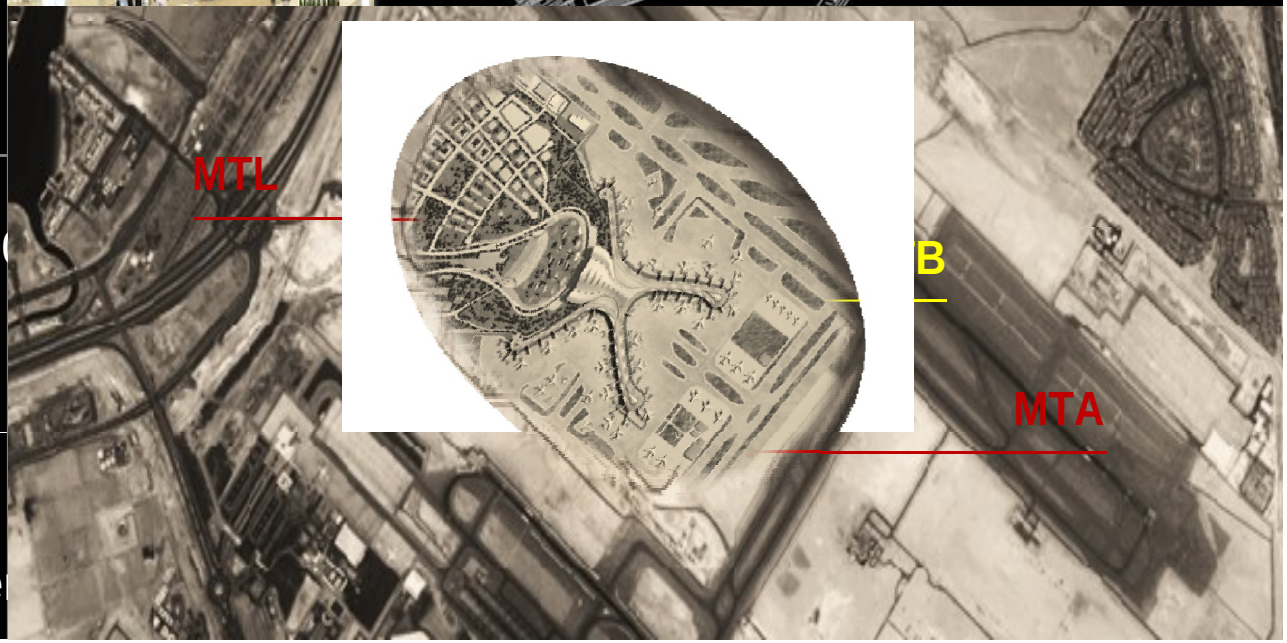
Doha's New Port Project
Doha, Qatar
Cost: $292 Million

GENERAL FIGURES

- Built Up Area: 700 000 m
- Project Value : $3 Billion
- Piers Aircraft Capacity: 6
- Number of Gates: 106

- Passenger Capacity: 850(Hour
- Check in Counters: 165
- BHS Capacity: 19000 / Hour
- BHS Length: 22 Kilomete





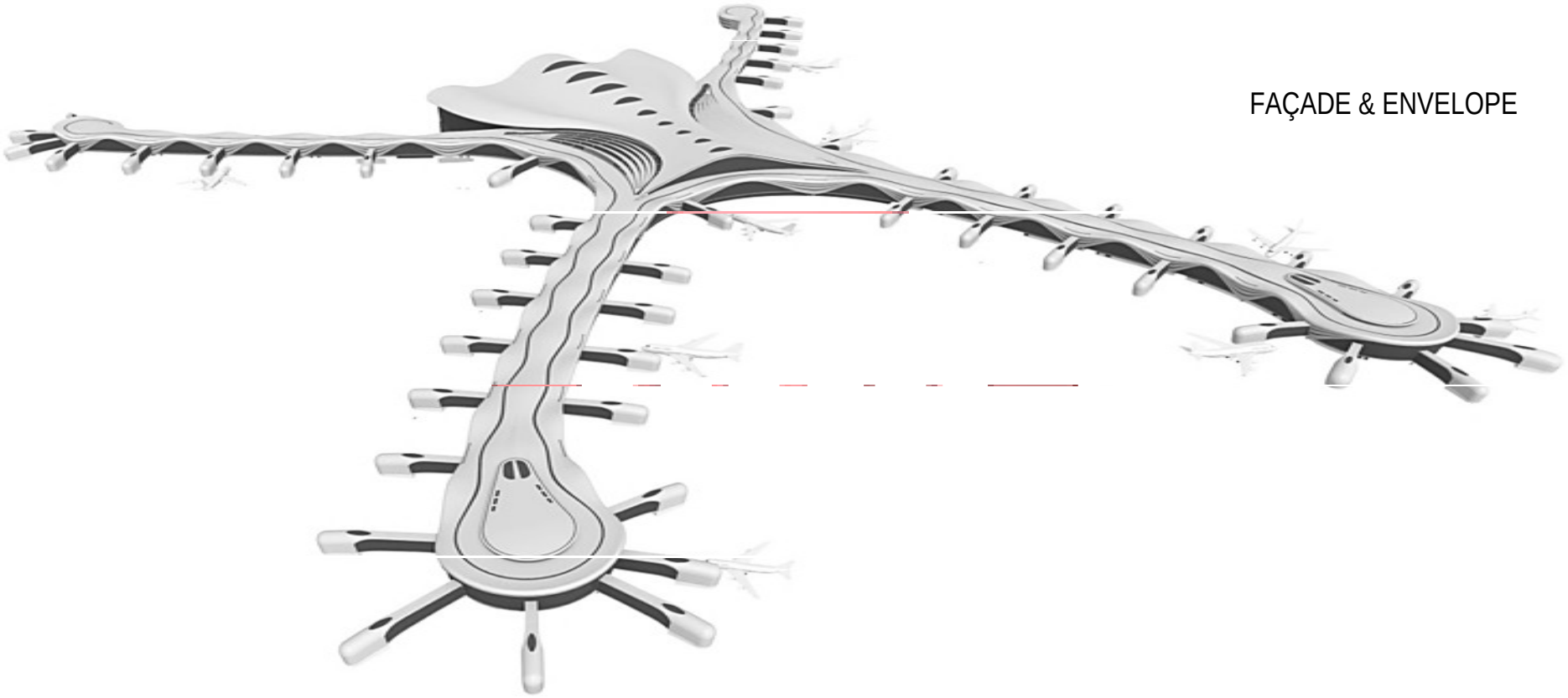
General Figures

Structural

- In situ Concrete Volume: 560,000 m³
- Pre-Cast Concrete Volume: 312,000 m³
- Steel Rebar Tonnage : 135,000 tns
- Structural Steel Tonnage : 45,000 tns

Architectural

- Blockwork: 230 000 m²
- Roof Cladding: 260 000



FAÇADE & ENVELOPE

REQUIREMENTS

ENGINEERING

- Clash Mitigation and Design Coordination
- Develop and Implement an RFI system
- Extract and Support the development of Shop drawings
- Realistic digital mock-ups

PROJECT CONTROLS / PLANNING

- Cost Estimation
- 4D studies, link to Primavera, Optimize Construction S
- Show Project resources (labor, material and equipmen
- Progress monitoring and control
- What if scenarios

CONTRACTUAL & QUANTITY SURVEYING

- Quantity take-off and measurements
- Variation orders management and visualization

MANUFACTURING

- Digital fabrication

E D I
ELECTRONIC DATA INTERCHANGE

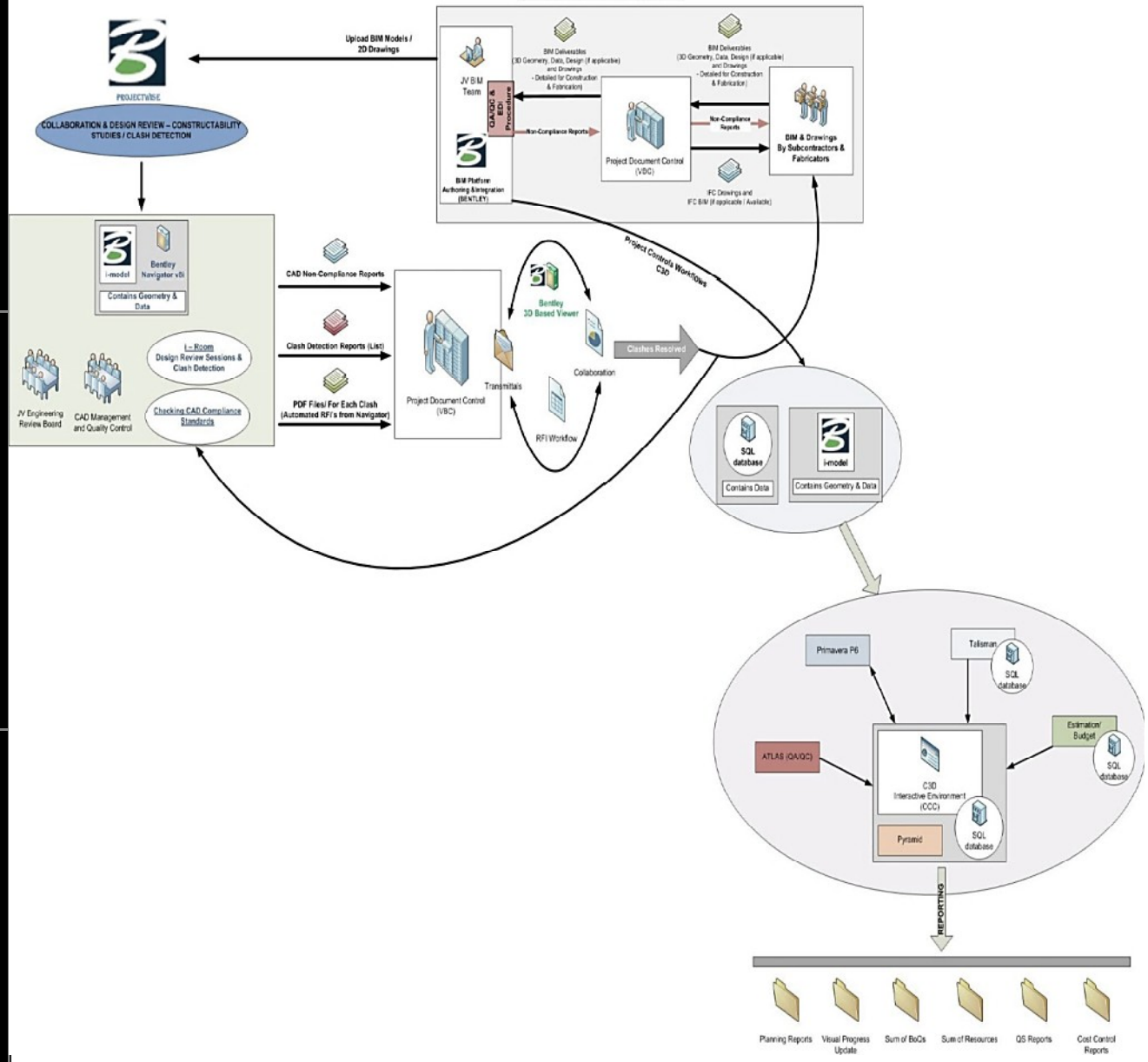
AIM

Arrangement and transformation of the BIM CAD files and information created by the JV & Subcontractors to project (TCAJV) BIM platform

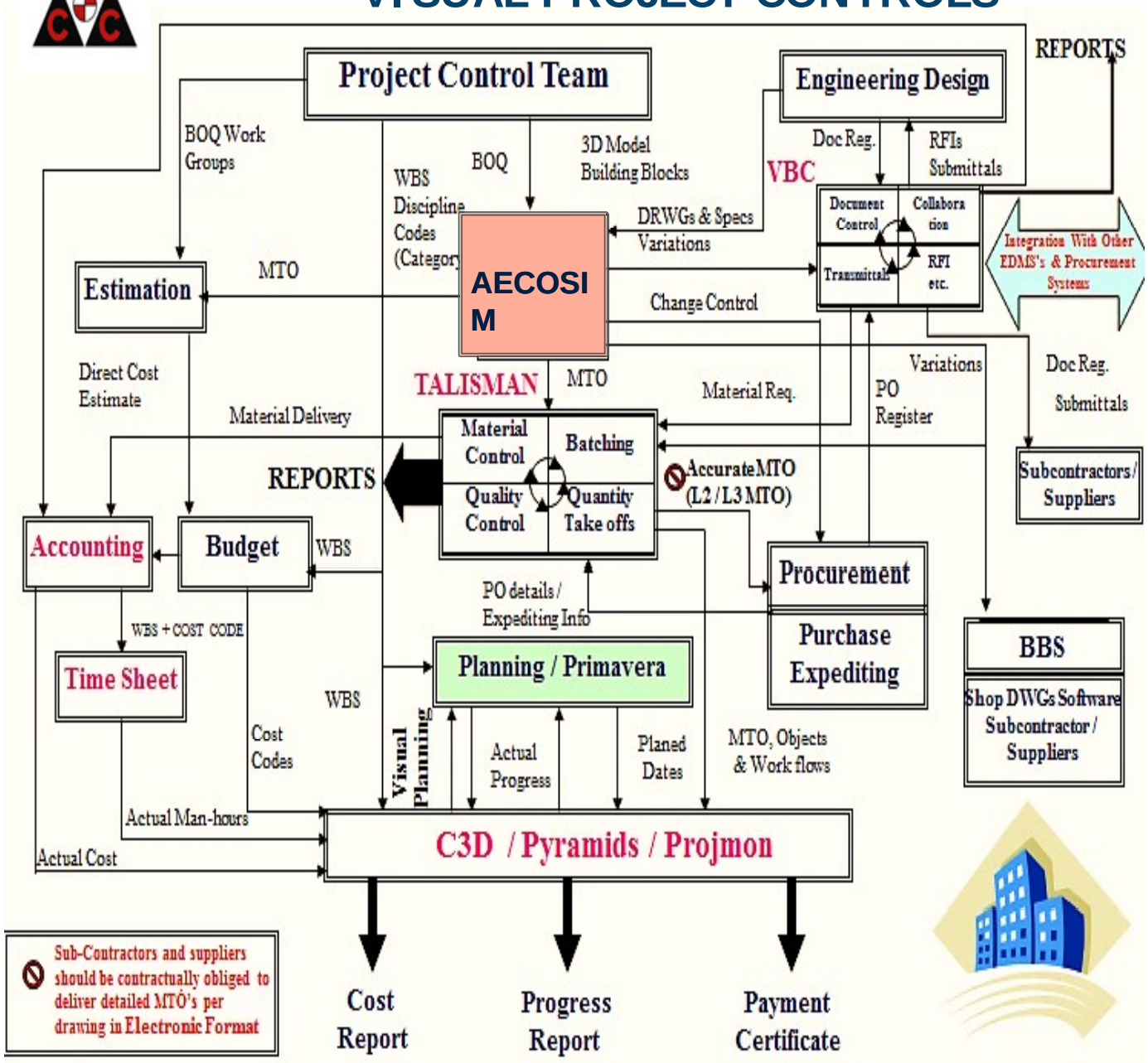
BENEFITS

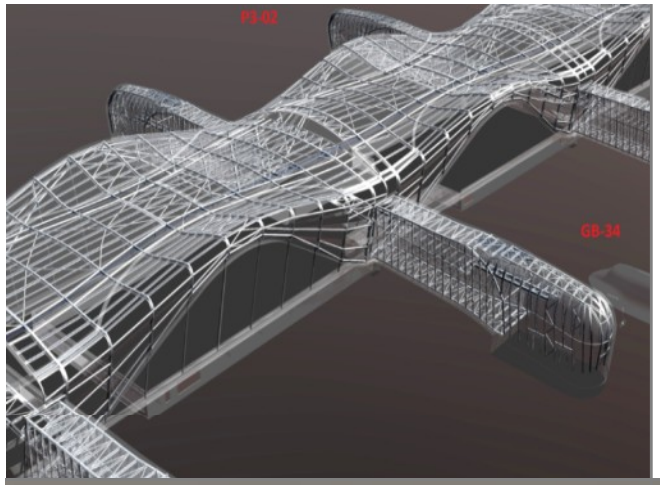
- Common language for graphical and textual data exchange
- Interoperability
- Integration of all BIM information from all disciplines
- Data integrity and lifecycle management

Integration Workflow Between Bentley and TCAJV In House Application

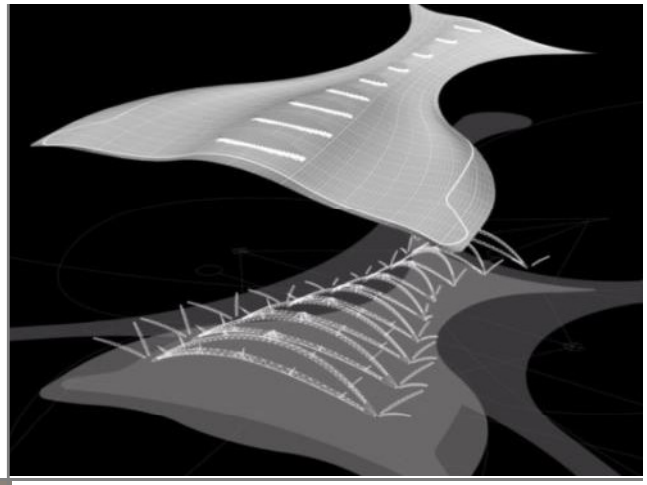


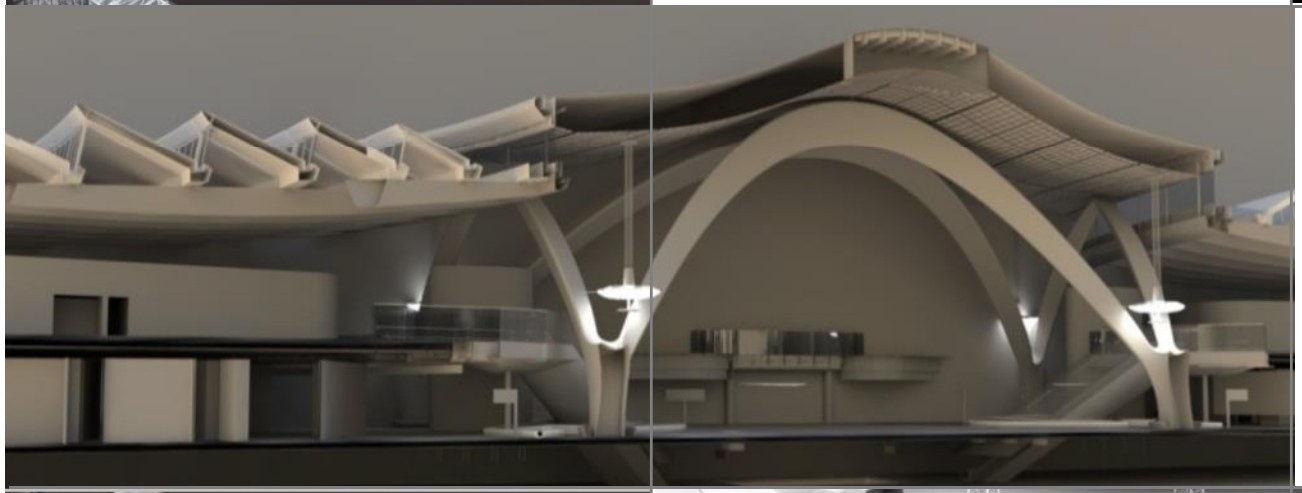
BIM BASED SYSTEM INTEGRATION – VISUAL PROJECT CONTROLS





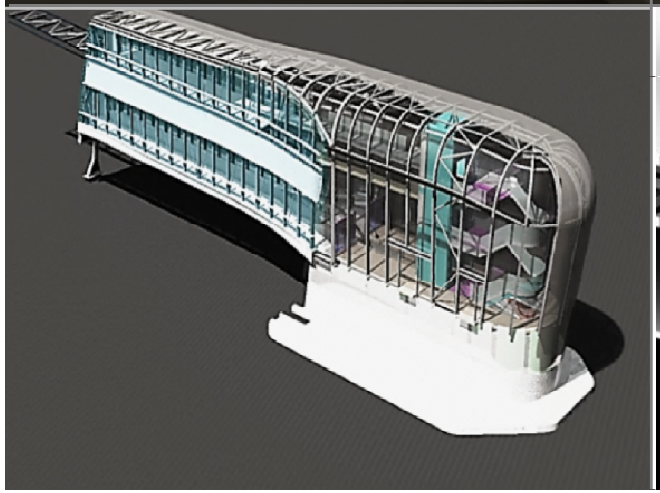
3 D MODEL LING

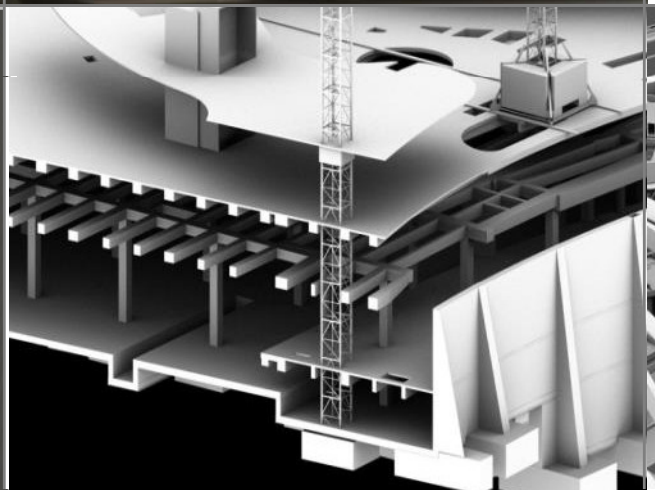


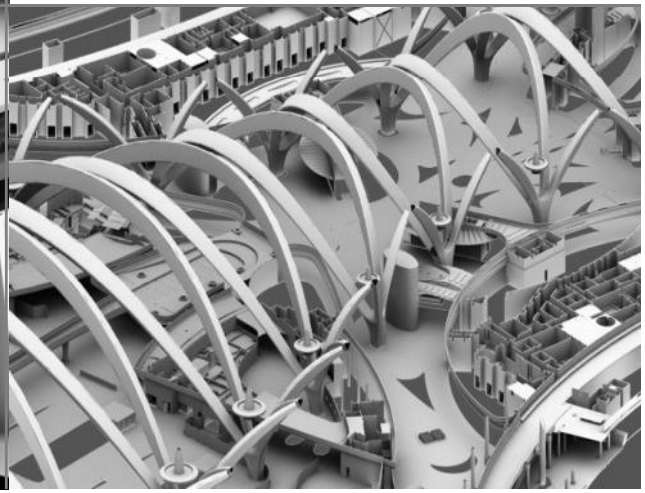


Bentley Tools allowed for

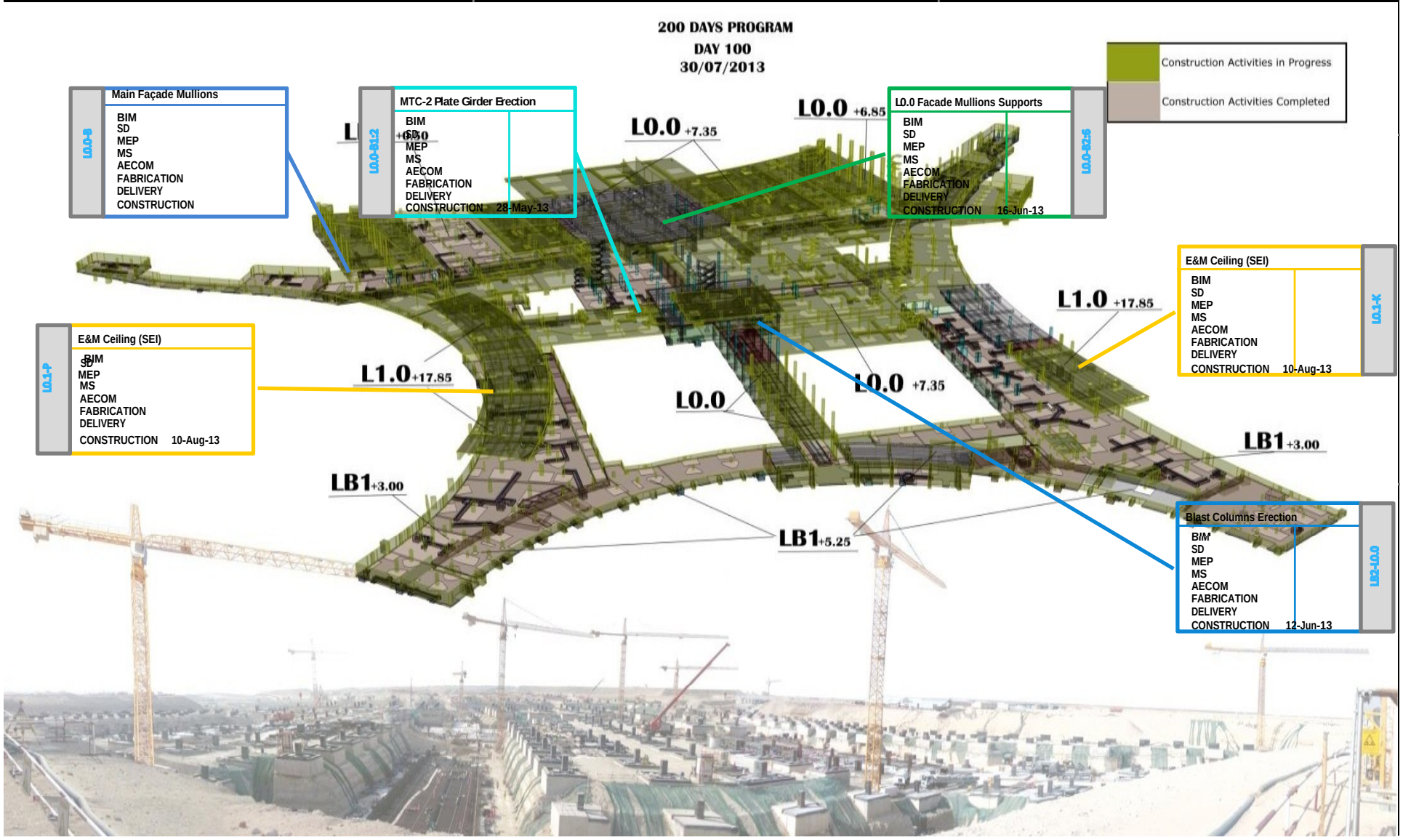
- Intelligent models genera
- Addressed the complex d
- Visualized engineering sit through all construction





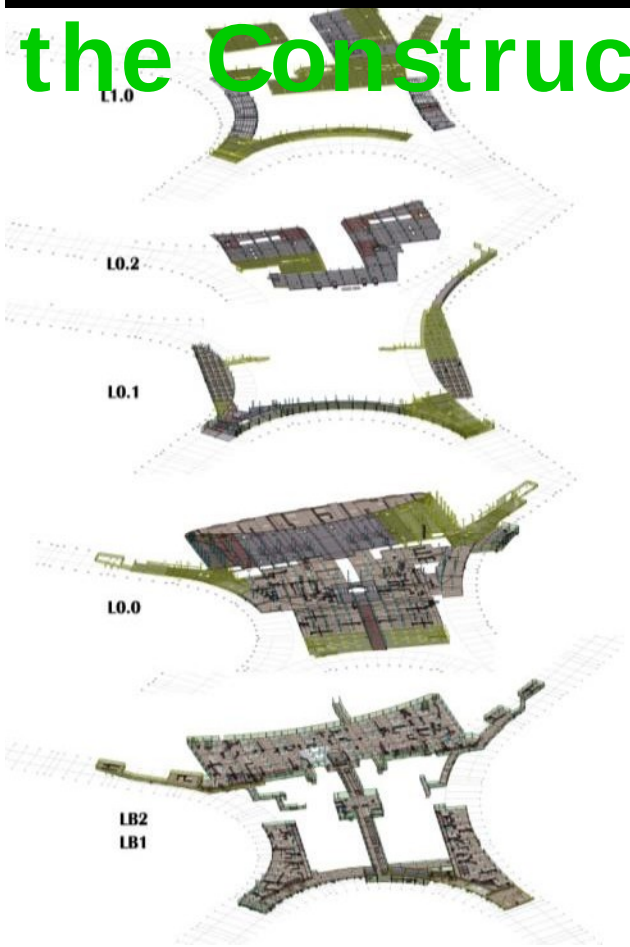


4D Simulation

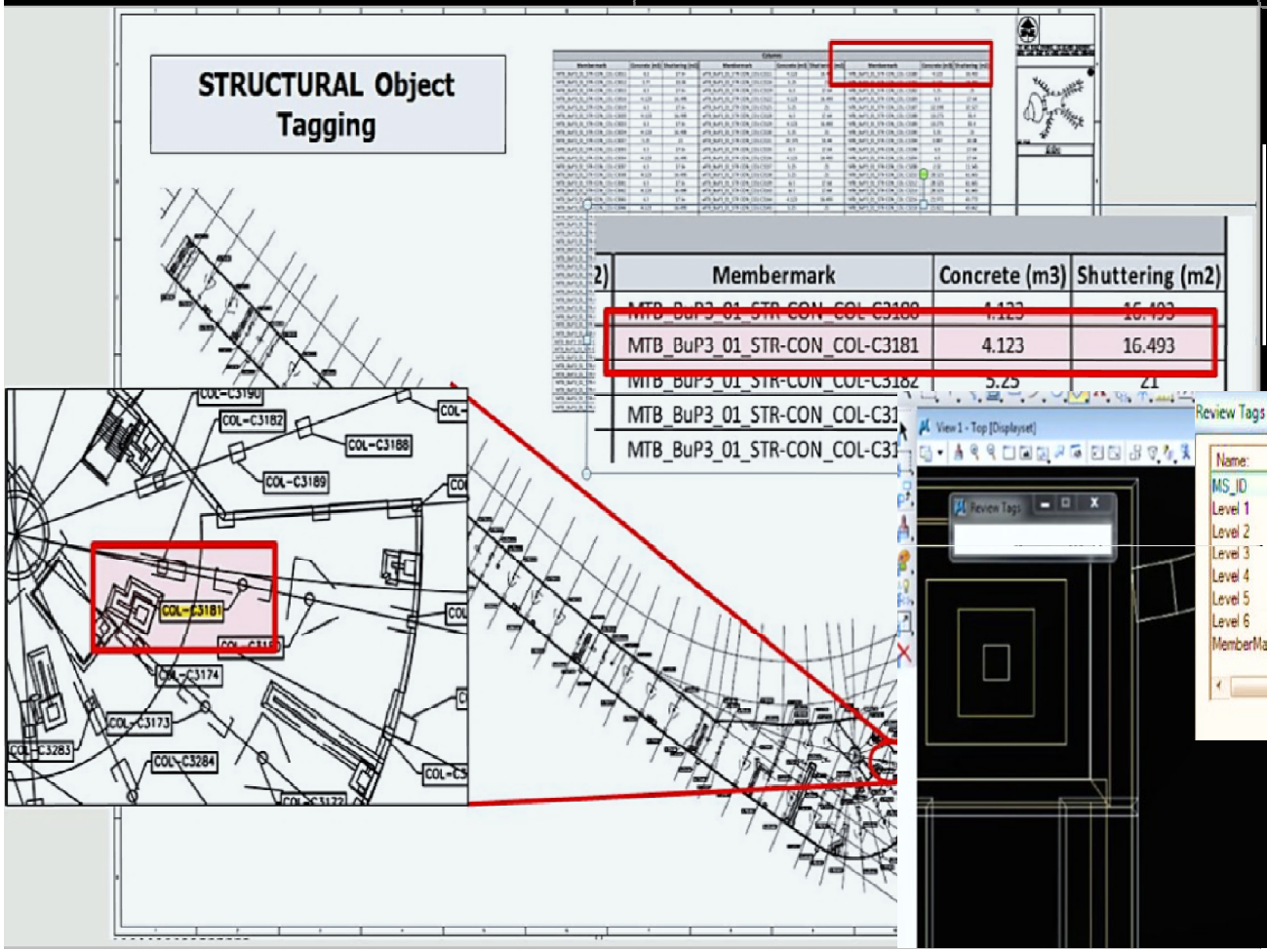


4D Simulation

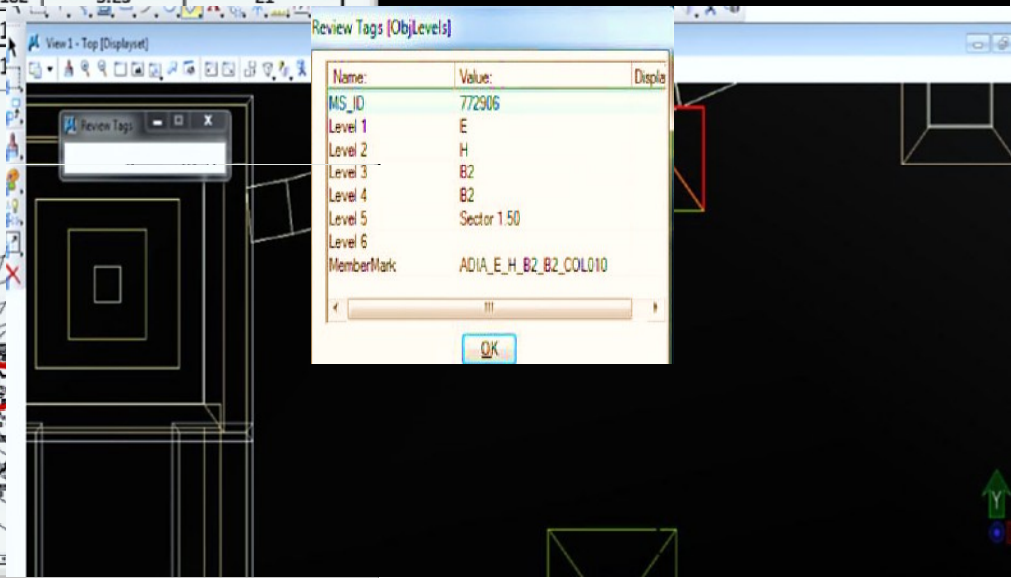
ROI : BIM Workflows Eliminated the Need for Lengthy Approval Cycles for the Construct



OBJECT NAMING

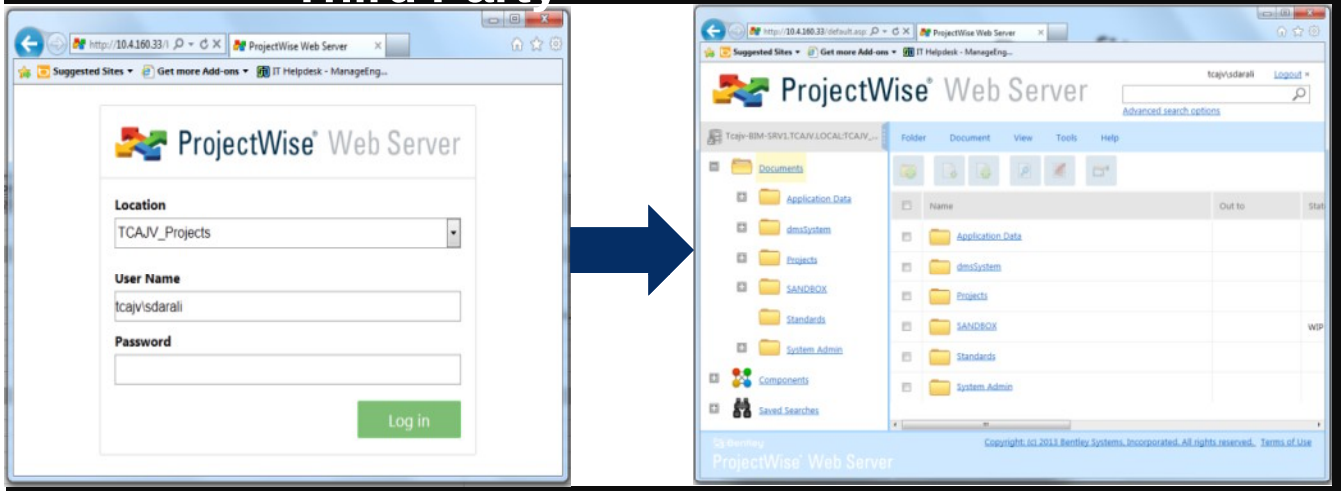


Objects are tagged based on ~~agreed~~ **WBS** ensuring uniqueness of each element.

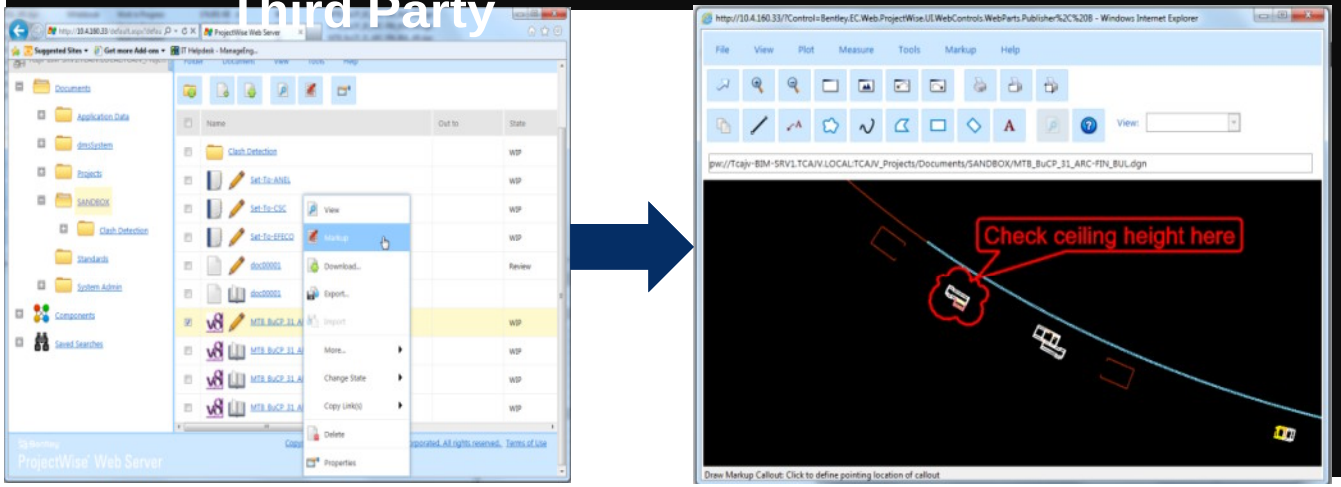


COLLABORATION PROJECT WISE

- Collaboration through Web Access to Third Party



- Collaboration through Markup by Remote Third Party



ROI :

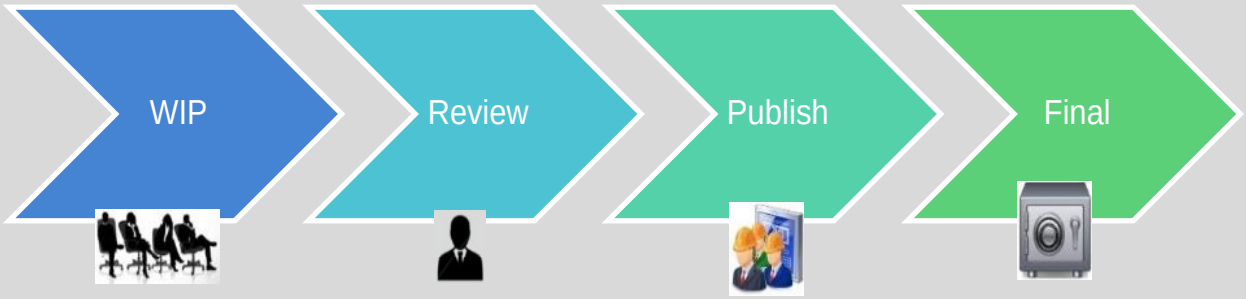
- Automatic Versions/Revisions
- Automatic Notifications
- Better Performance By Working Locally
- File Tracking
- File Information from within Explorer
- Custom File Attributes
- Number File Check-Out Window
- File Check-In Window
- Powerful and Fast Search Capability

COLLABORATION PROJECT WISE

⇨ Enforced Workflow

Workflow in PW Explorer

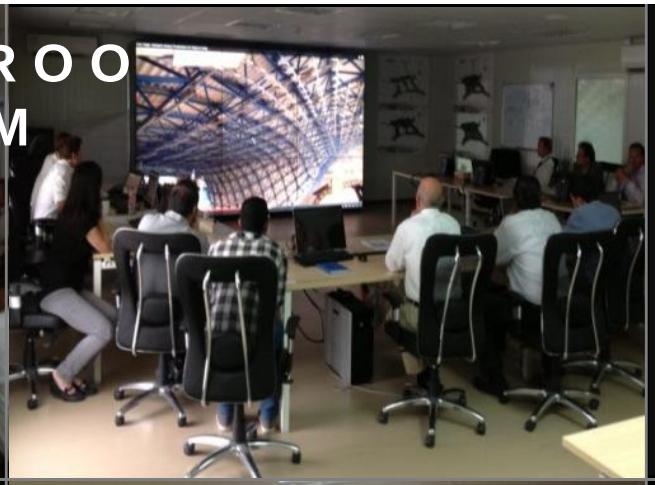
Name	Out to	State
Clash1_Mech vs Struc.pdf		Published
Clash2_Mech vs Struct.pdf		Review
Clash4_Mech vs Struct.pdf		WIP

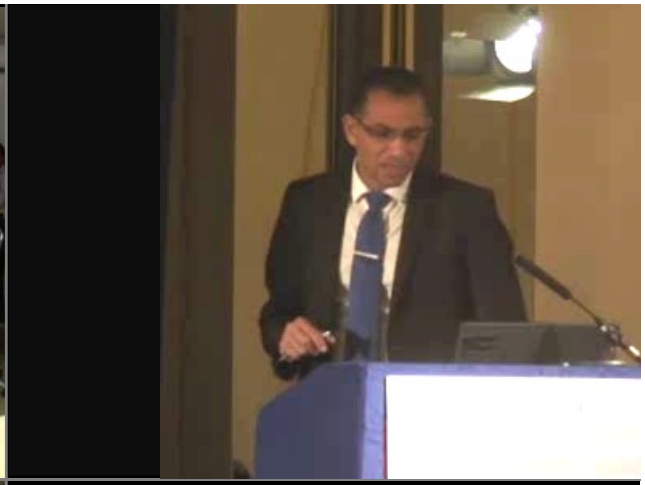


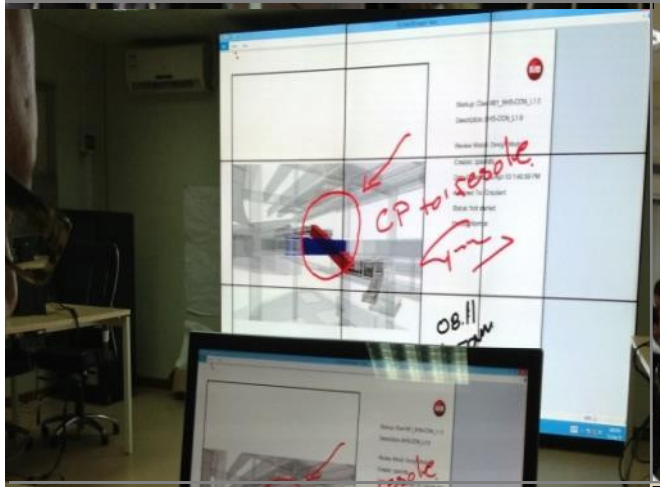
- Model created by WIP Team
- Review by QC Team
- Others can see but not change
- Accessible to Third Party (S/Cs, Client, Engineering)
- Model Ready For Coordination (LOD400)
- Model locked as Final Version (LOD400/500)

ROI :

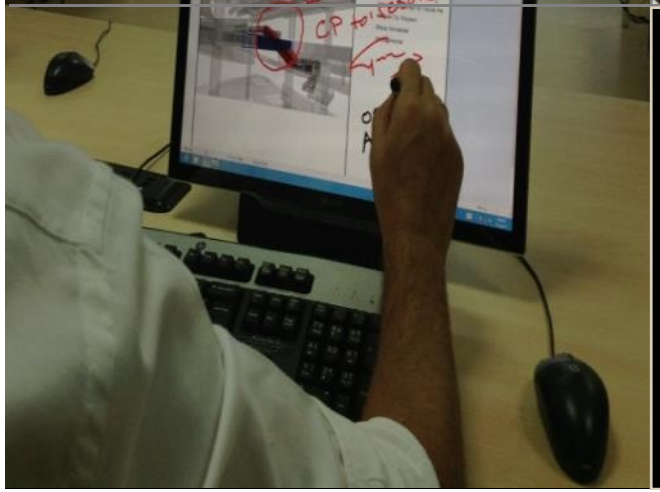
- ⇨ Automatic Versions/Revisions
- ⇨ Automatic Notifications
- ⇨ Better Performance By Working Locally
- ⇨ File Tracking
- ⇨ File Information from within Explorer
- ⇨ Custom File Attributes
- ⇨ Number File Check-Out Window
- ⇨ File Check-In Window
- ⇨ Powerful and Fast Search Capability







Issam El-Absi
Manager IS-Automation & Engineering
(BIM, Civil and GIS)
General Manager
BIM Centers, CCC Group
MTB Project BIM Manager

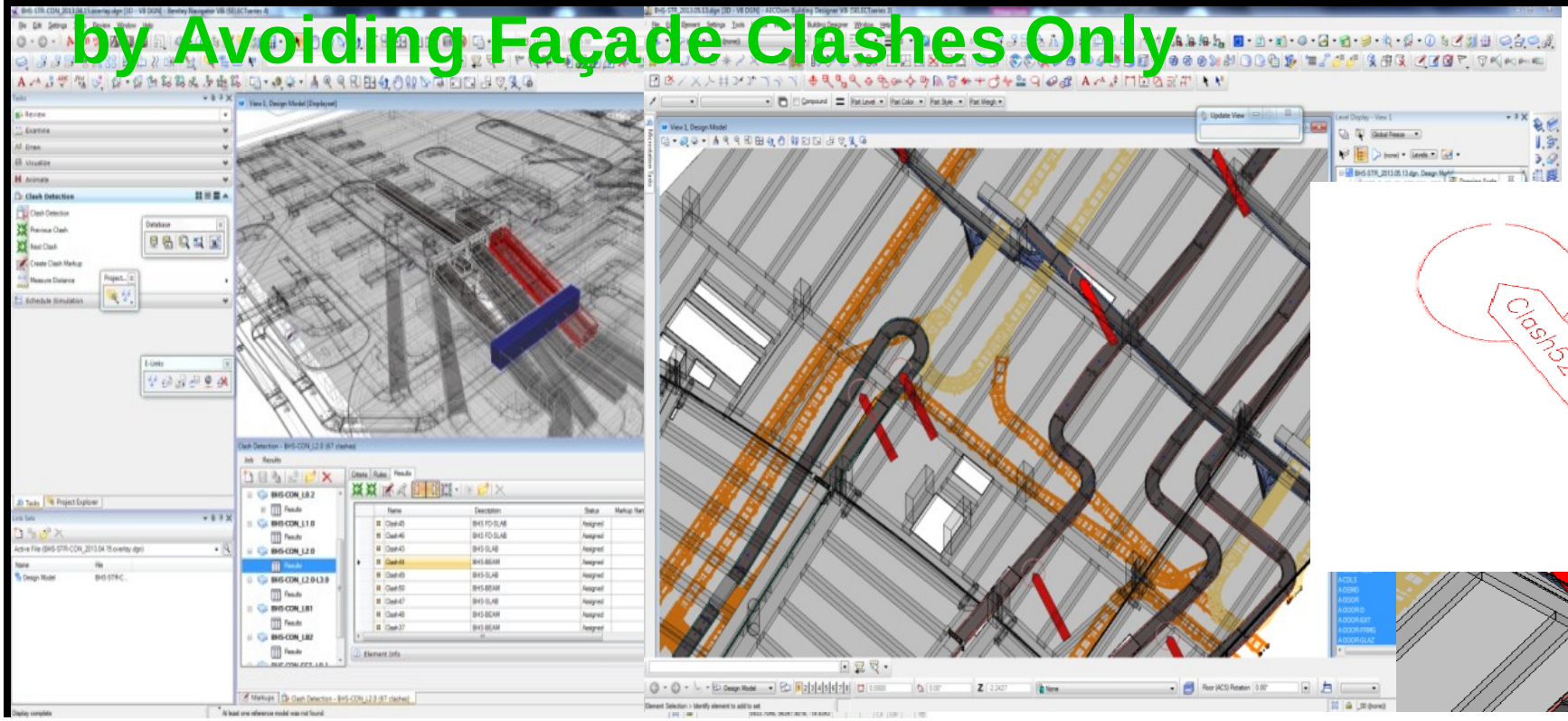


ROI : Innovative Methods For BIM Based Collaboration Reduced The Cycle Of Critical RFI'S

Clash Detection With Navigator

Clashes Tags

ROI : BIM Workflows saved Almost USD 1 million and more than 51000 MHRS by Avoiding Façade Clashes Only

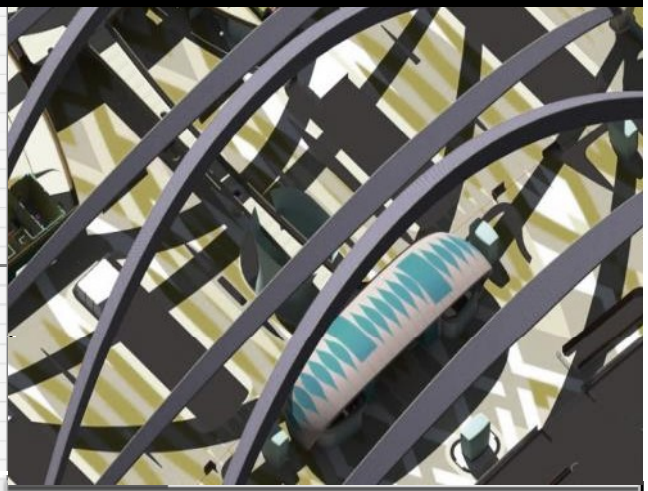


BIM Based Material Take Off

ROI : BIM Methods Reduced The Number of Quantity Surveying Team from 60 to 6 -

90 % Saving in Direct Cost

Description-1	Description-2	Handl	Length	From	To	BOQ No
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	15164	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15163	?			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	15154	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15153	?			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	15144	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15143	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	1512D	659.021			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	1511E	659.021			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	1510F	659.021			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	15100	659.021			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	15075	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15074	?			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	15065	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15064	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	15055	1045.734			
PVC	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15054	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	15053	629.218			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	15044	945.734			
PVC	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	15043	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	15042	529.218			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	1502D	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	1502C	?			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	1501D	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	1501C	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	1500D	986.974			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	14FFE	987.694			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	14FE0	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	14FDF	?			
RGS	25.00 MM CONDUIT EMT SET SCREW US METRIC	14FD0	375.			
RGS	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	14FCF	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	14F80	876.564			
PVC	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	14FAF	?			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	14FAE	1168.455			
PVC	25.00 MM CONDUIT EMT SET SCREW US METRIC	14F9F	776.564			
PVC	25.00 MM DIAMETER 90.0 DEGREE CONDUIT ELBOW EMT SET SCREW US METRIC	14F9E	?			



Code	Description	Unit	Sum of Sum of Quantity IFC	Sum of Sum of Quantity
03-R-28-095-A	Pre-action system manual station points	pc	291	
03-R-28-095-B	Manual fire alarm pull station points	pc	744	
03-R-28-095-C	Smoke detector points U.O.N type	pc	3342	

Blockwork Extraction for Level Basemen 2

Comparative Table of Work Time / Cost Impact / Accuracy Levels

ROI : BIM Workflows saved 1123.5 hrs = 118.36 ~ 119 days and $65,000 per Zone

Example output for one Shop Drawing Section Extraction

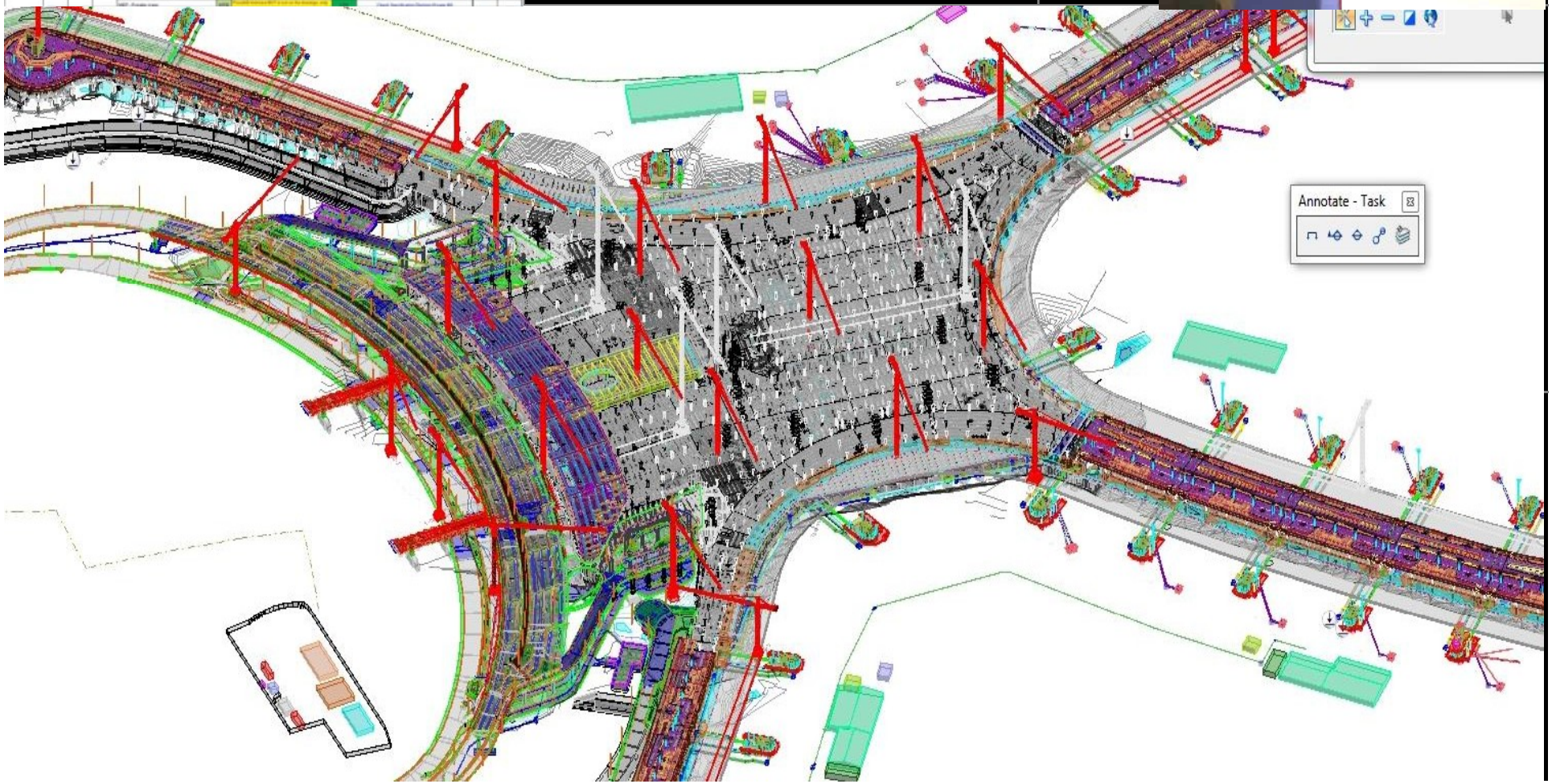
Department/Comparison aspect	Work Time	Numbers of Employees	Cost Impact/ hour	Editing Time	Clach Detaction	Accuracy
BIM (BIM Engineer)	10 min	1	2200/228=9,64$	5 min	Automated	99%
Engineering (DraftsMan)	120 min/ 2 hours	1	1400/228=6,14$	45 min	Manuallly	85%

Example output for 450 Shop Drawing Section Extraction for LB2

Department/Comparison aspect	Work Time	Numbers of Employees	Total Cost Impact	Editing Time/ Section	Numbers of Employees	Cost for Editing Time	Clash Detaction	Accuracy
BIM (BIM Engineer)	4500 min 75hours/9.5=7.89 ≈8 days	1	9.64*75=723$	2250 min 37.5 hours/9.5=3.94 ≈4 days	1	9.64*37.5=361.5$	Automated	99%
Engineering (DraftsMan)	54000 min 900hours/9.5=94.7 3 ≈95 days	1 for 95 days or 11 for 8 days	6.14*900=5526$	20250 min 337.5 hours/9.5 =35.5 days	1 for 35.5 days or 9 for 4 days	6.14*337.5=2072.25$	Manuallly	85%

BIM procedure can save 1124.5 hours = 118.36 ≈ 119 days and 6513.75 $ almost per floor

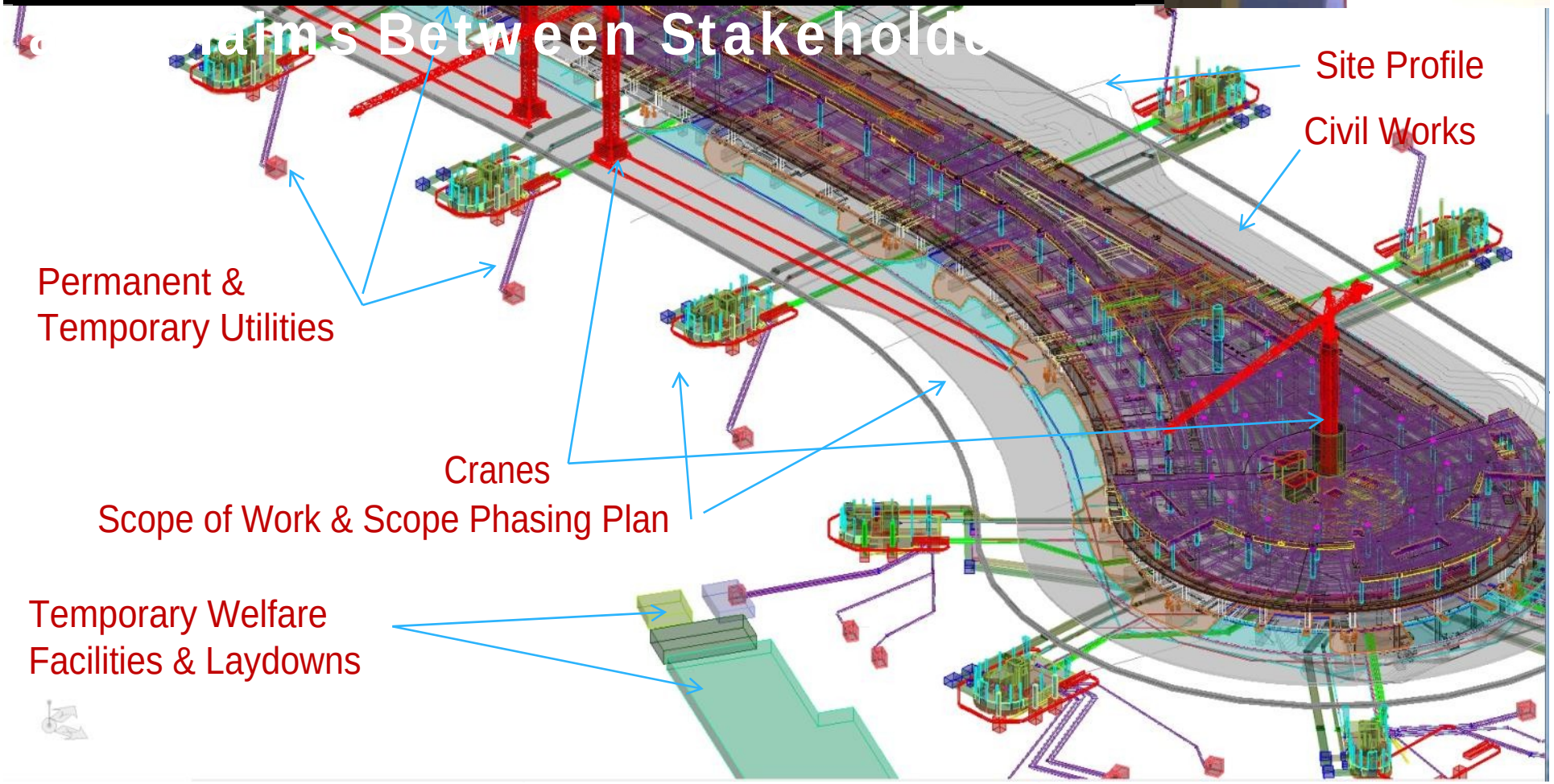
PROGRESSIVE INTERFACE INFRASTRUCTURE MASTER PLAN



PROGRESSIVE INTERFACE INFRASTRUCTURE MASTER

ROI : BIM Workflows Facilitated and Managed the Complex Interface Coordination Process Eliminating Costly Delays, Rework

Claims Between Stakeholde



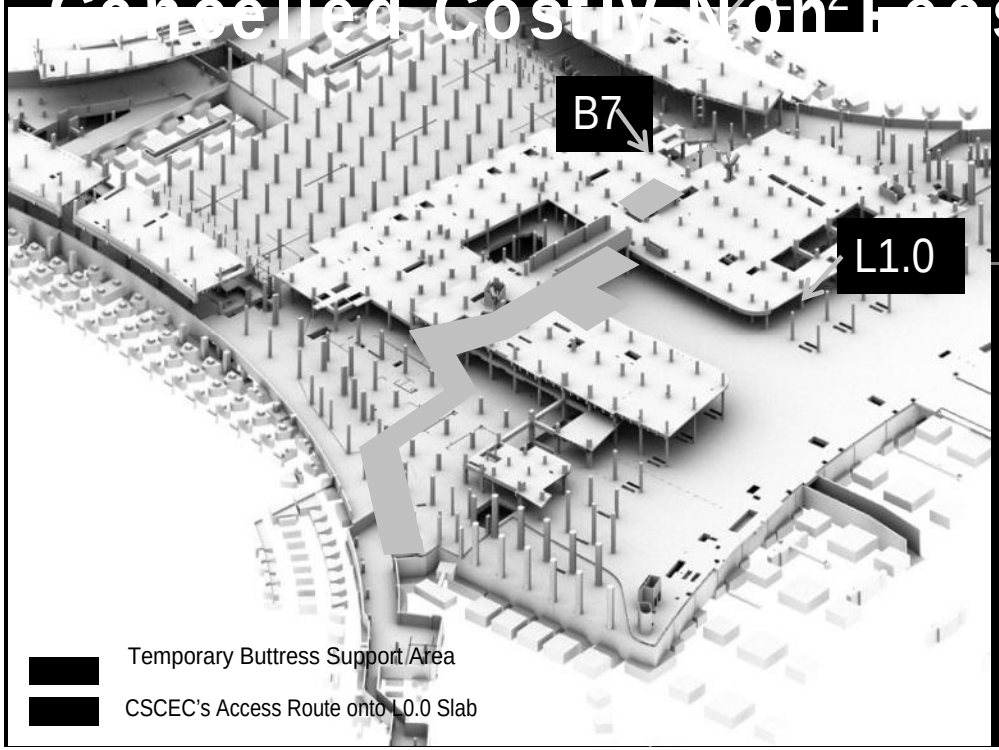
CONSTRUCTION SEQUENCE

INTERNAL LOGISTICS

ROI : BIM Methods Eliminated the Acquisition of 5 New Tower Cranes

4D Simulation Proved Less than 20% of Effective Utilization –

Cancelled Costly Non-Feasible Investment

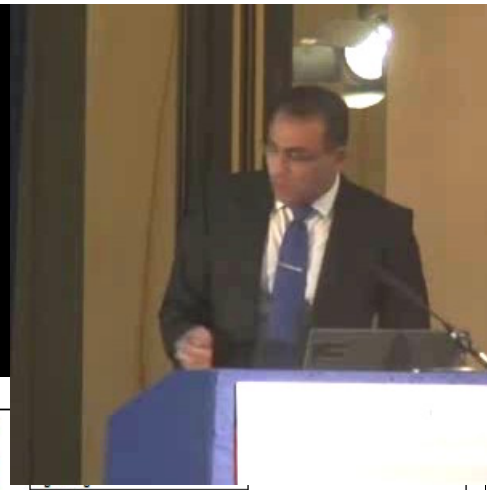


Site Condition on October 10th

Levels

BIM Weekly Progress Reports

METRICS KPI'S



Tepe Akfen TAV Construction | CCC | arabtec

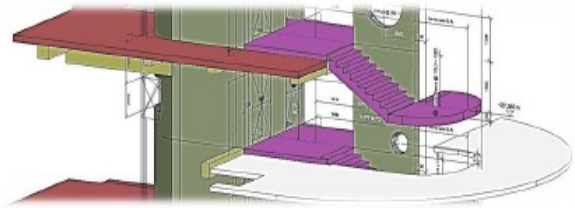
ABU DHABI INTERNATIONAL AIRPORT - MIDFIELD TERMINAL BUILDING

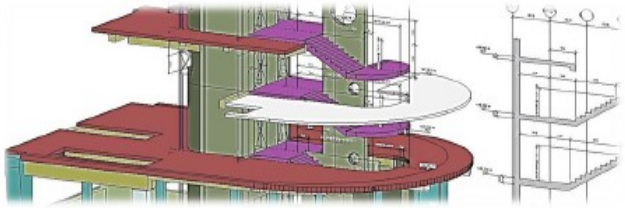
BIM WEEKLY PROGRESS REPORT

WEEK 44

Procurement
Controls

Resources:	
ADIA	35
CAI:	7
RAM:	8
MOA	3

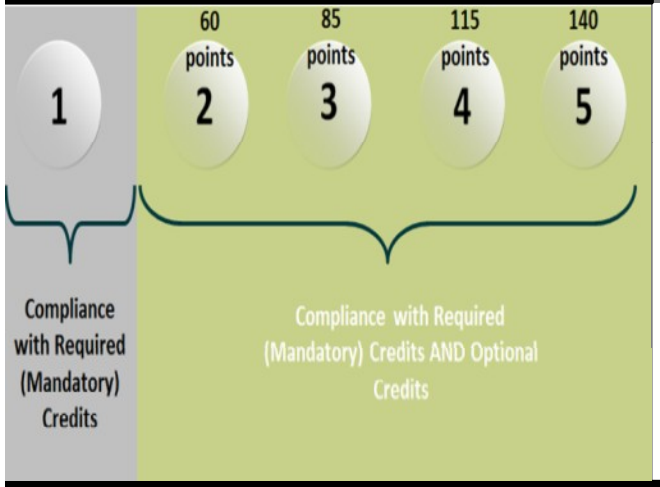




		Current Week 44						Forcasted Week 45					
		22nd Jun	23rd Jun	24th Jun	25th Jun	26th Jun	27th Jun	June 29 Day 1	June 30 Day 2	July 1 Day 3	July 2 Day 4	July 3 Day 5	July 4 Day 6
Status	PCT												
Meetings				Design Meeting @ 4pm	ADAC Meeting @ 3:30pm		Weekly Meeting @ 2:30pm						
In Progress	90%	External Coordination MEP (MTB_PIERS_01_MEP_S.D_1)											
Pending	82%	Tender BIM model											
In Progress	10%		Implementation of the proposed evaluation checklist of models on the CSCEC submission models (by Wajdi Mereb)										
In Progress	20%	Finalization of the list of urgent cases regarding the next two months General Coordination Workshop.											
In Progress	20%	Table 2nd FIX Schedule for the centralized coordination of all the disciplines (e.g. W55 for Cladding etc.)											
In Progress	5%		Evaluation of the proposal regarding the Checklist of the models and preparation one according to the needs of Steel (by Wajdi)										
In Progress	50%	Interdisciplinary Coordination at Main Façade Area between Steel, Concrete, Arch Façade											
Completed	100%			Meeting with Facades S/C & sending Transmittal & Preparing									
In Progress	60%		Quality Control in IFC models of Plumbing										
Completed	100%					BIM presentation to procurement department							
In Progress	10%							Paint- ARCH BUL Models Updating-r02					
In Progress	20%						L3.3 Paint						
Completed	100%						Water Features MTO						
Completed	100%		Extracting Plans in Pier 2 for										
In Progress	70%	Interface Development Plan - External Works											
In Progress	5%		Evaluation of the list of pending RFIs according the Engineering department (sent by e-mail 23rd June).										
Completed	100%	LB.1 Block Walls Sectors 5.13, 5.14,5.23,5.24 (R2)											
Completed	100%		Review of Bulletin 16.1 regarding Reinforcement changes										
Completed	100%		LB.1 blockwerk extraction										
In Progress	80%	LB.2 Update on Stiffeners Columns and Tie Beams According to Engineering and RFI											
Completed	100%					ADM Approval status until Ju							
Completed	100%				SnapShots for CP LB2 BlockV								
Pending	0%	Extraction Process Procedures											
In Progress	15%	LB.2 Blockwork Interior Elevations Update											
Completed	100%				Tagged columns, walls and pits layout for CP-L00								
Completed	100%				Tagged layout of North Ram								

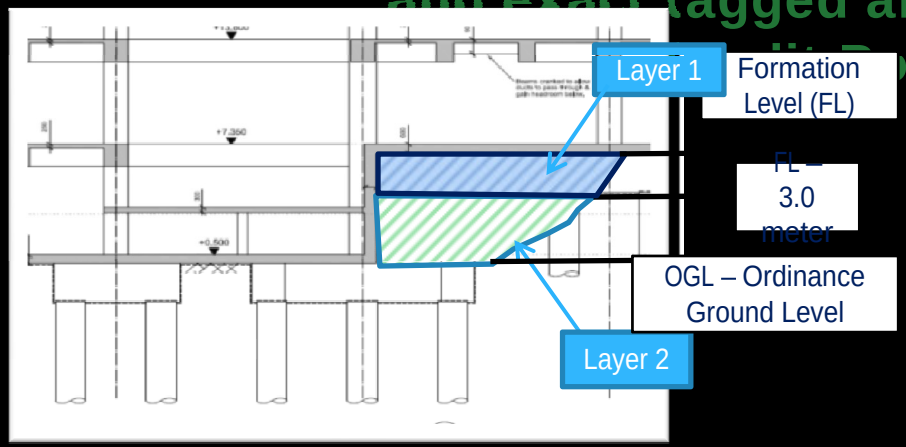
SUSTAINABILITY IN CONSTRUCTION

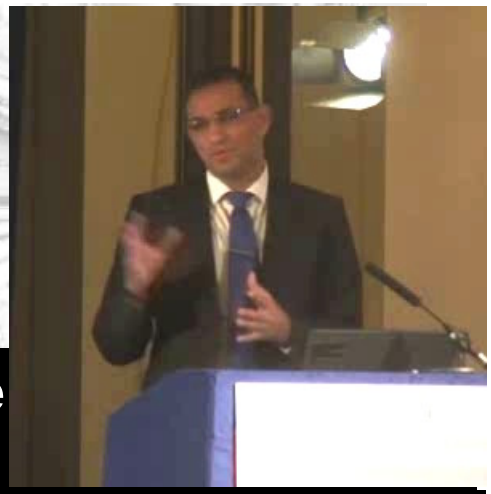
ROI : Use of 1,040,437 m^3 recycled aggregates



- Better utilization of existing stock piles
- Eliminating purchase and transportation on site of backfilling material.
- Better coordination of earthwork and maximum use of existing temporary access ramps and equipment for filling.
- Facilitating reporting for QC due to clear and exact tagged areas

Filling for Suspended Slabs and Slabs on grade





ROI : Innovative Methods For BIM Based Collaboration Reduce Critical RFI 'S

ROI : BIM Workflows saved Almost USD 1 million and more than 51000

ROI : BIM Workflows saved 1123.5 hrs = 118.36 ~ 119 days and $65,000

ROI : BIM Workflows Eliminated the Need for Lengthy Approval Cycles

ROI : BIM Workflows Facilitated and Managed the Complex Interface Coordination Process Eliminating Costly Delays, Rework and Claims Between

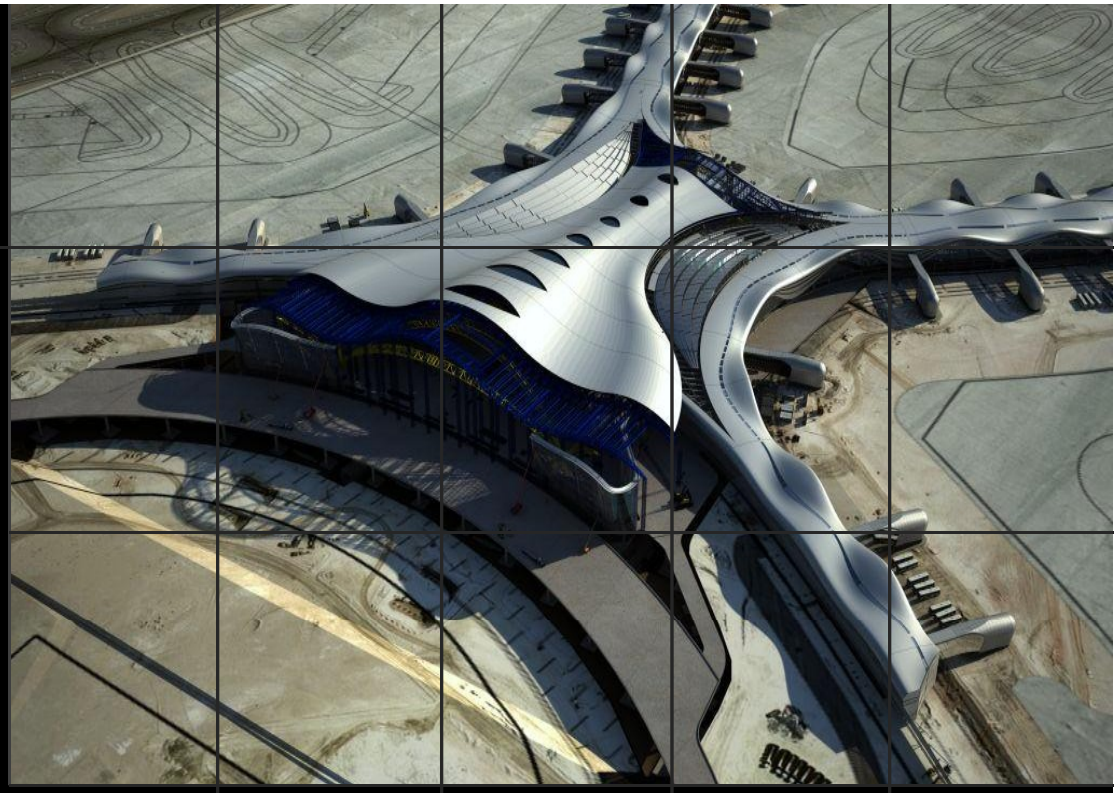
ROI : Use of 1,040,437 m^3 recycled aggregates

ROI : Integrating BIM with Document Management Systems Enabled Visual DOCUMENT LIFECYCLE MANAGEMENT AND TRACEABILITY
Facilitating Contractual Case Building and Claims Support

ROI : BIM Methods Eliminated the Acquisition of 5 New Tower Cranes - 4D Simulation Proved Less than 20% of Effective Utilization – Cancelled Costly Non

ROI : BIM Methods Reduced The Number of Quantity Surveying Team from

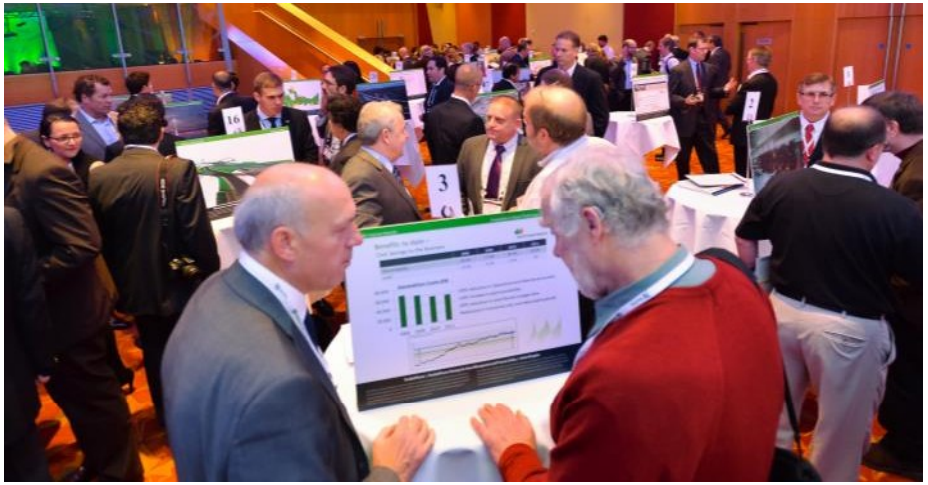
Be Inspired Awards Competition London, UK – 29.October.2013



CONSOLIDATED CONTRACTORS COMPANY

MIDFIELD TERMINAL BUILDING OF THE ABU DHABI AIRPORT

Issam El-Absi, Manager IS-Automation & Engineering (BIM, Civil and GIS) / General Manager BIM Centers - CCC Group / MTB Project BIM Manager



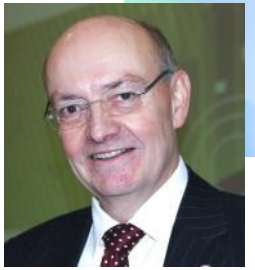
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

GeoSmart Government Speakers…

…at the *Year in Infrastructure 2013* Conference

Sir John Armitt
Chairman
Olympic Delivery Authority



Peter Hansford
Chief Construction Advisor to the UK Government

Andrew Wolstenholme
CEO, Crossrail

The *Year in Infrastructure 2014* Conference

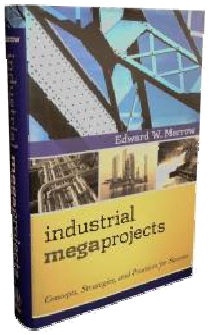
Please join us for

Year in Infrastructure 2014

Hilton London Metropole

London, Nov. 4-6, 2014

www.bentley.com/yiiconference



2014 Keynote Speaker:
Edward W. Merrow
Founder & President of IPA
Author of
Industrial Megaprojects

Submit your project for the 2014
Be Inspired Awards!

www.bentley.com/BeInspired

MIDDLE EAST GEOSPATIAL FORUM

Bentley *Sustaining* Infrastructure

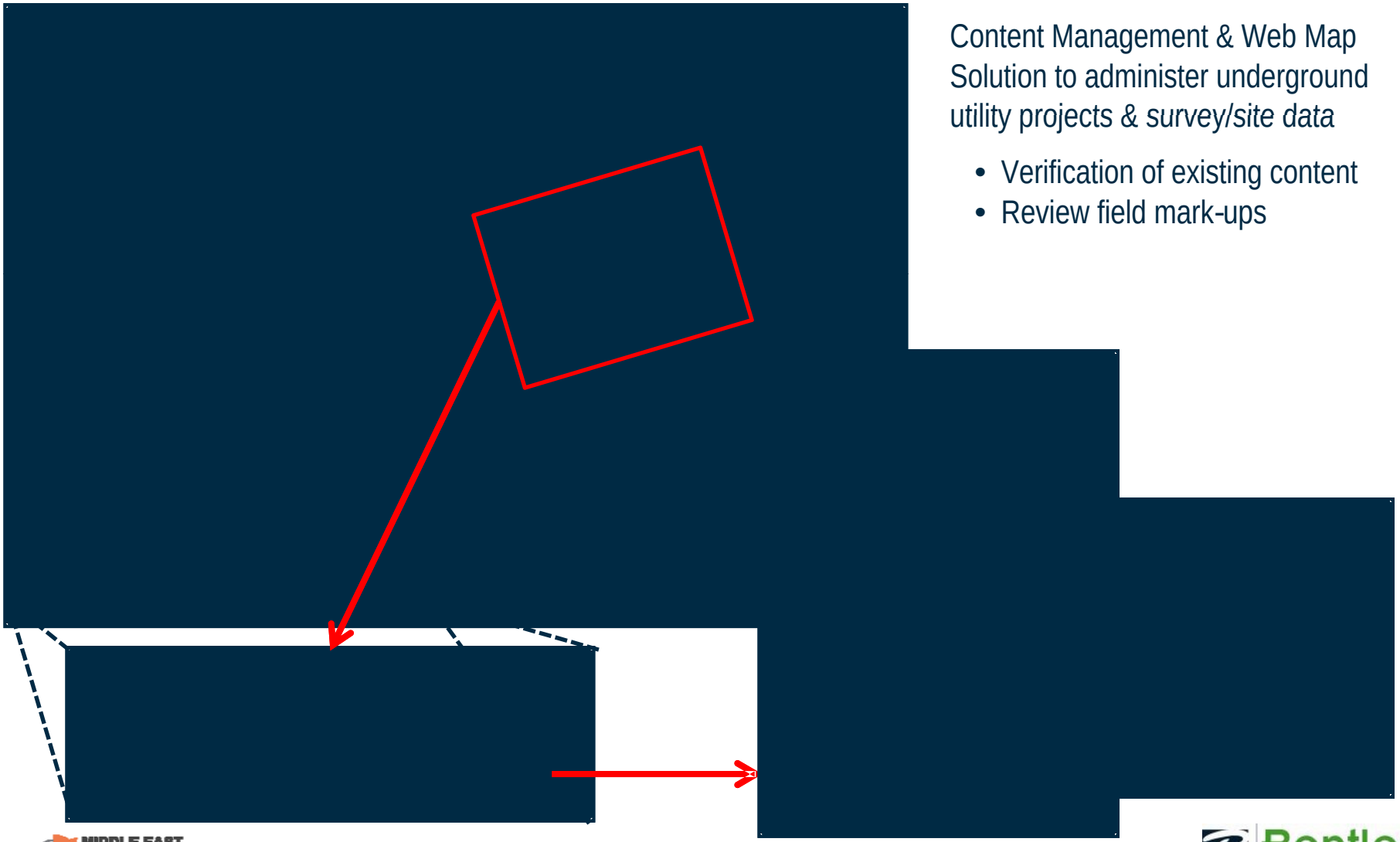
MIDDLE EAST GEOSPATIAL FORUM

Bentley
Sustaining Infrastructure

Evolving *Directions* of Geospatial Technology

Subsurface Utility Engineering

Project Planner – Prepare Project Information



Content Management & Web Map Solution to administer underground utility projects & *survey/site data*

- Verification of existing content
- Review field mark-ups

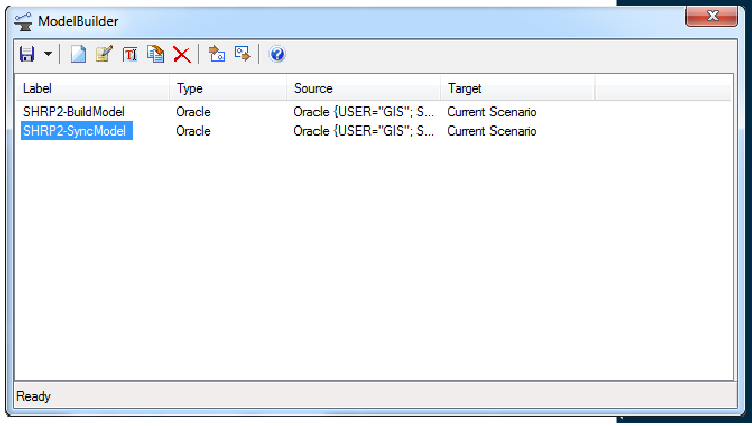
MIDDLE EAST GEOSPATIAL FORUM

Bentley Sustaining Infrastructure

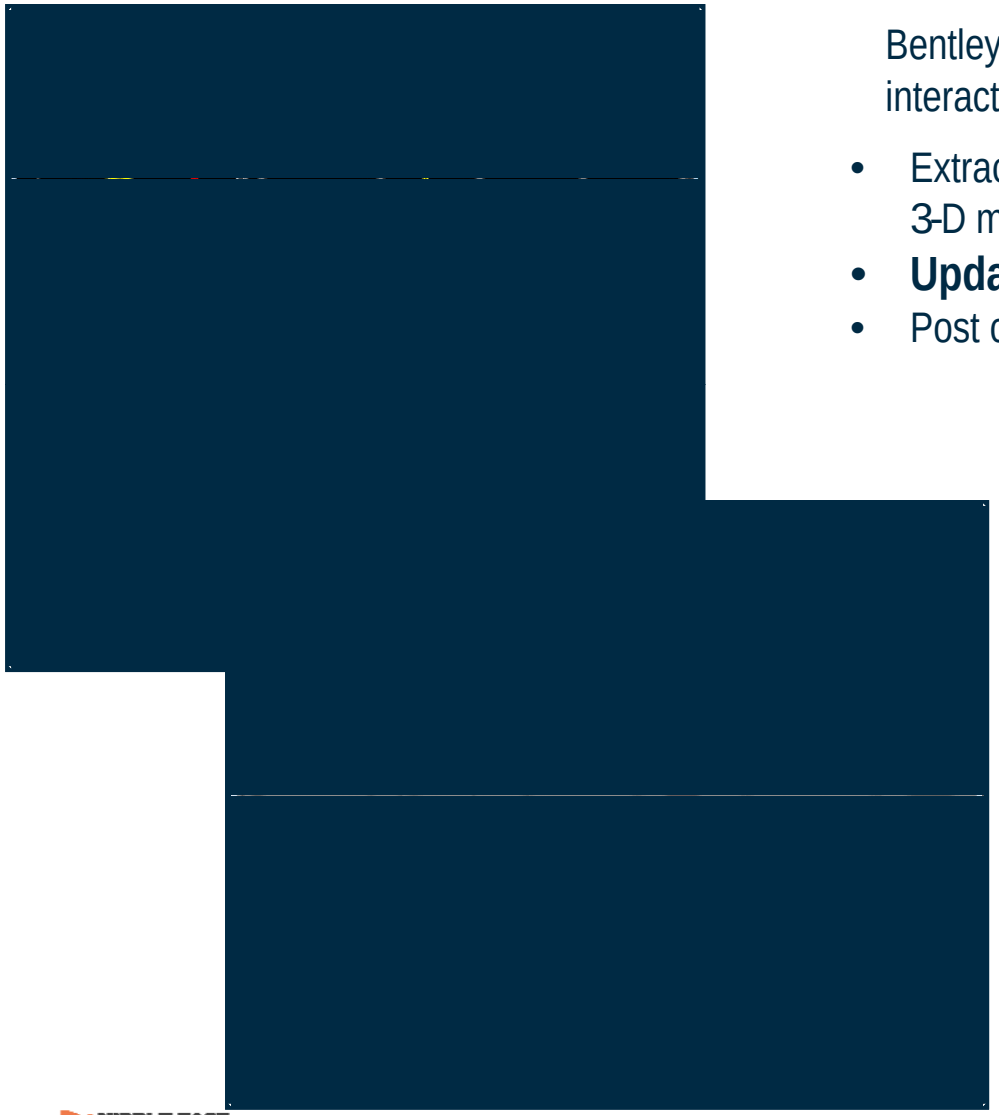
Project Engineer – Design Project

Bentley Engineering Software to extract, model, and interact with utility data.

- **Extract as-is conditions from 3-D spatial database to 3-D model**
- Update drainage network based on project
- Post changes to 3-D spatial database



Project Engineer – Design Project



Bentley Engineering Software to extract, model, and interact with utility data.

- Extract as-is conditions from 3-D spatial database to 3-D model
- **Update drainage network based on project**
- Post changes to 3-D spatial database

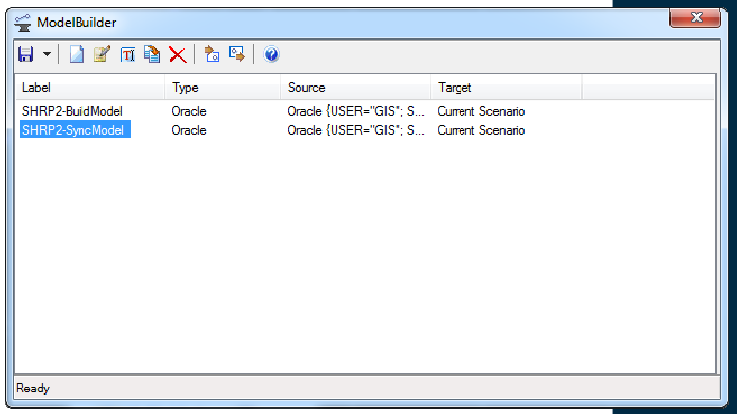
Project Engineer – Update Drainage Network

- Visualize existing utilities in a 3-D composite model
- Interact with underlying data and edit as needed
- Remove, update, and create new utilities based on project criteria
- Perform conflict analysis of proposed project changes

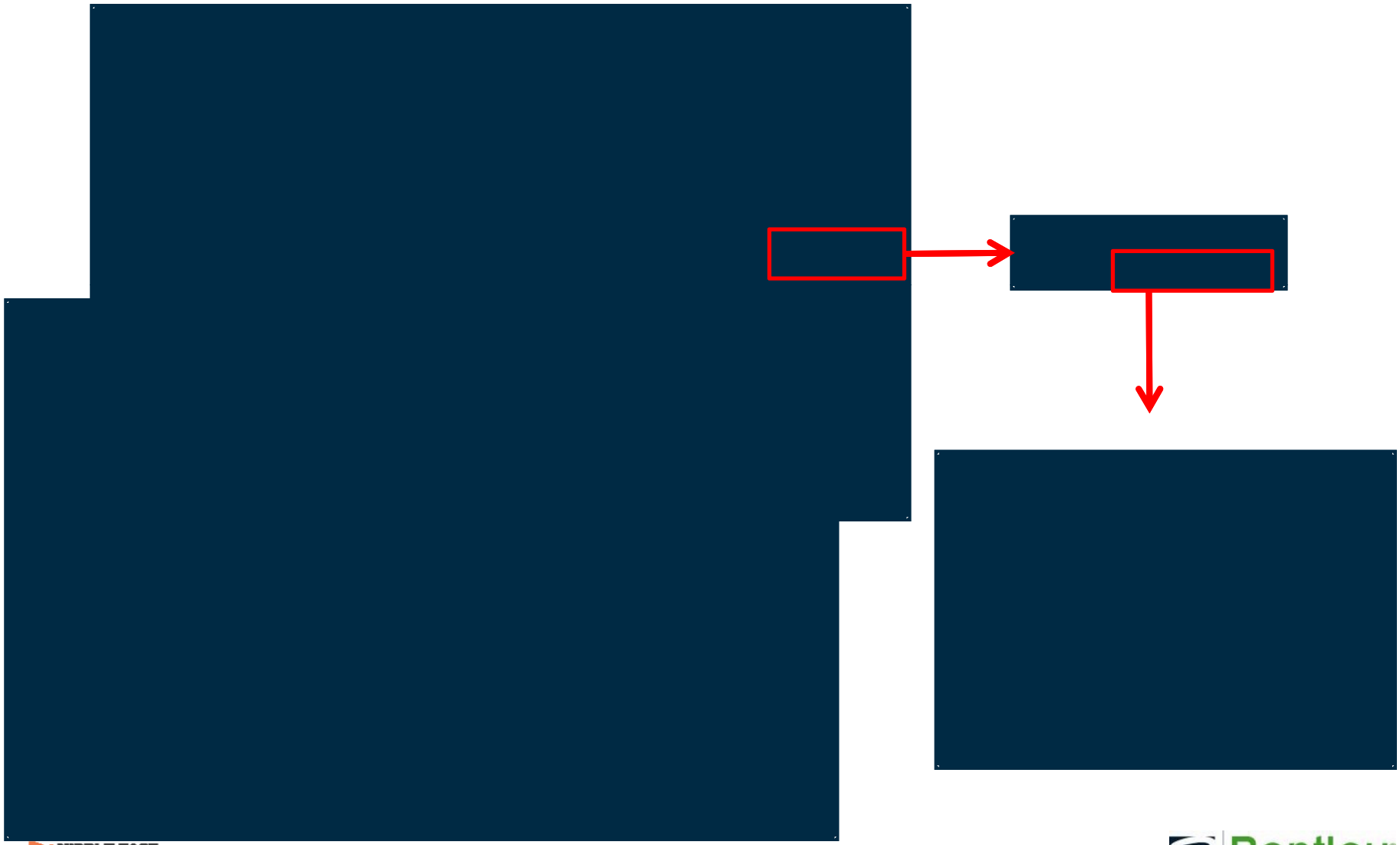
Project Engineer – Post as-builts to 3D spatial database

Bentley Engineering Software to extract, model, and interact with utility data.

- Extract as-is conditions from 3-D spatial database to 3-D model
- Update drainage network based on project
- **Post changes to 3-D spatial database**



Project Manager – Archive project content



Completing the Reach…

Evolving Directions of Geospatial Technology

Greg Bentley, CEO, Bentley Systems

Converging Reach of Information Mobility

Greg Bentley, CEO, Bentley Systems