## **BIM & Facilities Management**



### **BIM & Facilities Management**

**Chris Linning** 

**Building Information Manager** 

Building Development & Maintenance Portfolio

Sydney Opera House



### **BIM & Facilities Management**

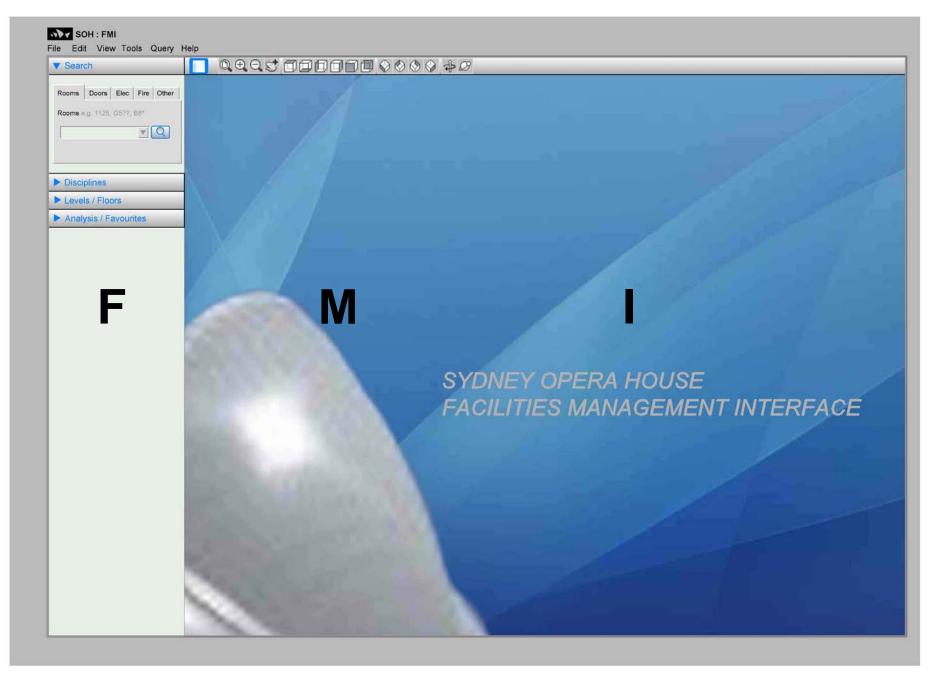
### **Building Development & Maintenance Portfolio**

"Provide first class venues, facilities and services to support our artistic and business aspirations"

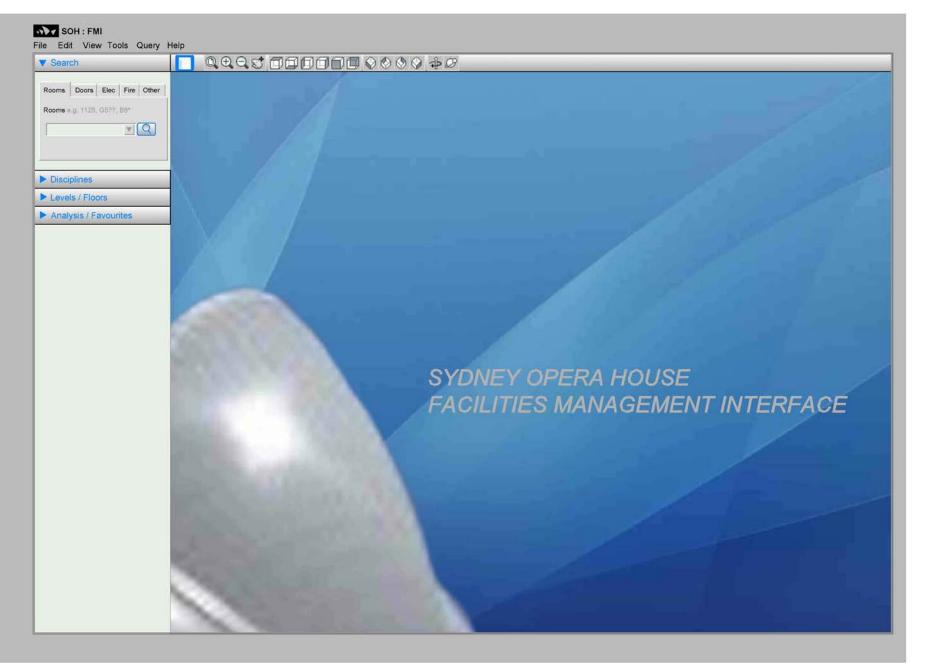
### **Building Information Manager**

- 1 Building Model: development, integration, interfacing, distribution
- 2 Spatial Information : development, ongoing maintenance, integration
- 3 Technical Library: maintenance, enhancement, accessibility

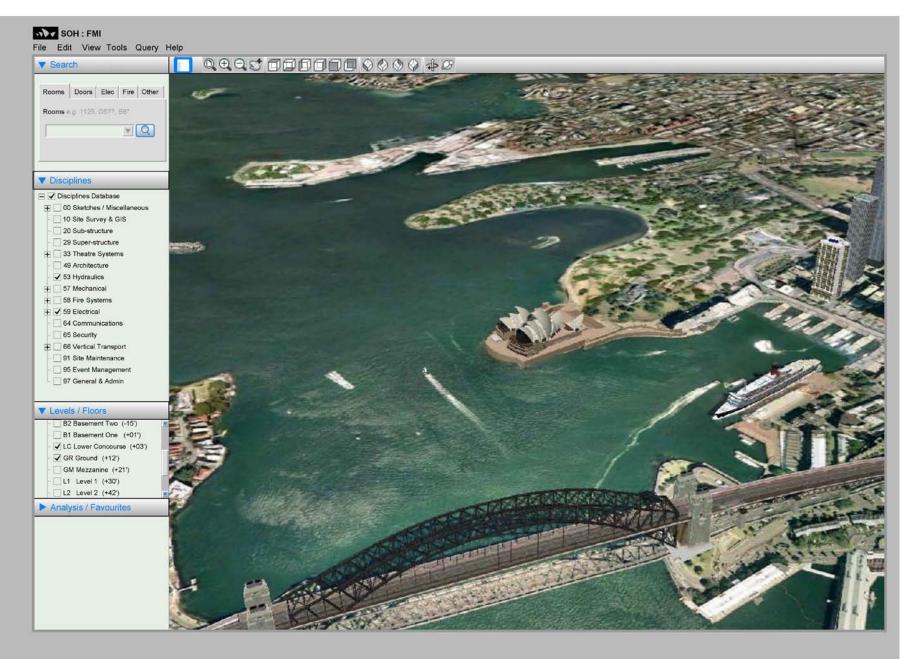
### **Facilities Management Interface**



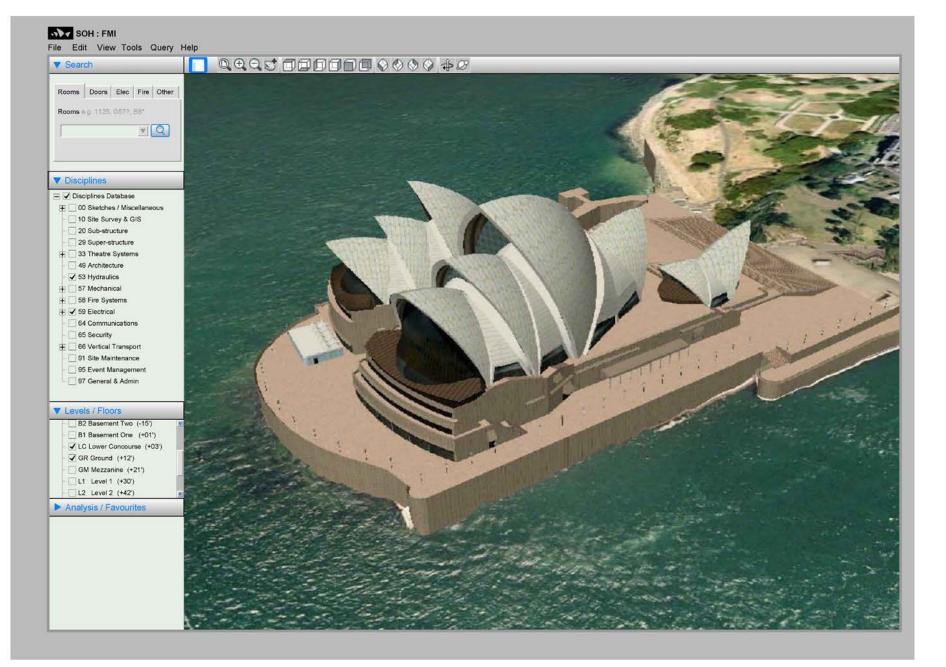


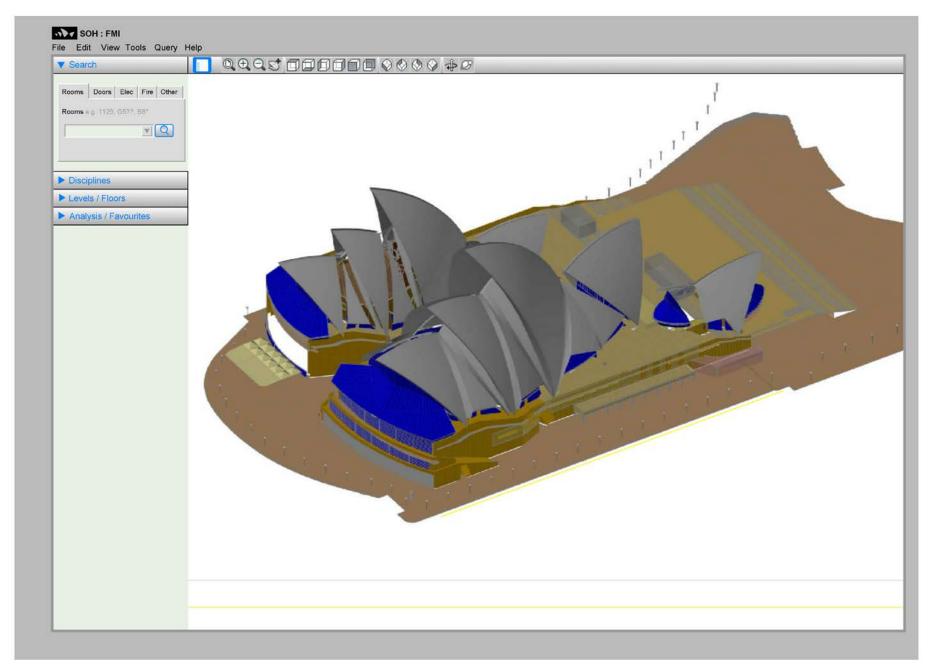




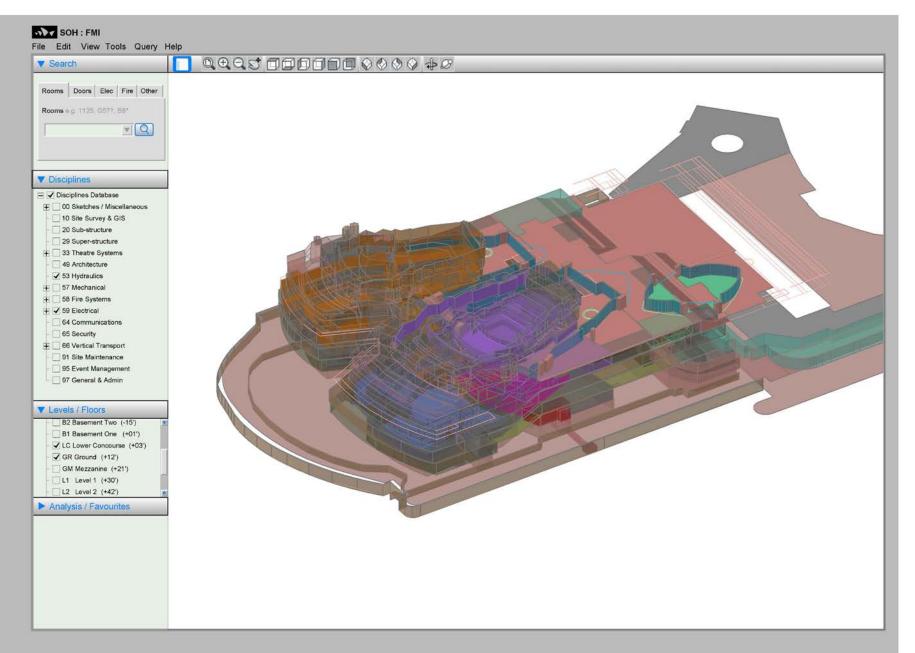




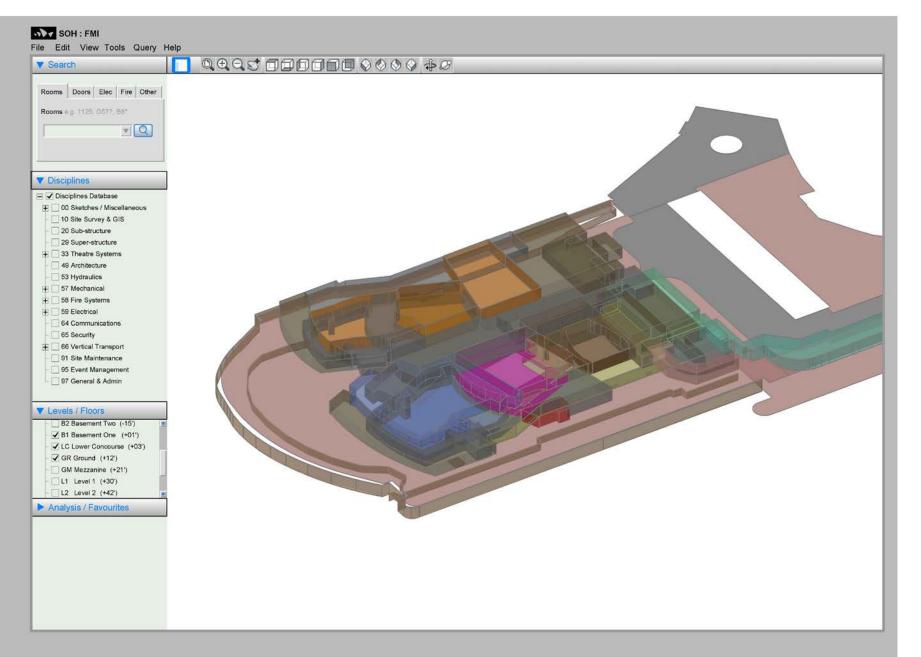




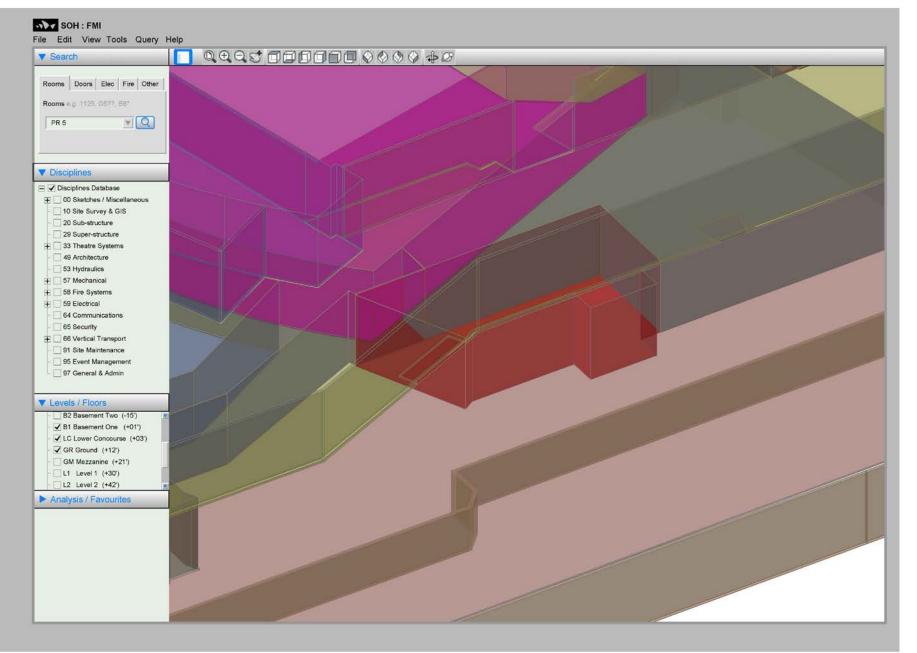






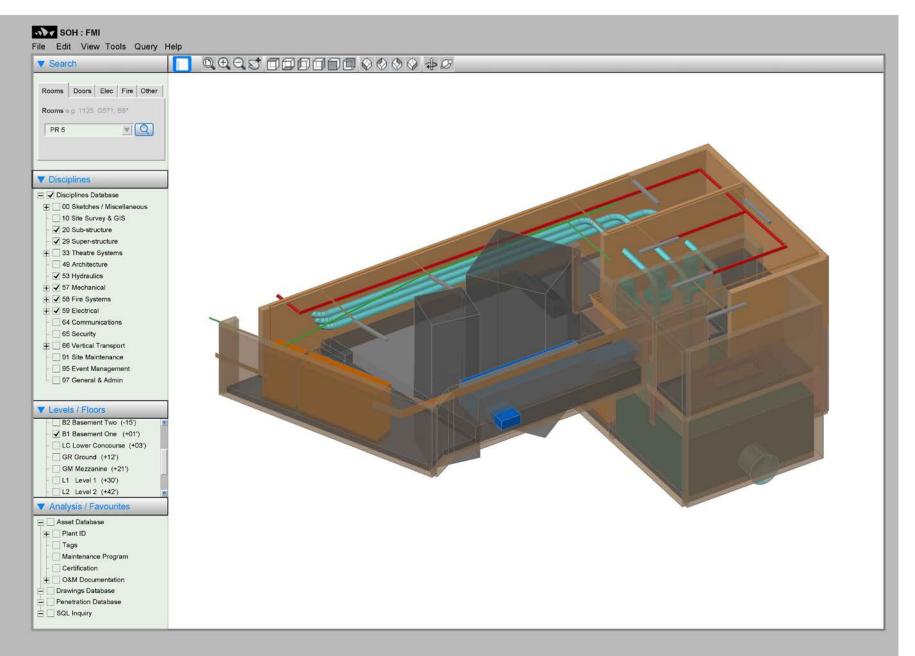






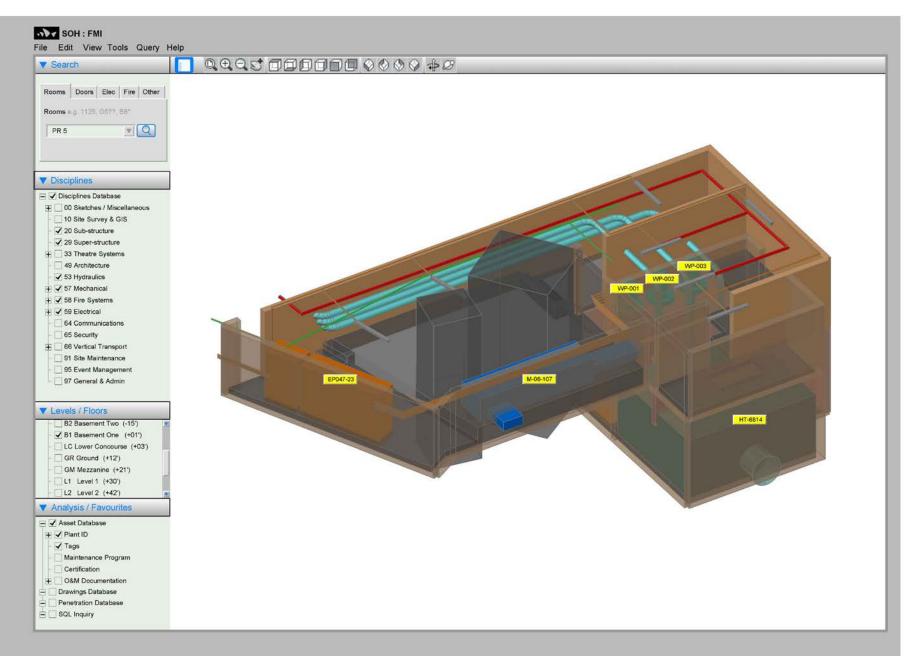


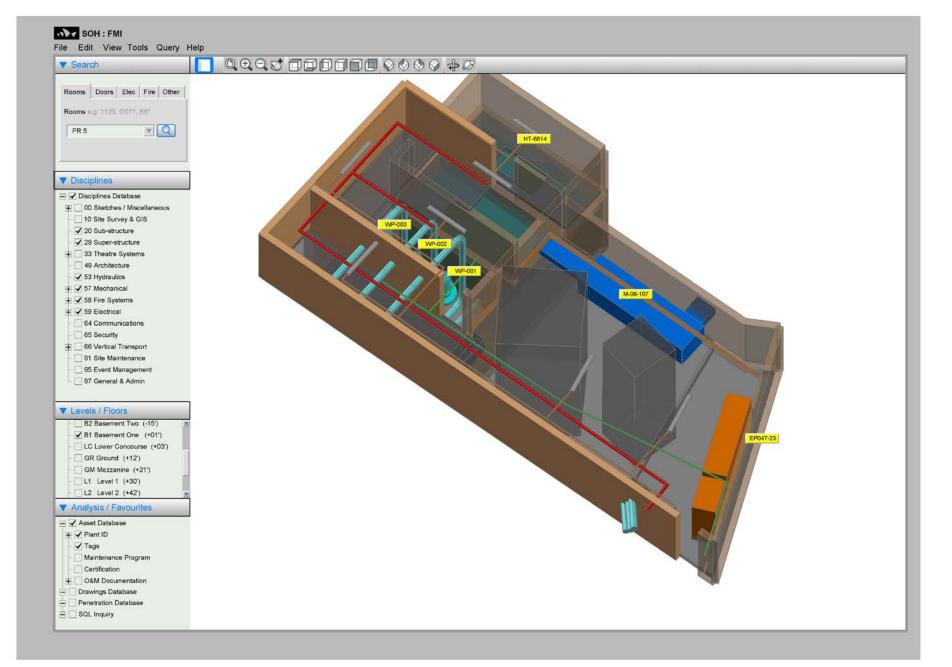




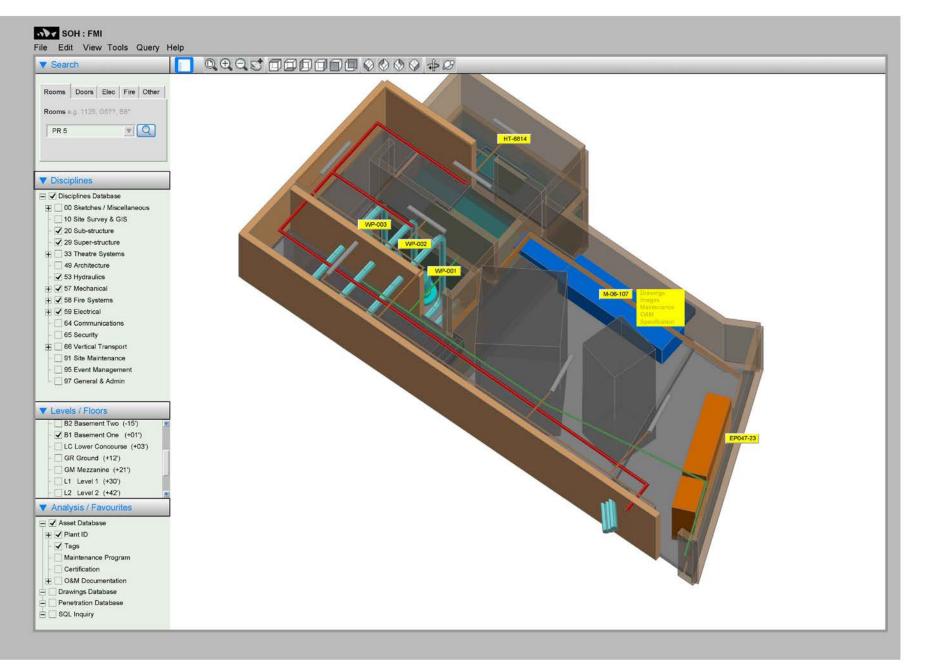




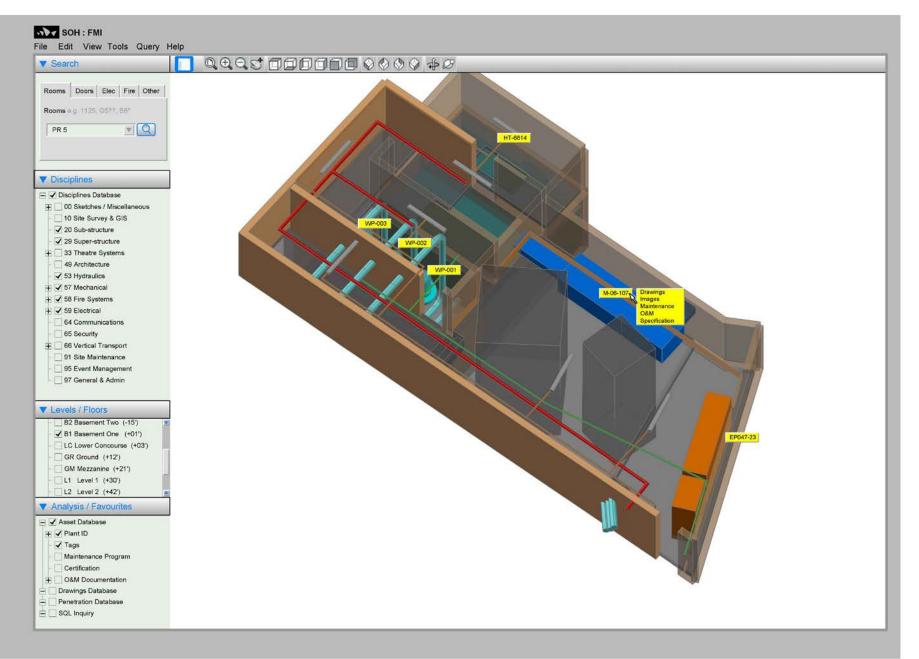






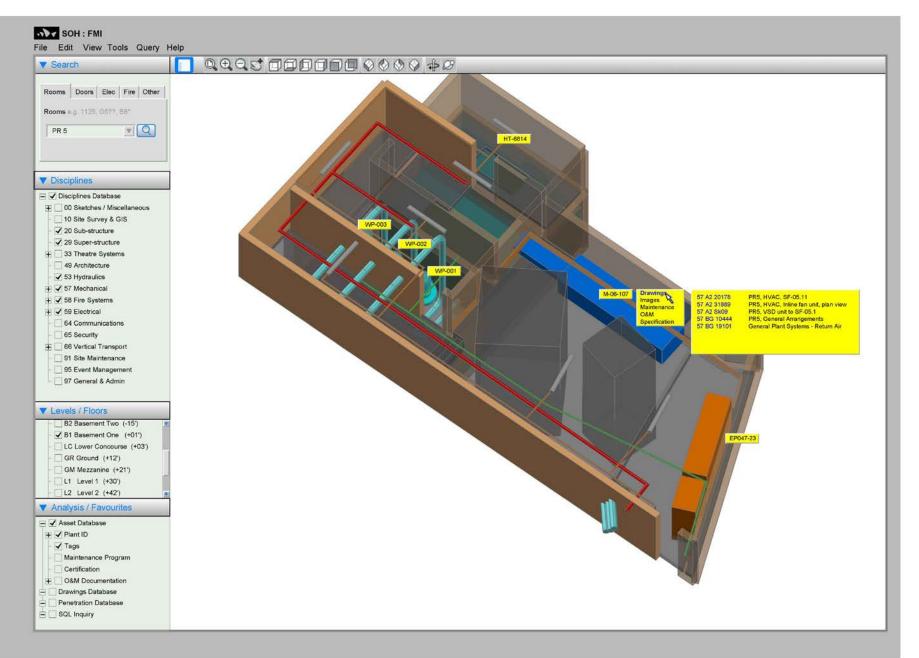




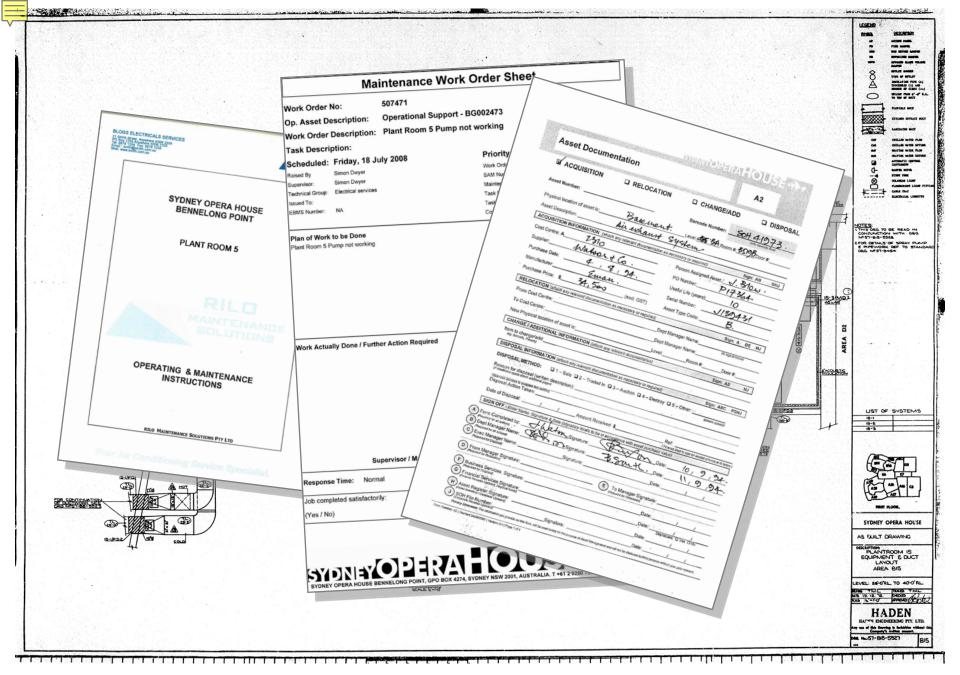




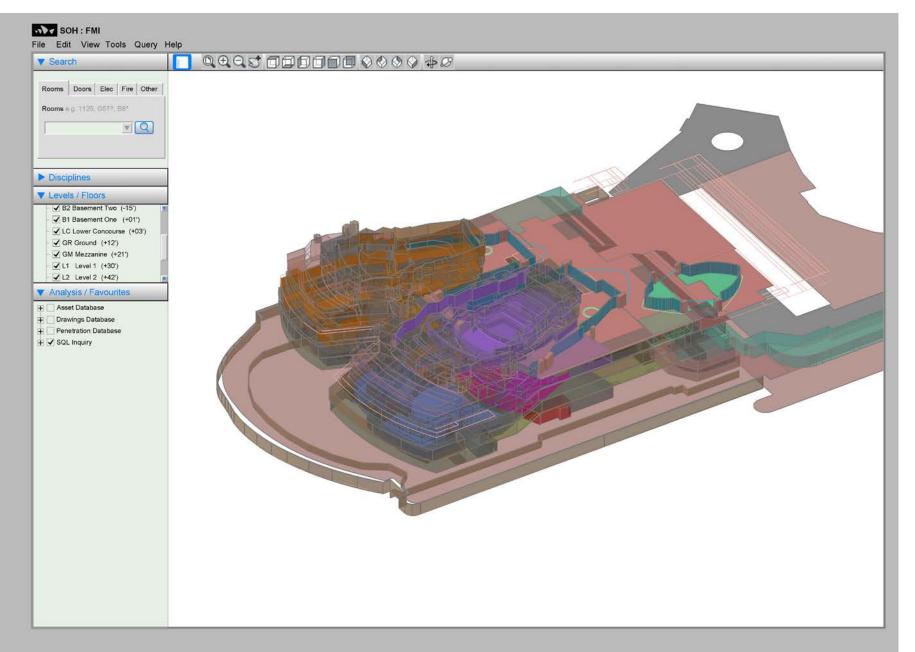






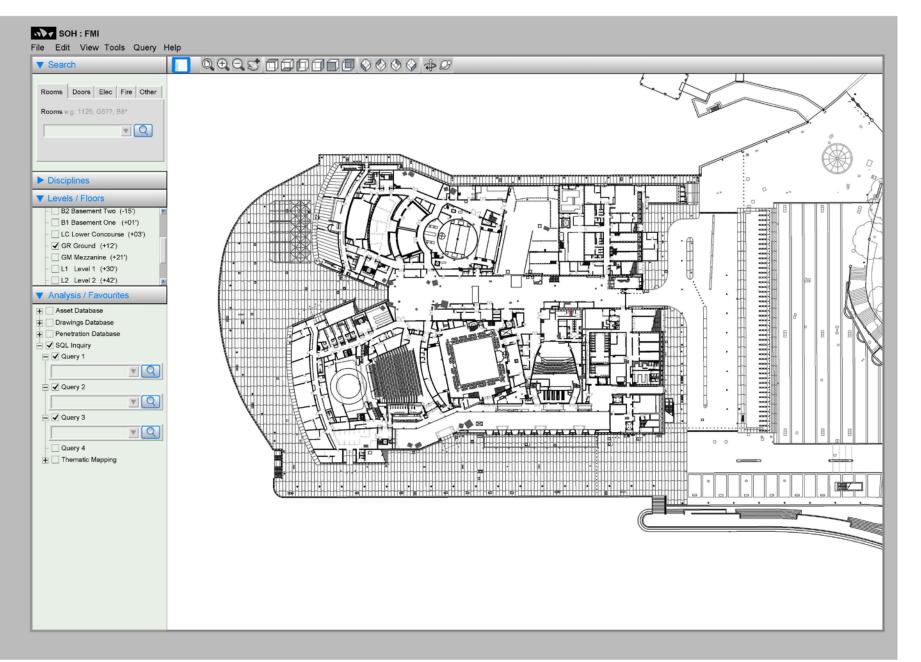




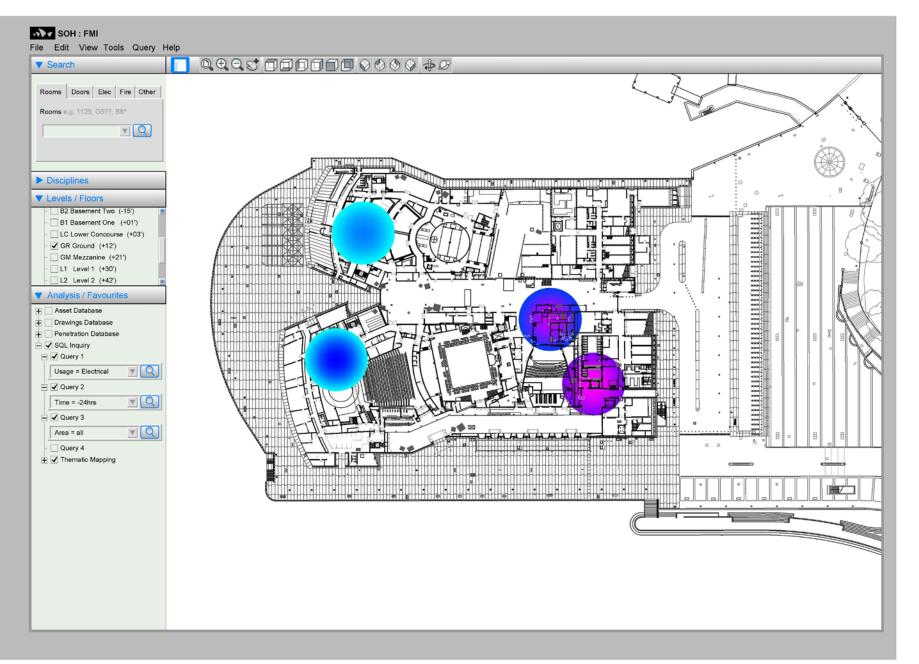




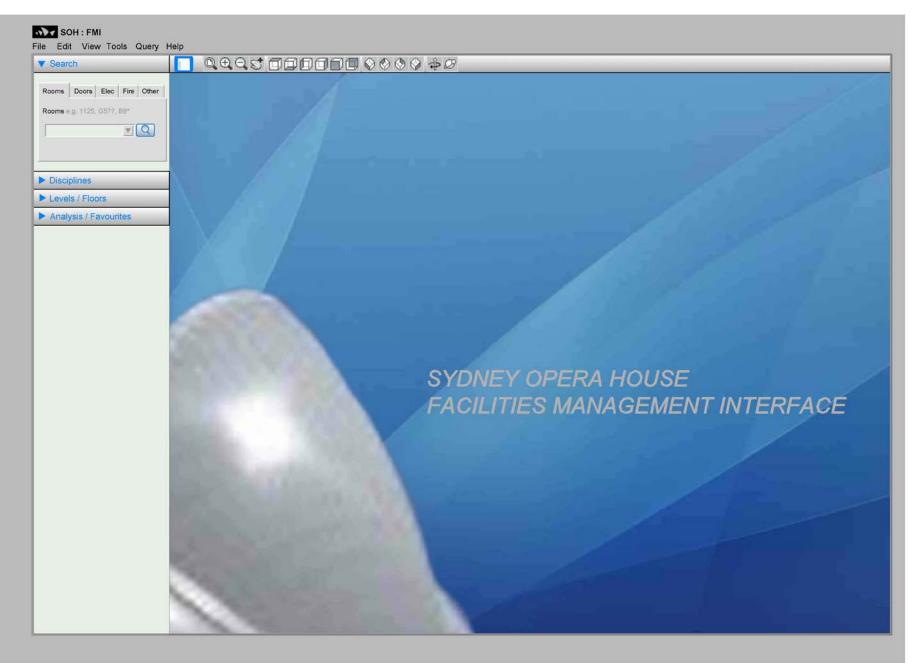






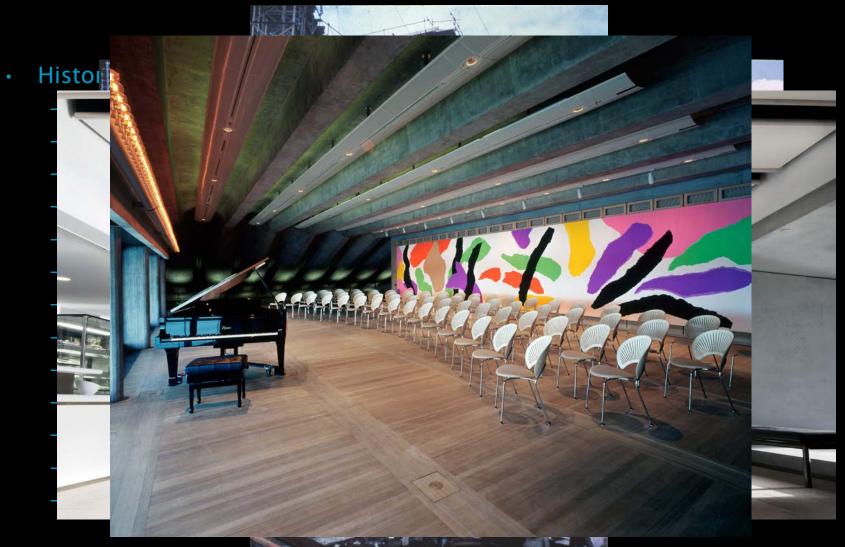








# "INFORMATION"





## "INFORMATION"

- Cost: Au\$102m (1973)
   Current Valuation: Au\$1.7b (2010)
- Life of Building: 250 ~ 300 years (37<sup>th</sup> year)

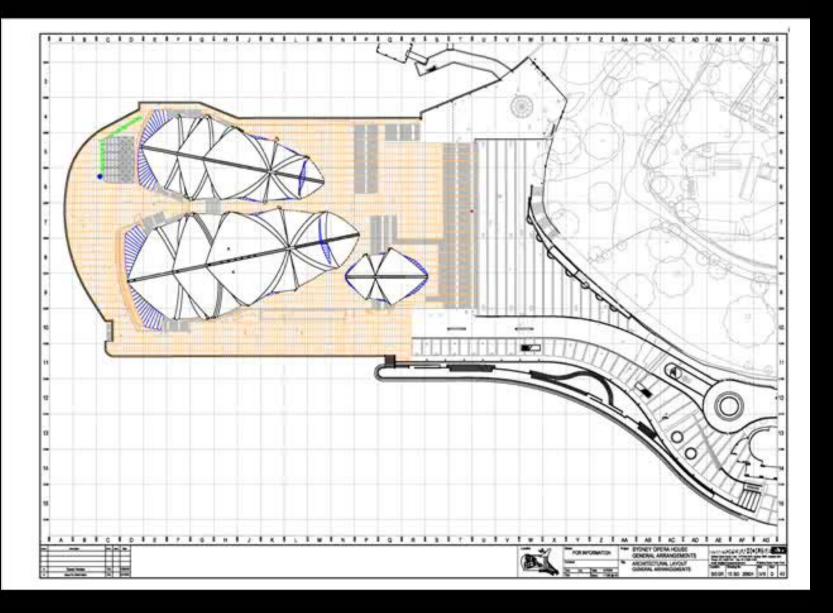


- Original Specifications: 69 covering every element, sub-contract & site operation
- International Resources:

  - DenmarkUnited Kingdom
  - SwedenJapan
  - AustriaFrance

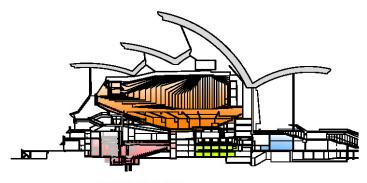
- GermanyNew Zealand
- Australia



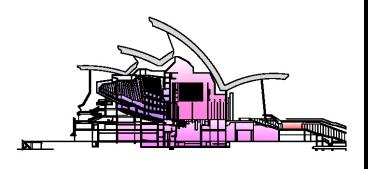




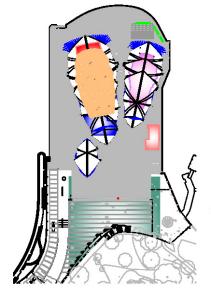




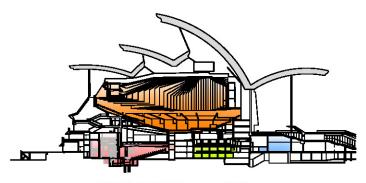
**CONCERT HALL** DRAMA THEATRE THE STUDIO **PLAYHOUSE** 



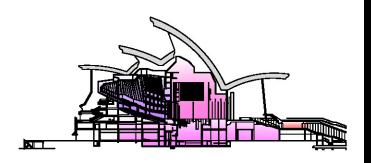
**OPERA THEATRE UTZON ROOM** 



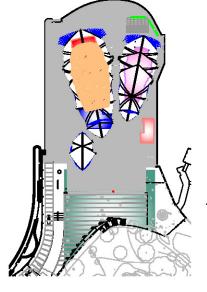
THE FORECOURT



CONCERT HALL 2679
DRAMA THEATRE 544
THE STUDIO 400
PLAYHOUSE 398

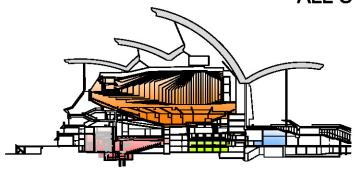


OPERA THEATRE 1533 UTZON ROOM 270

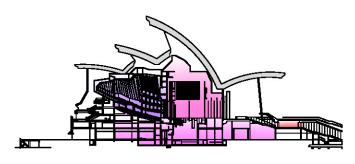


THE FORECOURT 6000

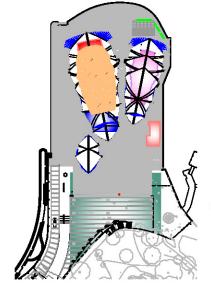
### ALL VENUES 11,284 ALL STAFF 750



CONCERT HALL 2679
DRAMA THEATRE 544
THE STUDIO 400
PLAYHOUSE 398

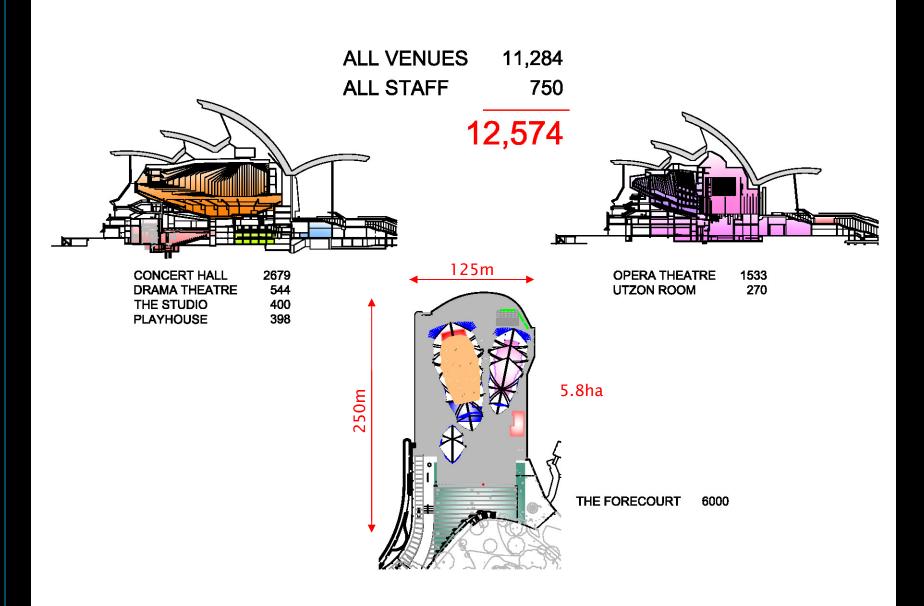


OPERA THEATRE 1533 UTZON ROOM 270



THE FORECOURT 6000









#### ARTS CENTRE

- >2500 performances per annum (approx. 7 performances per day)
- 7 Performance Venues
- 78 Rehearsal / Dressing Rooms
- Recording Studio
- Multi-media Suite
- 17 Internal TV Channels

#### **TOURISM VENUE**

- Prime Australian tourist destination
- 7.4m Site Visitors
- 17,500 tours per annum



#### BUILDING

- Operates 24 hours a day, 363 days of the year
- 6 Auditoria
- 12 levels / floors
- 2360 Spaces / Rooms
- 1641 Doors
- 78 Rehearsal & Dressing Rooms
- 6 Escalators
- 19 Elevators
- 2 Emergency Security Control Rooms + 197 Security Cameras
- 51 Plant Rooms & AHU: 12,000,000 litres of air / day
- 150 Switchboards
- 74 UPS units
- 645km of electrical main / sub-mains
- 975 Fire Dampers, 150 fire hose reels, 6km hydrant lines, 6500 sprinkler heads, 1200 smoke detector units
- Toilet Facilities: 24 public, 60 back-of-house.





## "INFORMATION MANAGEMENT"

- Conversion of 80,000 microfilms to pdfs, indexed, uploaded to a...
- SQL database fully searchable with maintenance functionality
- **CAD Guidelines** 
  - App A External Providers
  - App B Layer Structure
  - App C Title Information
  - App D Document Transmittal
- **BIM Guidelines**
- Coordinated Grid System
- **O&M Formatting Guidelines**
- **Door Labels**
- **Technical Numbering**





### "INFORMATION MANAGEMENT"

- Access Strategic Plan 2008
- BIM Guidelines 2009
- Building Standards Manual 2006



# 93 Policy Documents

30 Safe Work Procedures

- >45 Master Plans & Guidelines
- Strategic Building Plan 2008
- Sustainability Policy 2010
- Total Asset Management Plan 2009
- Utzon Design Principles 2002
- World Heritage Nomination 2006



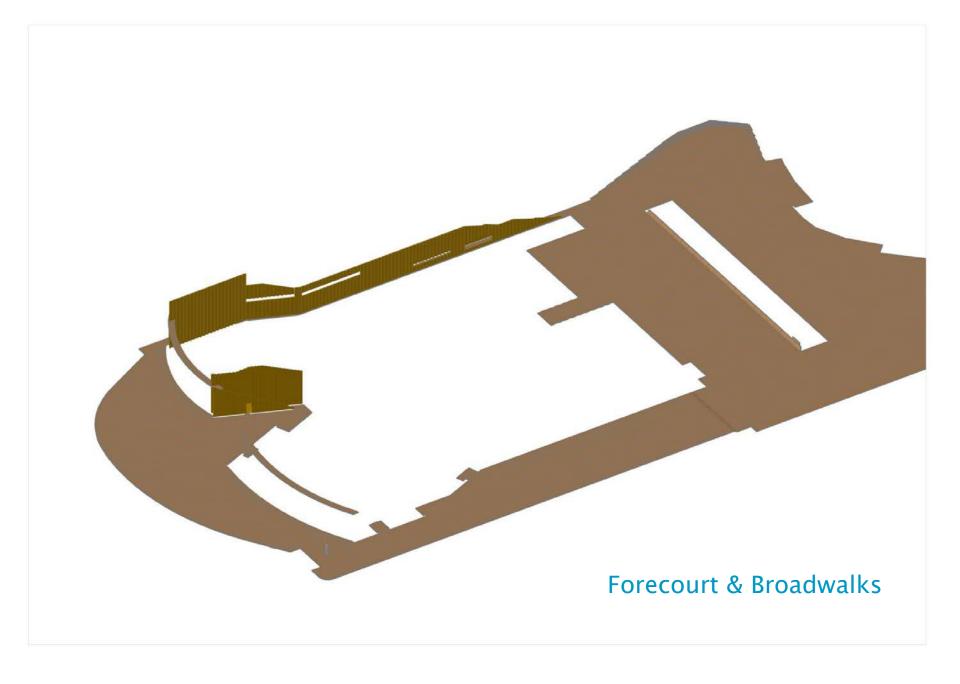


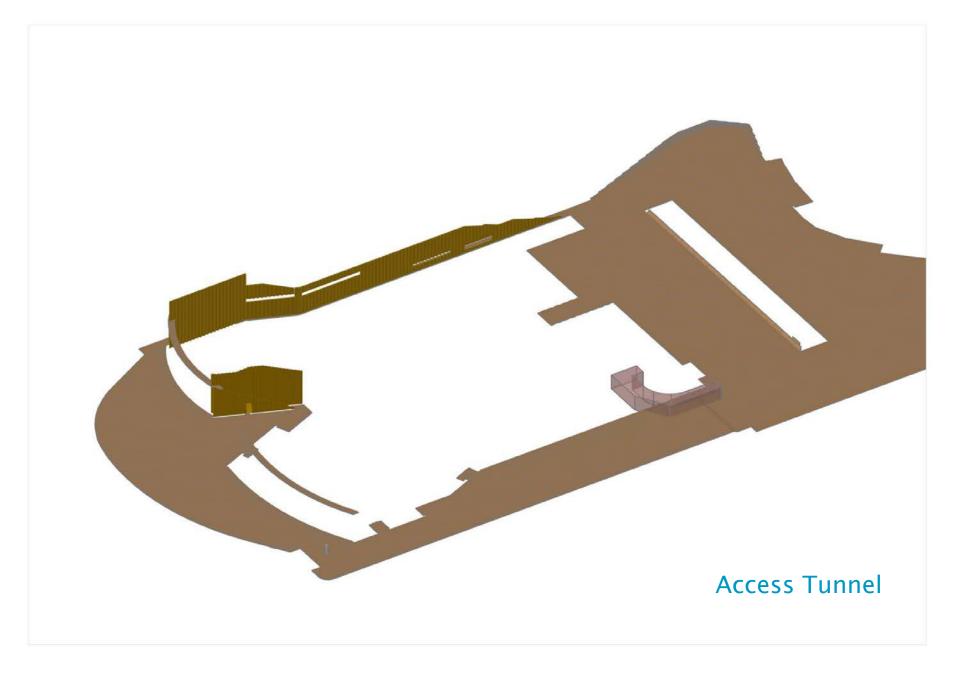
# "INFORMATION MODEL"

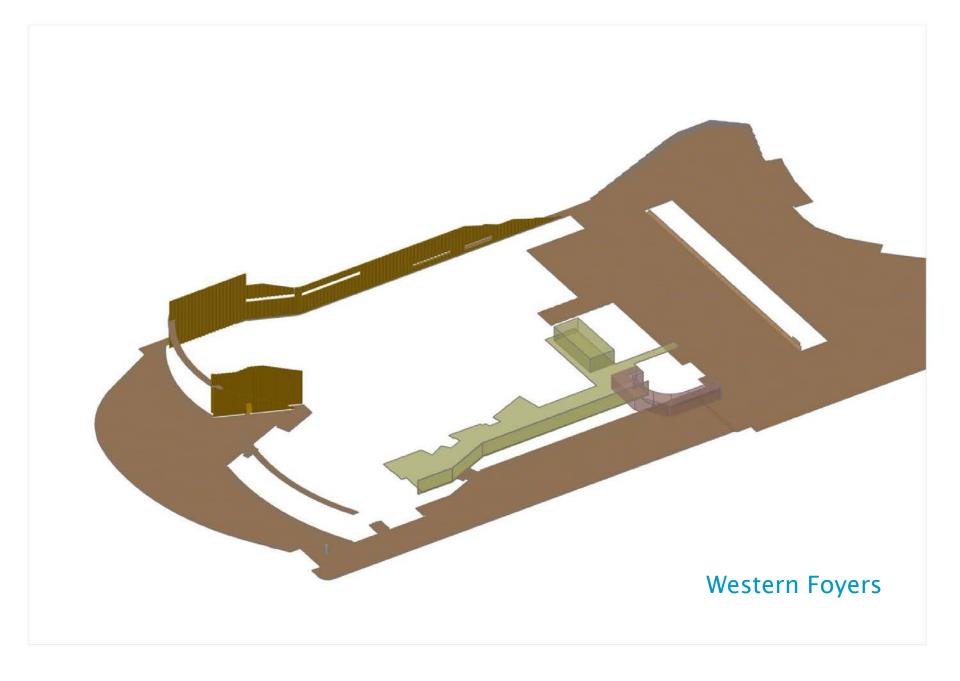
· Coordinated Controlled Survey Network (CCSN)

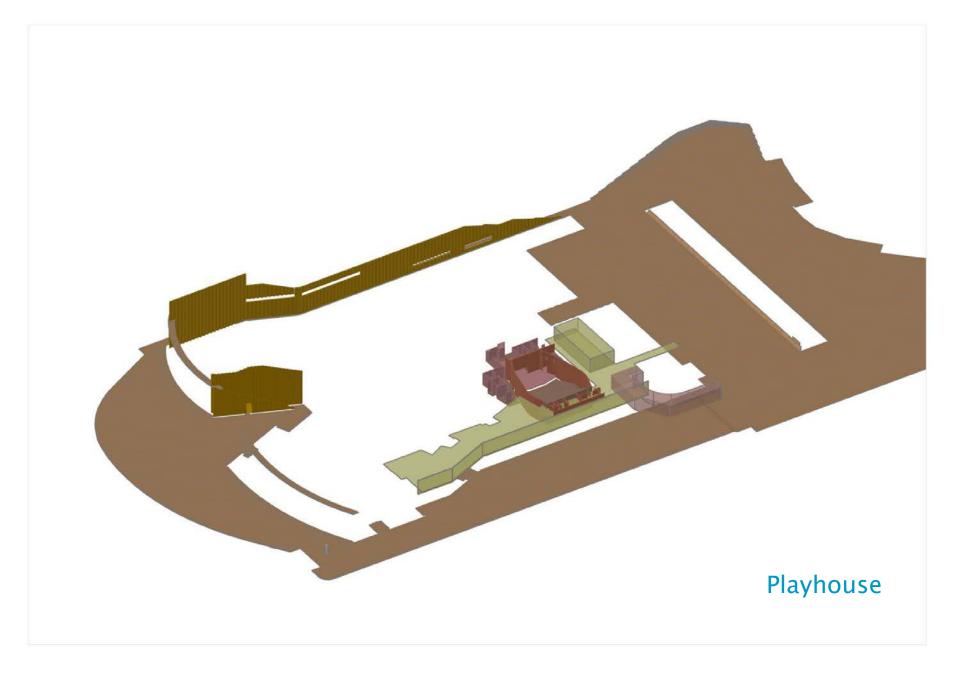
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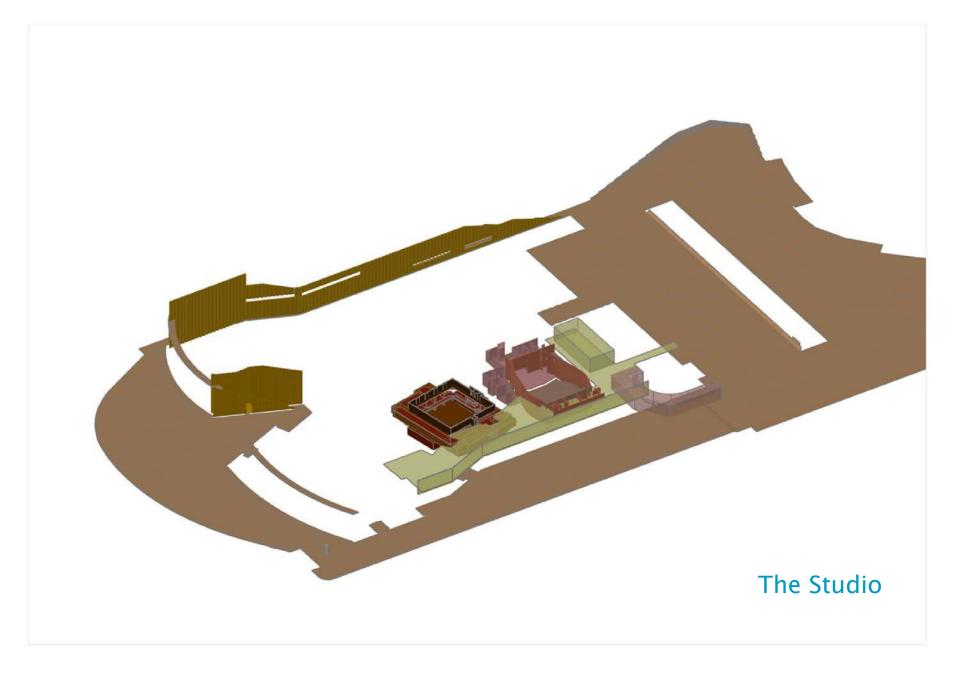
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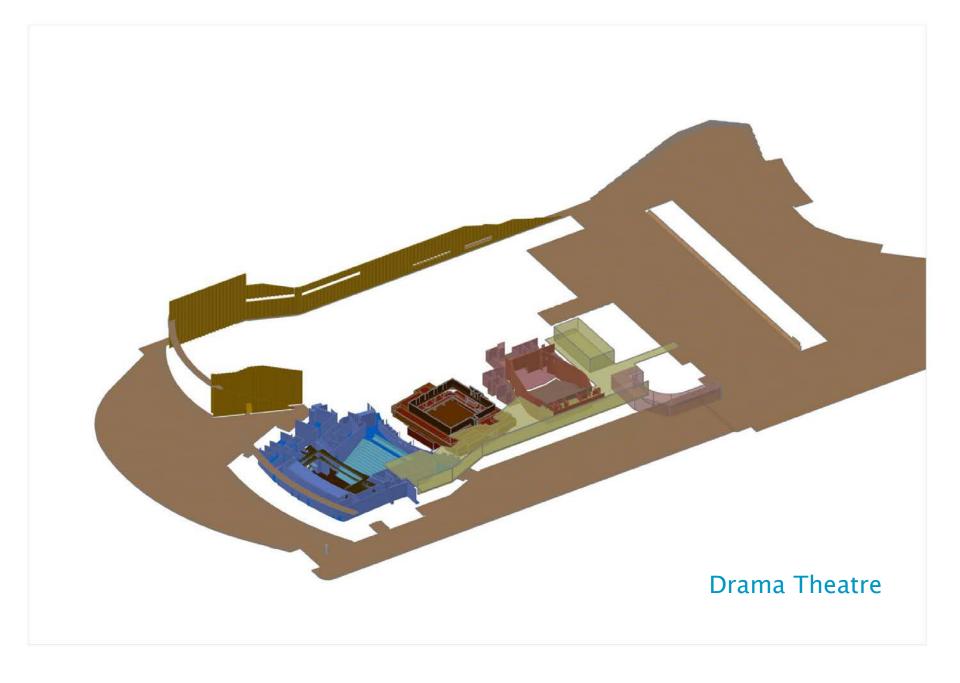




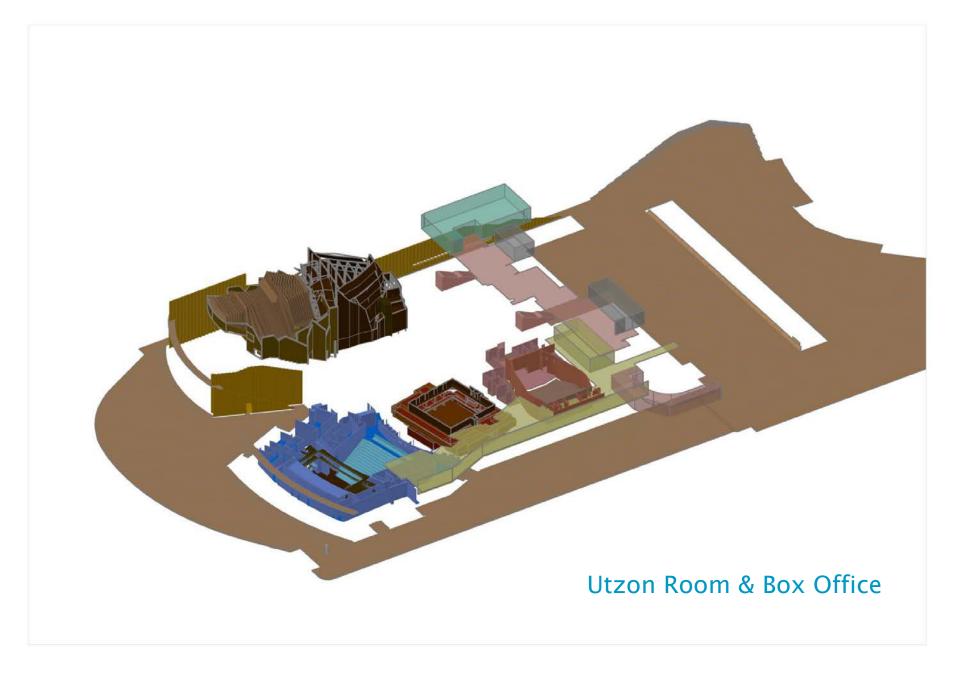








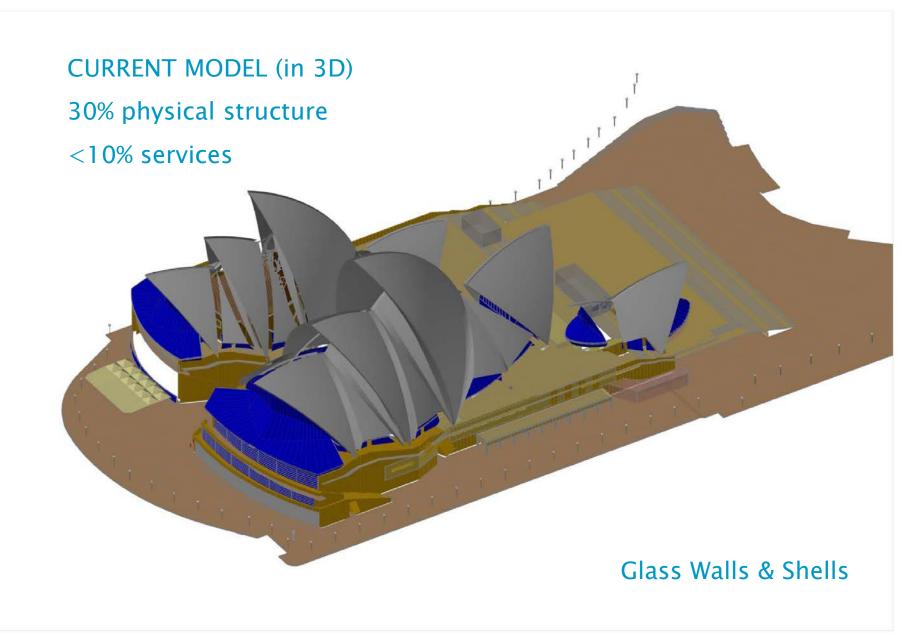














### VAPS Reference Drawing Sets

Set ID	Description	date	pdf	cad	AMG	AHD	CCSN*	CLASS**	
1	Frank Mason - SW, SE Entrance	2004	yes	yes	no	yes	no	В	
2	Hard & Forester - Forecourt Consolidation	2005	yes	yes	yes	yes	no	В	
3	Hard & Forester - SOH CCSN Survey Network	2005	yes	yes	yes	yes	yes	Α	
4	Hard & Forester - EBW, Carpark Entry	2006/07	yes	yes	yes	yes	no	В	
5	Hard & Forester - Forecourt / Lower Concourse	2007/08	yes	yes	yes	yes	yes	Α	
6	Hard & Forester - Forecourt Survey Control Set	2008	yes	yes	yes	yes	yes	Α	
7	Hyder - Forecourt Surface Design	2008	yes	yes	yes	yes	yes	Α	
8	DPs & Property Boundary	var	yes	no	no	no	no	D	
9	Forecourt Services Consolidation	2006	yes	yes	no	no	no	С	
10	Forecourt Paving / Master Plan	2008	yes	yes / no	no	no	no	Е	
11	VAPS : OT concepts by JPW	2003	yes	no	no	no	no	Е	
12	VAPS : OT issue for pricing by ARUP/CGP	2005	yes	no	no	no	no	Е	
13	VAPS : SOH Sketches / Concepts set	2008/09	yes	yes	yes	yes	yes	В	
14	SOH Carpark - DA Set	1990	yes	no	yes	?	no	Е	
15	SOH Carpark - Excavation Contract Set	1990	yes	no	yes	?	no	E	
16	AutoCAD xref drawing files	current	no	yes	yes	yes	yes	В	
17	SOH Height Datums, Nominal Floor Levels	current	yes	yes	n/a	yes	n/a	Α	
	* Coordinated Controlled Survey Network - SOH Local Survey Grid System								
	** Integrity Class for spatial accuracy, A - highest to E - lowest. An A Class document is far more accurate than an E Class document.								

Cost : Au\$38m Western Foyer & Access Tunnel

Operating & Maintenance Manuals :

23 hard copy manuals = 1.5 shelves = 800Mb pdf data

55 Archive bo

6 DVD's Proj

34Gb

00Mb pdf data 00Mb data

00Mb data



**CURRENT** ✓

SEARCHABLE ✓

FMI COMPATIBLE ×



## **TOWARDS INTEGRATION**

Taking the Australian Construction Industry forward



WHERE WE WERE WHERE WE ARE **NEXT STEP** WHERE WE ARE GOING

0 - 2D

Manual and CAD based (2D or 3D)

#### 1 - MODELLING

Single-disciplinary use of object-based 3D modelling software within one discipline

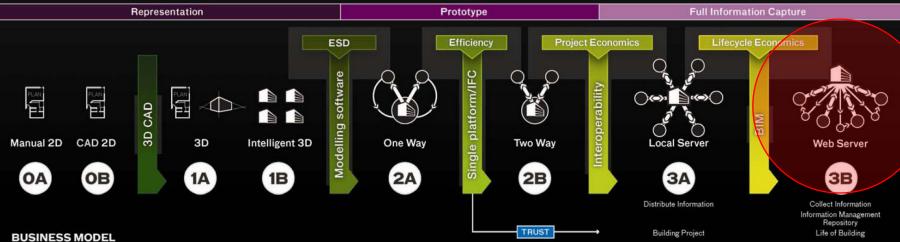
#### 2 - COLLABORATION

Sharing of object-based models between two or more disciplines

#### 3 - INTEGRATION

Integration of several multi-disciplinary models using model servers of other network-based technologies





ISOLATED

COLLABORATIVE

INTEGRATED



UPTAKE



Australian Institute of









Rules

"...the international agreements, to provide non-compromised exchange of construction data between countries and software communities"



Control



Information





# Request...

# Building Model Building Information

"...the international agreements, to provide non-compromised exchange of construction data between countries and software communities"

**Facilities Management** 



