



Rethinking Land Administration with New Age Space Technologies

Sook Yee Loh

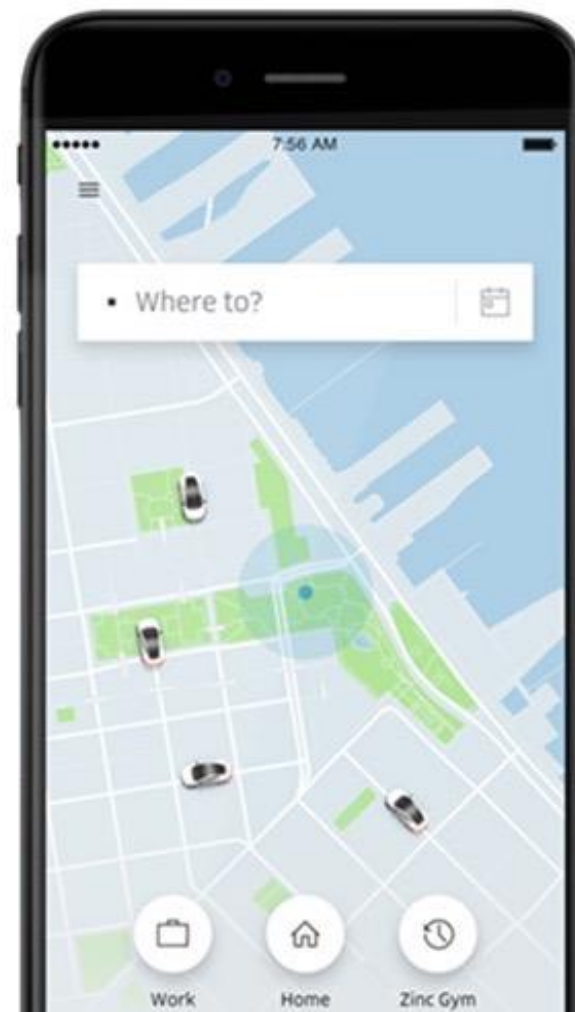
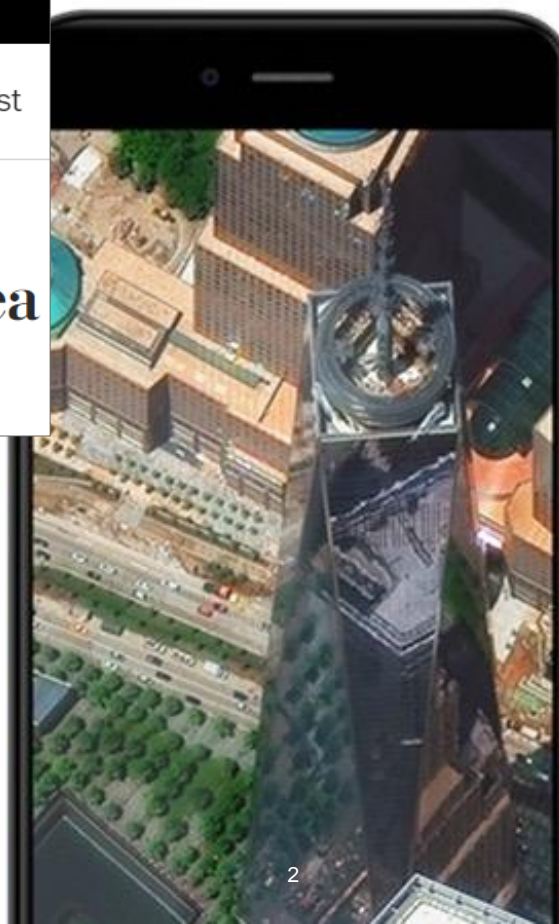
Senior Director, Asia Pacific Sales & Customer Success

Public – External Recipients

MAXAR



You've probably seen Maxar satellite imagery—or the maps derived from it—even if you didn't know where it came from.



MAXAR



Earth Intelligence

Maxar capabilities in Earth Intelligence help customers map, detect and predict change across the globe. Fueled largely by Maxar's own constellation of high-resolution imaging satellites, we provide high-resolution satellite imagery and derived data layers, machine learning and rich domain knowledge so organizations can make decisions with confidence.

3.8M

Square kilometers of Earth imagery capacity each day

125+

Petabytes of data in our archive

20-year

Inventory of global change in high-resolution

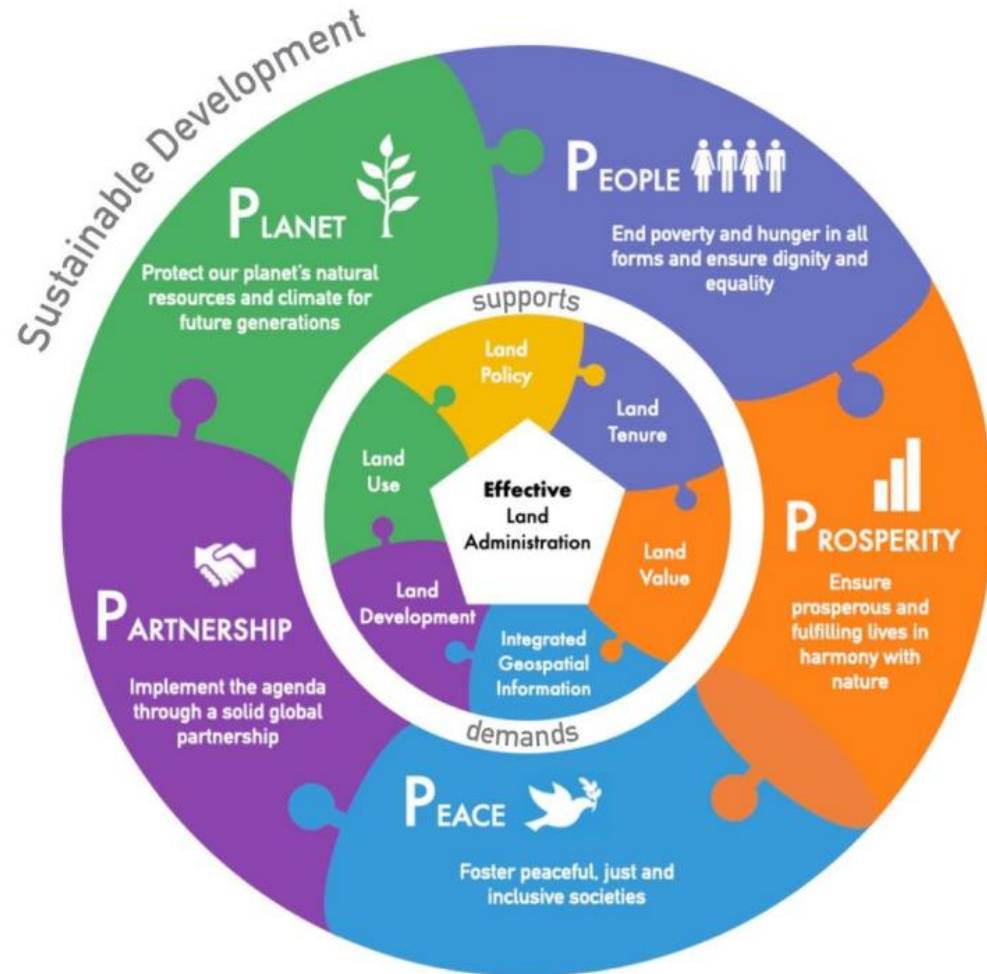


Geospatial foundation

Highest quality satellite imagery, basemaps
and 3D data over any location on Earth



Effective Land Administration for Sustainable Development



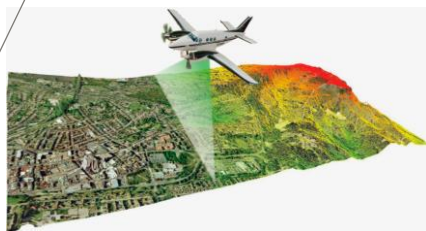


Orbit Distance and impact on scale & processing

Maxar WorldView-2
Satellite
770km

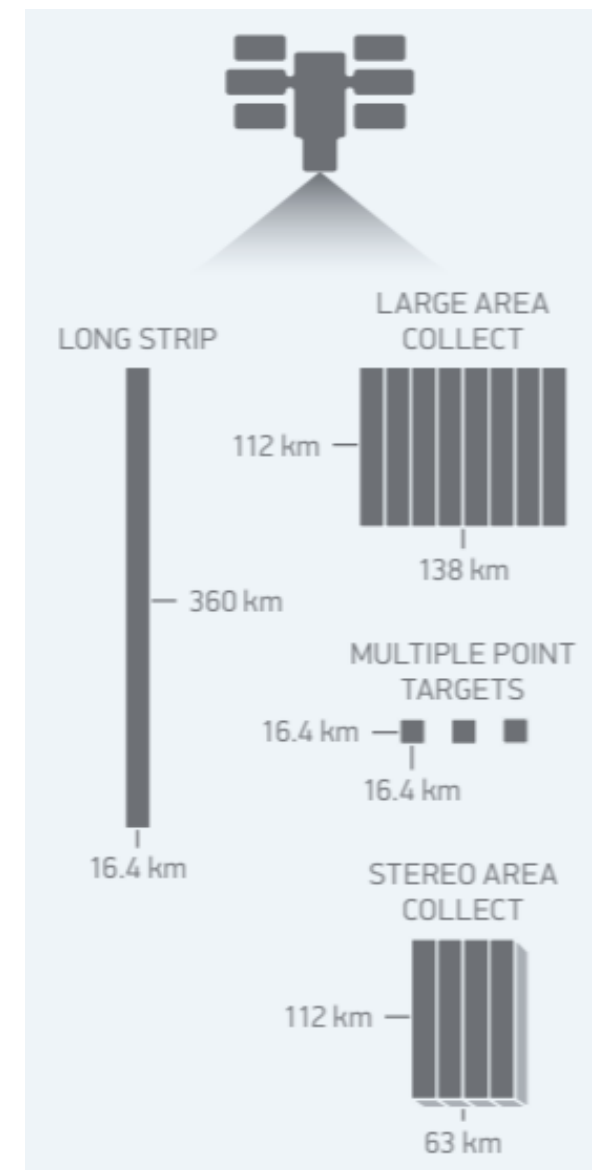


Aerial
~<30 km



- **Scalable** - Large Area Collect of 15,456 sqkm (112 x 138 km)
- **No Restrictions**
- **Cost Effective** - Lower Imagery, Manpower, Processing Costs for large AOIs
- **Limited Scale** - Aerial Photo of ~10-100 sqkm (Need ~773 x 20 sqkm captures for 15,456 sqkm)
- **Restricted** by no fly zones & times
- **Expensive** - Higher Imagery, Manpower, Processing Costs for large AOIs

Image is for illustration only and is not to scale



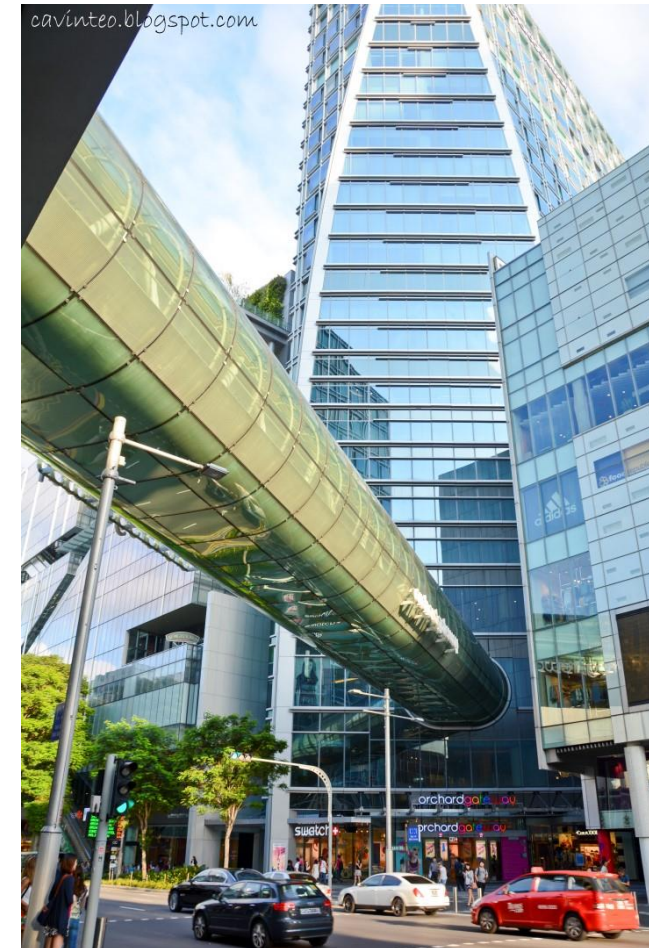


Land Boundary Data Acquisition Methods

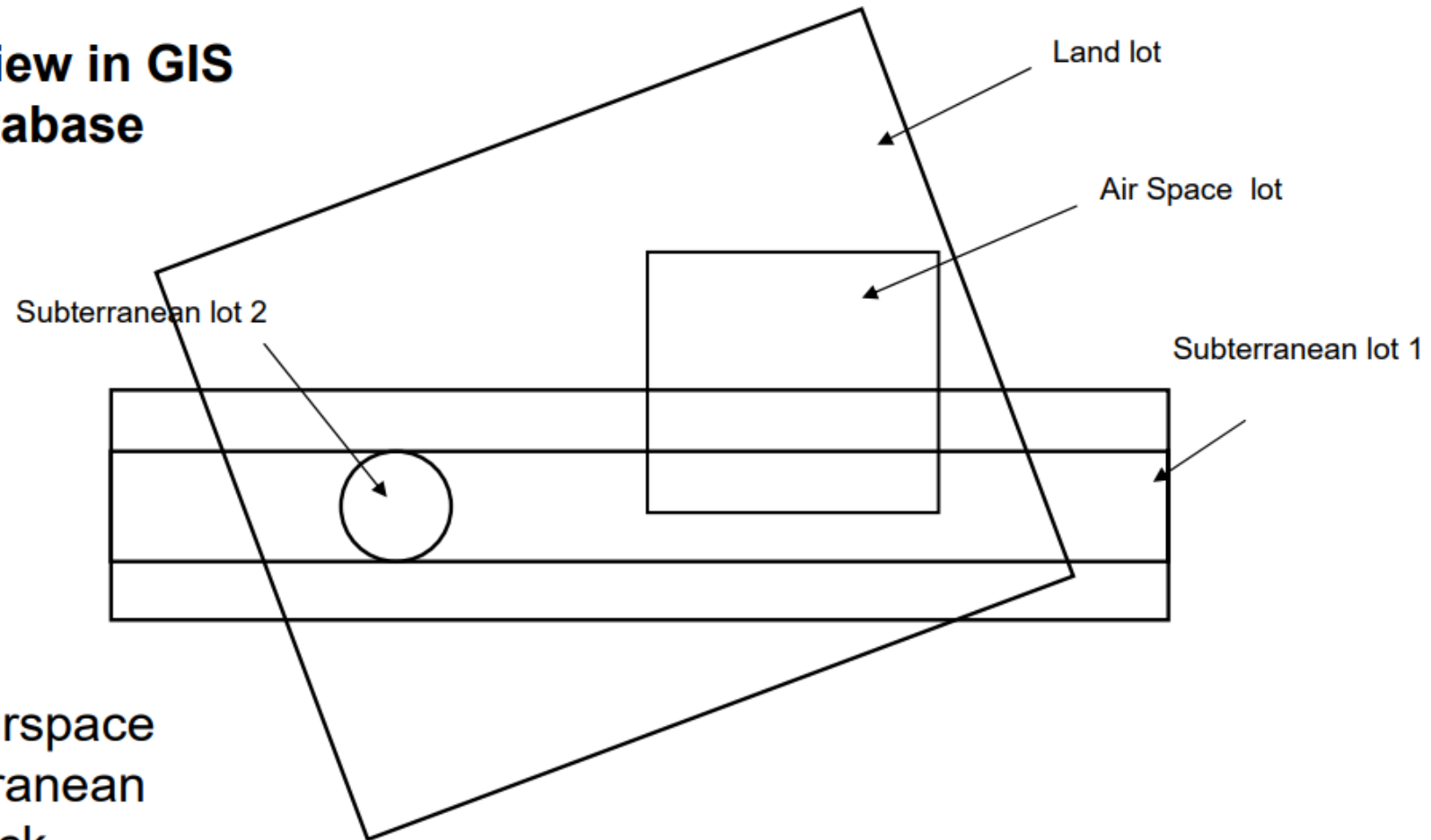


Factors	Ground Survey	Aerial Survey	Satellite Imagery
Time	⌚ ⌚ ⌚	⌚ ⌚	⌚
Cost per area	\$ \$ \$	\$ \$	\$
Area Coverage	✓	✓ ✓	✓ ✓ ✓
Accuracy	cm level	Sub-meter level	Sub-meter to 1m+
Site Accessibility	Restricted	Somewhat Restricted	No restrictions
Historical Context	Limited	Limited	Largely available

Modern building structures are getting complex



Plan View in GIS database

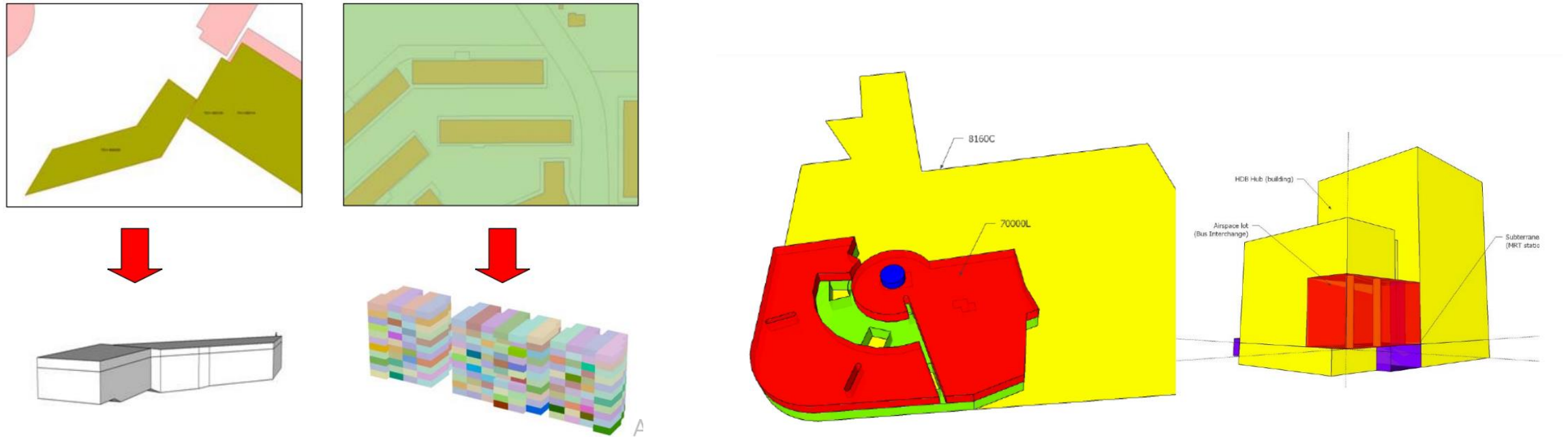


Complex airspace
and subterranean
lots inter-lock

**E.g. City Link, MRT
stations & underpasses**

Source: http://www.gdmc.nl/3DCadastres/workshop2011/documents/030_presentation.pdf

Moving from 2D to 3D Data Management

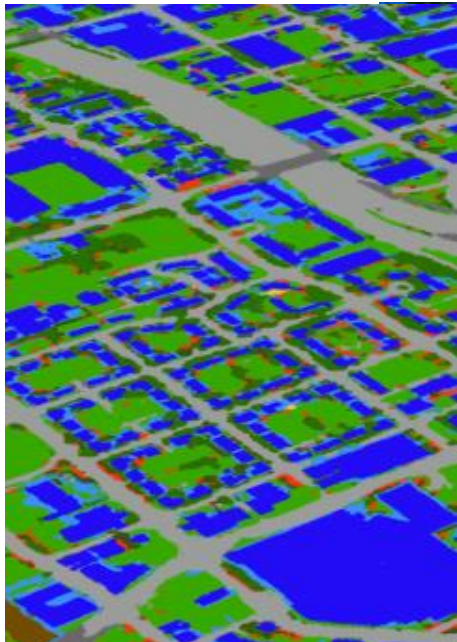


Source: http://www.gdmc.nl/3DCadastres/workshop2011/documents/030_presentation.pdf



Precision3D

See the world how it really is, in fully immersive 3D



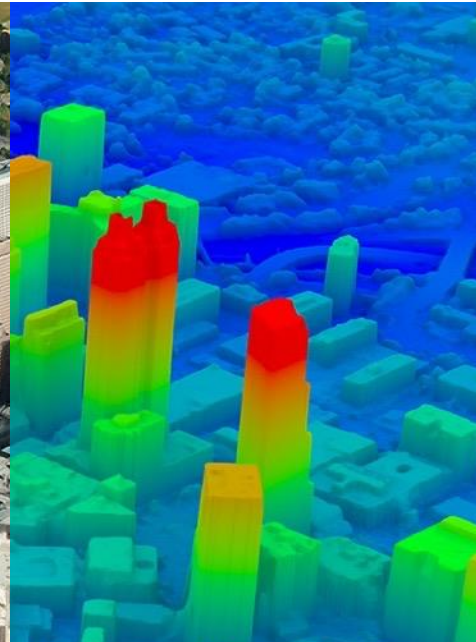
**CLUTTER
CLASSES**



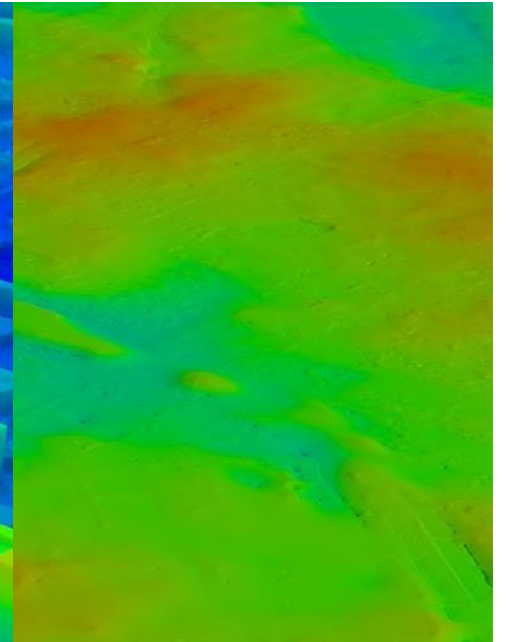
**VECTOR
BUILDINGS**



**3D SURFACE
MODEL**



**DIGITAL SURFACE
MODEL**



**DIGITAL TERRAIN
MODEL**



Precision3D Video – Maxar – Get the Whole Picture





SecureWatch - What you need, when you want it

Global Cloud Access:

- View and download privileges to any areas of interest (AOI)
- Access from anywhere
- Unlimited users under GB model
- Intuitive browser interface
- New imagery alerts
- GIS tool integration
- OGC API





Frequent Monitoring Imagery Help Project Farmland in Dali Yunnan Province

- Challenges
 - Yunnan Dali is both an important agricultural center and tourist destination. These two industries conflict as farmers construct illegal residences after getting rich from tourism. To protect valuable farmland, the local government relies on Maxar imagery to enforce land use regulations by detecting changes to the landscape.
- Solution
 - Through Beijing SpaceWill - Maxar's certified partner, the local government has found that high resolution satellite imagery presents an ideal solution to identify these structures. Quickbird, WorldView-1 and WorldView-2 were tasked for the project to monitor the target land monthly from May 2012 to September 2014.
- Result
 - Upon completion of the imagery collection, by comparing the latest images to the previous version, the local government identified changes to the landscape, and then removed the illegal area 62,000 m² and illegal structures 26,500 m²



Illegal Construction



WorldView-2 20130102 0.5m Locking target house



WorldView-2 20130606 0.5m Locking target house



WorldView-2 20140911 0.5m The house was dismantled



Constructions Encroaching on Farmland



WorldView-2 20130102 0.5m Locking target



WorldView-2 20130102 0.5m Locking target



WorldView-2 20140911 0.5m Construction was dismantled



National Land Survey

- Project Objectives
 - Big picture at national level
 - Prediction of changes and status quo results
 - Provide investigation objectives (clues, key points)
- Tasks
 - Based on the latest remote sensing images uniformly produced by the state, combined with the land survey database of the previous year, the consistency and fit relationship between the features of the remote sensing images and the land survey database are compared and analyzed, the inconsistent of the database with the image features is extracted.



National Land Survey



The database is cultivated land, the image is a connected river.
Extracted as 1101 types of inconsistent patches.



National Land Survey



The under construction spot refers to the road under construction. When the database map patch category is non-construction land, the image feature is road under construction, and the width of the road surface is $\geq 8\text{m}$, it is extracted as a map patch under construction.

National Land Survey



The database is cultivated land, and the image shows the characteristics of regular rows of trees, regular peripheral boundaries, uniform internal texture, obvious granularity, and “mushroom head” -like characteristics, which are obvious orchards. Extracted as 02 types of inconsistent patches.



Digital India Land Records Modernization Programme (DILRMP)

- Goals:
 - Modernization of land records
 - Minimize scope of land/property disputes
 - Enhance transparency in the land records maintenance system
 - Guaranteed conclusive titles to immovable properties in the country

- Major components:
 - Computerization of land record
 - Survey / re-survey
 - Computerization of Registration
 - Preparation of Digital Land Parcel Map



Agriculture Fields in India





Land parcel extracted from 15 cm HD imagery





Area calculation based on 15 cm HD imagery





Built-up areas captured on 15 cm HD imagery



Case Study #4: State Fiscal Transparency, Accountability and Sustainability (SFTAS), Nigeria

- Prime contractor: GAF
- Computerization of land records and land administration to develop a robust database for planning and development
- 11,905 km²
- ~14,717,000 est. buildings
- May 2018 vintage
- Maxar's deliverables:
 - TrueOrtho
 - DSM, DTM
 - 3D Building vectors
 - 3D Vegetation vectors
 - 3D Bridge vectors



Automated 3D Building vectors



QUALITY



CONSISTENCY



TIMELINESS



ACCESSIBILITY



RELIABILITY

MAXAR

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