MOSAIC

Innovative Design & Construction Solutions

Introducing new processes to reduce building costs

What if project data were accurate from the start?

Confidentiality and Ownership

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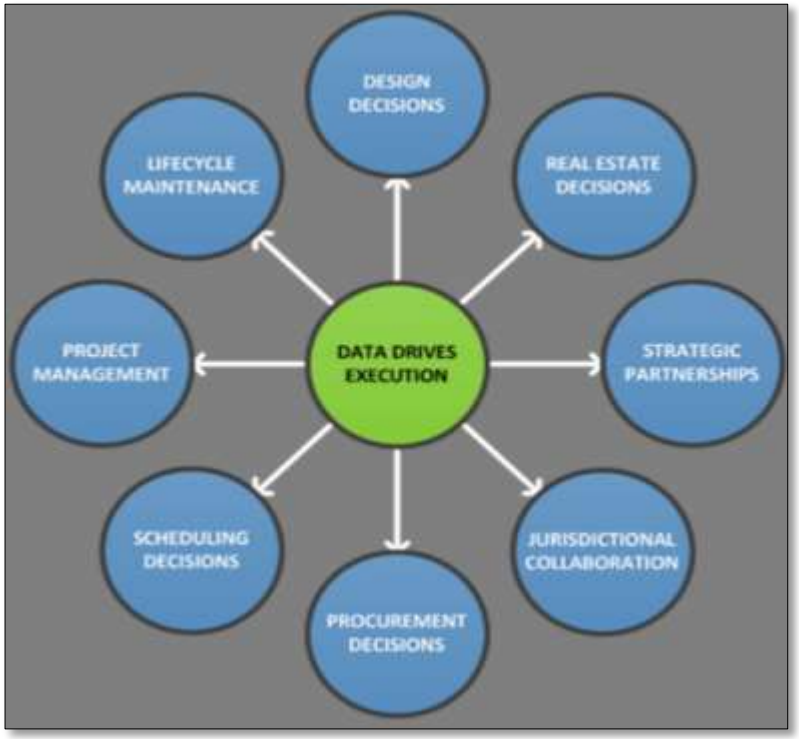
The MOSAIC Way

- MOSAIC is a **multidisciplinary group** of technology inspired project managers, contractors, architects, designers, engineers, quantity surveyors, Building Information Model (BIM) experts & Integrated Project Delivery (IPD) specialists
- We have a full-time team of **in-house programmers** developing and maintaining our suite of **proudly South African developed and owned** state-of-the-art BIM software, including **Collab** and **SkyBIM**.
- We **combine expertise** across disciplines, sectors and all major building types to deliver **fully integrated, fully costed Building Information Models**
- We bring together the major and specialist skills into a **single, managed service** to optimise the way **projects** are **designed**, **costed**, **constructed** and **managed**
- We generate cost estimates and **bills of quantities** in **real-time**
- We provide clients with **'digital doubles'** of their projects for **asset tracking** & **facilities management**

Benefits of the MOSAIC Way

- Centralised Real-time Project Data Management
- Singular Design Team Management
- Empowers the Owner/Client
- Incentivises Lower Project Cost
- Reduced Project Risk, Enhanced Cost Certainty
- Improved Co-operation and Governance
- Shared Ideals and Goals
- Extreme Flexibility
- No Responsibility Gaps
- No Hidden Costs or Agendas
- Integration of the Supply Chain
- Manage Schedules and Vendors More Effectively
- Elimination of Waste and Bottle-necks
- Living Data - Provide New On-going Management Services
- Monitor Virtual Projects in Parallel with the Real Ones
- Fully Transparent
- Open Sharing of Project Data Across All Parties and All Project Phases



Across Sectors

MOSAIC operates in multiple sectors:

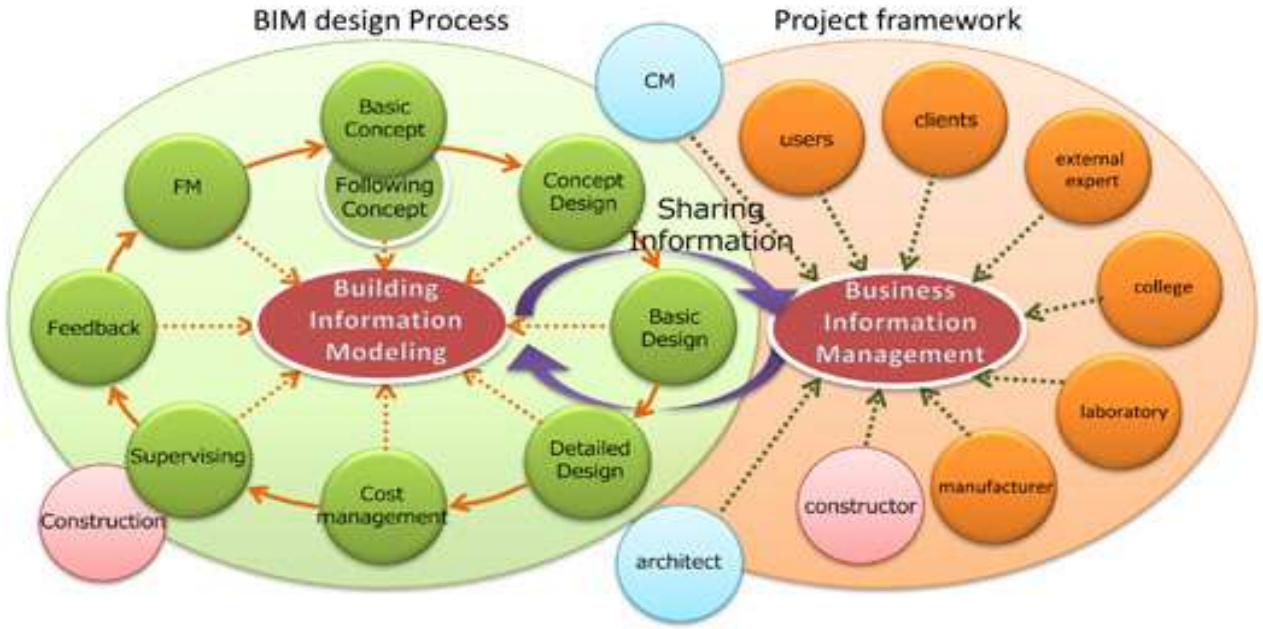
- Arts and Culture
- Commercial
- Retail
- Banking
- Affordable Housing
- Education
- Government
- Healthcare
- Hotels and Resorts
- Industrial
- Military
- Mixed-Use
- Residential
- Senior Living
- Transport and Aviation
- Infrastructure
- Water

Scope of Work

The following forms part of the MOSAIC scope of work:

Professional Services

1. Project management
2. Architectural services
3. Quantity surveying
4. Electrical engineering
5. Mechanical engineering
6. Fire services
7. Structural engineering



integration of multidisciplinary knowledge domains

MOSAIC Partner Program

- MOSAIC can **license** its technology, software, workflow and processes to **approved partner firms** – who are typically client, sector or geographically focused
- MOSAIC will help set up **master prototype projects** that are **fully integrated** across **disciplines**, **fully specified** and **fully costed**
- Master prototype projects are engineered to **simplify** and **accelerate** the **roll-out** of similar projects
- Project specific **research** and **development**
- Customised **software solutions**
- On-site **training**
- **Project management** and **monitoring**
- Full **competency transfer**

INEFFICIENCY
in the Construction Industry

Building Industry is Inefficient

Inefficiency in the building industry is estimated at over

50%

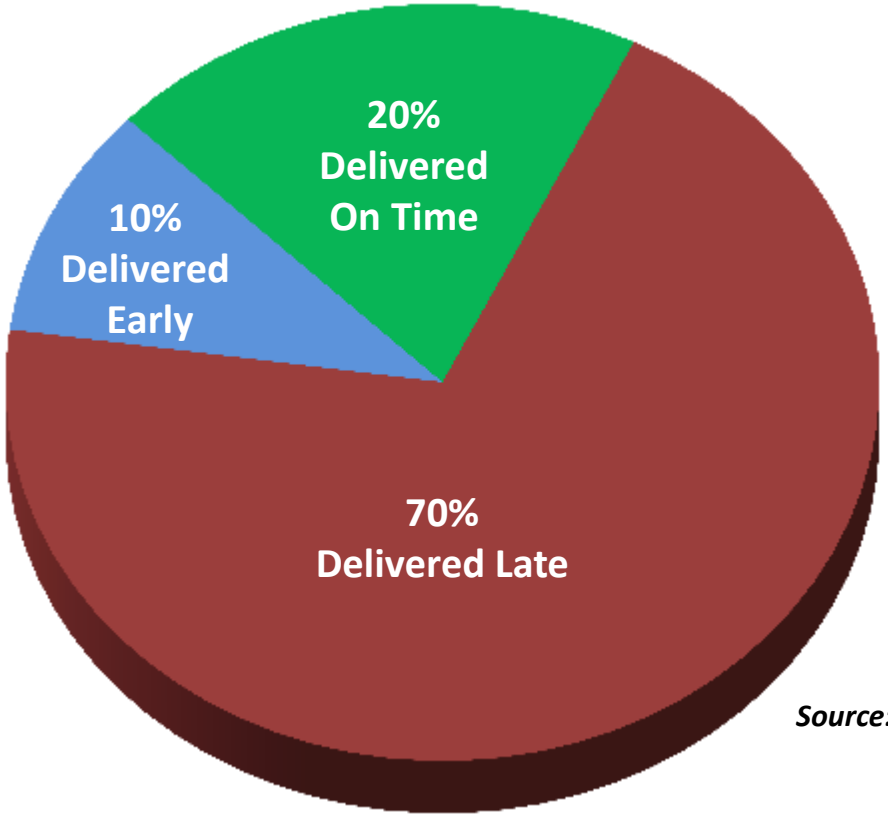
Source: BuildingSMART Alliance

10% Recounting, remeasuring, overestimating
15% Rework, avoidable collisions between trades
10% Poor or late planning
12% Material inefficiencies, overproduction
10% Labour inefficiencies, information treasure hunts

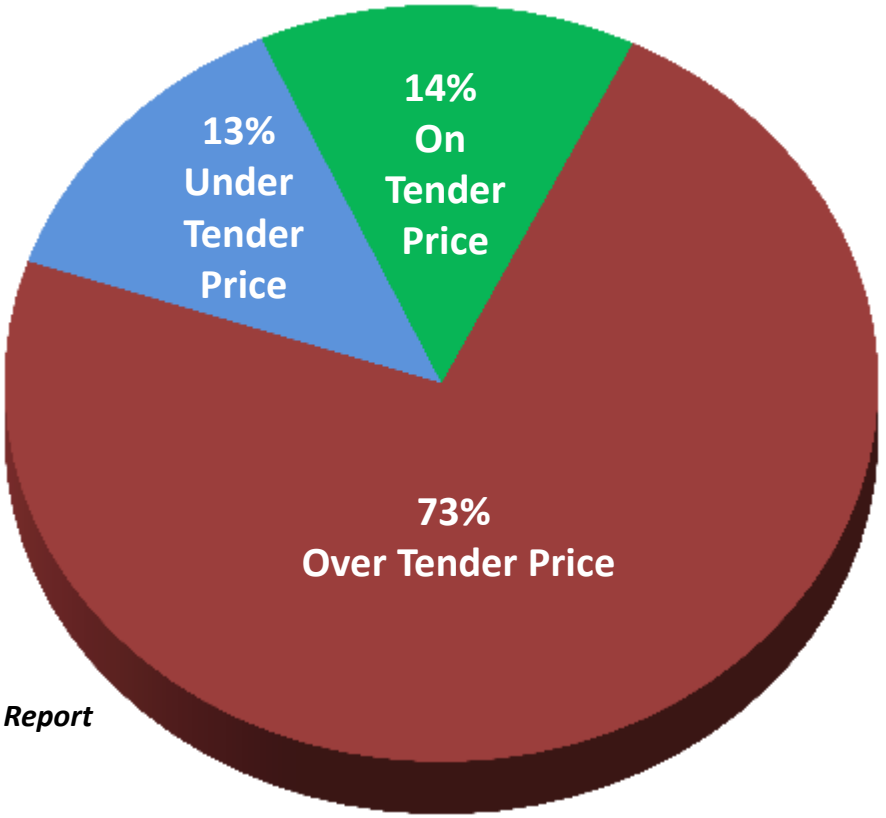
70% Delivered Late
73% Over Budget

Projects Late & Over Budget

70% Delivered Late



73% Over Budget



Source: UK Egan Report

Time

Cost

Conventional Design is Fragmented

- **Fragmented** teams working **linearly**
- Costly re-entry of **duplicate data**
- Information **throwaway**
- Digital **isolation**
- **Paper** intensive

Old School Estimating is Laborious

Old School Method 1

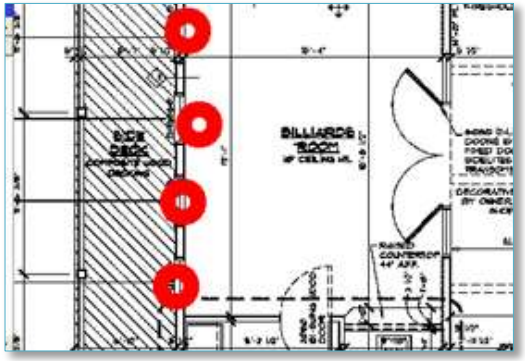
Manual takeoff from hardcopy drawings

Old School Method 2

Trace over paper drawings on a digitizer

Old School Method 3

Trace over PDF files using 'On Screen Takeoff'



- Slow and **labour intensive**

- Prone to **inaccuracies**
- Degree of **secrecy** surrounding calculation formulas

- **Loathe** design changes
- Detailed estimates only performed toward **end** of design phase

Goldmines of Data Trapped in Silos

- Projects generate **massive arrays of information**
- **High-value** project data **locked** inside **silos**
- Knowledge **hoarding,** lack of **transparency**
- **Adversarial** relationships, intricate dance of **risk-shifting**

WORLD MOVES TO BIM

Building Information Modeling & Virtual Construction

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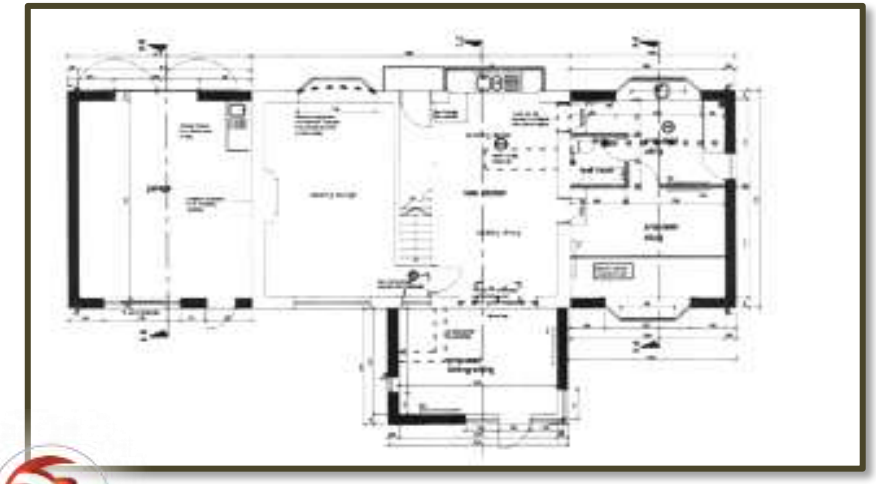
CAD versus BIM

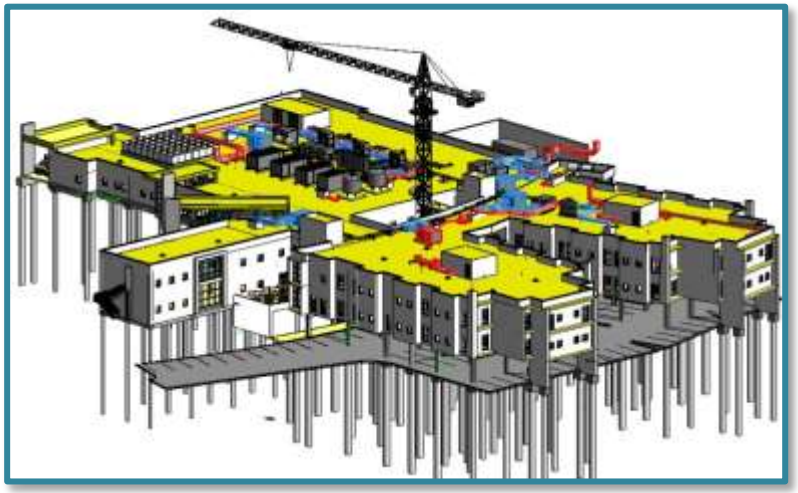
Computer Aided Design

- Primarily 2D
- Dumb graphics
- Lines, arcs, circles, polylines
- Electronic drafting
- Basic measuring
- AutoCAD



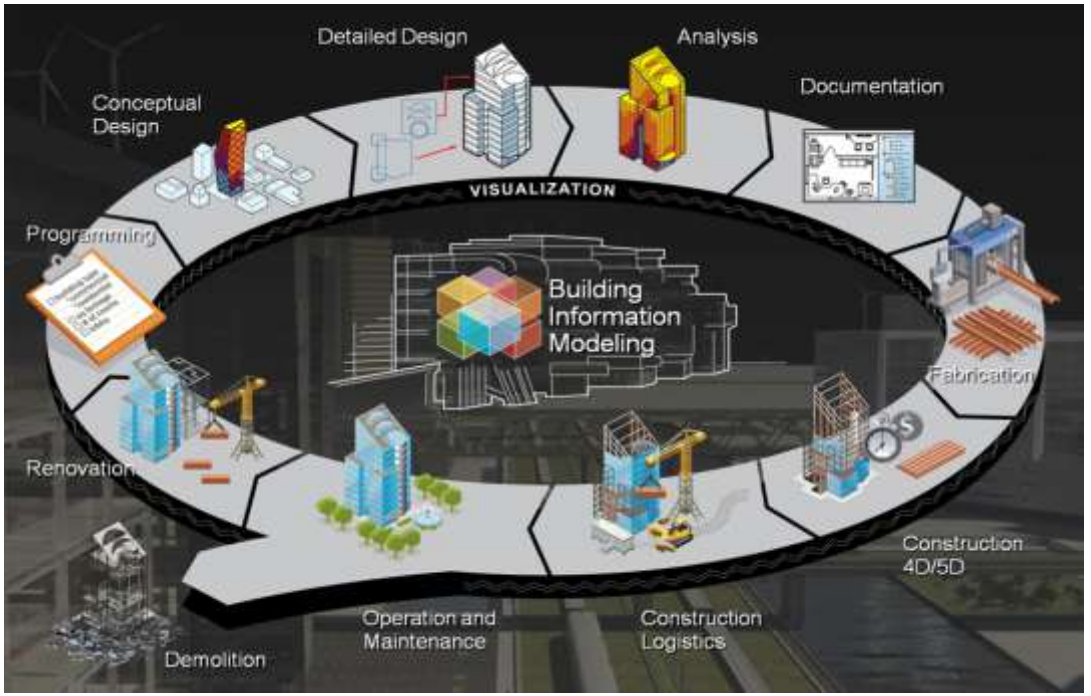
Building Information Modeling

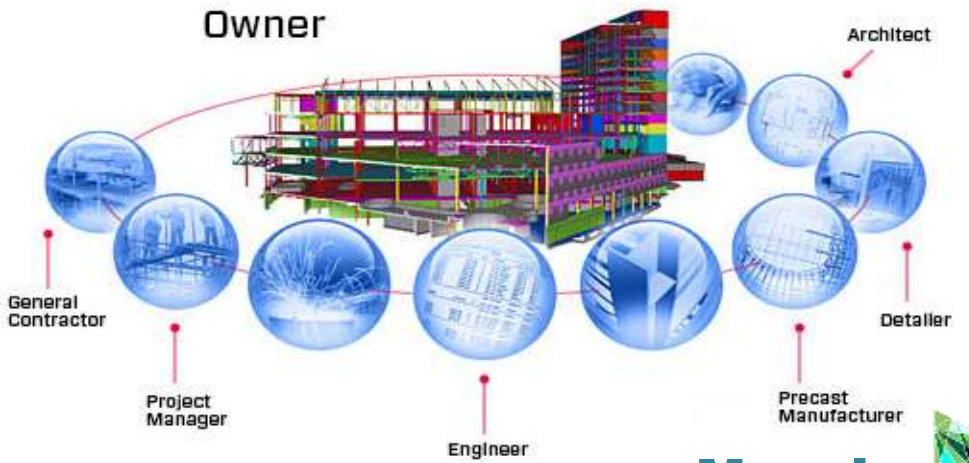
- 3D 4D 5D 6D 7D
  time cost green lifecycle
- Intelligent objects ‘LEGO’
- Walls, floors, doors, columns
- Virtual construction
- ‘One-click’ bill of quantities
- Revit, ArchiCAD



Building Information Modeling

- Building information modelling (BIM) **transforms** the way in which we design **buildings**, **cities** and **systems** to perform throughout their **entire life cycle**.
- BIM can be thought of as a **virtual model** – whether of a **building**, a **site**, an **infrastructure system** or a **city**.
- It allows any aspect of a design's performance to be **simulated and assessed** before it is built – helping us to **understand the design** more **completely** and much **earlier**.
- That virtual model becomes a reference for **better construction**. And it continues to **evolve**, even after it passes to the **assets owners** and **operators**.
- BIM achieves all this because it is not simply a 3D animation: it is an **intelligent project model** in which **information is embedded** so it can be **shared** between stakeholders throughout the whole process.





Plan ➡ Design ➡ Build ➡ Manage

- Across the project's **lifecycle**

BIM is a Steamroller

- UK government has **mandated** their requirement for **fully collaborative 3D BIM** as a minimum by 2016

UK market for BIM-related services will be an annual £30bn by 2020

Lower costs

33%

reduction in the initial cost of construction and the whole life cost of built assets

Faster delivery

50%

reduction in the overall time, from inception to completion, for newbuild and refurbished assets

Lower emissions

50%

reduction in greenhouse gas emissions in the built environment

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Green driving BIM Adoption

- Green BIM helps project stakeholders make informed decisions early in the design process to impact project efficiency & performance

Carbon

Use BIM to **test conceptual designs** so we can specify solutions with the lowest carbon impact. This allows us to **identify low carbon options** that have the potential to drive down carbon emissions during the **design** and **construction** phases, as well as options that lead to carbon savings during a building's **operation**.

Energy

Use BIM in design process to **evaluate energy efficiency** and make recommendations for **design alternatives** that will enhance a building's **performance**.
Every part of a building, from **MEP** (Mechanical, Electrical & Plumbing) systems to interior climate, can be simulated and optimized for energy efficiency.

Materials

Tying BIM to materials can significantly **reduce construction waste** and streamline the **supply chain** through more **accurate procurement**.
Like carbon footprinting, it also helps us select design solutions that can reduce the overall environmental impact of a building throughout its operation.

Water

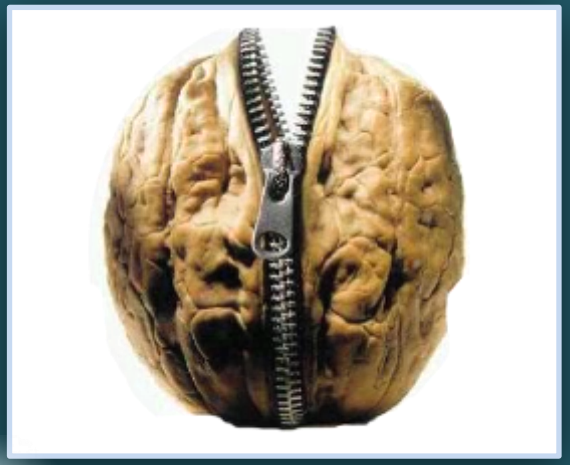
BIM helps to **quantify** the amount of water used in a building by calculating the **number of fixtures** (sinks, toilets, etc.) and their related **water usage**. This also helps us measure the potential for grey water reuse, which is highly beneficial for reducing demand on local water supplies.

BIM is a Game Changer

- BIM will **disrupt** the current construction sector and help it to become more industrialised.
- BIM will **revolutionise** collaborations between supply chain partners, unlock new business models, reduce costs, speed up delivery times, increase efficiency, cut waste, and deliver projects that are ‘right first time‘.
- BIM will **modernise** the construction sector in the same way that effective data exchange and collaborative supply chains have revolutionised the automotive and aerospace sectors over the past two decades.

MOSAIC TECHNOLOGY OVERVIEW

SkyBIM & COLLAB Platforms in a Nutshell



- ✓ In-house team of programmers
- ✓ Proudly South African technology
- ✓ Unique solution
- ✓ First in the world

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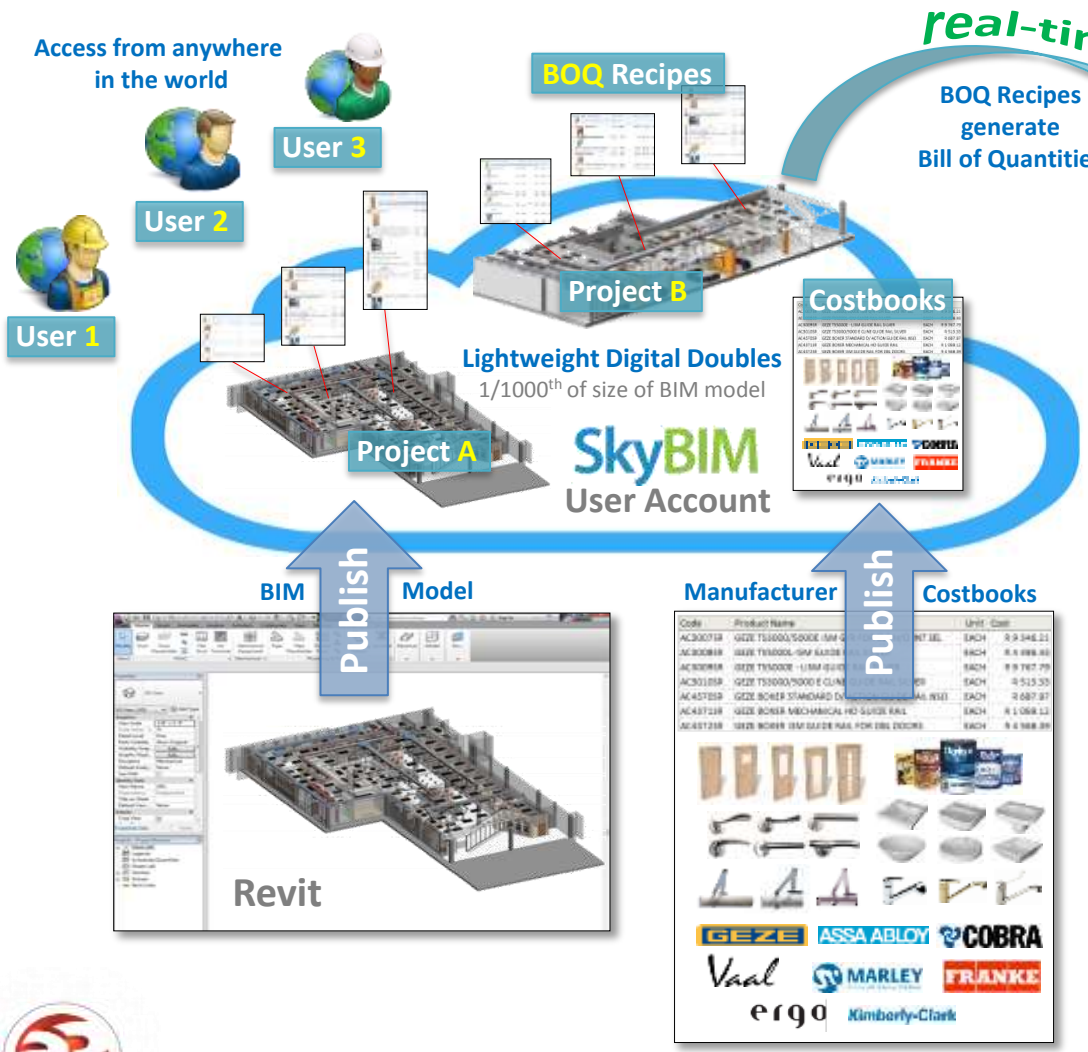
SkyBIM Platform in a nutshell

SkyBIM is a server based platform to securely host, cost and manage Building Information Model (BIM) projects, as well as to facilitate the procurement of building products. SkyBIM can automatically generate a Bill of Quantities.



Automatic Bill of Quantities

Item		Quantity	Rate	Amount
	BILL NO. 11			
	IRONMONGERY			
	LOCKS			
	Manufactured by GEZE or other approved			
1	GEZE 40mm single cylinder nickel plated lock (Product code: GEZE 950930108M/C.M.K)	63.000 ea		R0,000
	HANDLES			
	Manufactured by DAYTONA or other approved			
2	Stainless steel Daytona lever handels on 150 x 350mm back plate with Euro profile and to recieve cylinder lock (Product code: EDE101C69)	21.000 ea		R0,000
3	Stainless steel Daytona lever handels on 165 x 165mm back plate with Euro profile and to recieve cylinder lock (Product code: EDE101C69)	63.000 ea		R0,000
4	Stainless steel Daytona pull handels on 150 x 350mm back plate with blank profile including 6 fixing holes (Product code: 075/450/SS)	21.000 ea		R0,000
	PUSH PLATES AND KICK PLATES			
	Manufactured by GEZE or other approved			
5	200 x 813mm Intrad	21.000 ea	R120,000	R2 520,000
6	200 x 900mm Intrad	63.000 ea	R120,000	R7 560,000
	0.9mm Thick satin finished stainless steel plates countersunk screwed along edges at not exceeding 200mm centres			
7	813 x 300mm H Kickplate fixed to 40mm thick door on both sides	42.000 ea	R120,000	R5 040,000
8	900 x 300mm H Kickplate fixed to 40mm thick door on both sides	63.000 ea	R120,000	R7 560,000
	DOOR CLOSERS			
	Manufactured by GEZE or other approved			
9	Door closer	84.000 No	R250,000	R21 000,000
	Section No. 2 Bill No. 11 IRONMONGERY		Carried to Section Summary	R43 680,00

www.SkyBIM.com Page 38 of 97

COLLAB Platform in a nutshell

COLLAB is a real-time **in-context** project collaboration server that supports messaging, scheduled reminders, snagging, checklists, photos, attachments, product tracking and more. COLLAB integrates with SkyBIM and works online & offline.

Messaging
BULKHEAD 15mm Gypsum

Leslie Musikavanhu
20 Oct 2013 2:16pm
Niko, due to the beams behind, bulkhead height is going to increase

Nicholas Karassavas
20 Oct 2013 2:18pm
No problem, let me know when you have new height

Andries Geldenhuys
21 Oct 2013 8:16pm
New bulkhead height = 2650mm

Nicholas Karassavas
21 Oct 2013 8:32am
Sorted! Central model updated, all sheets reflect new bulkhead height

Reminders
Replace AIRCON Filter

Ian Smit
Reminder: 21 Sep 2014 2:18pm
Replace cassette unit filter 28 Sep (18 months since last replacement)
Action 1: SMS 082 555 1345
Action 2: Email john@drakefm.co.za

Item Status
GEZE Overhead Door Closer

Back Order
In Transit
✓ On Site
Installed
Checked

Snagging
Door 21 – 900 x 3032

Andries Geldenhuys
21 Oct 2013 8:16pm
FRONT LOBBY

Door installed wrong position

Files

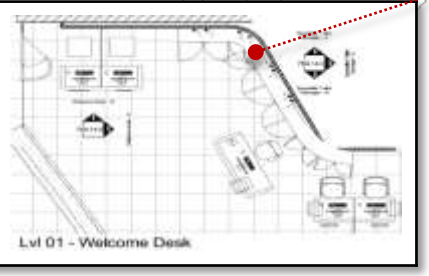
COLLAB Real-time Project Collaboration Engine

Use DWF Sheets to reference project remotely

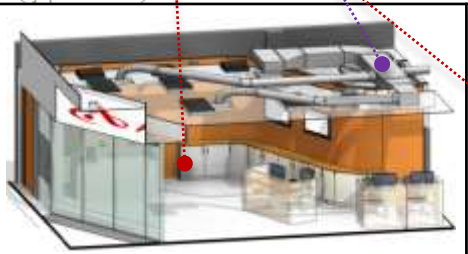
Specifications

Photos

DURBAN
ANDRIES



JOHANNESBURG
NIKO



CAPE TOWN
LESLIE

Real-time Snagging with COLLAB

- Snag items on **2D sheets** or **3D models**

Kevin Hinde
17 Mar 2014 8:16AM
BATHROOM

Incorrect bath spec

Nicholas Karassavas
21 Mar 2014 7:42AM
KITCHEN

Wrong tapset installed

Nelson Ncube
23 Mar 2014 3:16PM
MALE WC

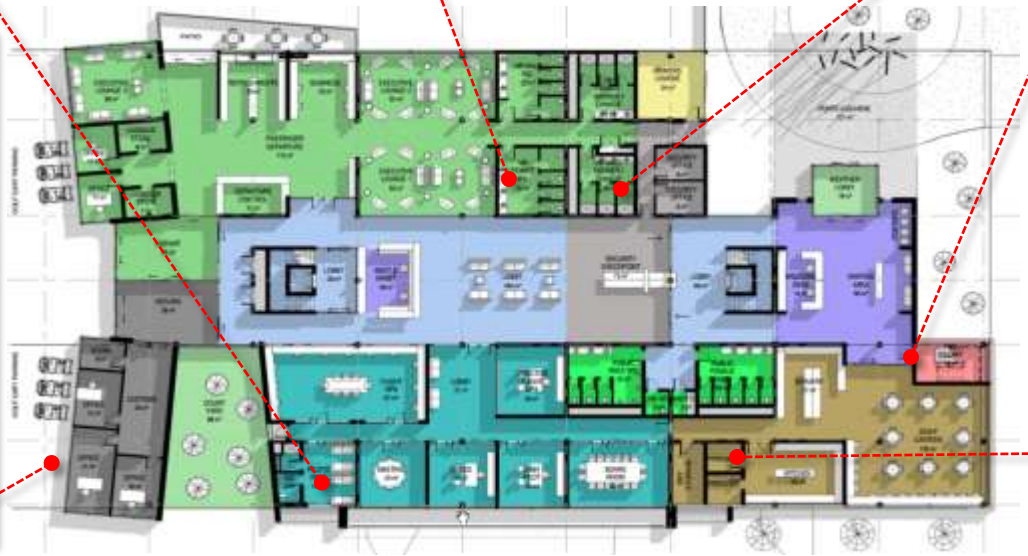
No water pipes provided

Leslie Musikavanhu
19 Mar 2014 3:17PM
STORE ROOM

Why overhead door closer here?

Willem Ackerman
19 Mar 2014 3:36PM
BATHROOM

Patches around windows , other areas to be smoothly finished



Willem Ackerman
21 Mar 2014 8:04AM
RECEPTION

Rust to door frames top and bottom to be repaired

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Integrate the World of Products

- via **Product Recipes** and **costs**

BIM Project

BIM Door

Door Name -
D09 - 900w x 2032h on Brick 115mm

Recipe Link

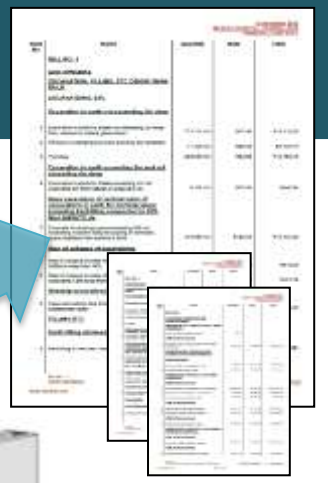
'Bill of Quantities' Product Recipe

Recipe Name - D09 - 900w x 2032h on Brick 115mm

				GEZE 	ASSA ABLOY 	ASSA ABLOY 		 Consumption 0.95m
1 ea	1 ea	1 ea	2 ea	1 ea	1 ea	1 ea	1 ea	
40mm semi-solid door size 900 x 2032mm high	1.6mm thick x 115mm wide galvanised mild steel frame for door 900 x 2032mm	Set up & build	One & a half pair 65 x 42mm steel hinges, supply and fitted	GEZE TS1003 silver standard arm overhead door closer size 3	ASSA ABLOY 125kHz Stand Alone Proximity Reader	ASSA ABLOY High Security Euro Profile Cylinder Electro mechanical lock	160mm stainless steel plate pull handle, with back stainless steel plate	110 x 75mm Lintols in lengths not exceeding 3m built over openings

Automatic Bill of Quantities

- **Total** 110 x 75mm **Lintols** required by **project**



BIM Project

Bill of Quantities

	BRICKWORK SUNDRIES			
	2,5mm Brickwork reinforcement			
16	75mm Wide reinforcement built in horizontally	9004,8196 m	R2,370	R21 341,422
17	75mm wide reinforcement circular on plan	43,3732 m	R2,840	R123,180
	Prestressed fabricated concrete lintels including necessary temporary supports			
18	110 x 75mm Lintols in lengths not exceeding 3m built over openings	716,110 m	R44,100	R31 580,451

Tie-in Procurement Costbooks

- **Populate BOQ Recipes** with **products** from **in-house Costbooks**

BIM Project

BIM Door

SkyBIM BOQ Door Recipe

NEW	External 44mm Thick Solid Door - 900 x 2032mm High	1 ea	R5 350,655
	0.90 x 2.03 x 44mm Thick door Commercial veneered with solid hardwood edges sprayed (non yellowing) and painted, 1.66mm thick pressed steel single rebate fr		
	Single leaf FLB closed-back solid door	1.000 ea	R3 300,000
			
	Steel frame for single door	1.000 ea	R500,000
			
	Precast concrete lintol to be installed above door	1.500 m	R30,000
			
	Enamel paint on door general surfaces	3.876 m2	R35,000
	4mm Thick full height Raven R55W weather strip to both si	9.928 m	R25,000
	Heavy duty brass hinges	1.000 Pr	R75,000
			
	One coat plaster to narrow widths	1.142 m2	
	Set up and build in single leaf door frame not exceeding 2.5	1.000 ea	R485,950
	Building in		
	Three lever lock including furniture	1.000 ea	R450,0
			
	Two coats acrylic PVA finish to plastered narrow widths	1.142 m2	R35,000
	Enamel paint on pressed steel door frames	2.025 m2	R35,000

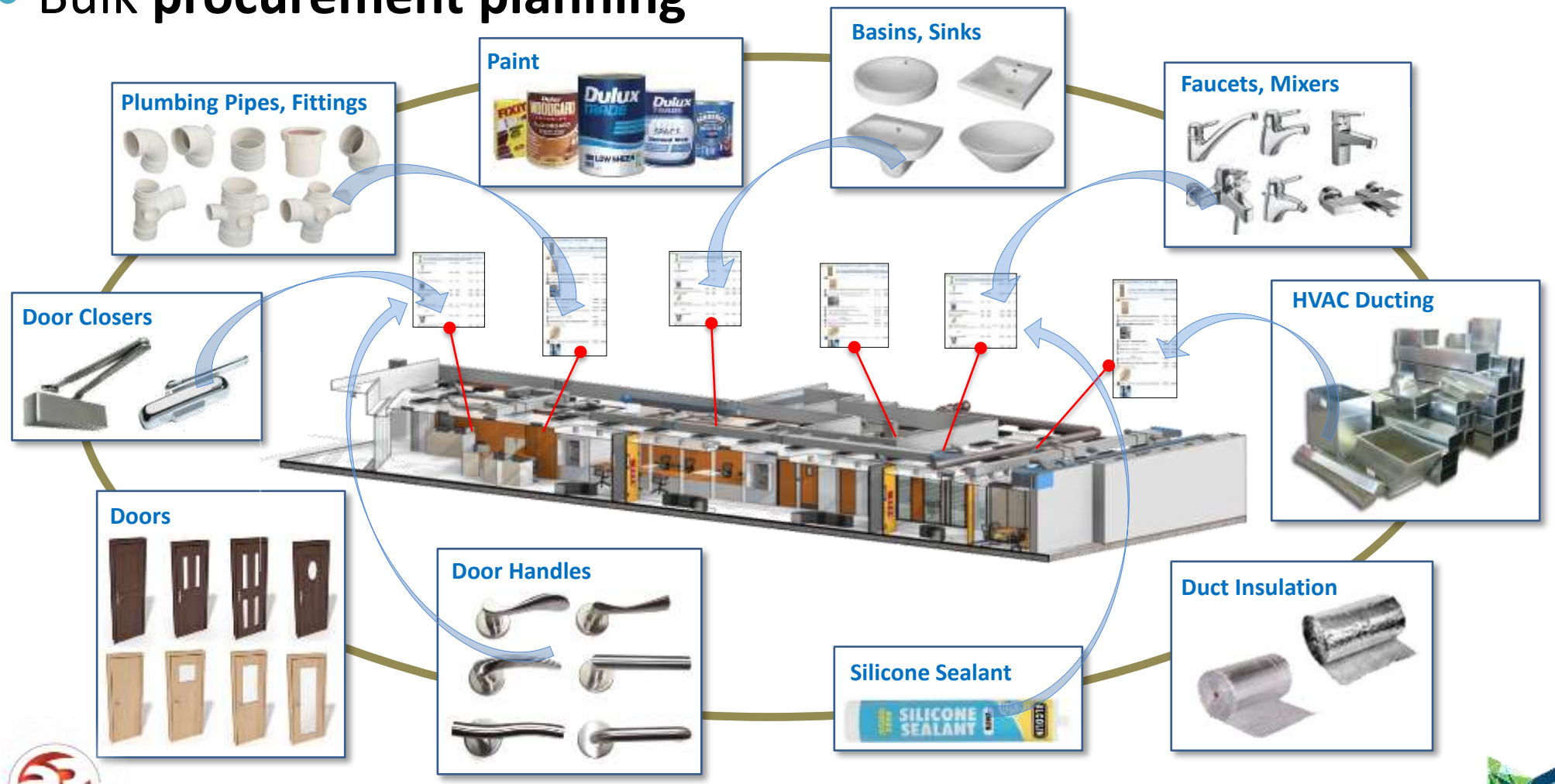
GEZE ASSA ABLOY COBRA Vaal MARLEY FRANKE ergo Kimberly-Clark

Procurement Costbooks

Code	Product Name	Unit	Cost
AC3007SR	GEZE TS3000/5000E ISM G/R FOR ELE H/O INT SEL	EACH	R 9 346.21
AC3008SR	GEZE TS5000L-ISM GUIDE RAIL SILVER	EACH	R 4 496.43
AC3009SR	GEZE TS5000E - LISM GUIDE RAIL SILVER	EACH	R 9 767.79
AC3010SR	GEZE TS3000/5000 E CLINE GUIDE RAIL SILVER	EACH	R 513.33
AC4370SR	GEZE BOXER STANDARD D/ ACTION GUIDE RAIL NSO	EACH	R 687.97
AC4371SR	GEZE BOXER MECHANICAL HO GUIDE RAIL	EACH	R 1 069.12
AC4372SR	GEZE BOXER ISM GUIDE RAIL FOR DBL DOORS	EACH	R 4 568.39
AC4373SR	GEZE BOXER E-ISM GUIDE RAIL SILVER	EACH	R 16 122.90
AC4374SR	GEZE BOXER E GUIDE RAIL SILVER	EACH	R 3 592.06
ACCESS	ACCESS CONTROL BY SPECIALIST	EACH	R 0.00
AD2001	GEZE MOUNTING PLATE FOR TS2000	EACH	R 146.37
AD2002	GEZE TS2000/3000 CLAMPING PLATE SILVER	UNIT	R 1 093.27
AD2003	GEZE FRONT SLIDES FOR TS2000 SR	EACH	R 64.17
AD3000	DUMMY DOOR CLOSER PIVOT	EACH	R 749.09
AD3010	GEZE H/O UNIT FOR G/RAIL TS1500/2/3/4/5000SR	EACH	R 210.50
AD3011	GEZE CABLE FOR ISM RAIL	EACH	R 209.75
AD3025	GEZE ACCESSORIES PACK FOR GUIDE RAIL	SET	R 54.11
AD4003	GEZE FRONT SLIDES FOR TS4000 SR	EACH	R 69.30
AD4301	GEZE TS430 COVER PLATE USE ON TIMBER FRAME SS	EACH	R 351.24
AD4302	GEZE TS430 COVER PLATE USE ON TIMBER FRAME BR	EACH	R 393.86
AD4372	GEZE H/OPEN DEVICE FOR ISM GUIDE RAIL	EACH	R 623.57

Integrate the Supply Chain

- Create **visibility** up and down the supply chain
- Bulk **procurement planning**



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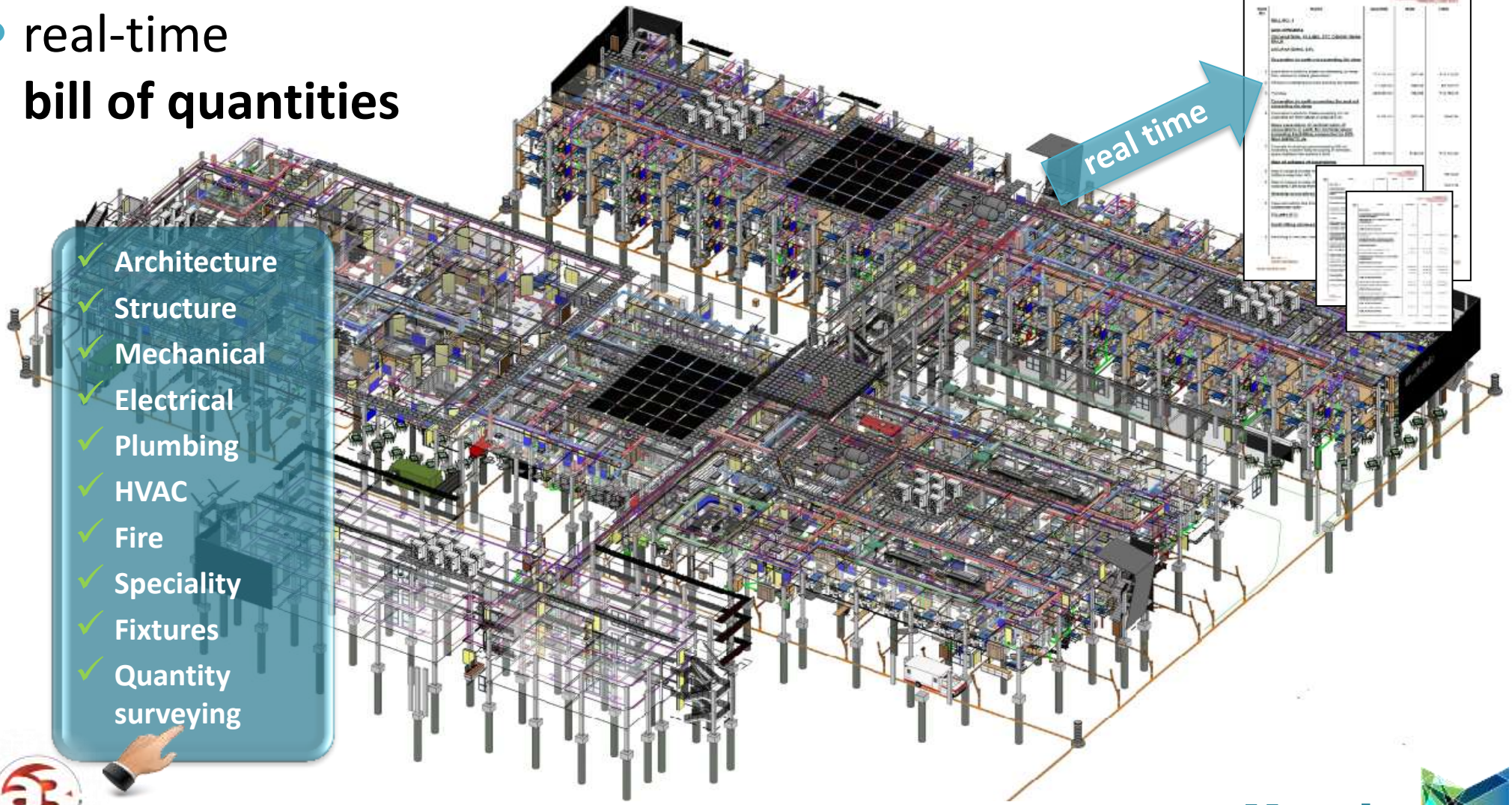
CONSTRUCTABILITY

Benefits of Virtual Construction

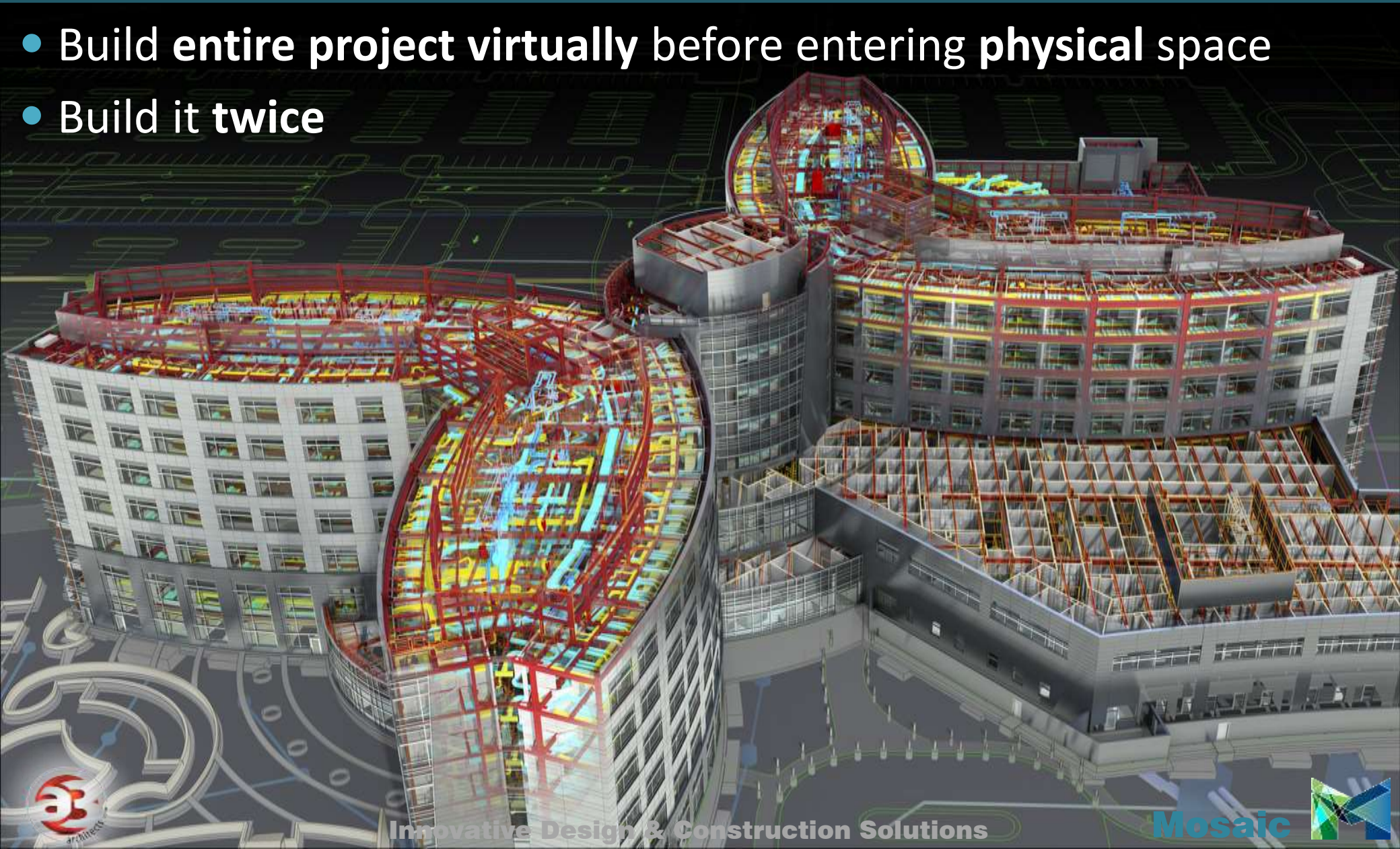
Integrated across Disciplines

- Includes **major** and **minor** disciplines
- real-time **bill of quantities**



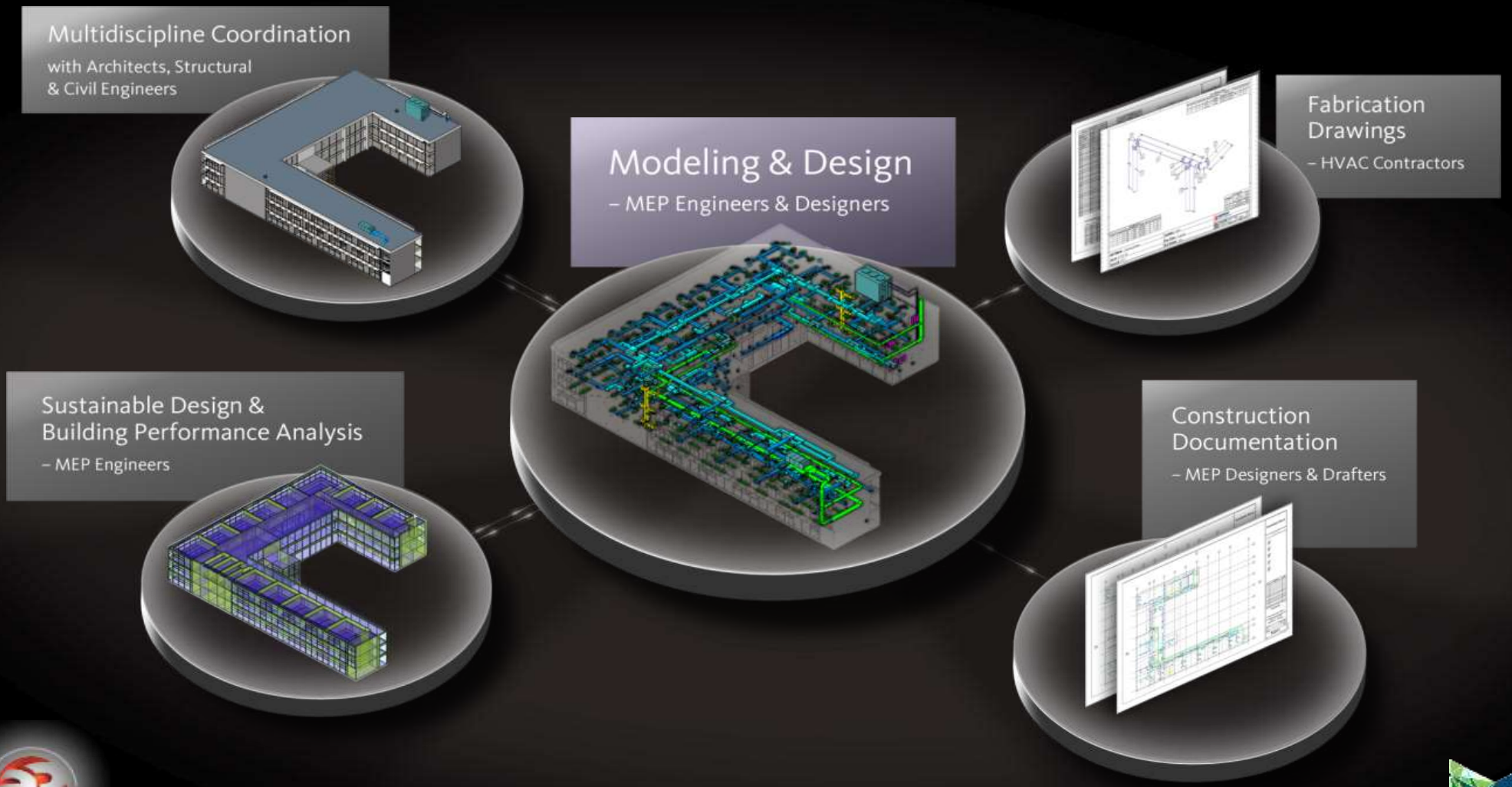
Complete the Design Virtually

- Build **entire project virtually** before entering **physical** space
- Build it **twice**



Coordinated Building Services

- BIM for MEP (Mechanical, Electrical, Plumbing)



Preconstruction Visualisation

- Understand the expected outcome **before** its built

360°Panoramic Renderings

- Create 360 degree panoramic renderings from **any location**
- View both **online** or **offline** with iPad, iPhone, Android

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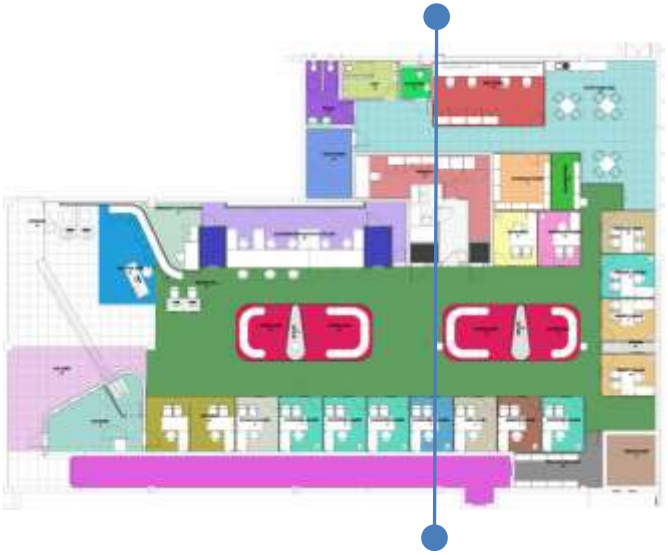
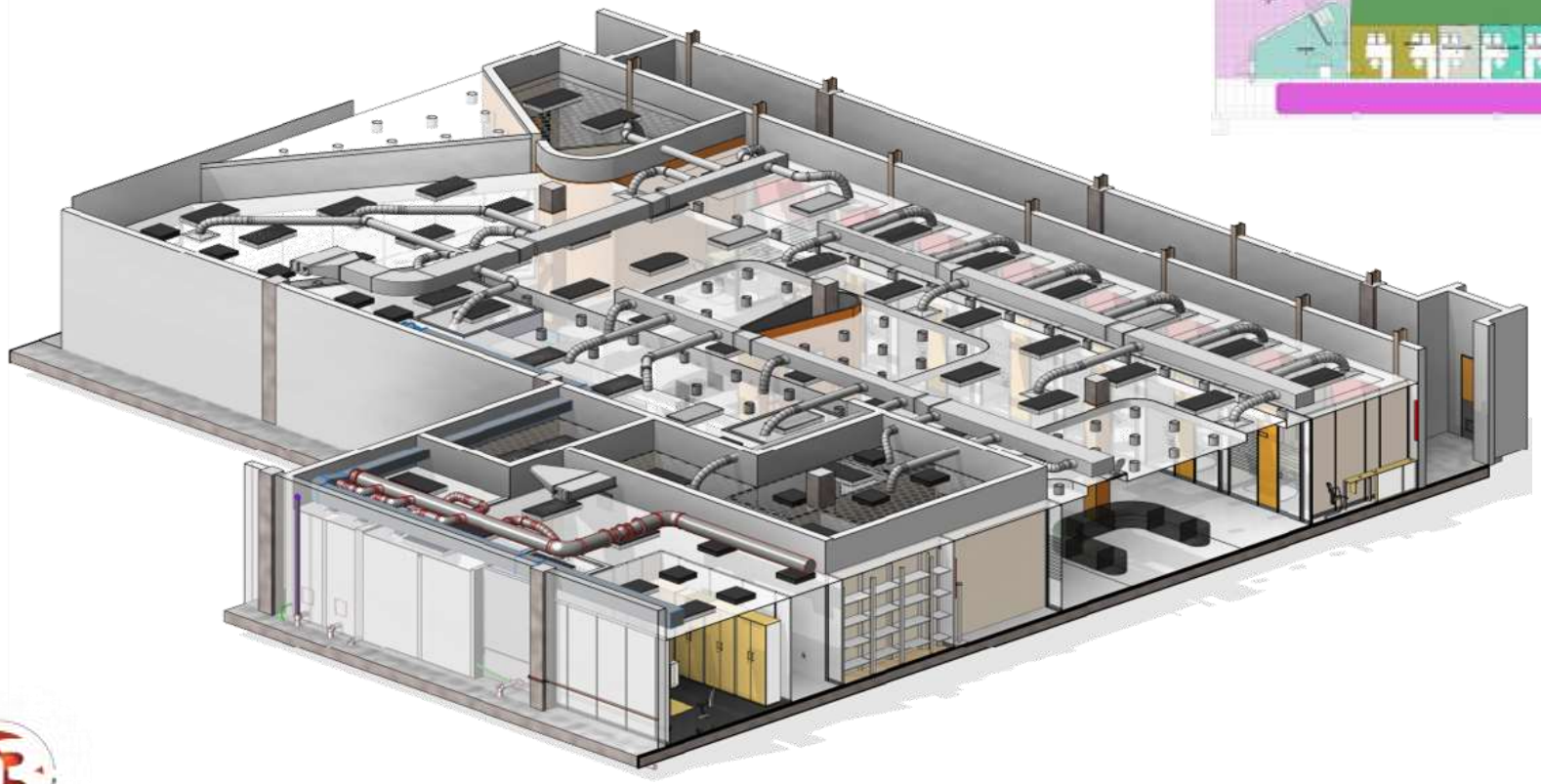
Dynamic 3D Sections

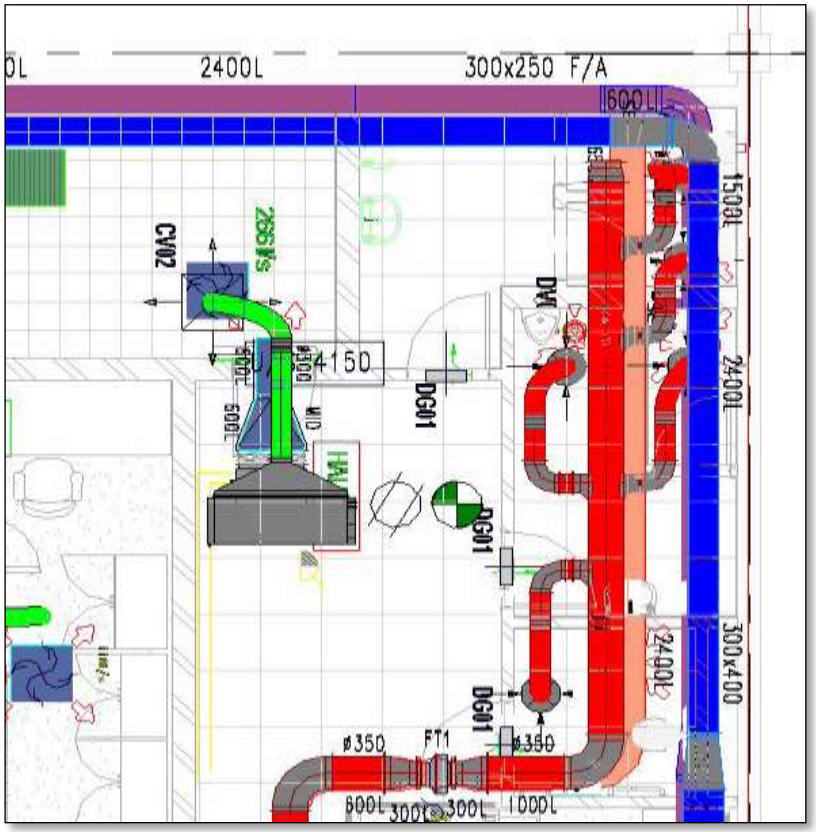
- Create live sections in any location
- More than just “eye candy”
- Early construction understanding





Resolve Complex Design Issues

- Identify and eliminate **defects**
- **Value engineer** cost optimisations

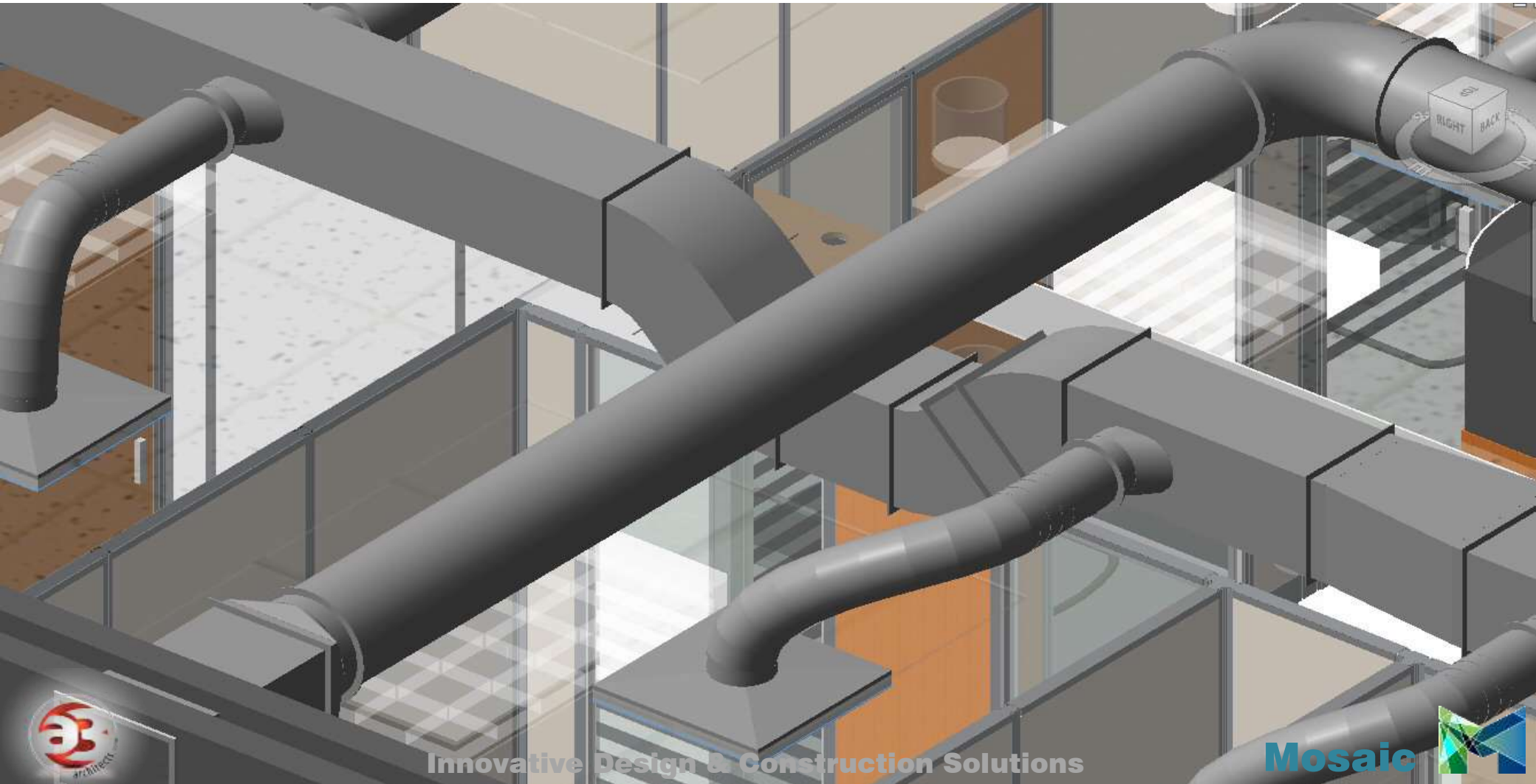


Traditional

Integrated 3D BIM

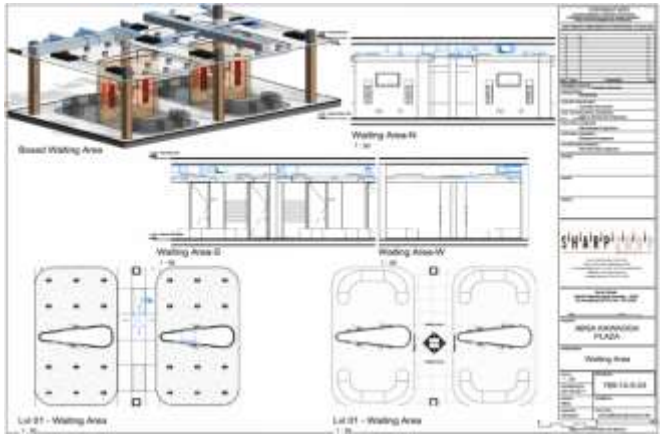
Avoid Collisions between Trades

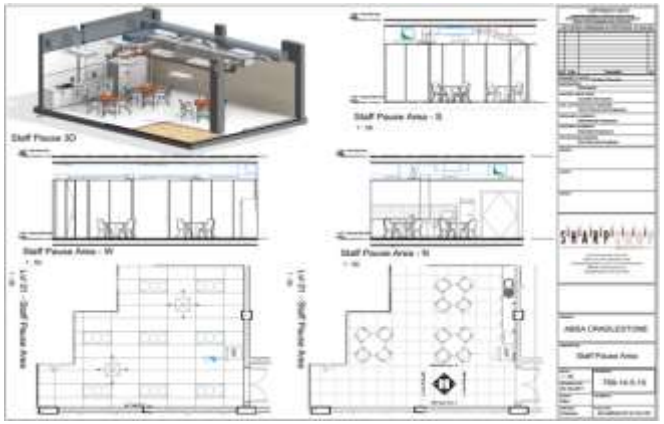
- Up to **15 percent** of the **cost** of a project is **lost** because of **rework** and **avoidable collisions** between trades

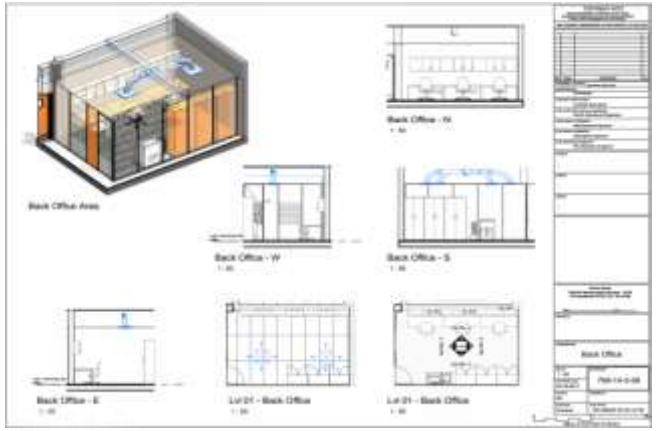


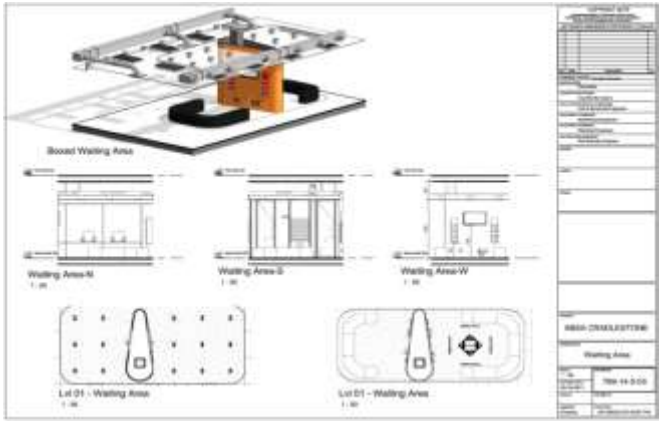
Comprehensive ‘2D’ Deliverables

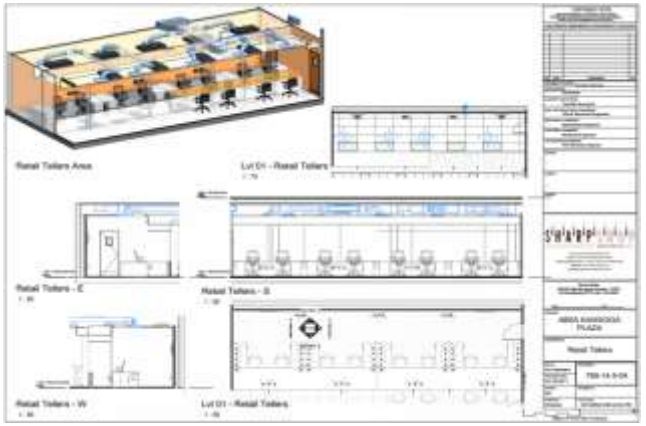
- Issue hybrid 2D/3D room-data sheets for **any** location
- Easy to understand, contractor friendly











Construction Simulation

- Link BIM project to **construction schedule**

Construction Simulation

- Link BIM project to **construction schedule**

PROJECTS as LEGO

Fully specified, fully costed Solution in a Box

By Sector

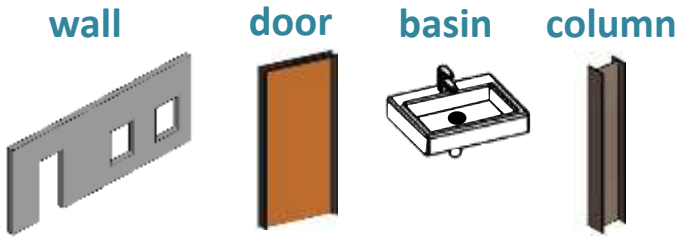
- ✓ Healthcare
- ✓ Hotels & Resorts
- ✓ Commercial
- ✓ Retail
- ✓ Green Housing
- ✓ Mixed Use
- ✓ Education
- ✓ Government

Innovative Design & Construction Solutions

Mosaic

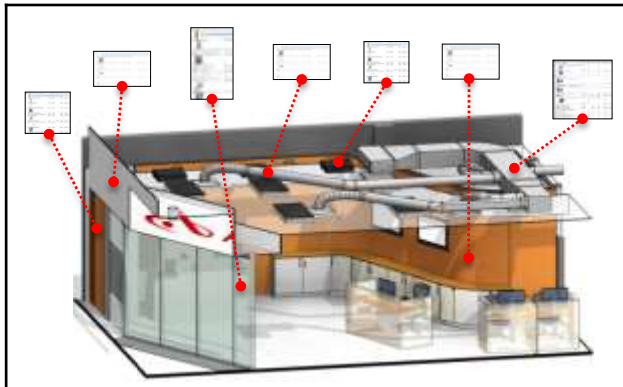
Think of BIM as Digital LEGO

- BIM elements behave **intelligently**
- BIM elements are virtual **placeholders** for **real-world** building products

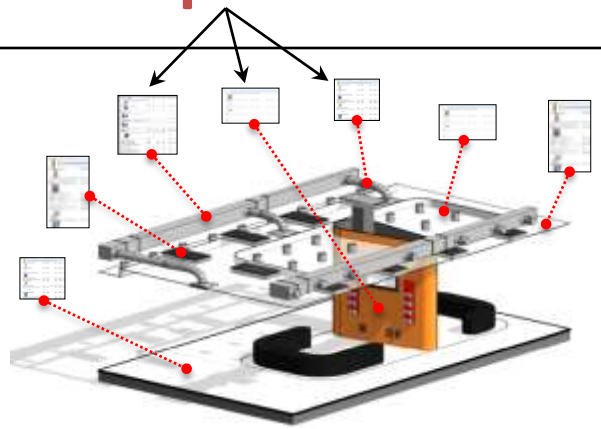


Fully Costed Preconfigured Zones

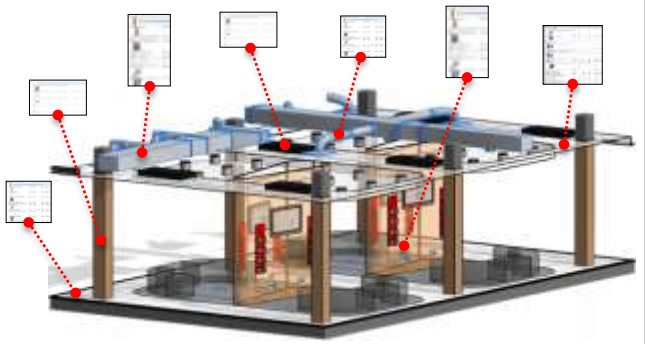
- Preconfigured **zones** allow quick and easy **assembly** into **project**
- Attach Bill of Quantities **recipes** for **real-time costing**



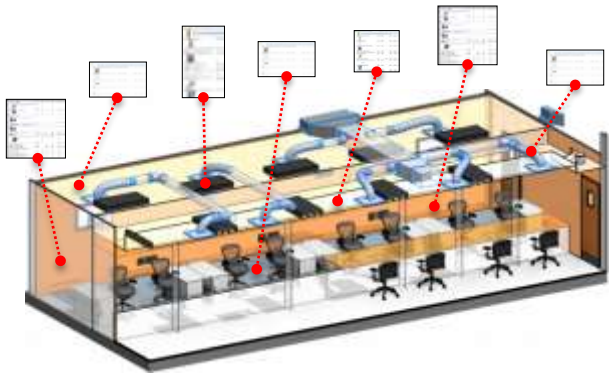
Welcome Area



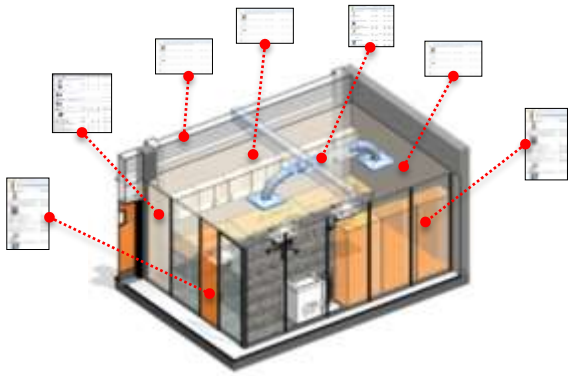
Waiting Area 1



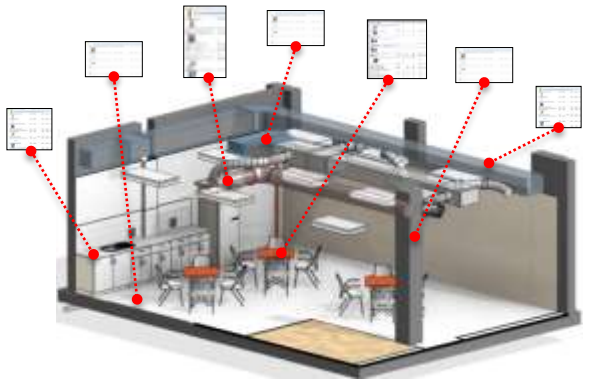
Waiting Area 2



Retail Tellers Area



Offices



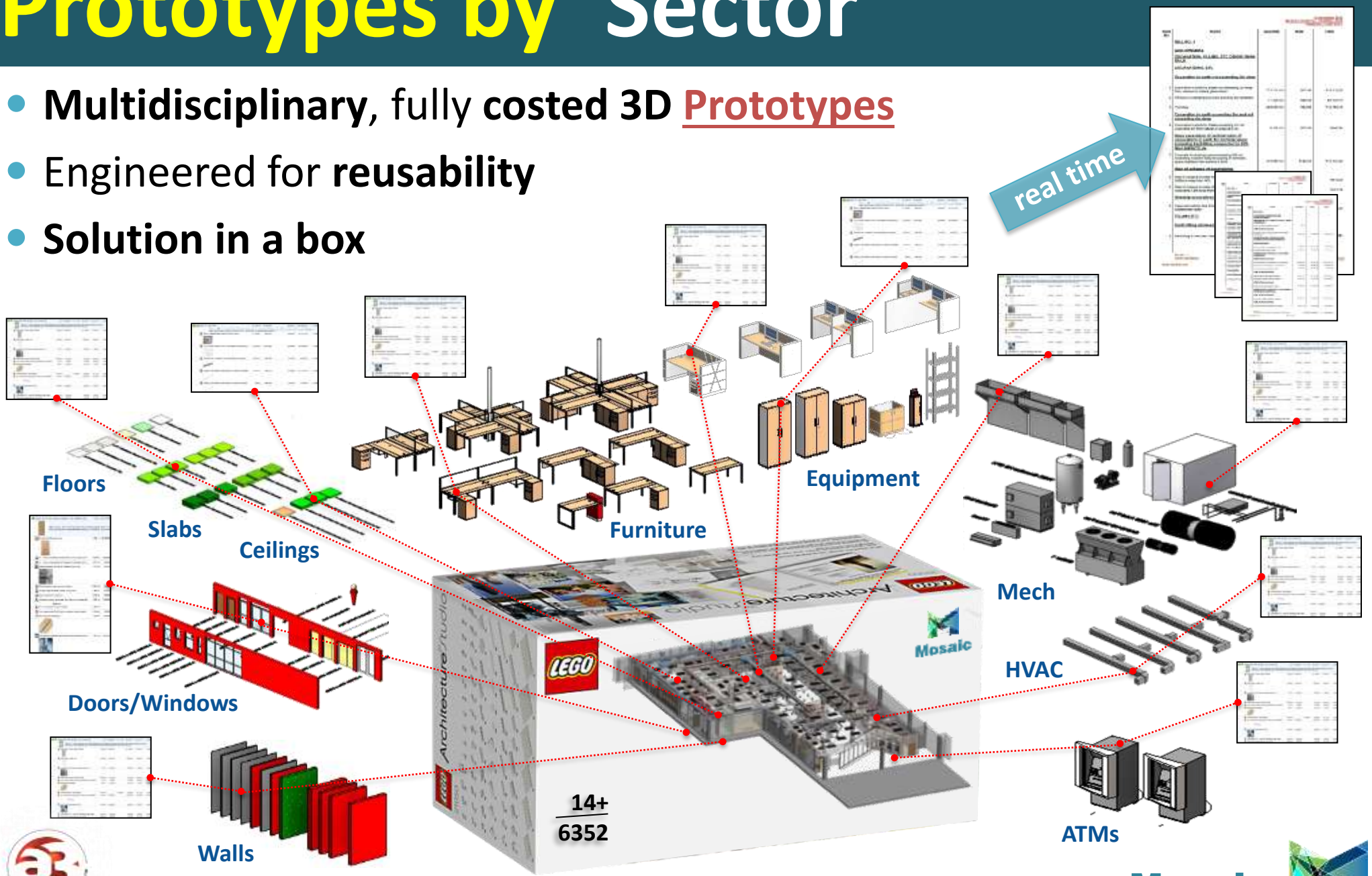
Staff Pause Area

Prototypes by ‘Sector’

- **Multidisciplinary**, fully **costed 3D Prototypes**
- Engineered for **reusability**
- **Solution in a box**

Bill of Quantities

real time



Innovative Design & Construction Solutions

Mosaic

REUSABILITY

Optimised to Accelerate Project Roll-out

By Sector

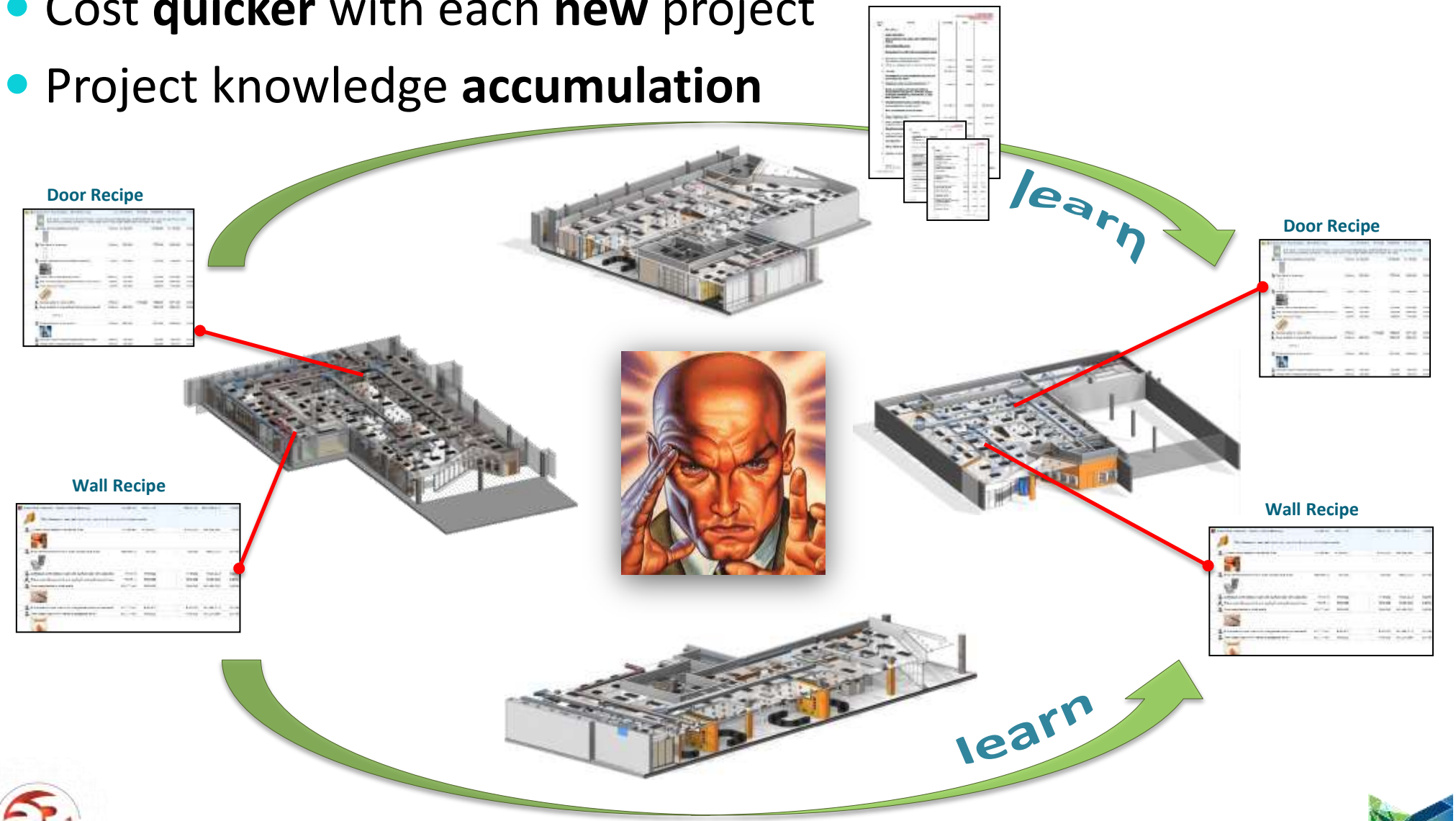
- ✓ Healthcare
- ✓ Commercial
- ✓ Retail
- ✓ Residential
- ✓ Mixed Use

Innovative Design & Construction Solutions

Mosaic

Projects Learn from each other

- Cost **quicker** with each **new** project
- Project knowledge **accumulation**



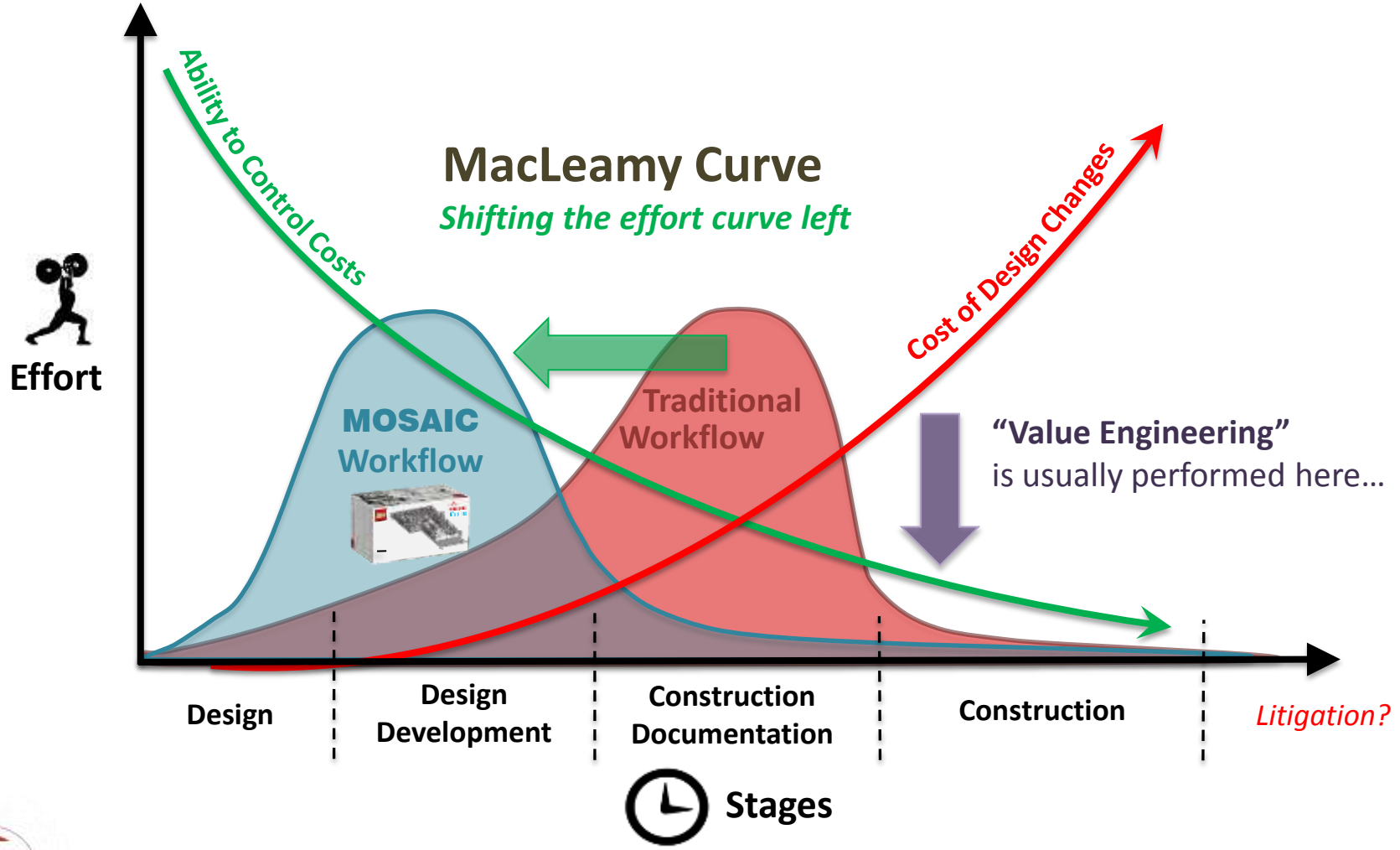
Accelerated Project Roll out

IMPROVED EFFICIENCY

Faster output with fewer resources

Mosaic Way versus Conventional

- **Resolve** design earlier**, value engineer** cost optimisations



Faster Project Delivery

- Multidisciplinary **BIM Prototyping** is **FAST**
- New projects **70% complete** from day one
- Quicker project **turnaround**

Traditional Consultants

6 weeks

Integrated BIM Team

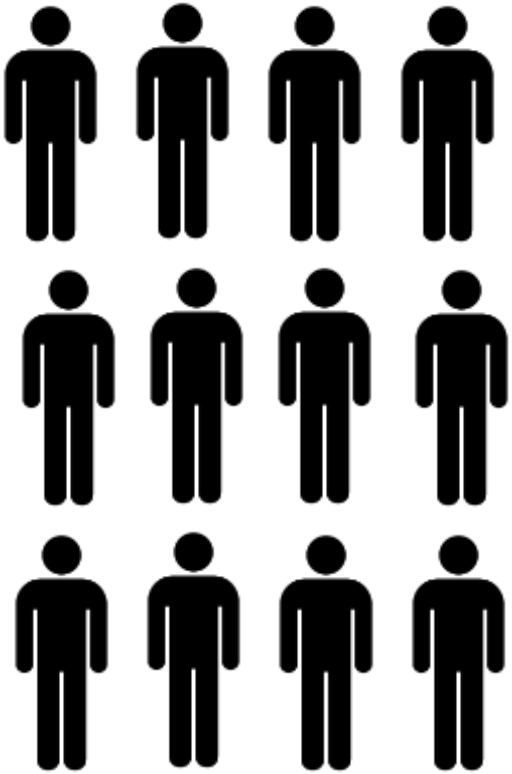
2 weeks

Do More with Fewer Resources

- Small **expert multidisciplinary** BIM teams
- Work **parallel** instead of linearly
- Improved **project load** capability

A MOSAIC expert BIM team of **FOUR** utilising a **pre-engineered BIM prototype** is equal to **TWELVE** traditional consultants in terms of project load capability

=

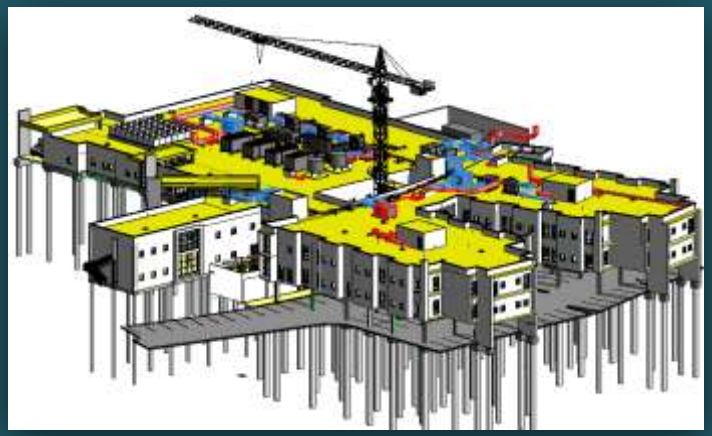


MOSAIC Integrated BIM Team

Traditional Consultants

ENHANCED COST CERTAINTY

Real-time cost reporting



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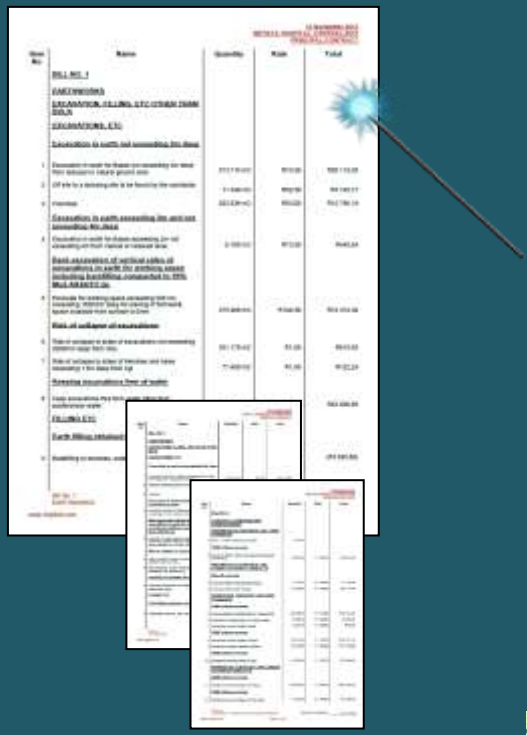
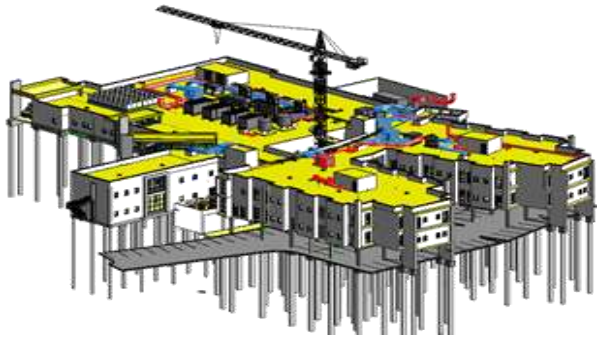


Automatic Bills of Quantities

- Generate Bill of Quantities **directly** from the BIM project
- Reduce **project risk,** better **planning**

BIM Model

Collection of BIM Lego blocks



Collection of BOQ Recipes

Real-world products & costs

Real-time Cost Reports

Bill of Quantities

True Bidirectional Relationship

Enhanced Cost Certainty

Elemental Estimate

Name			Unit Cost	Total	%
Two coats acrylic PVA finish to plastered narrow widths		R35,000	R35,000	R61,180	0.01%
Heavy duty brass hinges	1.000 Pr	R75,000	R75,000	R75,000	0.01%
					
Two lever mortice lock including chromium plated furniture	1.000 ea	R350,000	R350,000	R350,000	0.06%
					
120.8 - Frames, rails, skirtings, etc				**R2 015,00**	**0.34%**
Rail - 2850 x 1135	1 ea	R2 015,000	R2 015,000	R2 015,000	0.34%
40mm diameter galvanised mild steel floor mounted handrail 1 135mm high with ends ragged and embedded into the floor with epoxy, grout and adhesive					
40mm diameter Handrail	2.850 m	R500,000	R500,000	R1 425,000	0.24%
Extra over handrail for 90 degrees bend	2.000 ea	R295,000	R295,000	R590,000	0.10%
120.9 - Shelves, fittings, etc				**R160 550,00**	**27.01%**
Back Wall unit size 556 x 900 x 2 225mm High	5 ea	R8 500,000	R8 500,000	R42 500,000	7.15%
 Back Wall Unit, size 556mm long x 900mm wide x 2 527mm high overall entire unite formed of Chipboard and finished with White wood Veneer, straight cut with 3mm solid edges, clear satin non-yellowing finish, grain to run horizontally, as well as Supawood Duco Panelling to front and sides of Station and five rows of shelving with pencil round edges, satin sprayed Duco finish, colour: Plascon NEU08					
0.556 x 0.9 x 2.225m High Back Wall Unit	5.000 ea	R8 500,000	R8 500,000	R42 500,000	7.15%
Base	6 ea	R1 500,000	R1 500,000	R9 000,000	1.51%
1200 x 1000 x 300mm high metal base	6.000 ea	R1 500,000	R1 500,000	R9 000,000	1.51%
Point of Sale Station 1.5 x 0.7 x 0.9m High (Counterliquor)	3 ea	R7 550,000	R7 550,000	R22 650,000	3.81%
 Point of Sale Station, size 1 500mm long x 700mm wide x 900mm high overall entire unite formed of Chipboard and finished with White wood Veneer, straight cut with 3mm solid edges, clear satin non-yellowing finish, grain to run horizontally, as well as Supawood Duco Panelling to front and sides of Station with pencil round edges, satin sprayed Duco finish, colour: Plascon NEU08					
1.5 x 0.7 x 0.9m High Point of Sale Station	3.000 ea	R7 000,000	R7 000,000	R21 000,000	3.53%
180mm High brushed stainless steel M003 skirting conceal	13.200 m	R125,000	R125,000	R1 650,000	0.28%
Fridges - 3D CHILLER-END-7-UR - Fridges - CHILLER-END-7-	2 ea	R13 600,000	R13 600,000	R27 200,000	4.58%
 Chiller end_7_UR					
2.5 Door Keg Fridge c/w Doors	2.000 ea	R13 600,000	R13 600,000	R27 200,000	4.58%
Fridges - FREEZER-2-GD.0001	3 ea	R13 100,000	R13 100,000	R39 300,000	6.61%
 2 GD FRZ					
Stainless Steel 2 1/2 Door Underbar Fridge cw 150mm Spl	3.000 ea	R13 100,000	R13 100,000	R39 300,000	6.61%
Steel Checkout Counter overall size 2 300 x 1 000 x 960mm Hig	2 ea	R4 950,000	R4 950,000	R9 900,000	1.67%
 Check out Counter, overall size 2 300mm long x 1000mm wide x 960mm high overall entire unite formed of steel					
2.3 x 1.0 x 0.96m High Steel Checkout	2.000 ea	R4 950,000	R4 950,000	R9 900,000	1.67%
Window Display Station size 2 417 x 600 2 225	1 ea	R10 000,000	R10 000,000	R10 000,000	1.68%
Window Display Station, overall size 2 417mm long x 600mm wide x 2 225mm high overall entire unite formed of Chipboard and finished with White wood Veneer, straight cut with 3mm solid edges, clear satin non-yellowing finish, grain to run horizontally, as well as Supawood Duco Panelling to front and sides of Station with pencil round edges, satin sprayed Duco finish, colour: Plascon NEU08					
2.417 x 0.6 x 2.225m High Window Display Station	1.000 ea	R10 000,000	R10 000,000	R10 000,000	1.68%
130 - CEILINGS, PARTITIONS AND ACCESS FLOORING				**R30 165,71**	**5.08%**
130.1 - Ceilings				**R30 165,71**	**5.08%**
Basic Ceiling - Generic	46.772 m²	R200,000	R200,000	R9 354,468	1.57%
12.5mm Thick Gypsum ceiling boards to bulkheads in varying widths to and long lengths countersunk screwed to galvanised mild steel section hangers, bearers, sub-grids suitably spaced to prevent deflection and sagging, screwed up and fixed to concreter brickwork including "Fibatape"; over all joints, double over butt joints, plasterbeads and trims to ensure neat edges, the whole finished with gypsum skim plaster trowelled to a smooth polished surface					
Soffit of horizontal bulkheads suspended not exceeding 1m	46.772 m2	R200,000	R200,000	R9 354,400	1.57%

Bill of Quantities

Item		Rate	Amount
	BILL NO. 11		
	IRONMONGERY		
	LOCKS		
	Manufactured by GEZE or other approved		
1	GEZE 40mm single cylinder nickel plated lock (Product code: GEZE 950930108M/C.M.K) 63.000 ea		R0,000
	HANDLES		
	Manufactured by DAYTONA or other approved		
2	Stainless steel Daytona lever handels on 150 x 350mm back plate with Euro profile and to recieve cylinder lock (Product code: EDE101C69) 21.000 ea		R0,000
3	Stainless steel Daytona lever handels on 165 x 165mm back plate with Euro profile and to recieve cylinder lock (Product code: EDE101C69) 63.000 ea		R0,000
4	Stainless steel Daytona pull handels on 150 x 350mm back plate with blank profile including 6 fixing holes (Product code: 075/450/SS) 21.000 ea		R0,000
	PUSH PLATES AND KICK PLATES		
	Manufactured by GEZE or other approved		
5	200 x 813mm Intrad 21.000 ea	R120,000	R2 520,000
6	200 x 900mm Intrad 63.000 ea	R120,000	R7 560,000
	0.9mm Thick satin finished stainless steel plates countersunk screwed along edges at not exceeding 200mm centres		
7	813 x 300mm H Kickplate fixed to 40mm thick door on both sides 42.000 ea	R120,000	R5 040,000
8	900 x 300mm H Kickplate fixed to 40mm thick door on both sides 63.000 ea	R120,000	R7 560,000
	DOOR CLOSERS		
	Manufactured by GEZE or other approved		
9	Door closer 84.000 No	R250,000	R21 000,000

Section No. 2
Bill No. 11
IRONMONGERY

Carried to Section Summary R43 680,00

Share Data with Other Systems

- Export to Excel, Access, SAP, etc

	B	C	D	E	F	G	H
1	Page	Item	Description	Quantity	Unit	Rate	Total
2	39		**CARPENTRY AND JOINERY**				0.00
3	39		**DOORS ETC**				0.00
4	39		**Fire doors**				0.00
5	39	1	Class B fire door size 900 x 2032mm high including 2mm thick gms framing suitable for 220mm brick	9.000	No	4563.30	41069.70
6	39	2	Class B fire double door size 1613 x 2032mm high including 2mm thick gms framing suitable for	11.000	No	8000.00	88000.00
7	39	3	Class B fire double door size 1800 x 2032mm high including 2mm thick gms framing suitable for	7.000	No	8500.00	59500.00
8	39	4	Class D fire double door size 2000 x 2032mm high including 2mm th...	4.000	No	9000.00	36000.00
9	39		**Wrought meranti doors hung to steel frames**				0.00
10	39	5	44mm Framed batten door 813 x 2032mm high of 106mm stiles and top rail, 22 x 106mm middle ledge and braces and 44 x 220mm bottom ledge filled in flush on one side with 22mm V-jointed	7.000	No	1407.00	9849.00
11	39	6	44mm Framed batten door 900 x 2032mm high of 106mm stiles and top rail, 22 x 106mm middle ledge and braces and 44 x 220mm bottom ledge filled in flush on one side with 22mm V-jointed	4.000	No	1600.00	6400.00
12	40		**Semi-solid flush doors with 3,2mm plain hardboard covering on both sides, hung to steel frames**				0.00
13	40	7	40mm semi-solid door size 813 x 1980mm high	19.000	No	500.00	9500.00
14	40	8	40mm semi-solid door size 813 x 2032mm high	213.000	No	423.15	90130.95
15	40	9	40mm semi-solid door size 900 x 2032mm high	7.000	No	581.00	4067.00
16	40	10	40mm semi-solid double door size 1359 x 2032mm high	1.000	No	1071.00	1071.00
17	40	11	40mm semi-solid double door size 1613 x 2032mm high	53.000	No	909.30	48192.90
18	40	12	40mm semi-solid one and half leave door size 1213 x 2032mm high	22.000	No	1071.00	23562.00
19	40	13	40mm semi-solid sliding door size 1700 x 2064mm high	1.000	No	1600.00	1600.00
20	40	14	40mm semi-solid sliding door size 1800 x 2064mm high	6.000	No	1600.00	9600.00
21	40	15	Extra over 40mm semi-solid door for viewing panel opening size 300 x 300mm high	3.000	No	84.00	252.00
22	40		**FRAMED FRAMES ETC**				0.00
23	40		**Wrought softwood**				0.00
24	40	16	38 x 38mm Sawn SA Pine Jamb linings plugged	75.240	m	39.00	2934.36
25	40		**BEADS, ARCHITRAVES, ETC**				0.00
26	40		**Wrought meranti**				0.00
27	40	17	12 x 12mm meranti glazing beads	3.600	m	19.00	68.40
28	40	18	32 x 44mm meranti viewinng panel framing nailed	3.600	m	121.00	435.60
29	41		**JOINERY SUNDRIES**				0.00
30	41		**Wrought softwood**				0.00
31	41	19	40 x 200mm high hardwood bumper rail (vinyl covering elsewhere measured)	513.511	m	109.20	56075.40
32	41		**FITTINGS**				0.00
33	41	20	20mm thick hardwoord Fire extinguisher board size 200 x 600mm with bullnosed edges all round	33.000	No	220.00	7260.00
34	41	21	Auto Beams - 1800 x 900	8.000	ea	218.48	1747.84
35	41	22	Auto Rack Frame - 2400 x 900	4.000	ea	315.64	1262.56

Bill No. 1 | Bill No. 2 | Bill No. 3 | Bill No. 4 | Bill No. 5 | Bill No. 6 | **Bill No. 7** | Bill No. 8 | Bill No. 9 | Bill No. 10 | Bill No

Microsoft

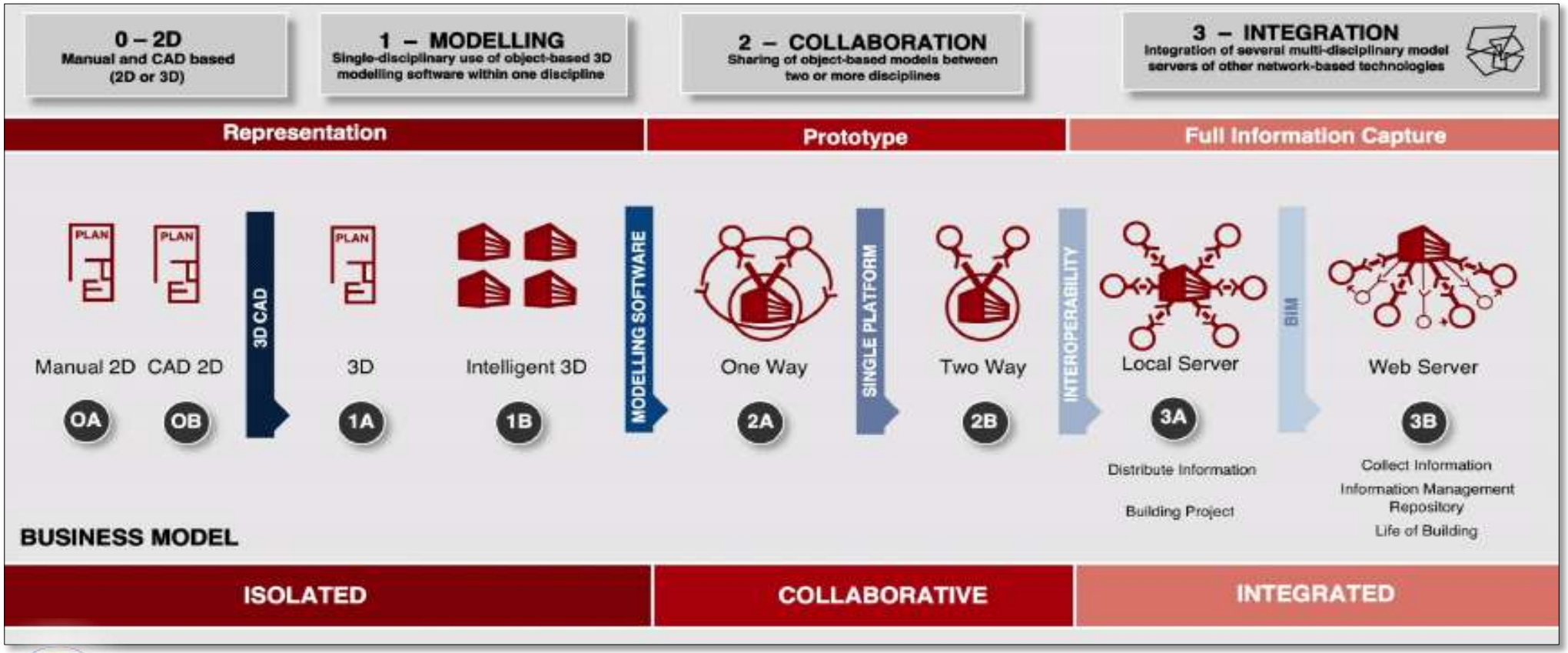
SAP

COLLECTIVE INTELLIGENCE

Ever growing Repository of Project Knowledge

Full Project Information Capture

- MOSAIC digitally captures **all project information** and make it available to the **entire project team** throughout the **lifecycle** of the project…



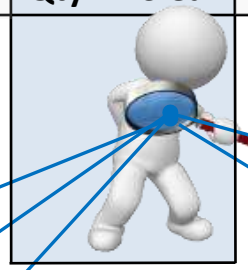
Collective Project Intelligence

- Search and report across **ALL** projects
- **'Google'** your branches
- **BIG data** analysis

Track Assets across Projects

- **Real-time** tracking of **assets** across **multiple projects**

Beradi Basin STE8604	Sterling Basin STE8643	Milbrooke Basin STE8550	**Seattle Basin STE8598**	Silicone Sealant	Odyssey Mixer DXR7720	Espree Mixer DXR7743	Foreno Mixer DXR8265	Colonial Mixer DXR8519
Qty: 64 ea	Qty: 71 ea	Qty: 39 ea	**Qty: 113 ea**	Qty: 1827 m	Qty: 25 ea	Qty: 41 ea	Qty: 112 ea	Qty: 17 ea



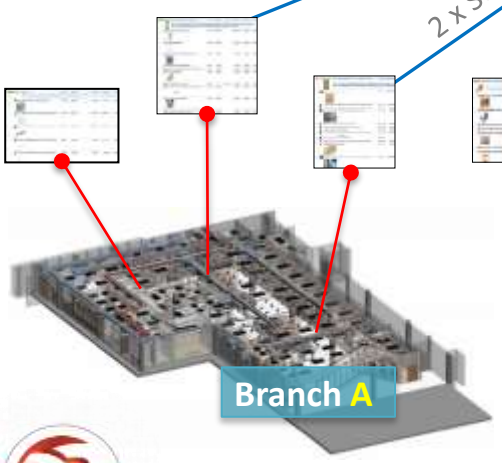
4 x Seattle Basins

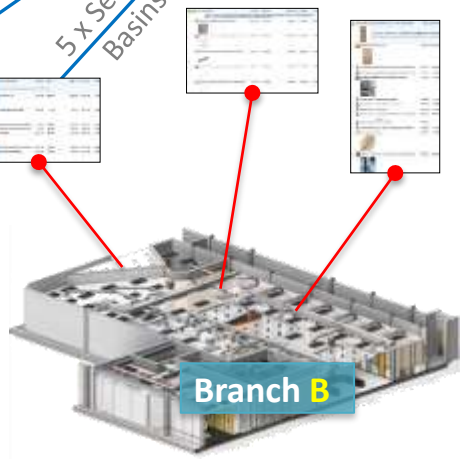
2 x Seattle Basins

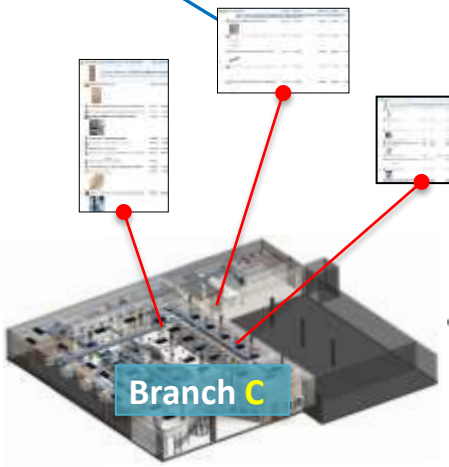
5 x Seattle Basins

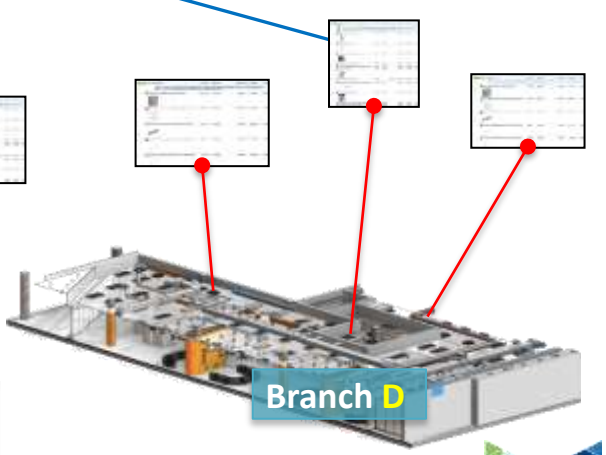
6 x Seattle Basins

2 x Seattle Basins



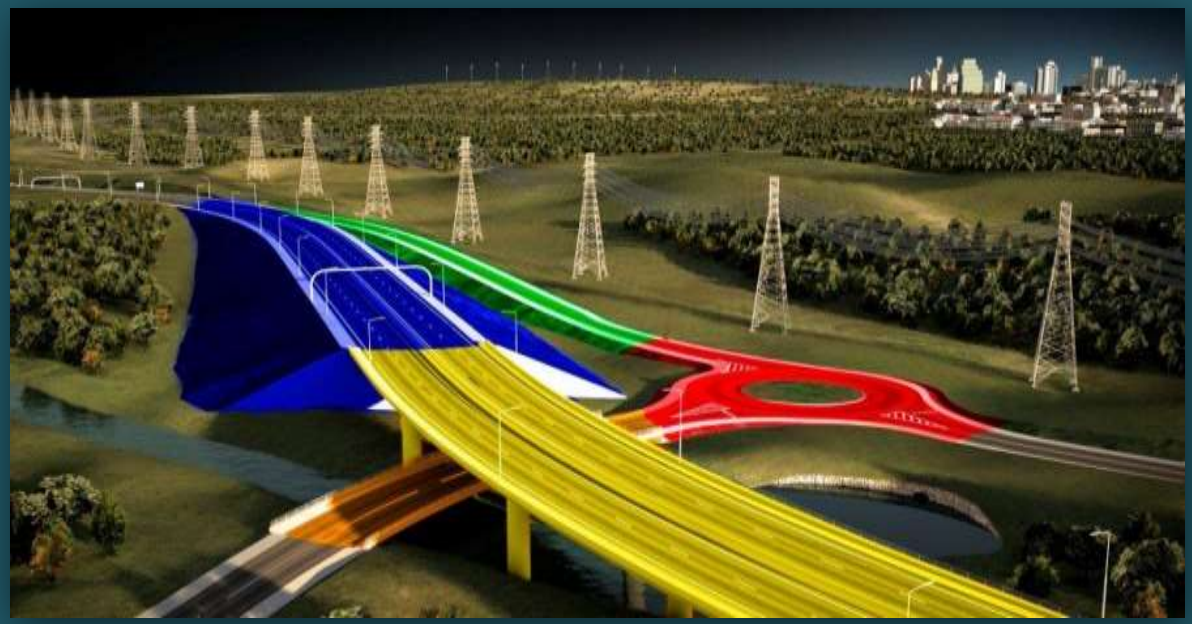






BIM for INFRASTRUCTURE

Horizontal BIM



Innovative Design & Construction Solutions

Mosaic

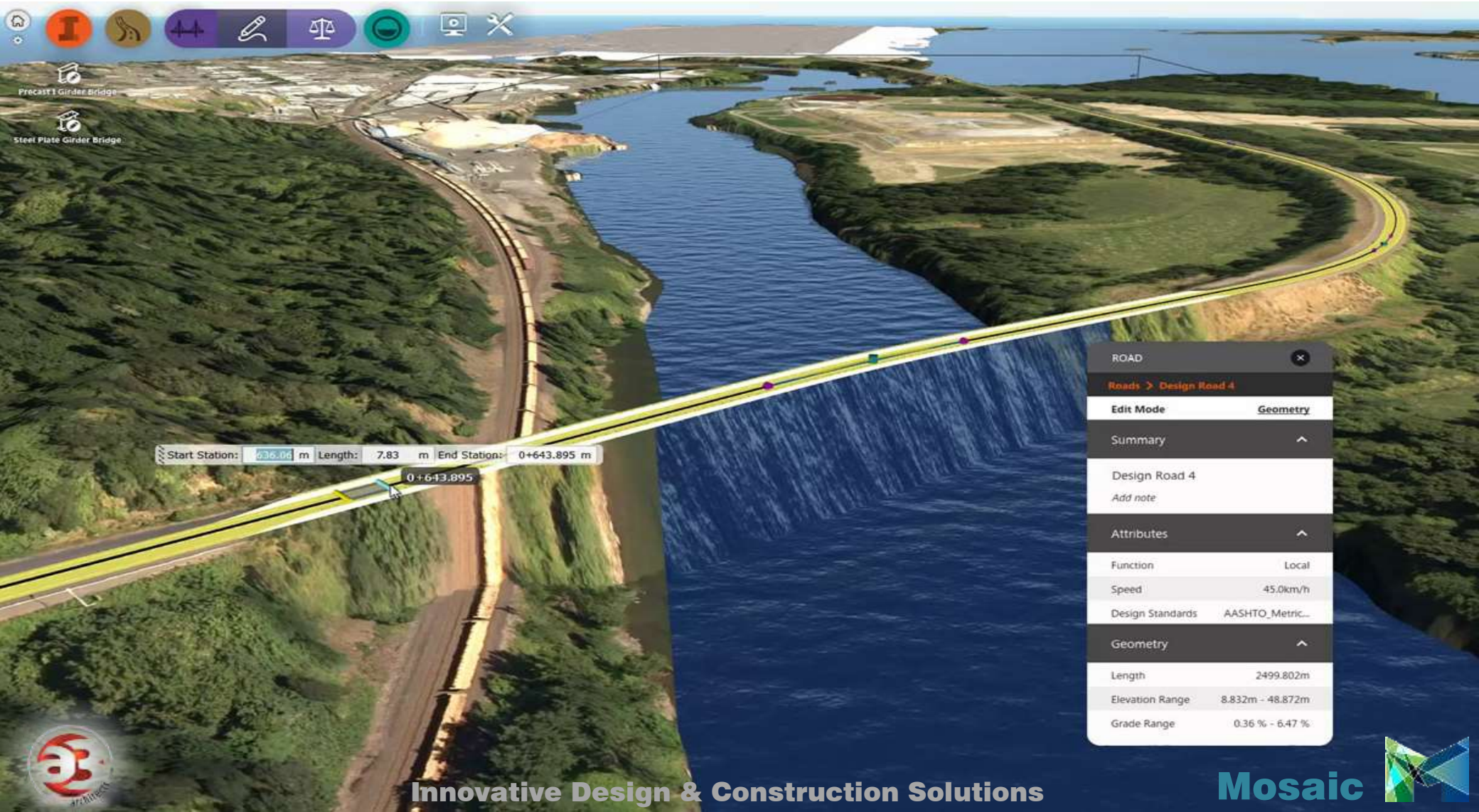
Large Infrastructure Projects

- Integrate civil, geospatial and 3D buildings

- Gain greater insight into planning, design and construction
- Better understand project impact
- Better predict project outcomes
- Help inform management decisions
- Engage stakeholders via web/mobile
- Animated storyboard presentations
- Conduct environmental analysis
- Dynamic sun, shadows, water, cloud
- Add roads, bridges, buildings

Conceptual Roadway Design

- Explore multiple road design concepts in context



Corridor Optimisation

- Determine optimal horizontal & vertical roadway geometry

Intelligent Drainage Design

- Analyse watersheds and streams across large terrains

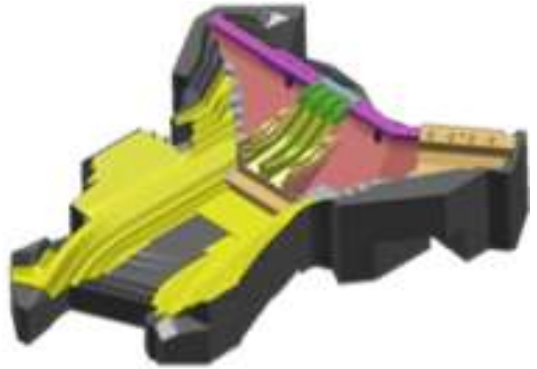
Automate Culvert Layouts

- Design culvert crossings with projected water flow

Hydropower Stations

- $3 billion Huangdeng Hydropower Station in China

Huangdeng Hydropower Station integrates a number of engineering disciplines and design elements, including power production, living quarters, processing plants, and auxiliary facilities linked by a network of infrastructure and roads. The project includes complicated retaining structures, underground factories, and diversionary structures, as well as very large and complex equipment and a multitude of supporting utilities.



With an **integrated 3D BIM model**, engineers are able to speed the understanding of the hydrology, to calculate the volume of material that needs to be removed along with grading plans, to calculate the amount of cement needed, the location of structures, and the interconnecting infrastructure between the facilities.

KEY BENEFITS

- ✓ PLANNABILITY
- ✓ COSTABILITY
- ✓ CONSTRUCTABILITY
- ✓ REUSABILITY
- ✓ MANAGEABILITY

Thank you