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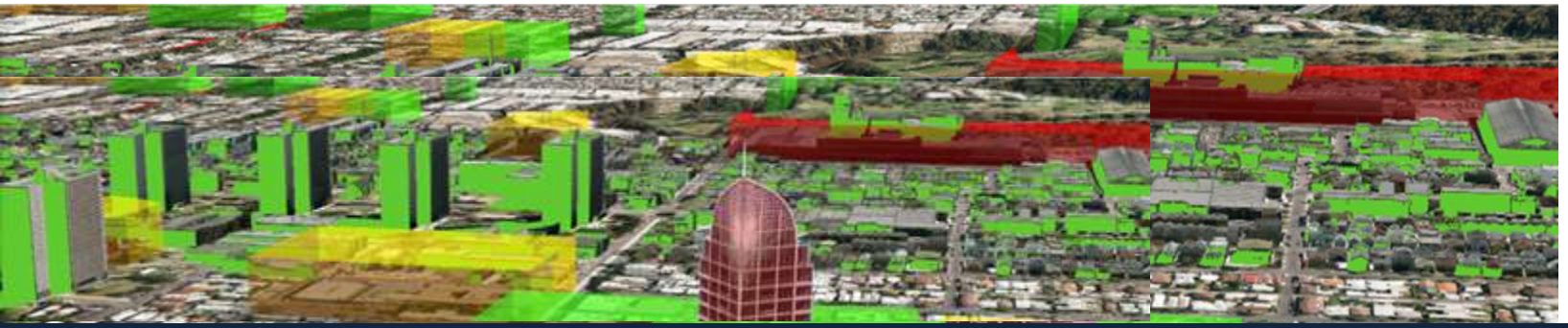


VISUALIZING THE SMART CITY –3D SPATIAL INFRASTRUCTURE

GEOSMART ASIA- 30 SEP, 2015

Agenda

- AAM
- What is a Smart City?
- Data Acquisition
- 3D Modelling
- Benefits
- Questions

AAM

AAM is a Geospatial Services company specialising in the collection, analysis, presentation and delivery of geospatial information. Our depth of resources provides the flexibility to adapt our methods to specific project needs. We then help our clients manipulate it, analyse it, and profit from it.

Dedicated provider of Geospatial Services

- ~500 staff, Multiple Offices
- Aerial Photography and LiDAR
- Unmanned Airborne Solutions
- GIS and Web Mapping
- 3D GIS and Visualisation
- High-Definition Surveying and Monitoring
- Land, Engineering and Industrial Survey

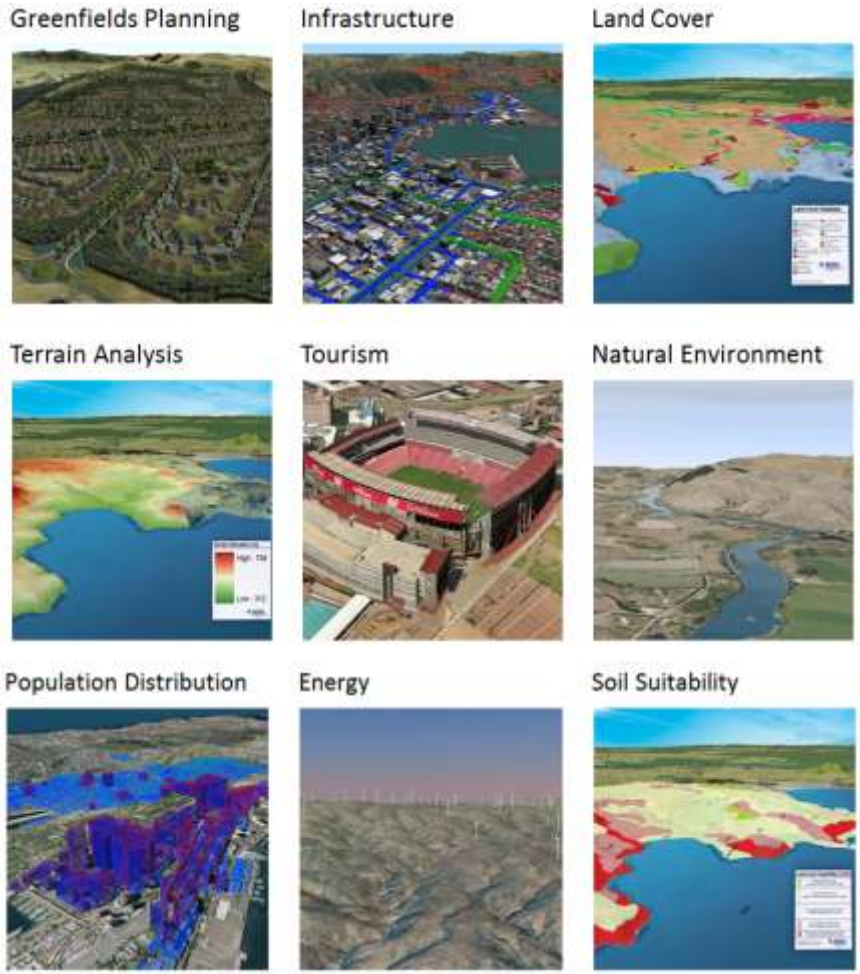
Offices in Malaysia, Africa, India, Singapore, New Zealand & Australia

GEOSPATIAL WORLD FORUM

WINNER GEOSPATIAL SOLUTIONS COMPANY OF THE YEAR 2014

What is a Smart City?

- Multi-purpose 3D Spatial Infrastructure



What is a Smart City?

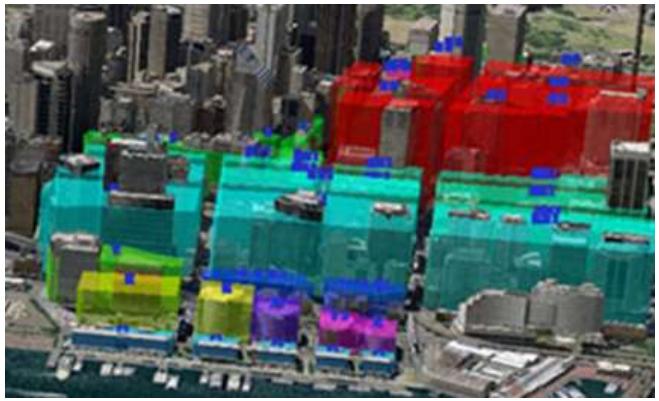
- Concept planning

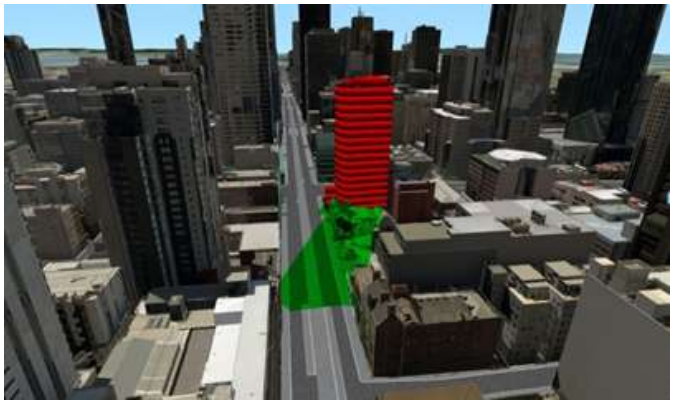
What is a Smart City?

- Master planning

What is a Smart City?

- Planning 3D GIS Tools



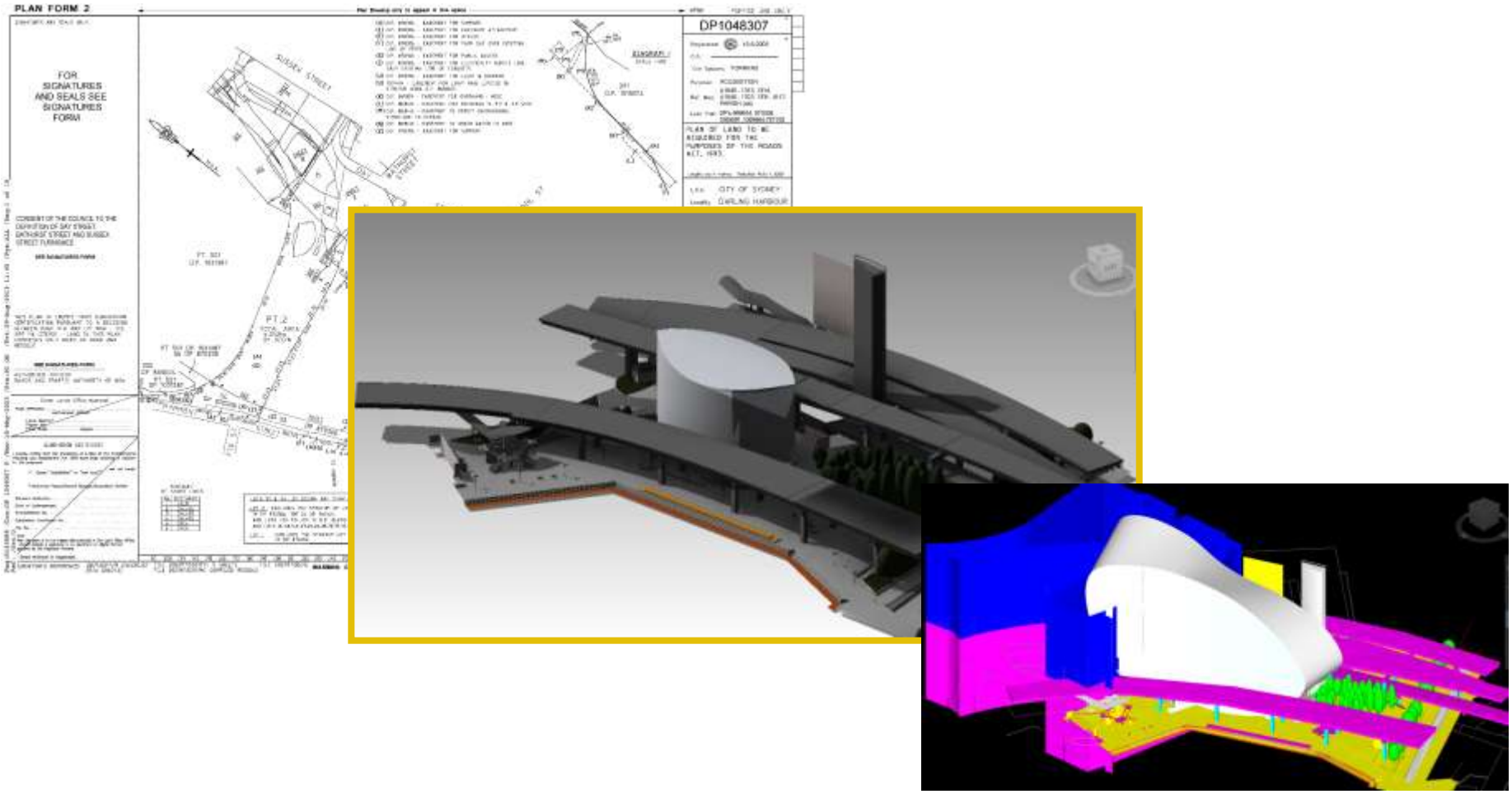


What is a Smart City?

- Weather

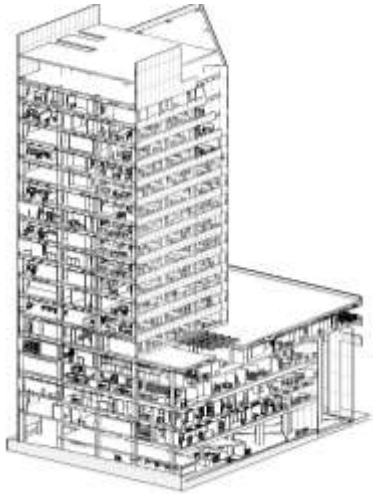
What is a Smart City?

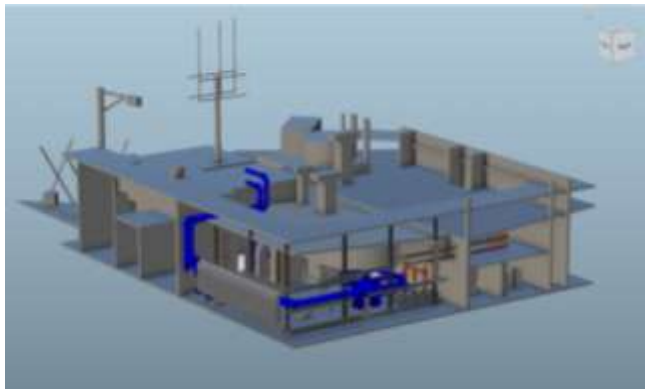
- 3D Cadastre



What is a Smart City?

- Smart Buildings inside Smart Cities





Rigorous spatial foundation

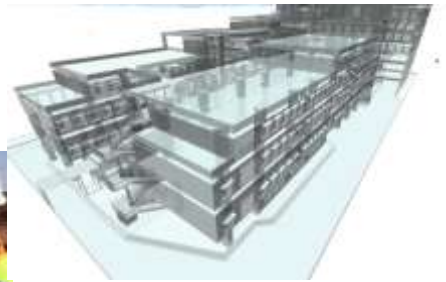
…geospatial data are the building blocks of a Smart City.

A virtual 3D City Model supports a Creative, Knowledgeable, Sustainable, and Connected Intelligent Virtual EcoCity which allows you to interact with Smart City outputs

How Do We Get There

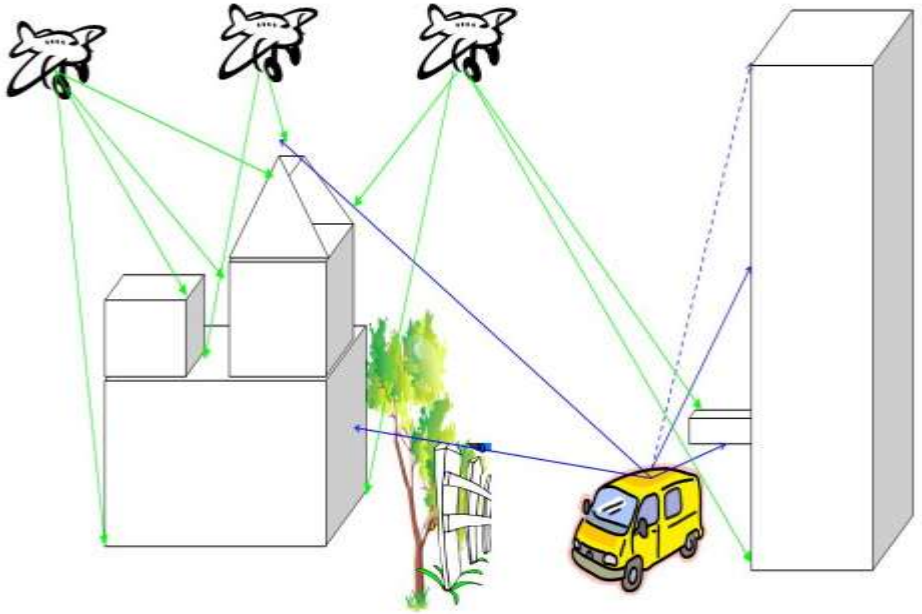
From Metres To Millimetres

1. Satellites
2. Aircraft
3. UAVs (drones)
4. Vehicles
5. Existing plans
6. Inside buildings
7. Field Survey.



Data Acquisition Methods

- Aerial Survey
  - LiDAR Sensors
    - Terrain and all above ground features including, building, trees, powerlines and other structures
  - Oblique camera sensor
    - Quality nadir for high resolution orthophotos
    - Oblique photos for building modelling and realistic texturing
- Terrestrial Survey
  - MLS Sensors
    - Detailed road and street scape features
  - 360 degree Cameras
    - Feature extraction & realistic texturing



AVIATION PLATFORMS – LIDAR AND IMAGERY

applying the right platform to every project

LIDAR & IMAGERY –DIFFERENT PLATFORMS

High vehicles preferred

Boats

Rail Vehicles

Tripods

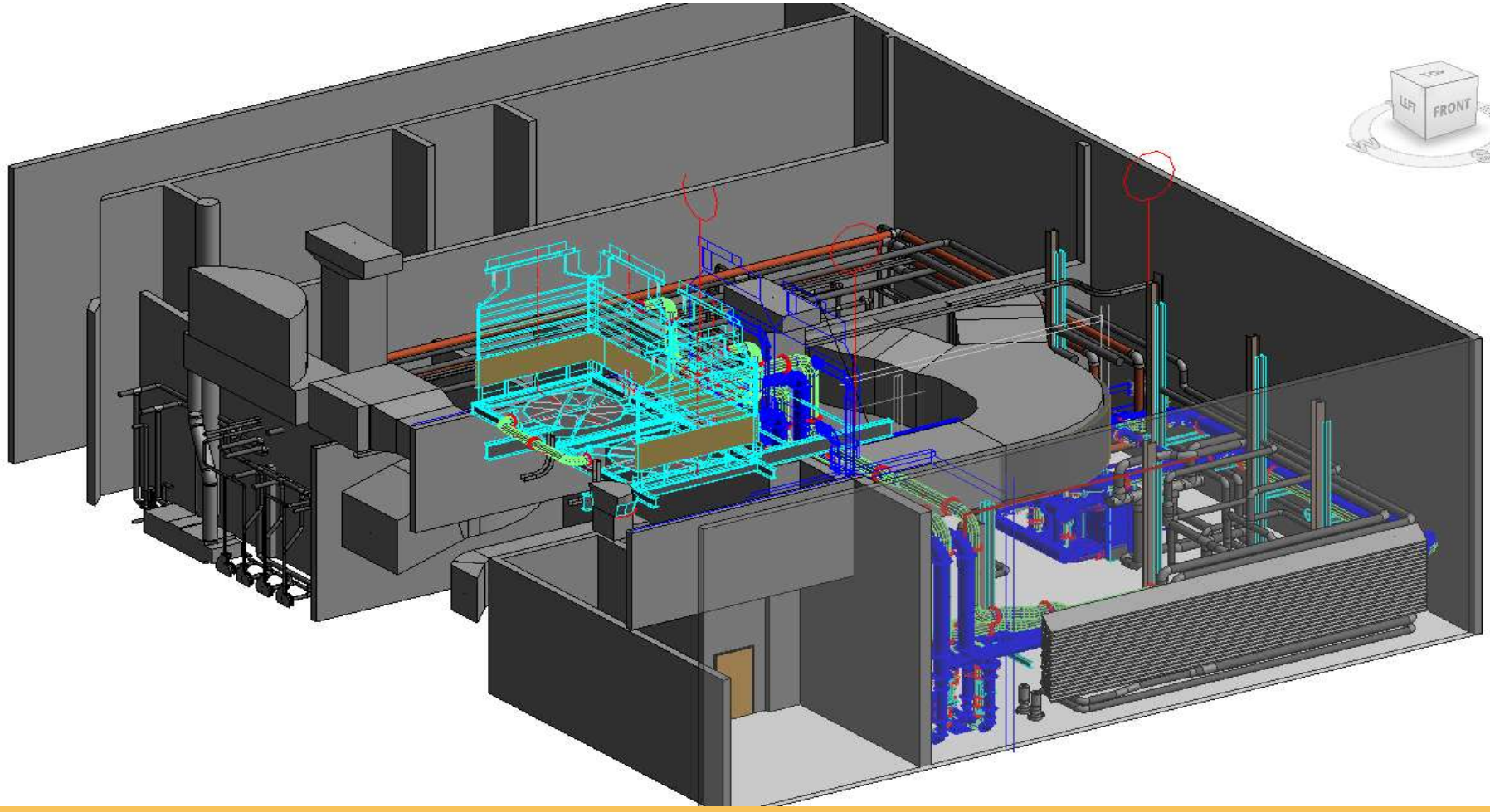
Trolleys

Quad bikes

or even handheld

LIDAR – INSIDE

to support Building Information Models (BIMs)



LIDAR – INSIDE

to support Building Information Models (BIMs)

IMAGERY: VERTICAL

Satellite ,aerial and UAV photography
for land use and accurate terrain definition

0.8m pixel (satellite)

0.25m pixel (camera)

0.06m pixel (camera)

IMAGERY: OBLIQUE

DATA ACQUISITION

Aerial versus Terrestrial Cityscape Capture

1. Aerial Capture provides:
    1. *Greater access to more building facades*
    2. *Greater efficiency in data capture*
    3. *Definition of rooflines*
    4. *More perspectives on more facades*
    5. *Required perspective for more planning purposes*

2. But is limited by:
    1. *Shadows*
    2. *Building awnings*
    3. *Vegetation*
    4. *Urban canyon.*

DATA ACQUISITION

Aerial versus Terrestrial Cityscape Capture

1. Terrestrial Capture provides:
    1. *Clearer access to prominent facades*
    2. *Higher resolution*

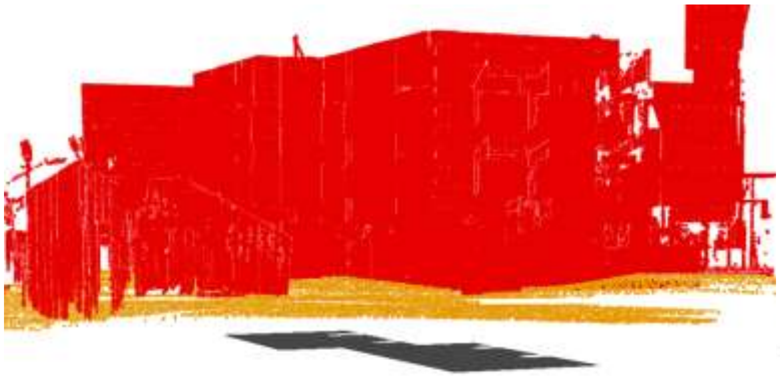
2. But is limited by:
    1. *Facades accessible by vehicle or on foot*
    2. *Poor building geometry definition (other than streetscape)*
    3. *Building awnings*
    4. *Vegetation*
    5. *Less efficiency in data capture over large areas*
    6. *traffic.*

3D Modelling Program

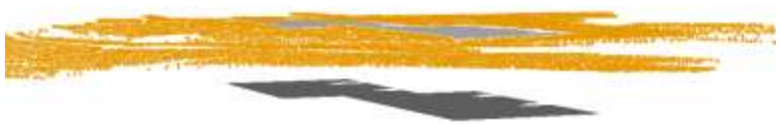
- Aerial Survey is used to generate
  - LOD 0 Accurate Terrain Relief and Digital Surface Model
  - High resolution Orthophoto
  - LOD 1 Building Block Models
  - LOD 2 Building and Bridge Models
  - Waterbodies and Vegetation Models

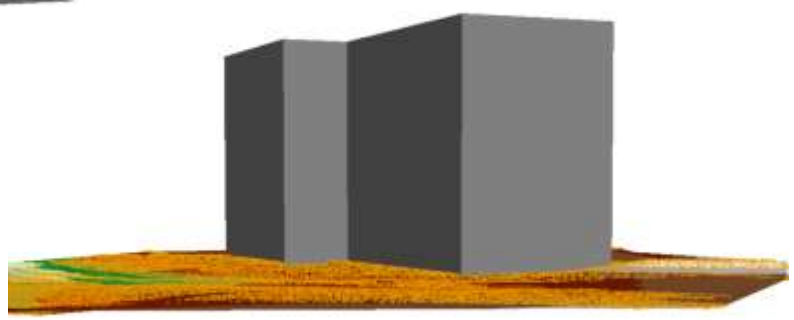
- Terrestrial Survey is used to generate
  - LOD 0 Accurate Terrain Relief Model
  - LOD 1 Directional Road Network
  - LOD 1 and LOD 2 Road, Bridge and Tunnel Models
  - LOD 2 City Furniture Models
  - LOD 3 Building Models

Building Models

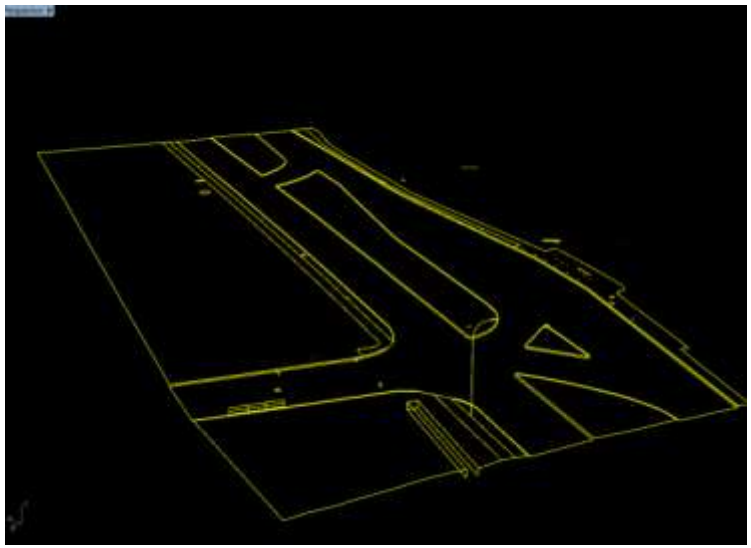


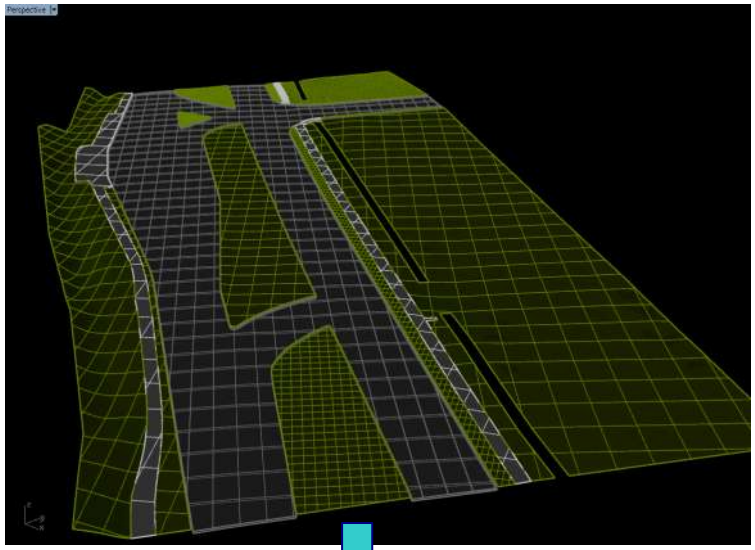
ROOF_MIN	ROOF_MAX	ROOF_MEAN	GND_MIN	GND_MAX	GND_MEAN	ROOF_HT	ROOF_X	ROOF_Y	ROOF_AREA
96.56	97.64	96.528	90.702	91.208	91.047	3.481	259455.14	5764898.75	394.9
103.59	107.61	104.847	101.015	101.426	101.23	3.616	259637.970	5766070	252.266
77.52	84.35	81.403	76.976	78.454	77.804	3.858	259736.093	5768640.5	238.56
112.61	113.83	113.143	108.631	108.903	108.719	4.424	259334.71	5765574	61.976
115.66	117.62	116.739	111.666	112.894	112.379	4.36	259287.492	5766183	263.266
72.24	74.82	73.457	69.757	70.313	70.019	3.437	259297.582	5769776	288.380
108.94	110.25	109.463	104.747	104.987	104.987	4.616	259585.620	5765758.25	66.141
108.63	111.51	110.606	106.312	106.613	106.489	4.316	259929.226	5766086	152.643
104.93	108.64	107.477	104.381	104.591	104.463	3.024	259913.996	5768687	136.067
68.36	72.2	71.952	67.6	68.808	67.806	4.146	259257.501	5768756.5	164.047
126.52	130.38	129.145	124.655	124.899	124.765	4.38	259911.296	5766495.5	771.731
113.2	116.95	114.381	109.927	110.794	110.427	3.953	259369.921	5765638.75	273.389
107.39	108.29	107.811	103.728	104.251	104.007	3.804	259591.765	5766017	177.682
118.81	118.43	116.46	113.37	116.538	116.489	3.97	259466.796	5765783	117.182
116.1	117.38	116.768	113.028	113.275	113.148	3.62	259488.434	5765790.6	56.88
105.1	106.35	105.769	102.509	102.768	102.614	3.155	259587.486	5768640	107.380

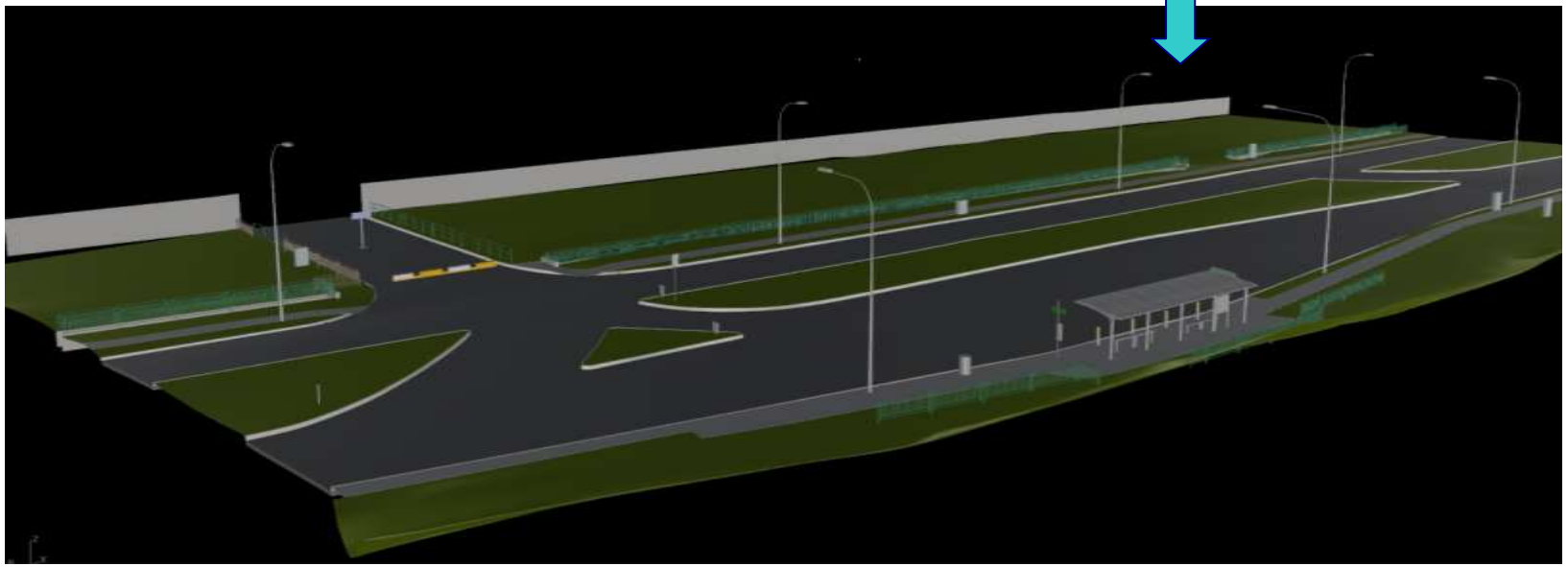




Road LOD2 Models





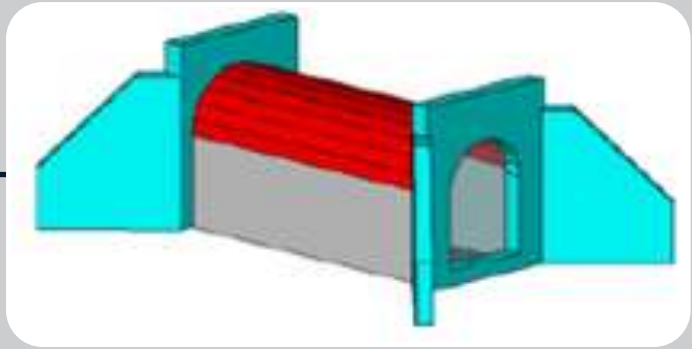


Transportation Models

Tunnels LOD 1 / LOD2 Closed Solids

Ground and Non-Ground Classified Point Cloud

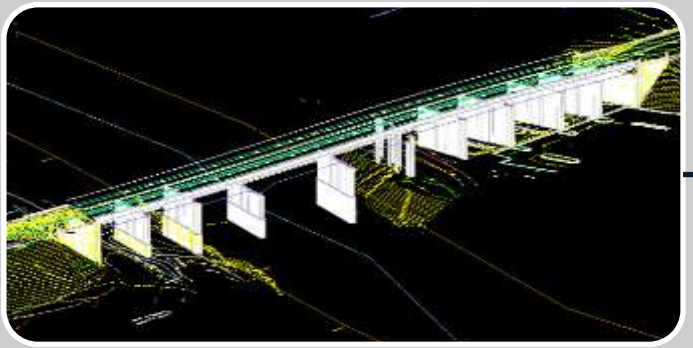
Tunnel Closed Solids



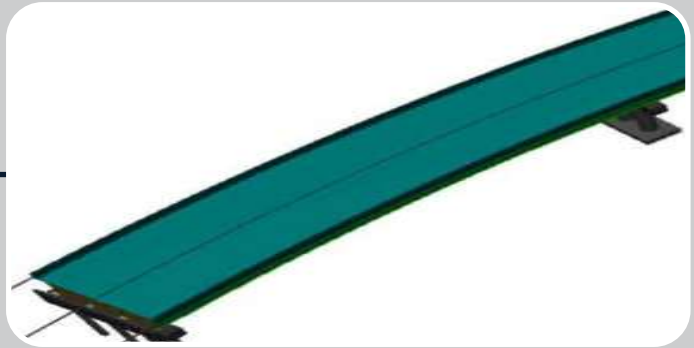
Transportation Models

Bridges LOD 1 / LOD2 Closed Solids

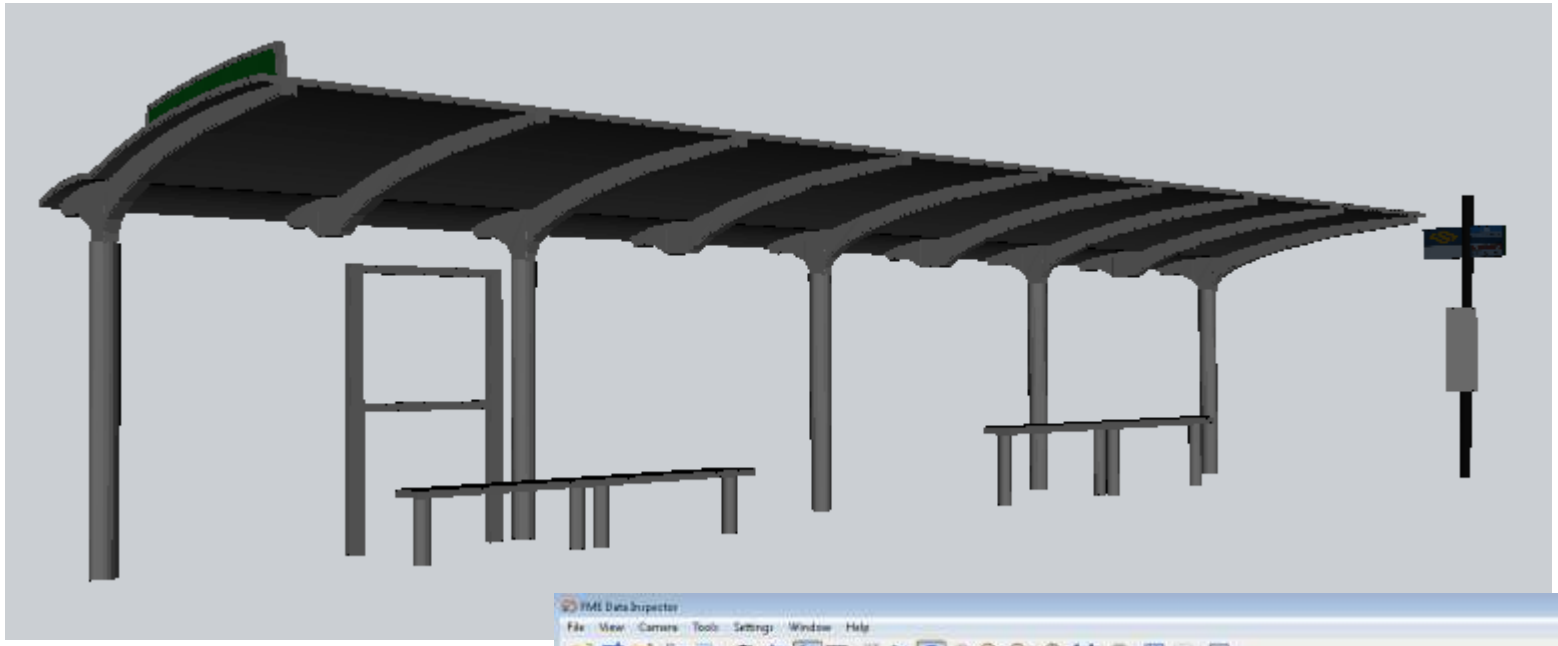
Non-Ground Classified Point Cloud

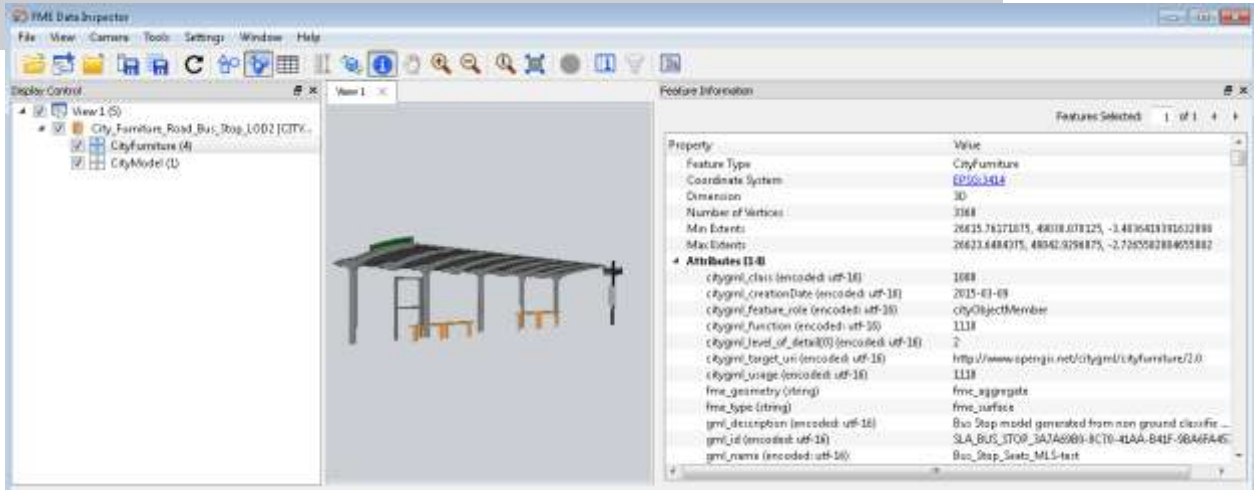


Bridges Closed Solid



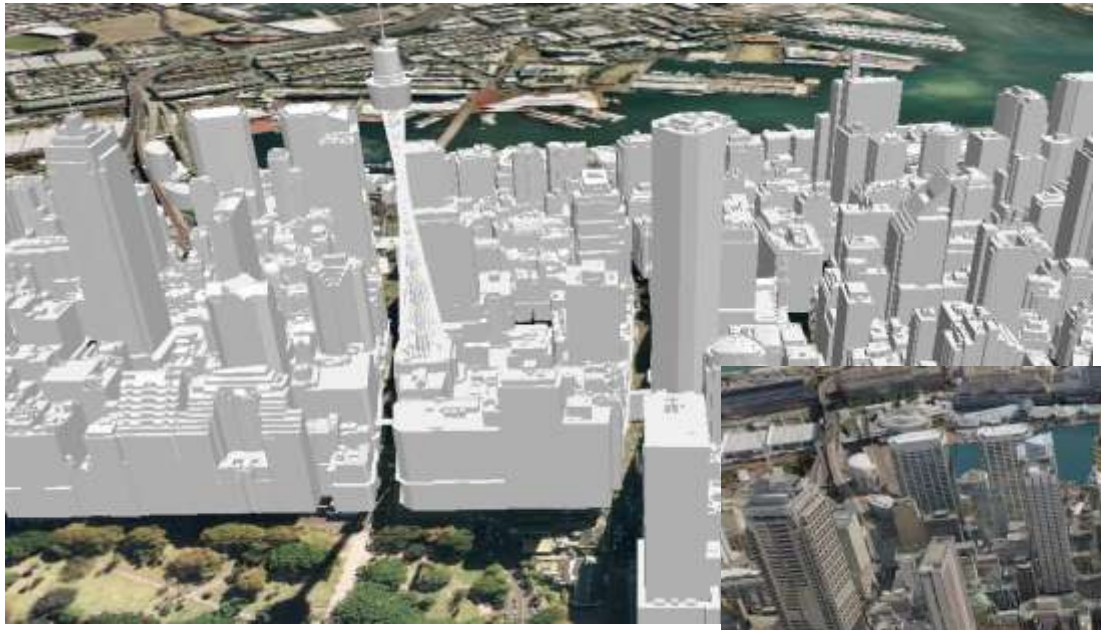
City Furniture Models



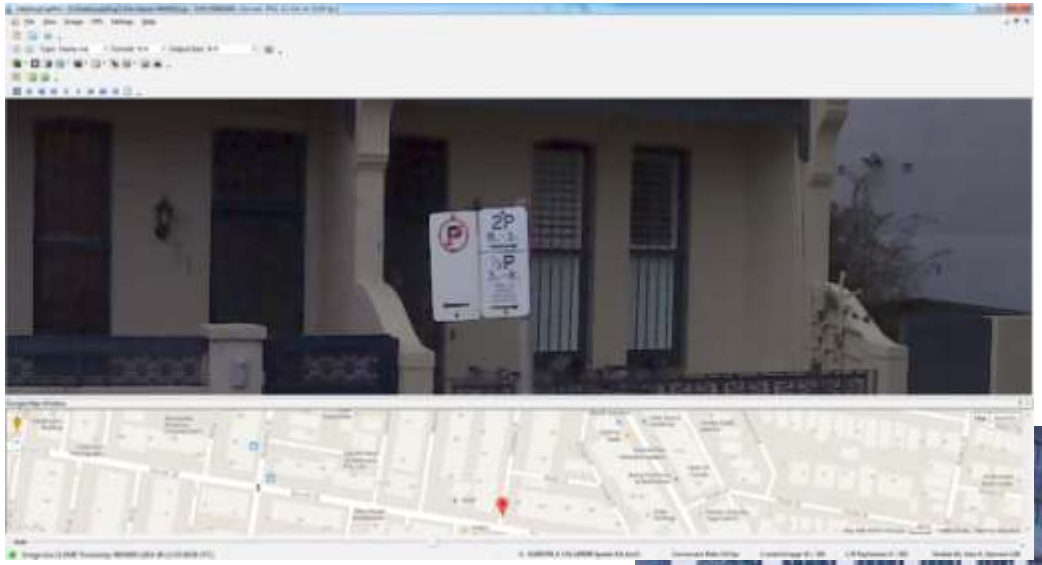


3D Modelling Program – For realism

Automatic harvesting of oblique imagery



Terrestrial Imagery – For realism



Final Derived Models

Data Standards

International Smart City Mapping Standards and Conventions, CityGML, HTML5, WebGL

Futureproof Smart City deployment and provide access to other users functionality

- Multi-Scale Modelling [Level of Detail]
  - From landscape to interior model

- LOD 0 – Regional model

- LOD 1 – City model

- LOD 2 – City model with roof structure

- LOD 3 – Detailed architecture

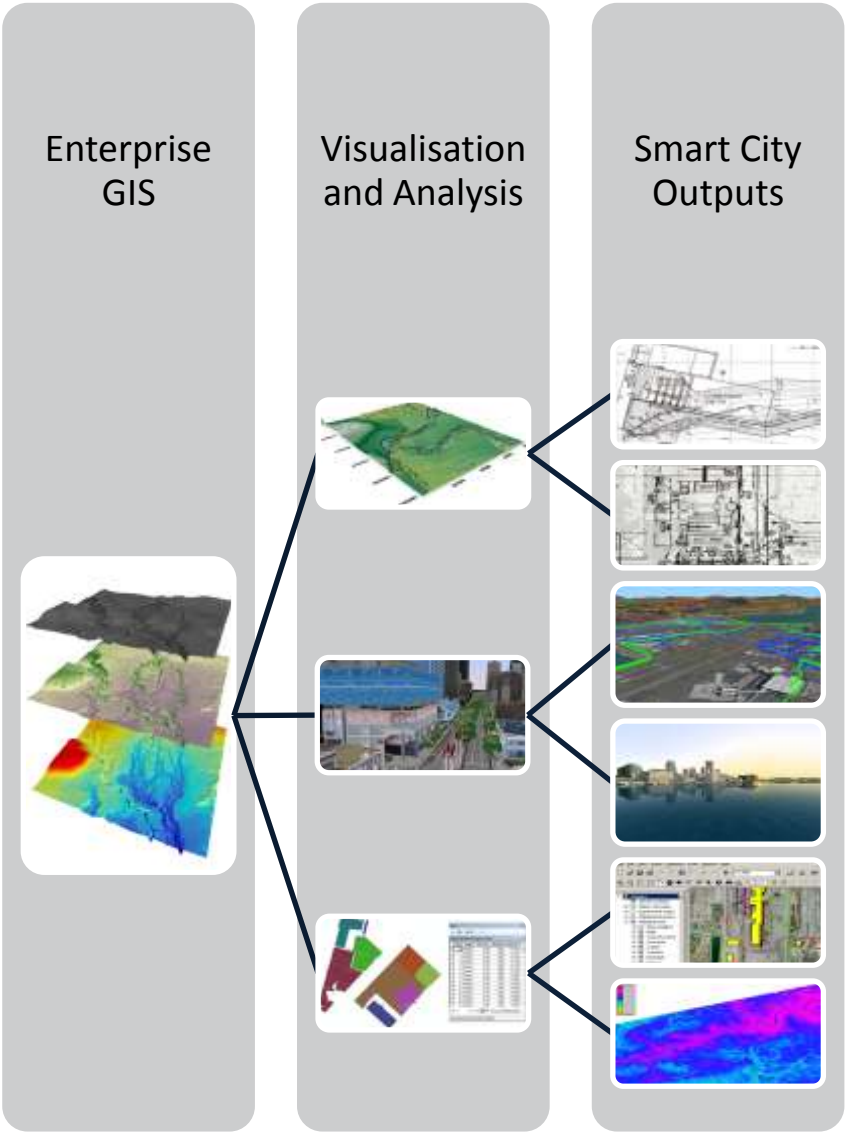
- LOD 4 – Interior Model

OGC® Technical Committee Member

bsi. ISO 9001 Quality Management FS 542572

3D Spatial Data Infrastructure

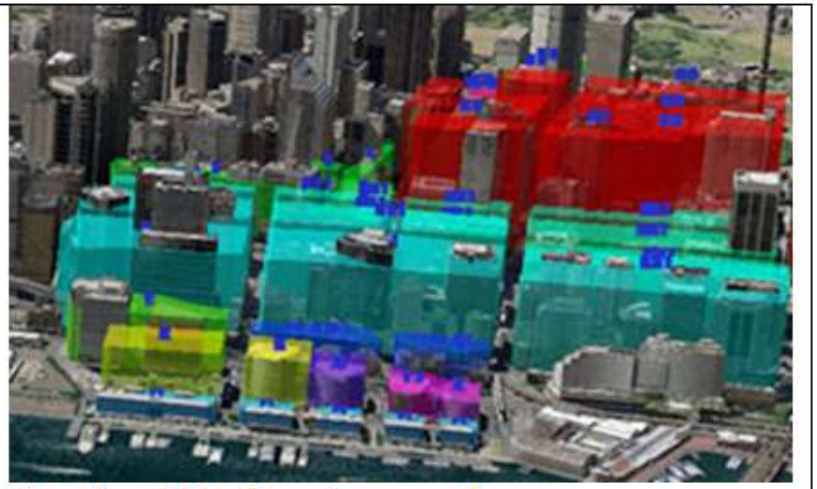
Hosted or Local



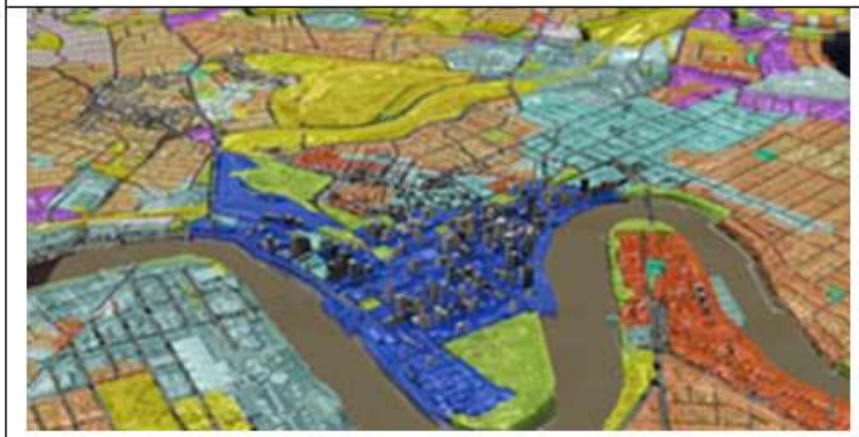
K2Vi – AAM's 3D Visualisation and Analysis Software

Functionality and Benefits

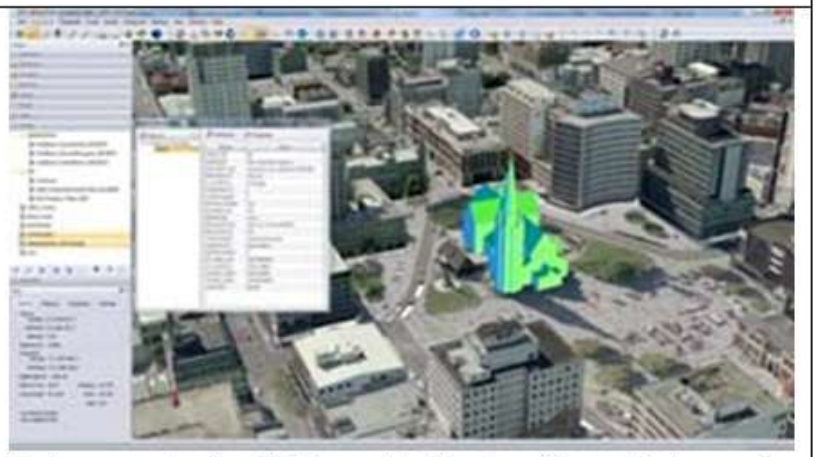
Viewing on workstation, web or kiosk



Overlay 3D planning envelopes



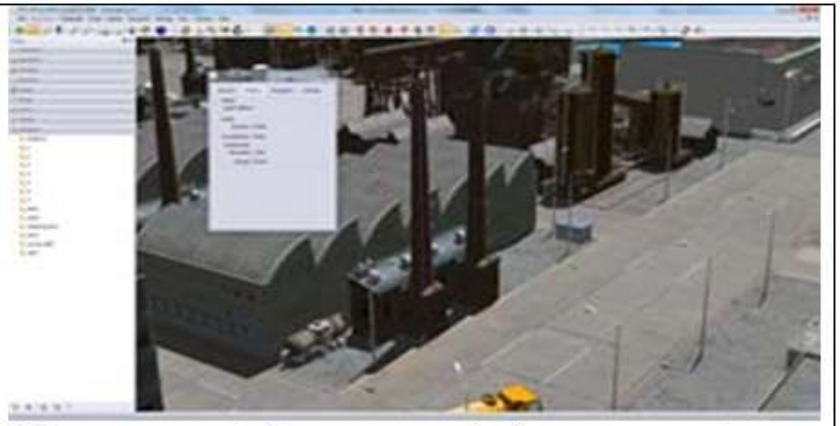
Overlay 2D planning schemes



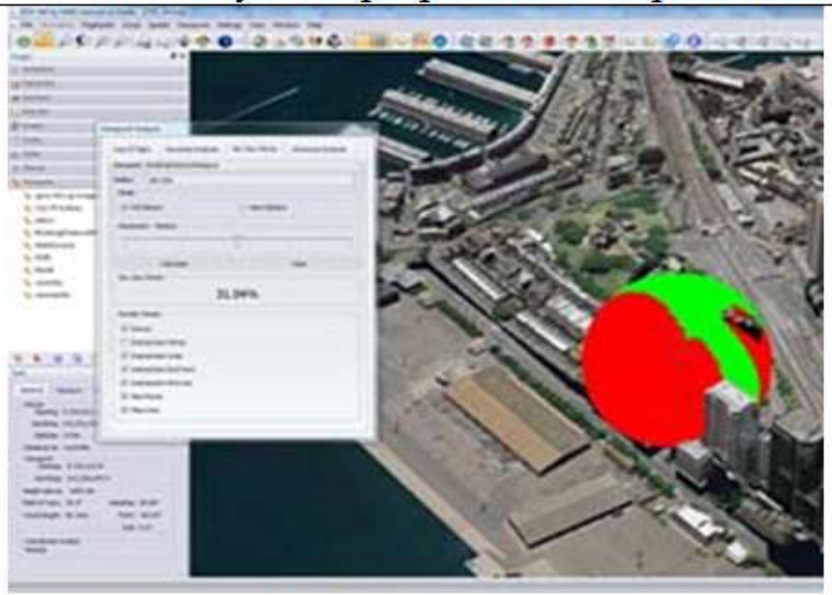
Interrogate building attributes from internal or external source (eg. ArcGIS)

Functionality and Benefits

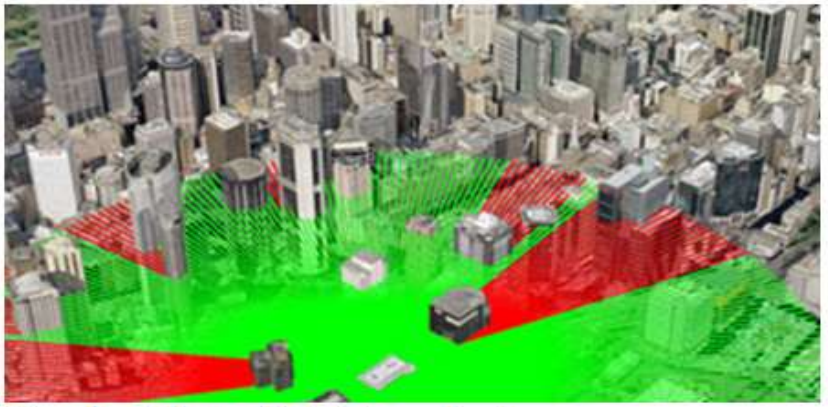
Shadow analysis of proposed developments



Measurement: linear, areal, slope, aspect



Display sky visibility from nominated point



Conduct line of sight analysis

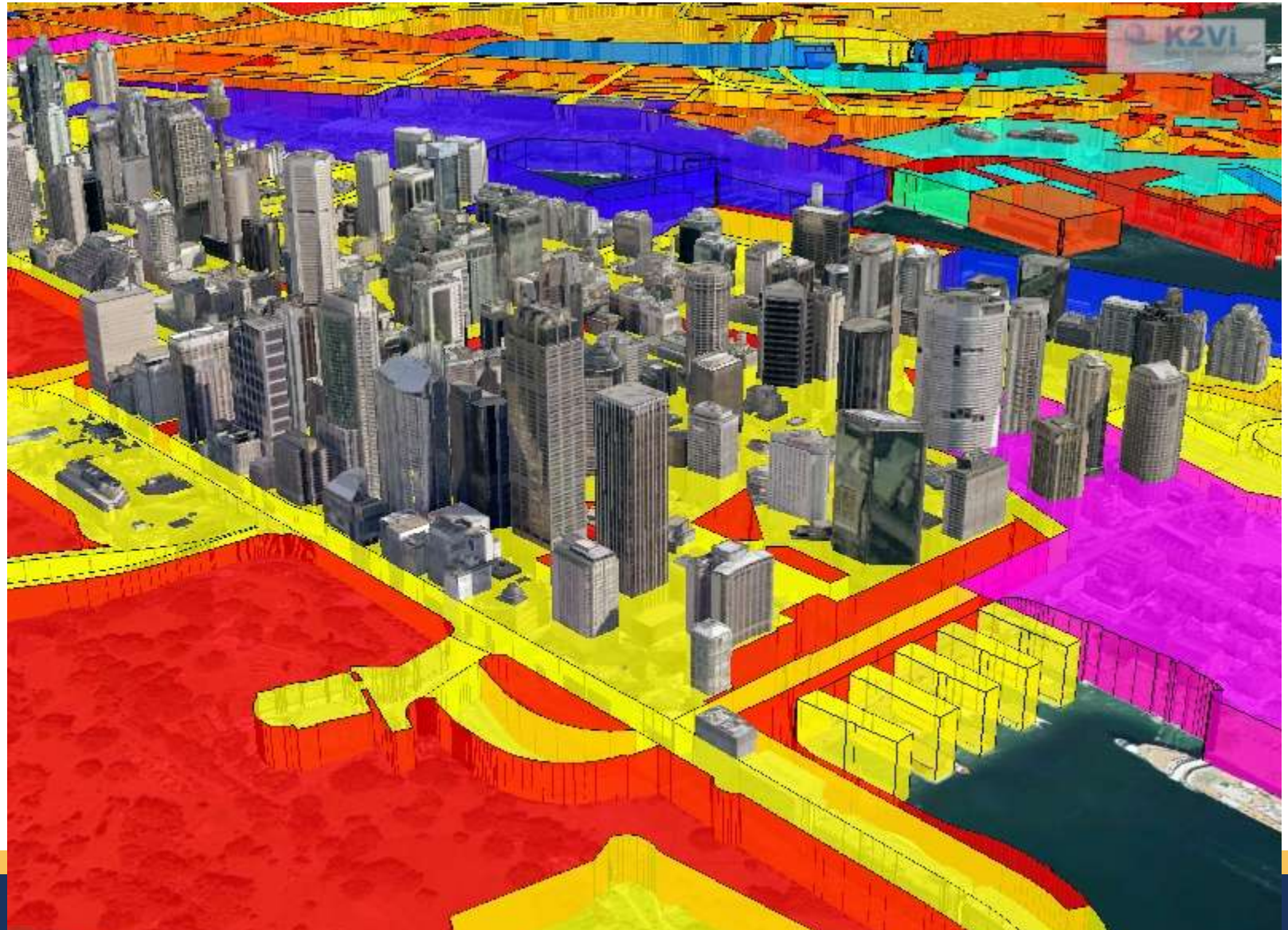
Functionality and Benefits

Existing Citymodel

Functionality and Benefits

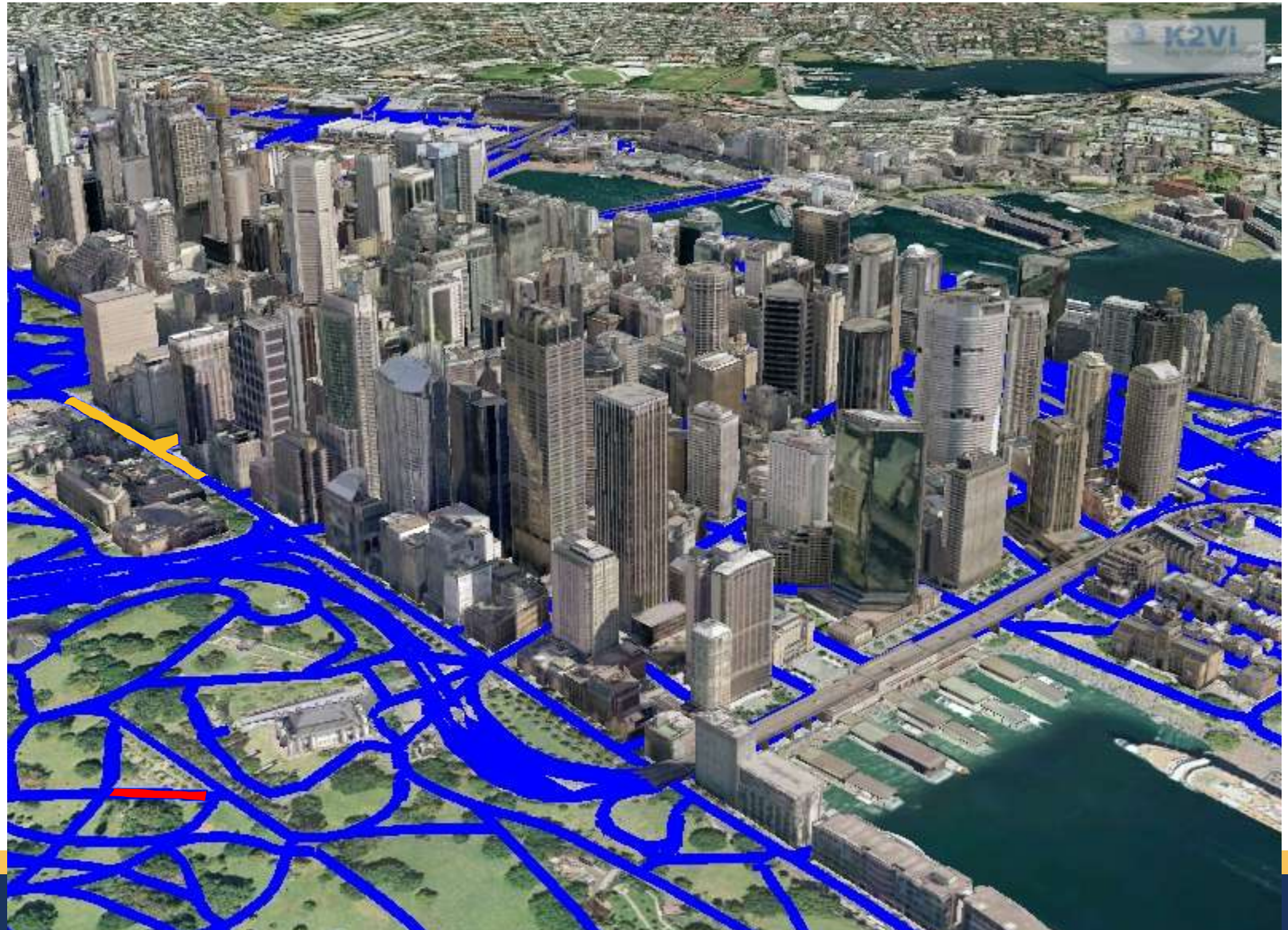
Traffic Flow: Width denotes quantity

Security Monitoring Coverage: Colour denotes density



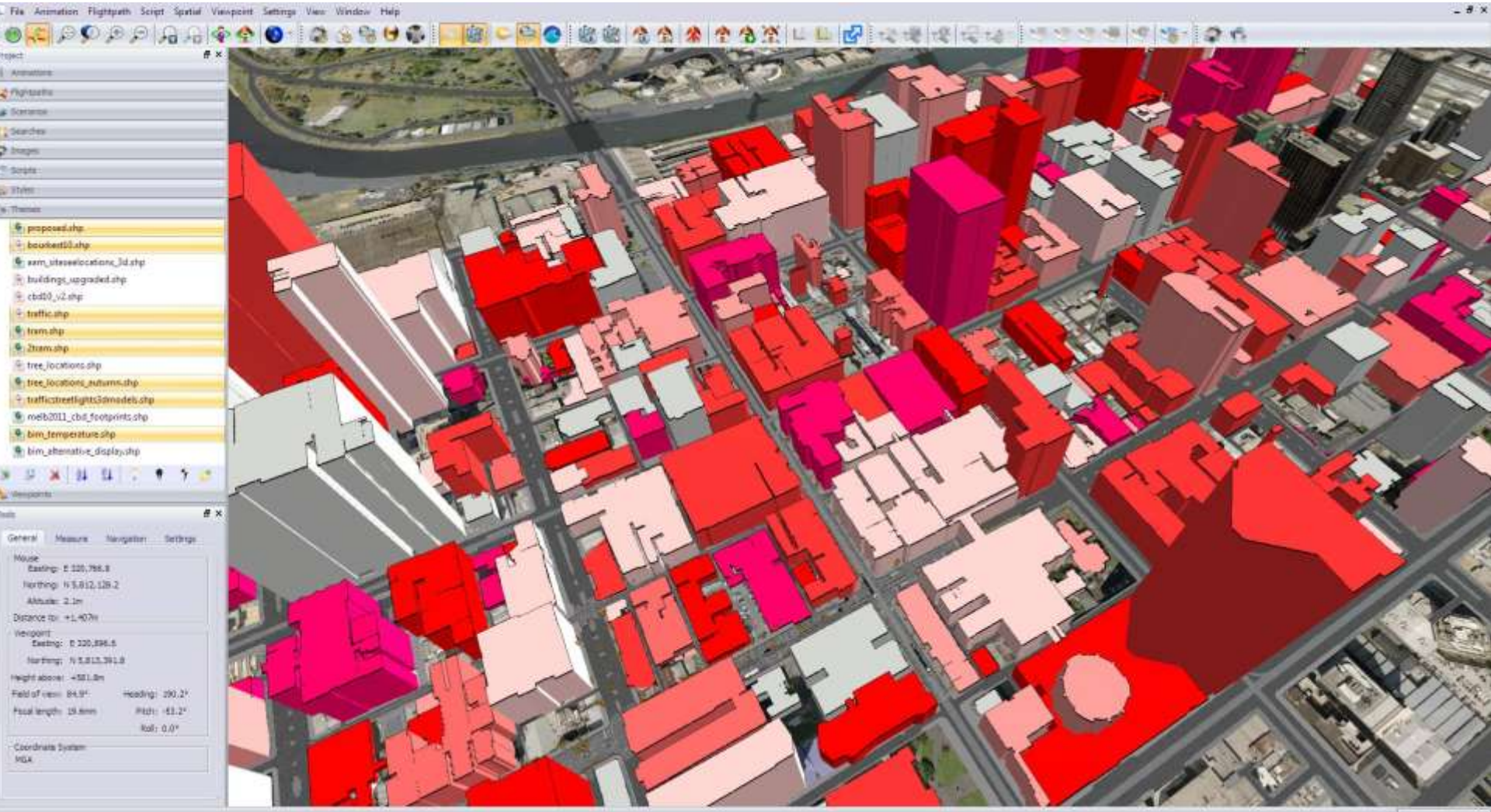
Functionality and Benefits

Realtime monitoring of street lighting



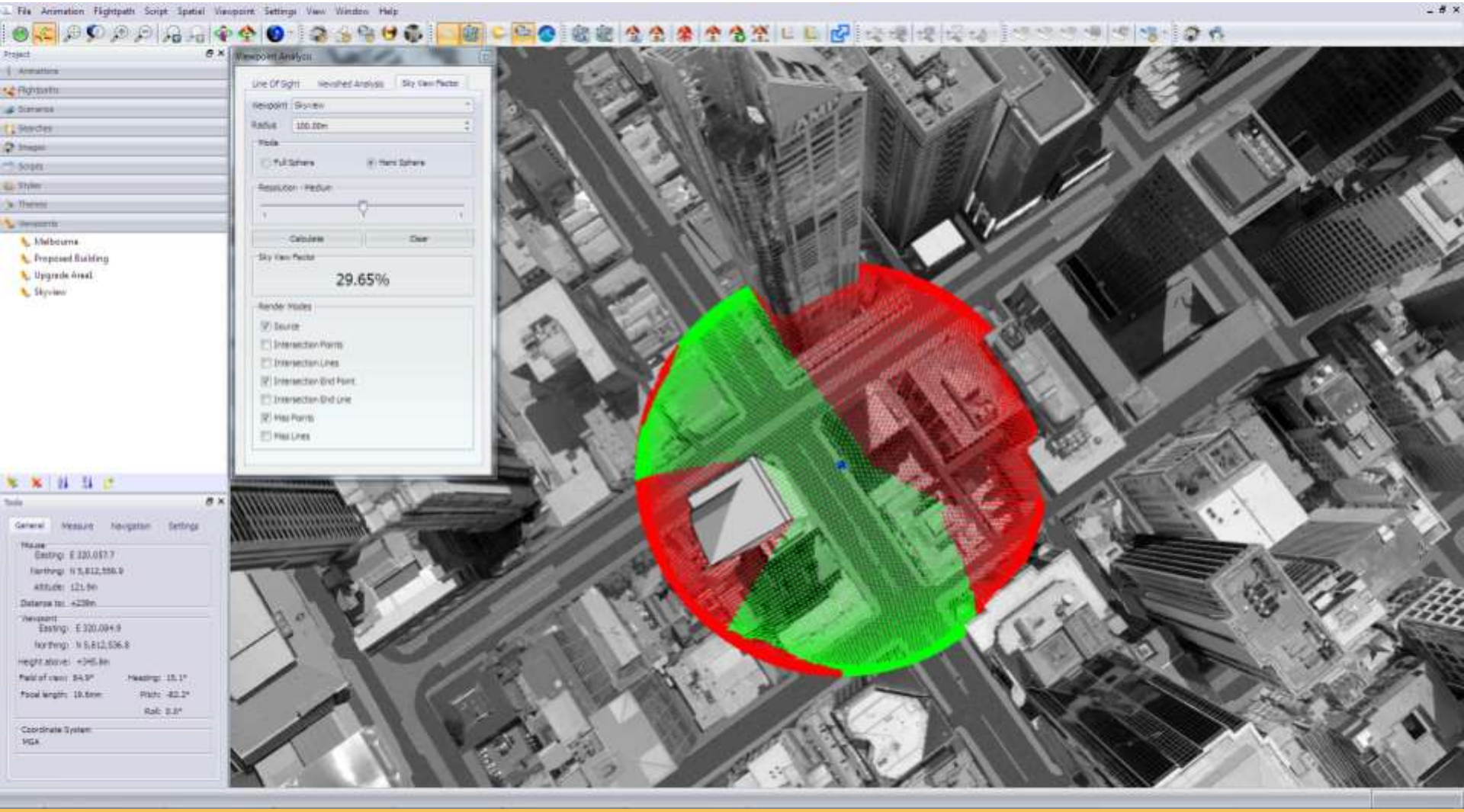
Functionality and Benefits

Existing building shapes coloured by energy consumption



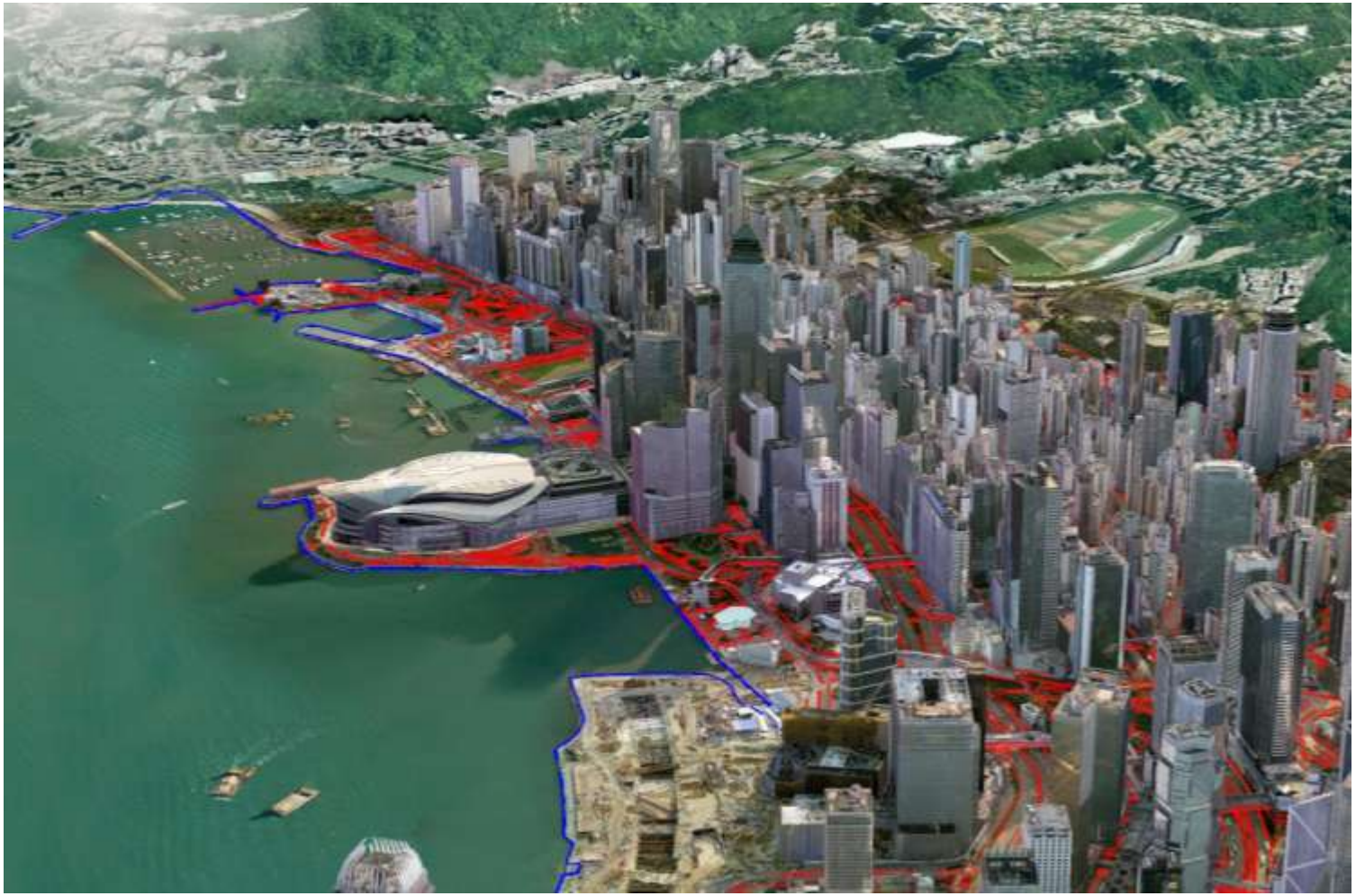
Functionality and Benefits

Computing and visualising solar visibility on specific sensor



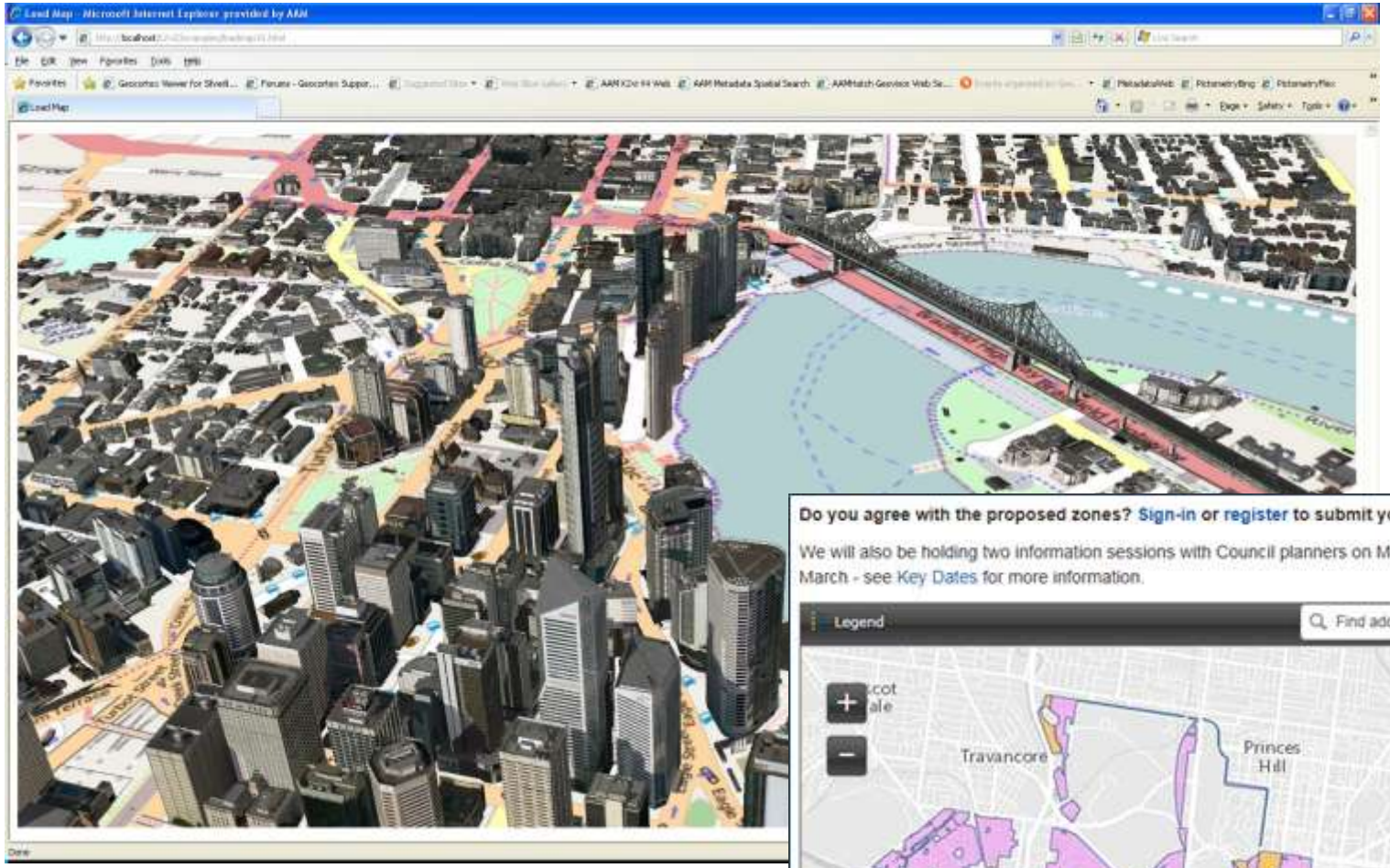
Functionality and Benefits

- Government Authorities - better understand their environment



Functionality and Benefits

- Government Authorities – better communication

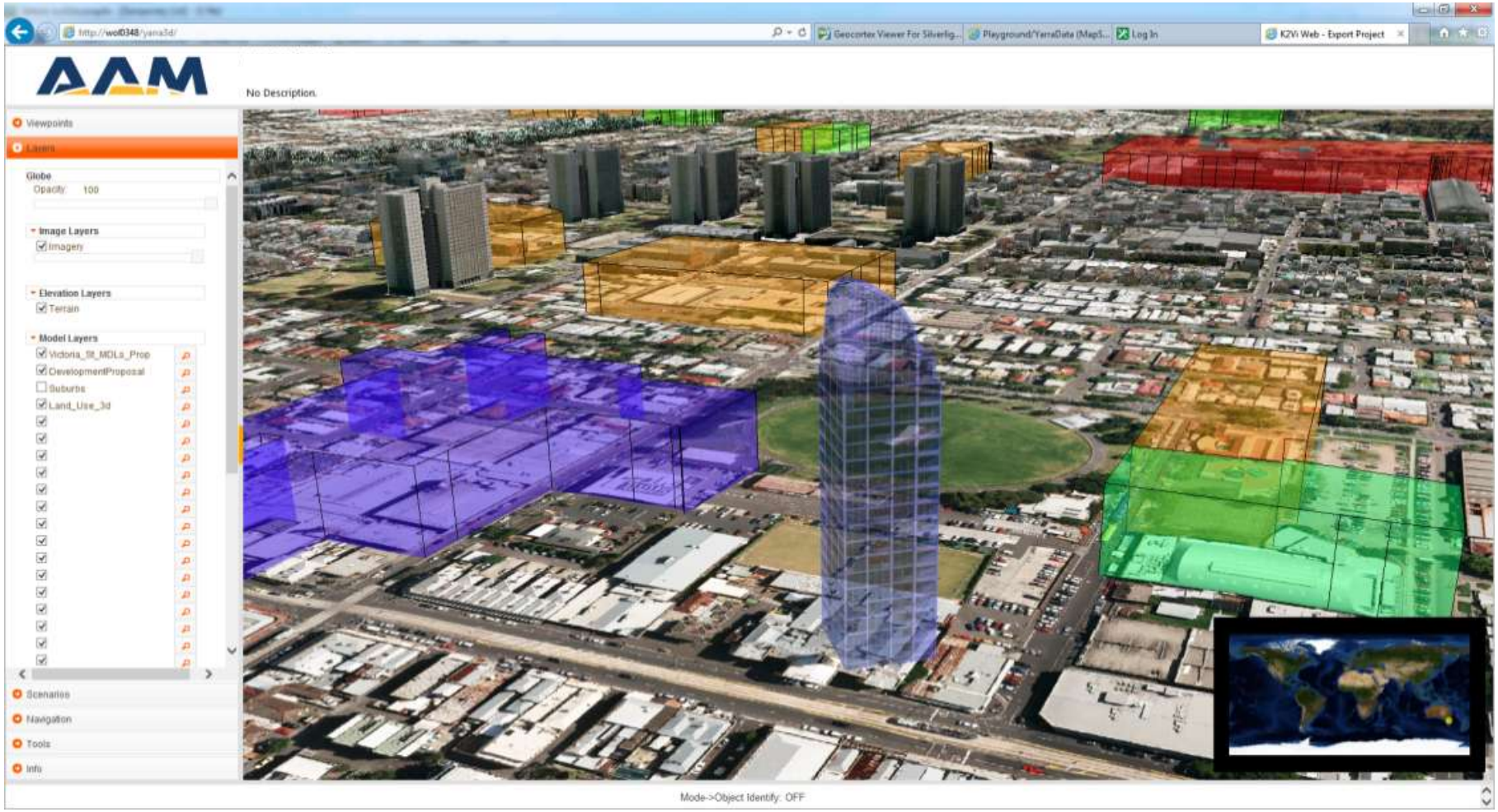


Functionality and Benefits

- Building Authorities – design

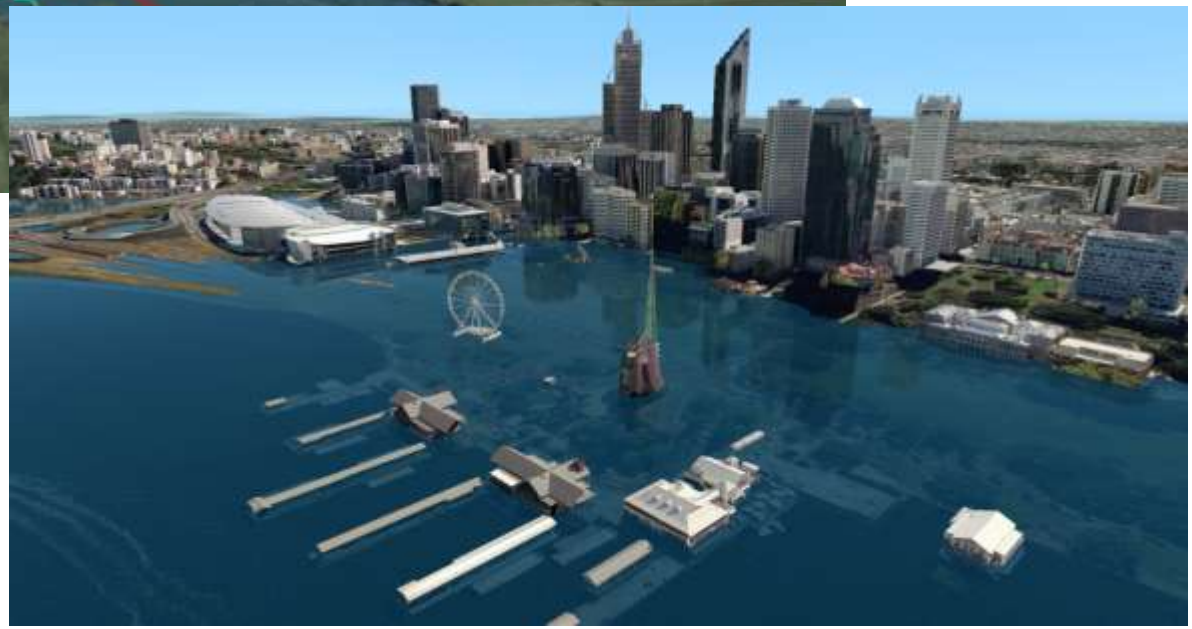
Benefits

- Building Authorities – promote proposed developments via the web



Functionality and Benefits

- Utilities – stormwater and flood management



Functionality and Benefits

- Transport Authorities – traffic simulation / real time vehicle animation

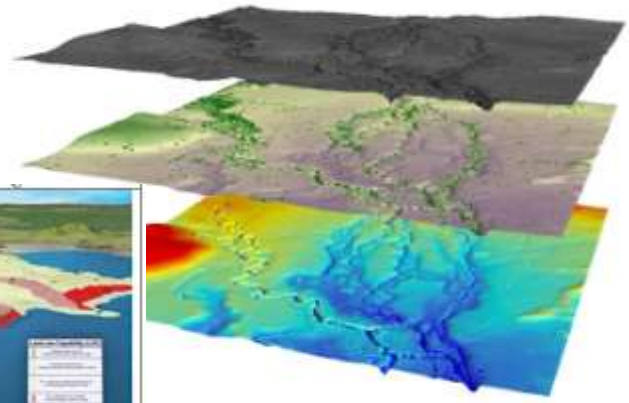
Functionality and Benefits

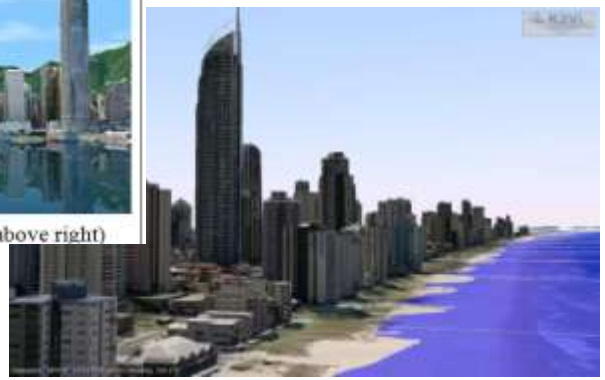
- Improved decision making

Interaction with transport corridors

Interaction with land categories, eg soil type

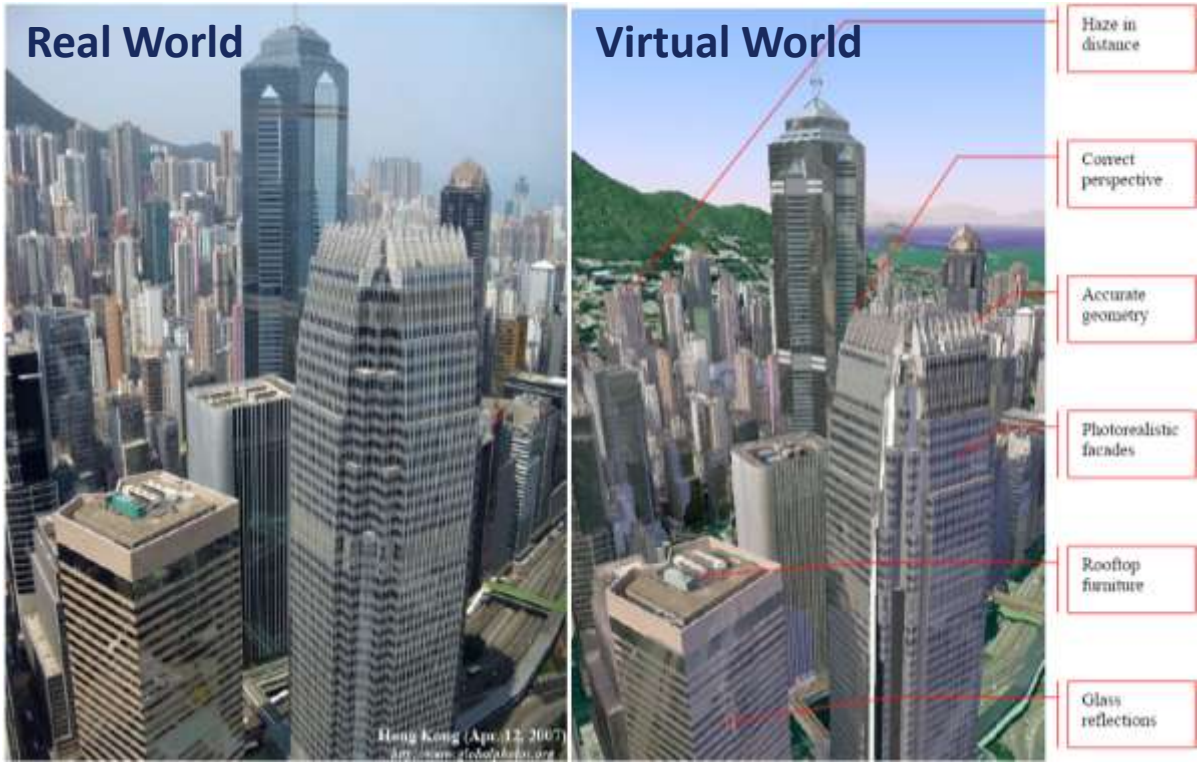
Ability to spatially embed a handheld photo (above left) into the citymodel (above right)





Thankyou

Come and see AAM in the exhibition hall



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