

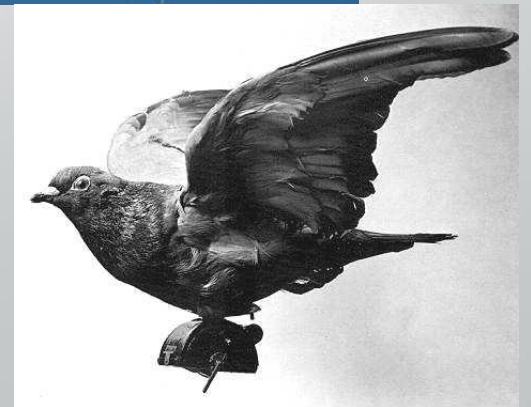
UAV Survey

AETOS HOLDING PTE LTD



Aerial Platform

- How it Begin
 - Aircraft
 - Helicopter
 - Blimp
 - Balloon
 - Kites
 - Parachute
 - Pigeon



Aerial Platform

- Limitation
 - Cost
 - Runway
 - Certified Pilots
 - Ability to control
 - Area that it can cover
 - Stability
 - Controlled Area



Aerial Platform

- Current Platform

- UAV

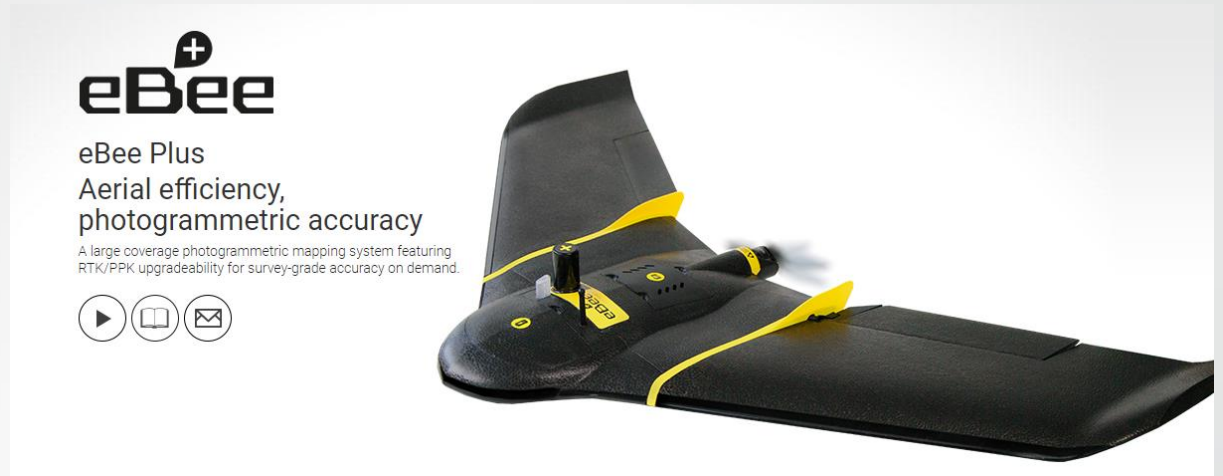
- Quad
 - Octo
 - Hexa

- Fixed Wing

- VTOL

- Advantages

- Ease of use
 - Precision
 - Live transmission
 - Needs small area
 - Assortment of payload
 - Flexibility



Aerial Platform

- Fixed Wing UAV
 - Advantages
 - Longer flight time
 - Cover larger areas in shorter time
 - Higher flight safety
 - Better image quality over a large area
 - Disadvantages
 - More difficult to learn
 - Needs higher attitude
 - Large area needed to safely takeoff and land



Aerial Platform

- Multirotor UAV
 - Advantages
 - Agile and can hover
 - Small area needed for take off
 - Better image quality (slower)
 - Greater flexibility with payload
 - Easier to learn to operate
 - Disadvantages
 - Covers smaller area
 - More maintenance
 - Slower compared to fixed wing
 - Shorter flight time (28 mins)



Aerial Platform

- Hybrid UAV
 - Advantages
 - Can hover
 - Small area needed for take off
 - Cover a large area
 - Longer flight time
 - Disadvantages
 - Limited payload weight
 - More maintenance
 - Needs a more experienced pilot
 - In hover mode very short battery life.



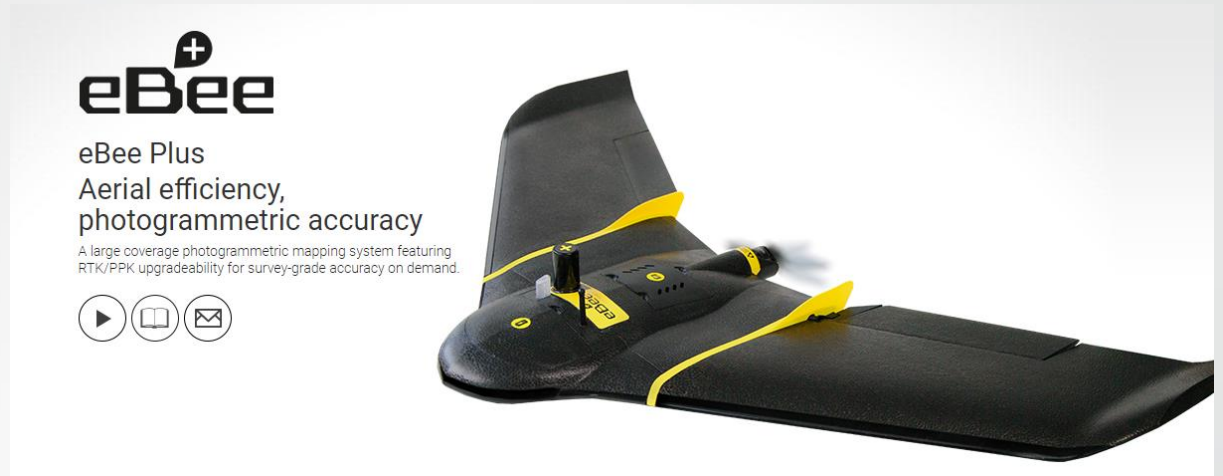
Aerial Platform

- Advantages

- More effective and efficient
- Safer especially in hazardous areas
- Easy to operator and learn
- Can generate a lot of different types of output for various needs

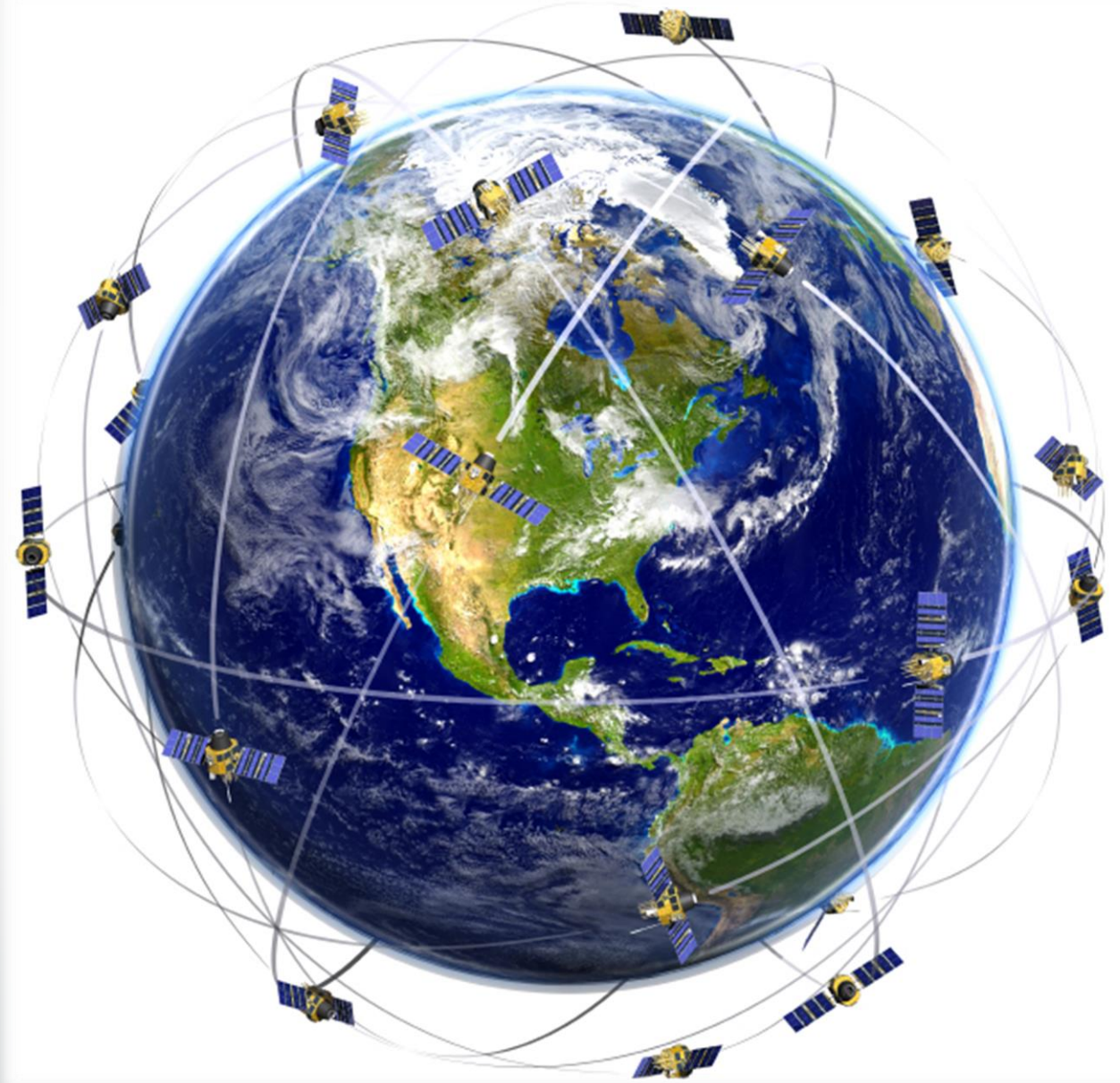
- Disadvantage

- Pilot skills
- There are limitations
- Cost



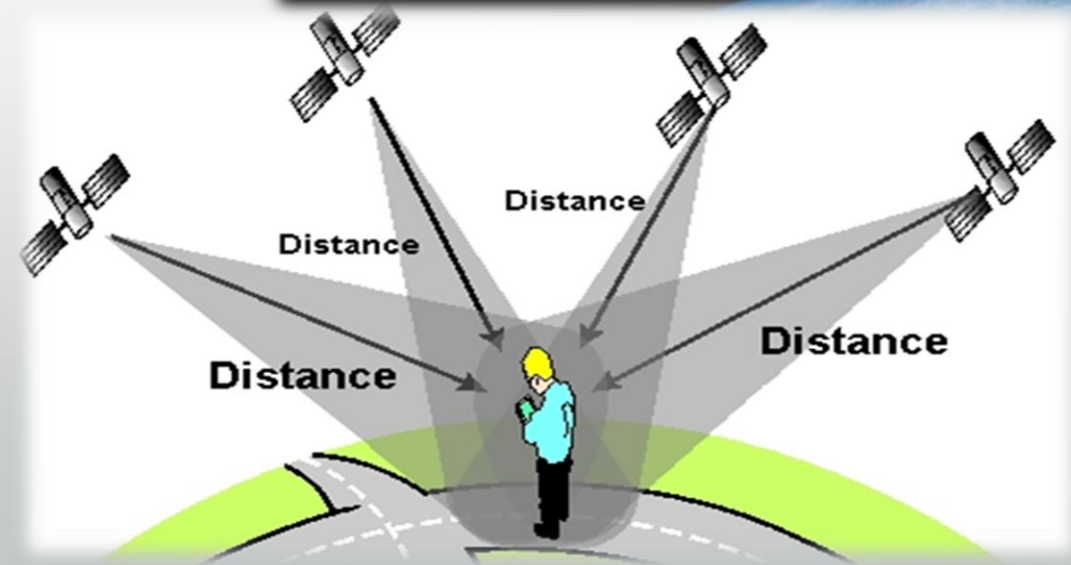
GPS / GNSS

- GNSS (Global Navigation Satellite System)
 - GPS (USA) 27 Satellites
 - GLONASS (Russia) 24 Satellites
 - Galileo (EU) 15 Satellites
 - BeiDou (China) 21 Satellites
 - 12 hours orbit
 - Broadcast
 - Course (Acquisition Code)
 - Precision Code
 - Navigation Message
 - GPS Date/Time and status
 - Satellite Position
 - Almanac (constellation)



GPS / GNSS 2

- Carrier Freq
 - L1 = 1575.42 Mhz
 - L2 = 1227.60 Mhz
- Mobile devices only L1 (Single Band)
- Most surveying grade equipment (Duo Band)
- 3 sat or more horizontal
- 4 or more vertical position (drift 3 – 5m)



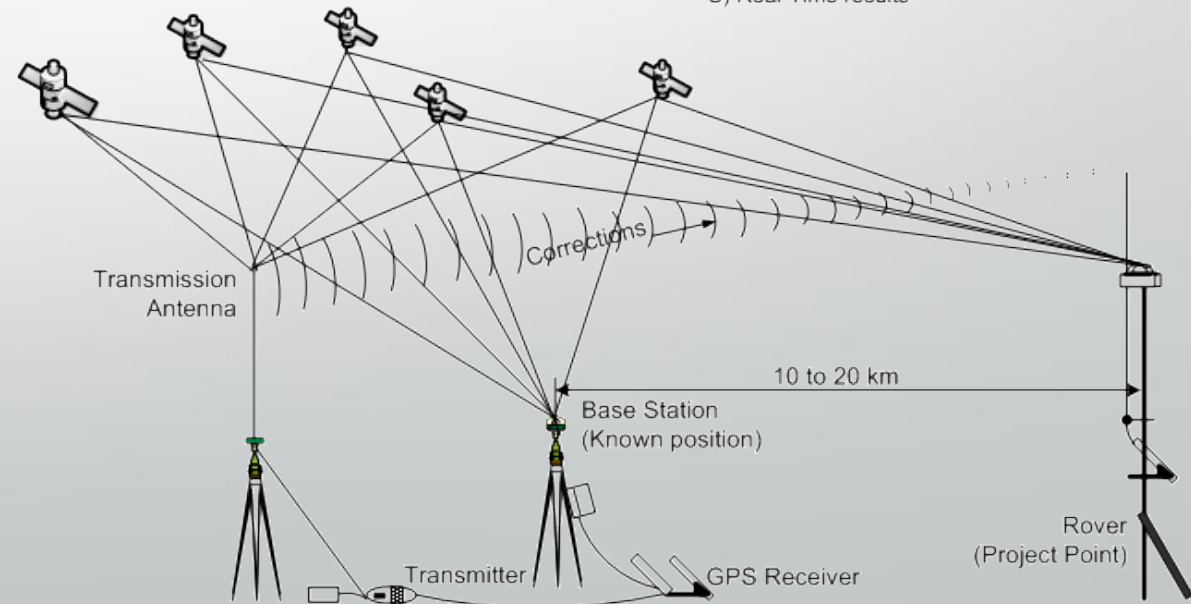
RTK (Real Time Kinematic)

- Accuracy
 - Can achieve up to 3 cm or more
 - 2 ppm
- Used with
 - Known points
 - Unknown Points
- Usually coupled with DUO band
- Detects an additional data Carrier phase
- Broadcast correction to rover or drone

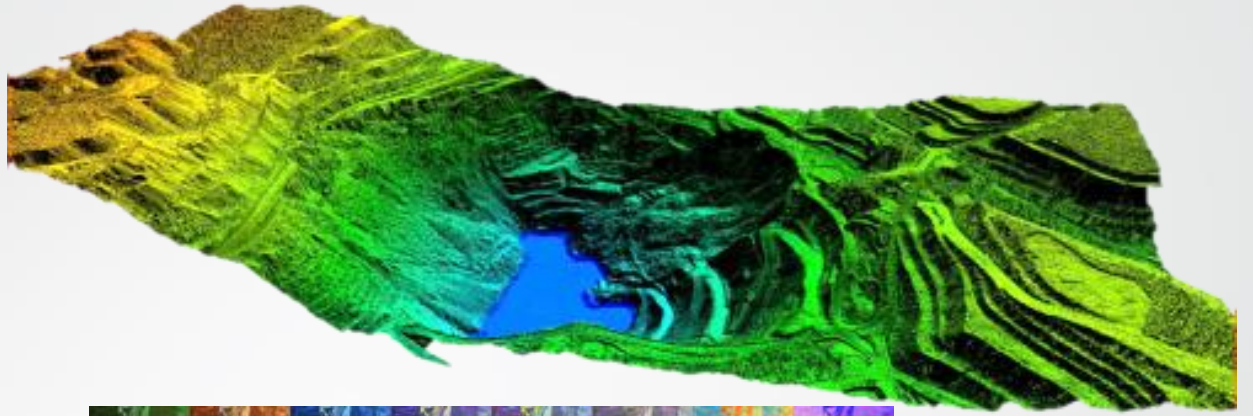
Real-Time-Kinematic

Positional Accuracy +/-2 cm or so

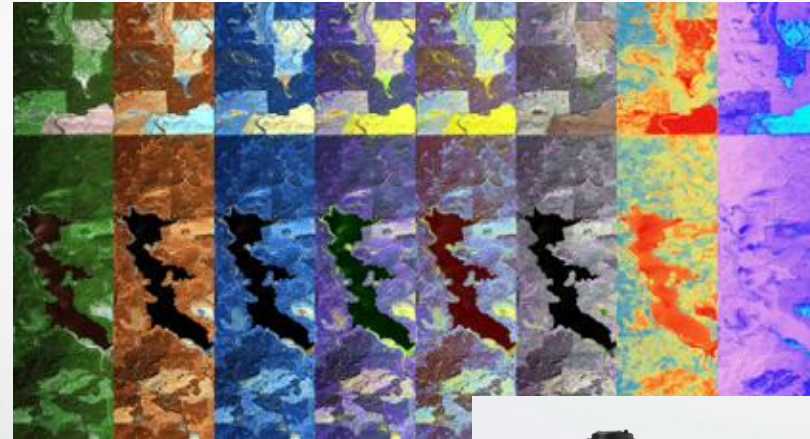
- Same Satellite Constellation (Base station – Rover/or Rovers)
- Carrier Phase (Track 5 satellites Minimum)
- Radio Link
 - A) More information
 - B) Fast information
 - C) Real-Time results



Surveying Payloads

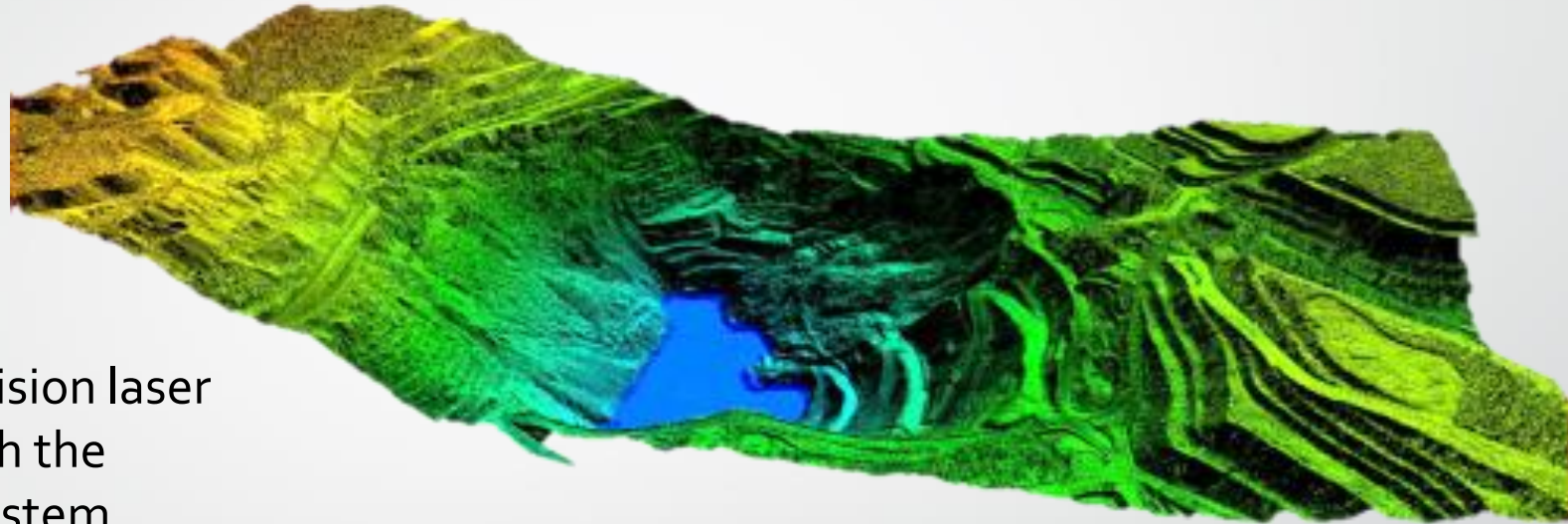


- Payloads
 - LIDAR
 - Light detection and ranging (Laser)
 - Multispectral Sensor
 - High resolution cameras
 - FLIR
- Stabilizing Gimbal



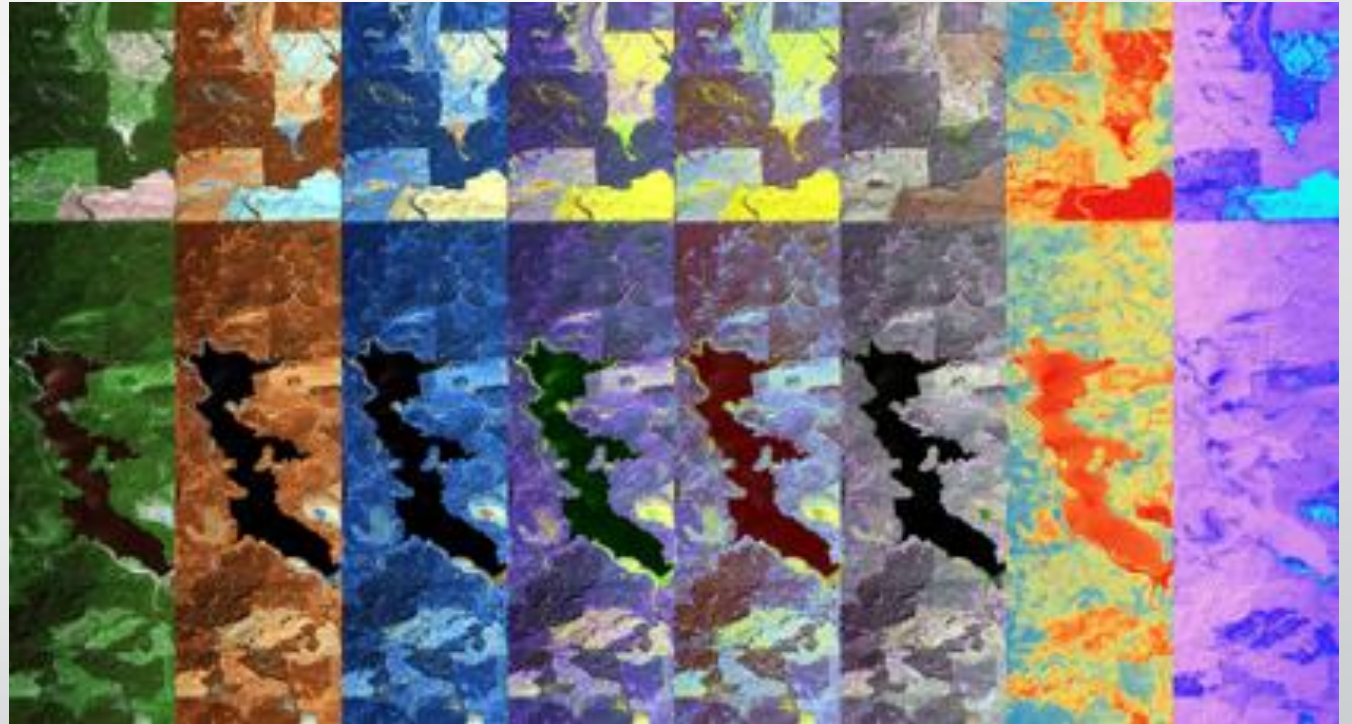
Surveying Payloads

- LIDAR
 - is based on high precision laser scanners coupled with the Global Positioning System (GPS) and Inertial Navigation Systems (INS) to produce a high level of accuracy.



Surveying Payloads

- Multispectral Sensors



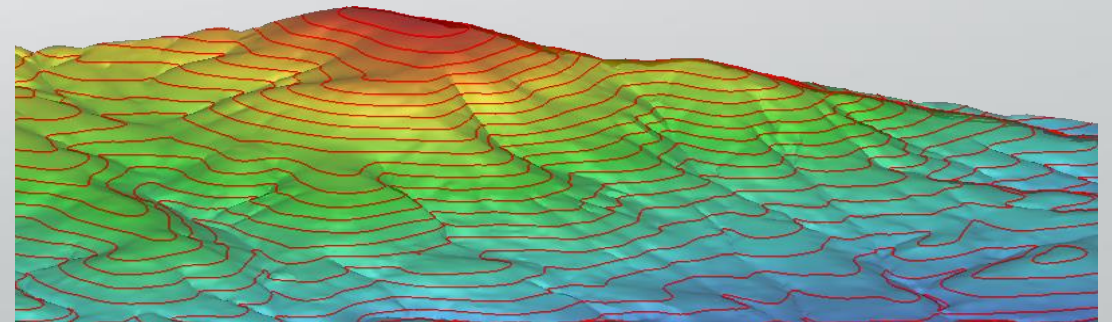
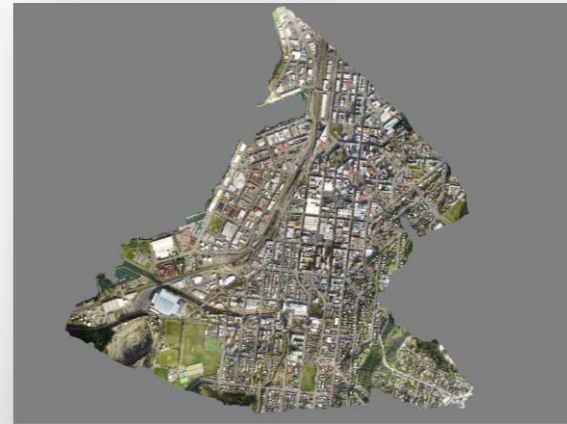
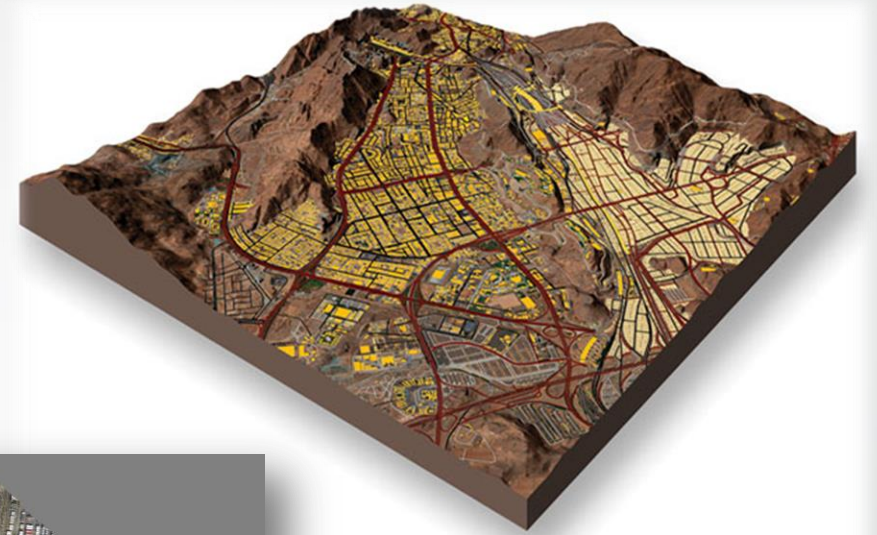
Surveying Payloads

- High Res Cameras
 - Light weight
 - Full frame
 - Min. 24 megapixels
- Stabilizing Gimbal
 - Provides 3D stability for the camera system to have to ability to take good shots.



Applications

- Land Survey
 - Photogrammetric Mapping
 - Digital Terrain Model
 - Contours
 - GIS (Geographic Information System)
 - Orthomosaic Maps



Applications

- Site Progress and safety checks
 - High Res Videos
 - Photo log
 - GPS markers to develop time lapse



Thank you



Member of the Surbana Jurong Group