

Utilization of Trimble Mobile Scanning in Malaysia

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Mobile Scanning Systems



MX1 Mobile
Imaging
Scanner

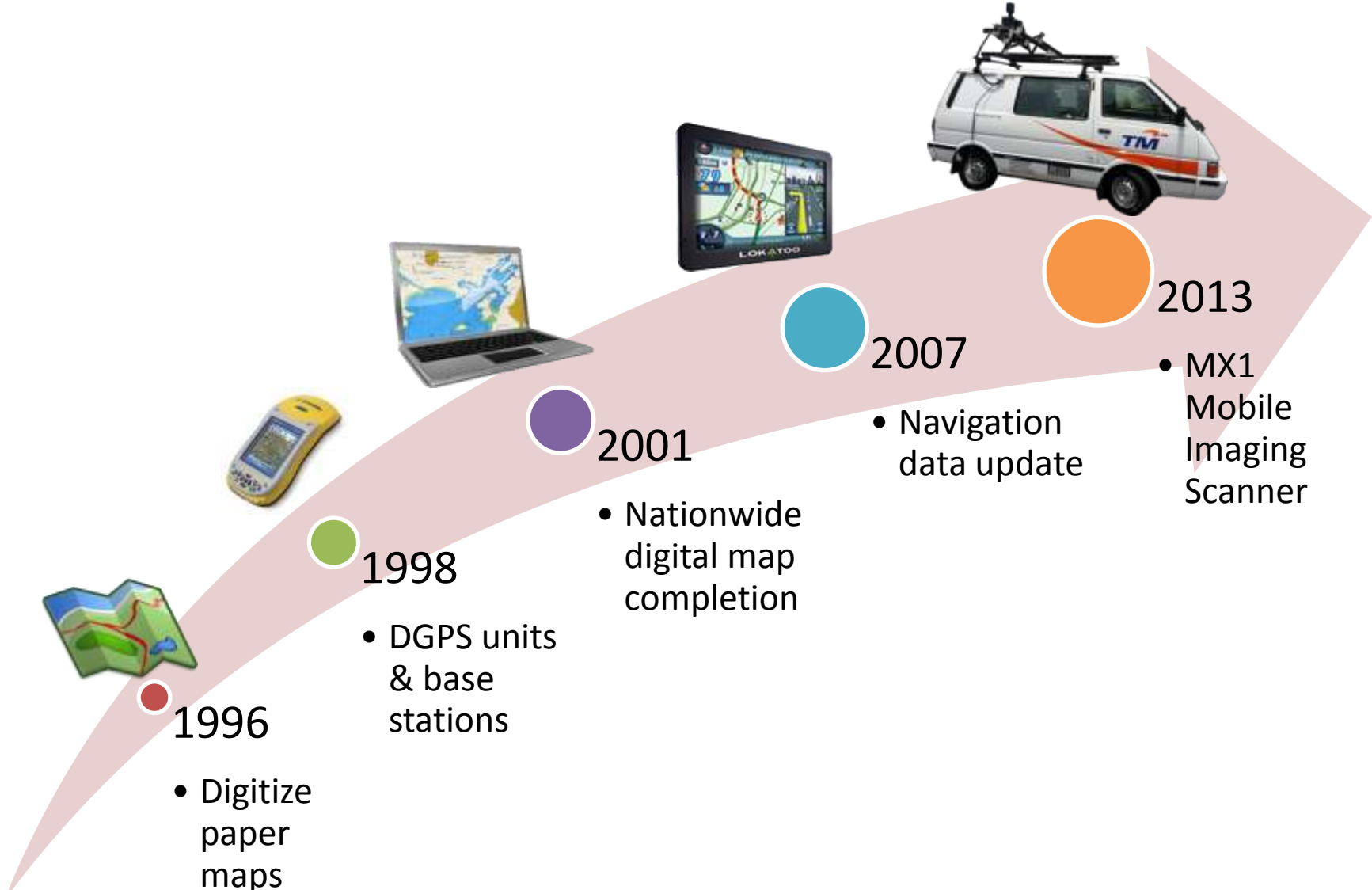


MX8 Mobile
Laser
Scanner

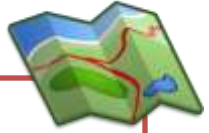
Mobile Imaging Scanner

MX-1

Map Updating Evolution



Navigation Data Update



Paper map

- Surveyor provided with printed map and sent to site
- Unable to verify due to no image proof

Video Survey

- Surveyor provided with video cam & GPS logger
- Requires manual focusing of video cam



DIY Street View

- Vehicle equipped with DIY Street View systems
- No real time GNSS correction
- Doesn't support photogrammetry



Trimble MX1



Trimble MX1



Ladybug5

- 30 Megapixel camera (6 x 5 MP)
- Able to cover 90% of a full sphere
- 5 Gbit/s USB 3.0 interface



POS LV 220

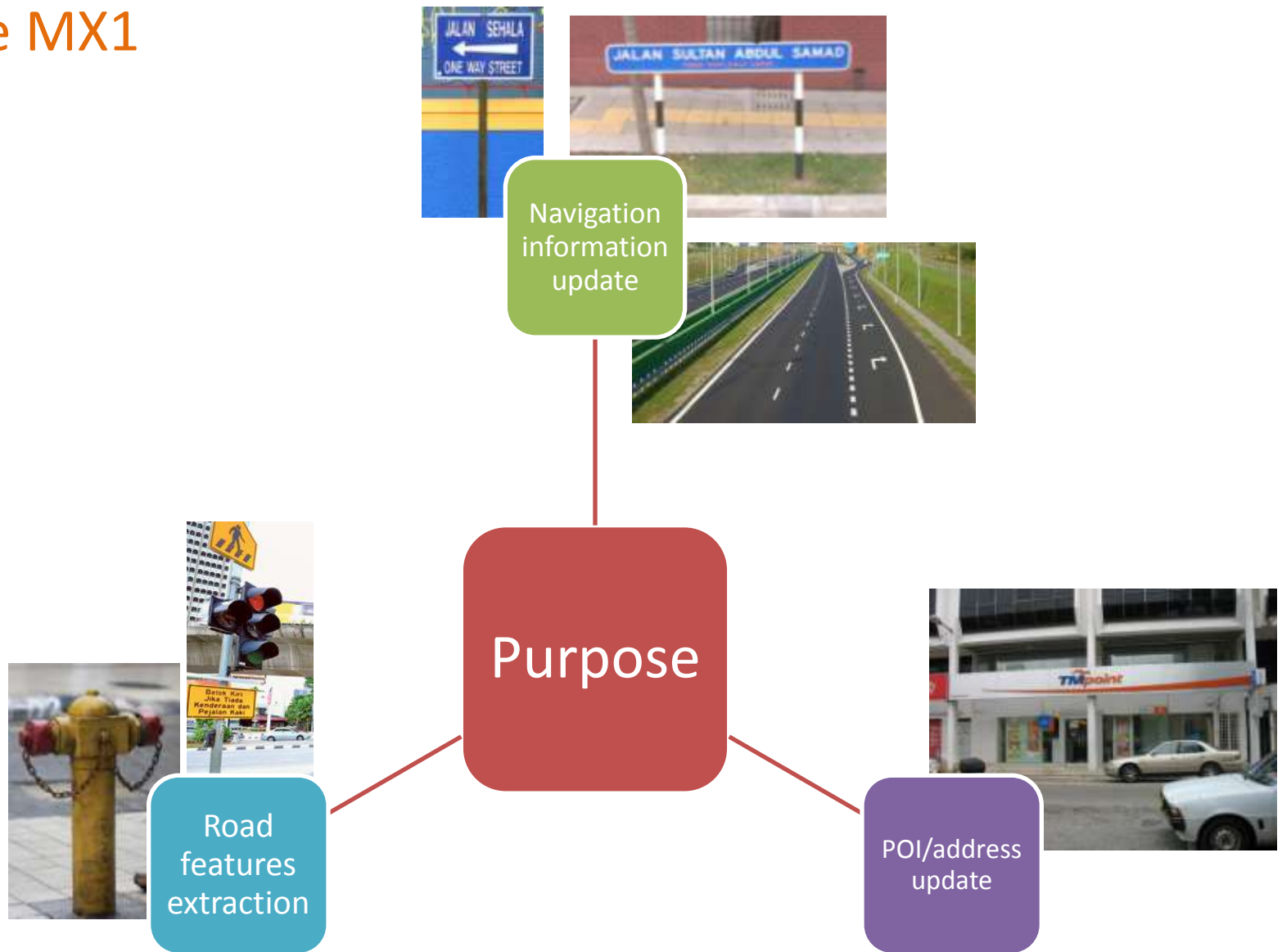
- Real Time XY Accuracy +/- 0.30 m
- Post Processed XY (with GPS) +/- 0.02 m
- Real Time Z Accuracy +/- 0.50 m
- Post Processed Z (with GPS) +/- 0.05 m
- DGPS (OmniStar) capable



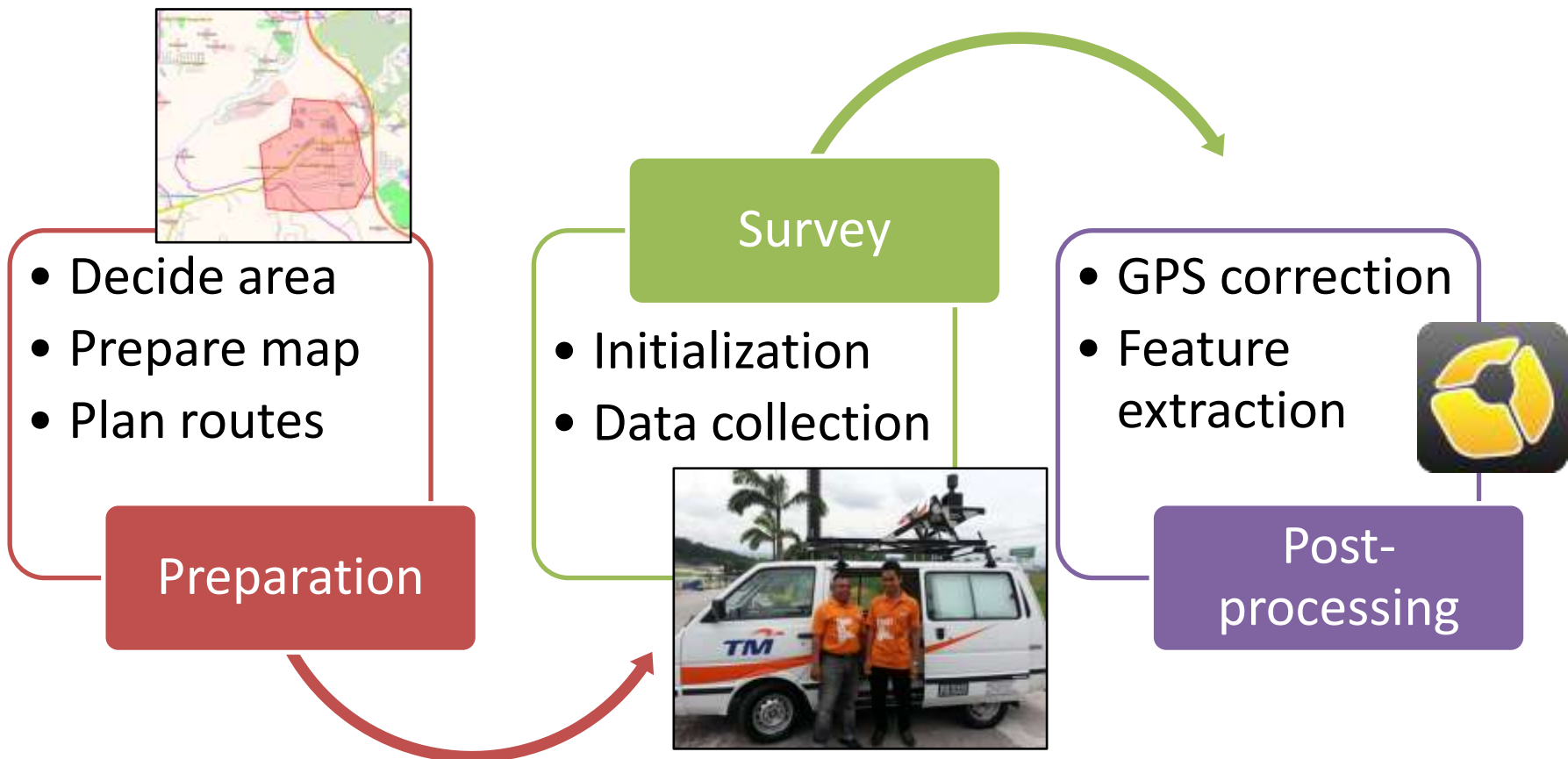
Rugged computer system

- Intel Xeon 2.3 Ghz
- 16 GB Memory
- 64-bit system
- Windows 7

Trimble MX1



Workflow



Feature Extraction



1st point



Move 1 step forward



2nd point

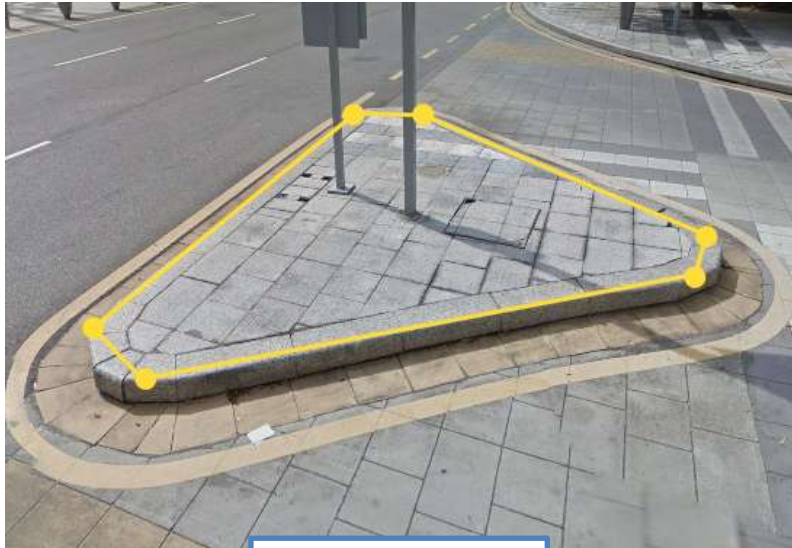


XYZ value

Feature Extraction



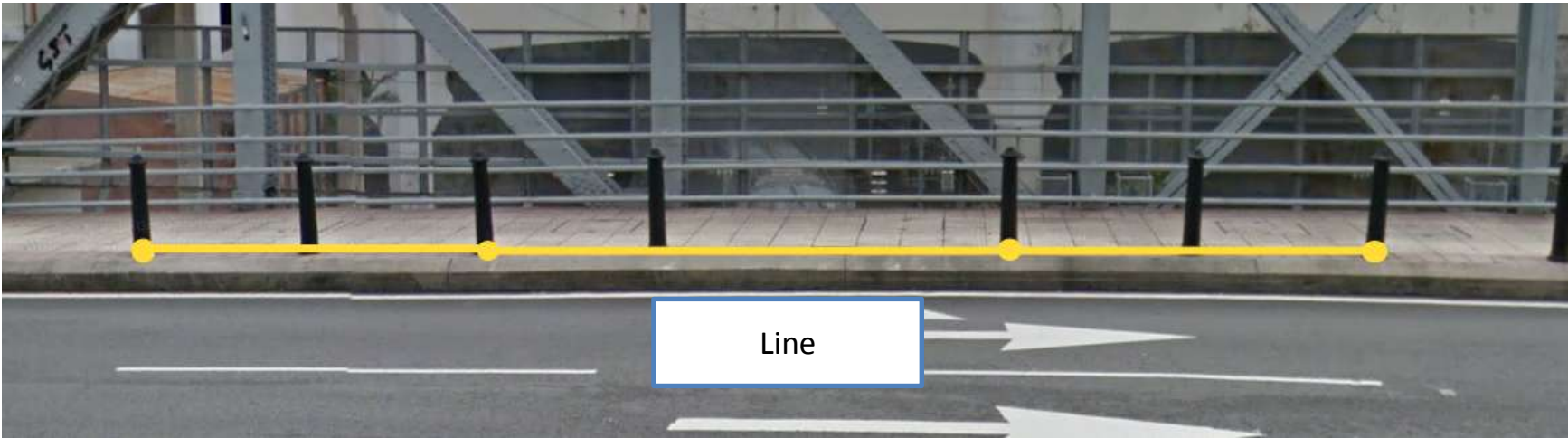
Point



Polygon



Measurement



Line

Strategy

Focus

- New commercial area
- Non-updated in map
- High population density

Schedule

- 2 Operators
- 8 a.m. – 5 p.m.
- No survey during rain & after dark

Progress

- Since December 2013
- 10,000 km around Klang Valley

Limitation – Base map Update



Survey



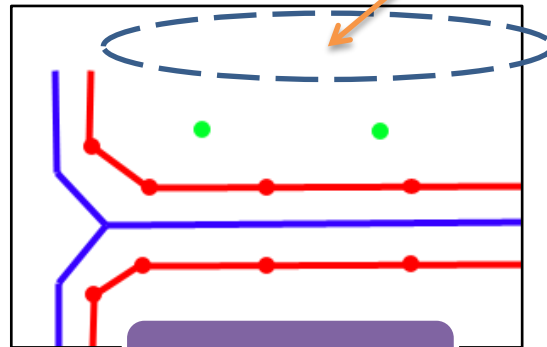
Plot



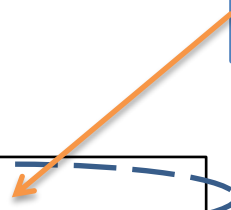
Export



Update



Unable to Plot



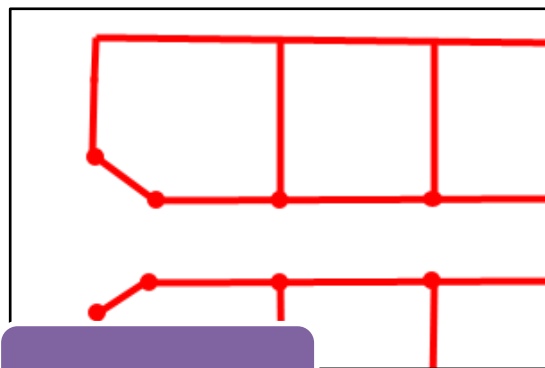
MX1 + UX5



Survey



Extract



Export

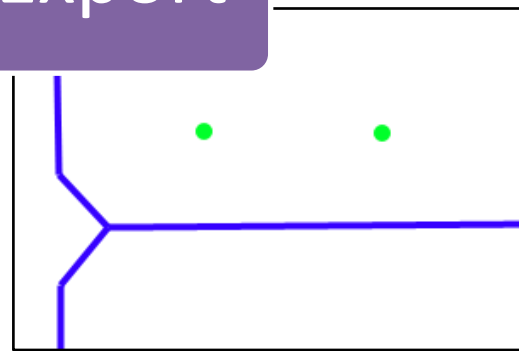
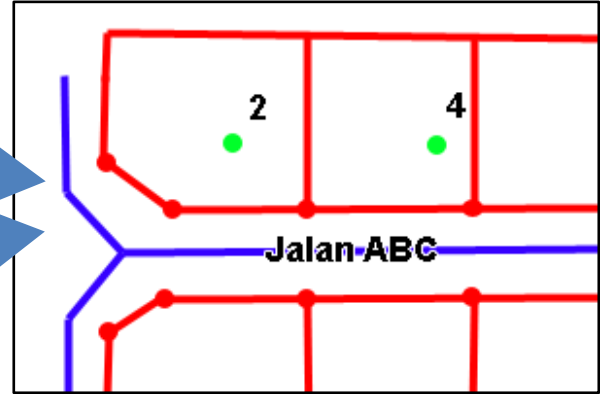


Survey



Extract

Export



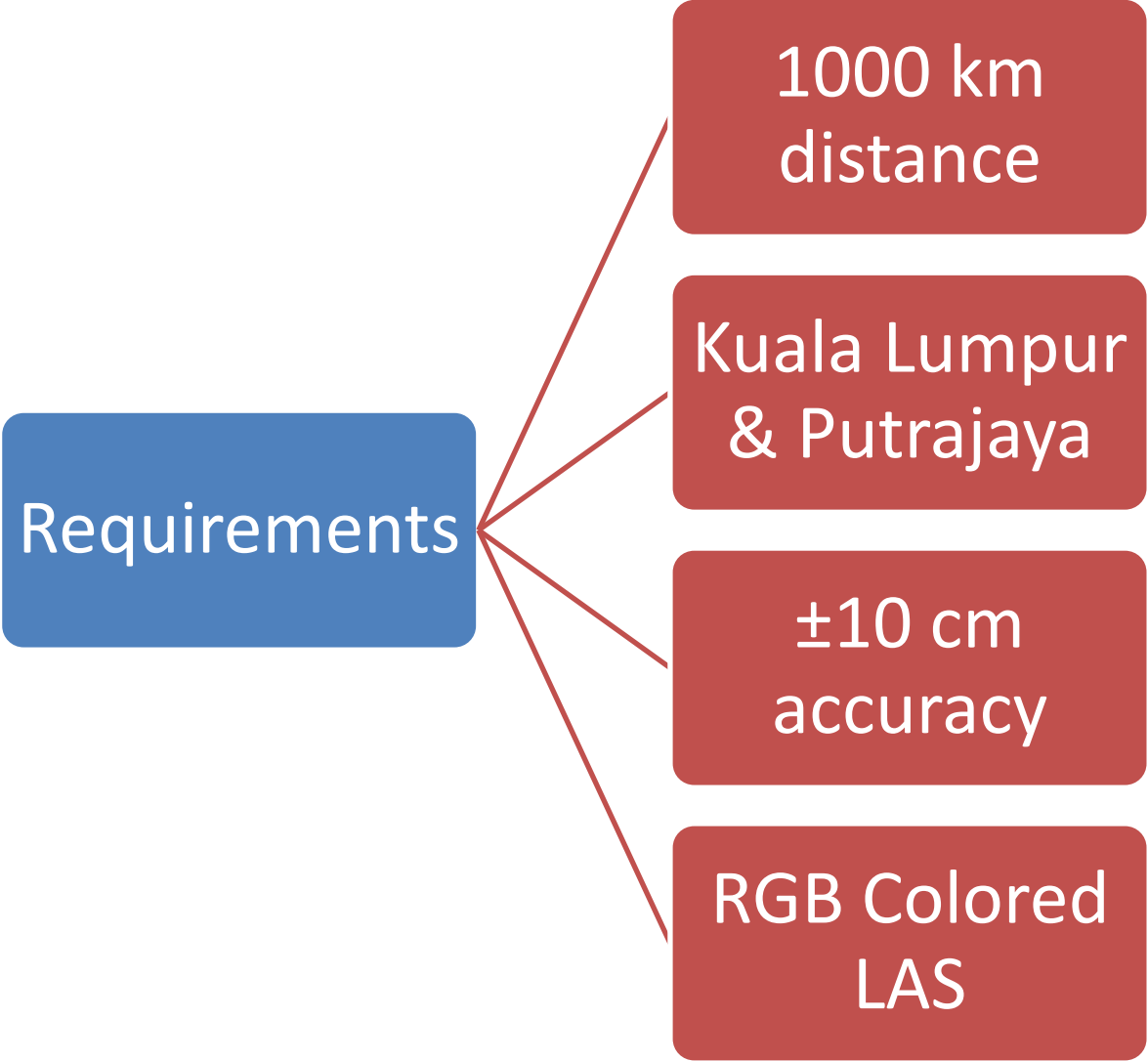
Sample Panoramic Images



Mobile Laser Scanning

MX-8

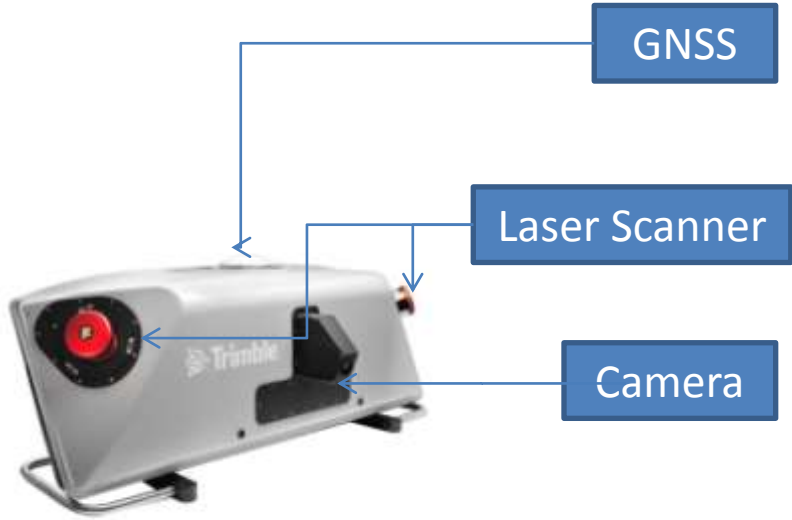
Mobile LiDAR Acquisition



Trimble MX8



Components



Laser Scanner Specifications

- Field of view: 360 degree
- Scanning frequency: Up to 150 Hz
- Data rate: 1,100,000 meas./second
- Max. operating range: 800 m
- Accuracy & Precision: 8 & 5 mm
- Enclosure rating: IP 64
- Operating range: -10 to +40 deg C
- Laser product classification: Class 1 (eye safe)



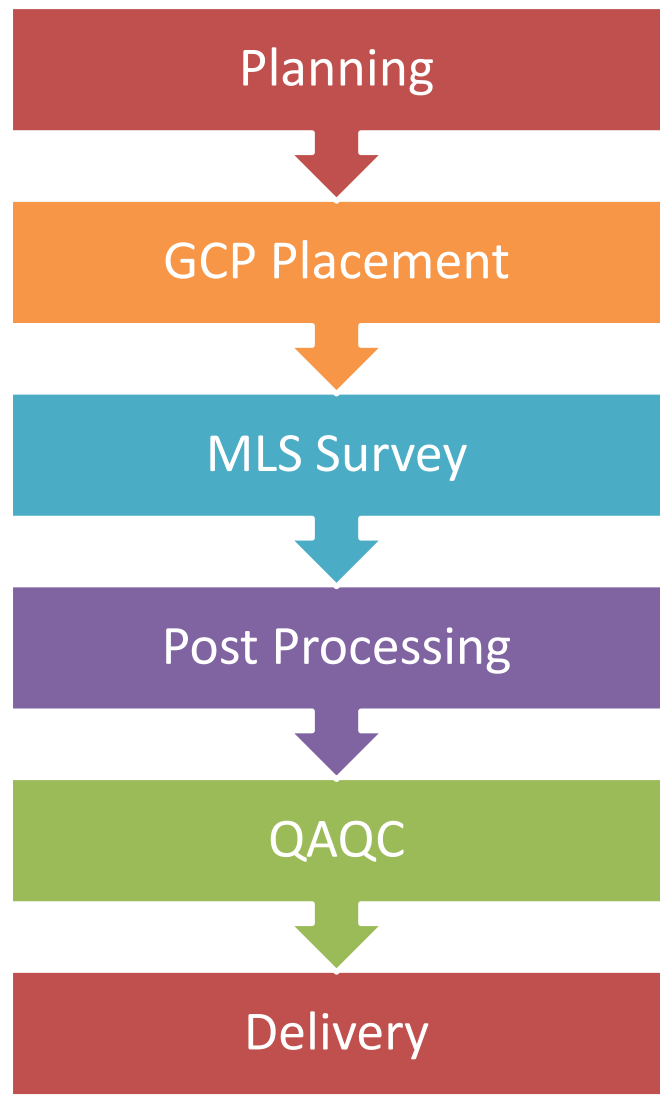
Imaging Specifications

- Grasshopper Camera
- 5 Mega Pixel Resolution (2448x2048 dpi)
- Panoramic imaging pod for both front and rear facing (6x 5MP camera)
- Surface Imaging pod (1x 5MP camera)
- Frame Rate 4 FPS for each camera (free running)

POS LV 520 Key Specifications

- Real Time XY Accuracy +/- 0.035 m
- Post Processed XY (with GPS) +/- 0.02 m
- Real Time Z Accuracy +/- 0.050 m
- Post Processed Z (with GPS) +/- 0.05 m
- Pitch and Roll with GPS Post Processed 0.005 degree
- True Heading with GPS Post Processed 0.015 degree

Workflow



Plan survey route
Plan target locations



Ground control point placement & survey



Daily survey 7 a.m. – 5 p.m.
Survey data copied into external



GPS correction
Point cloud registration & process output



Visual checking on processed output



Copy into hard drives

Challenges & Strategies

Traffic conditions

- Go out as early as 6 a.m.
- End before 5 p.m.
- Survey city centers during weekends & holidays

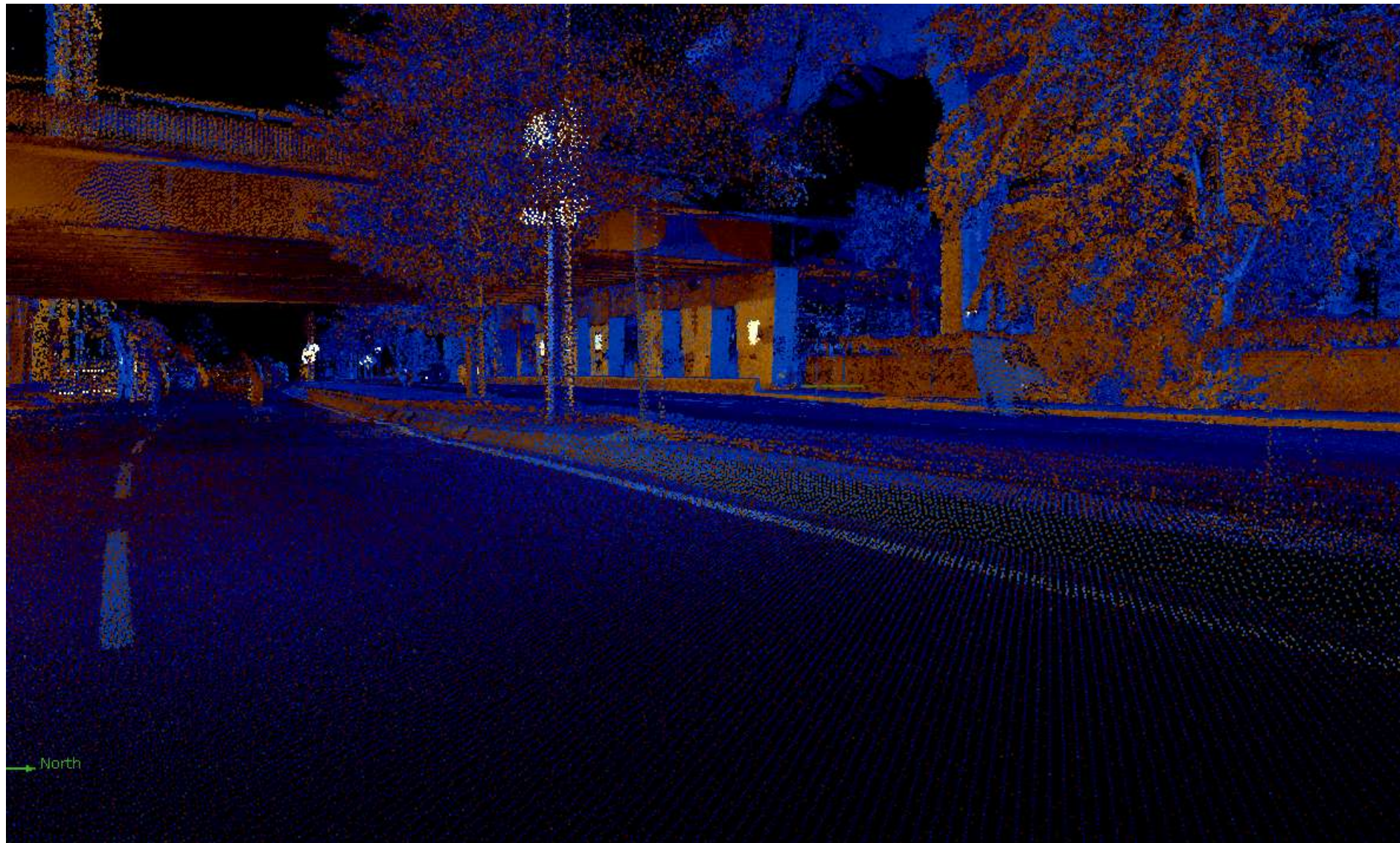
Weather conditions

- No survey during rain & after rain
- Drive 60 km/h on highways to avoid overheating, 40 km/h on normal roads
- 10 minute stops every 20 minutes survey if overheat

Processing large data

- ~60 projects to be completed process within 5 months
- Each project takes about 2-3 days for end to end process
- 6 personnel working 24/7 shift using 6 Trident Imaging Hub

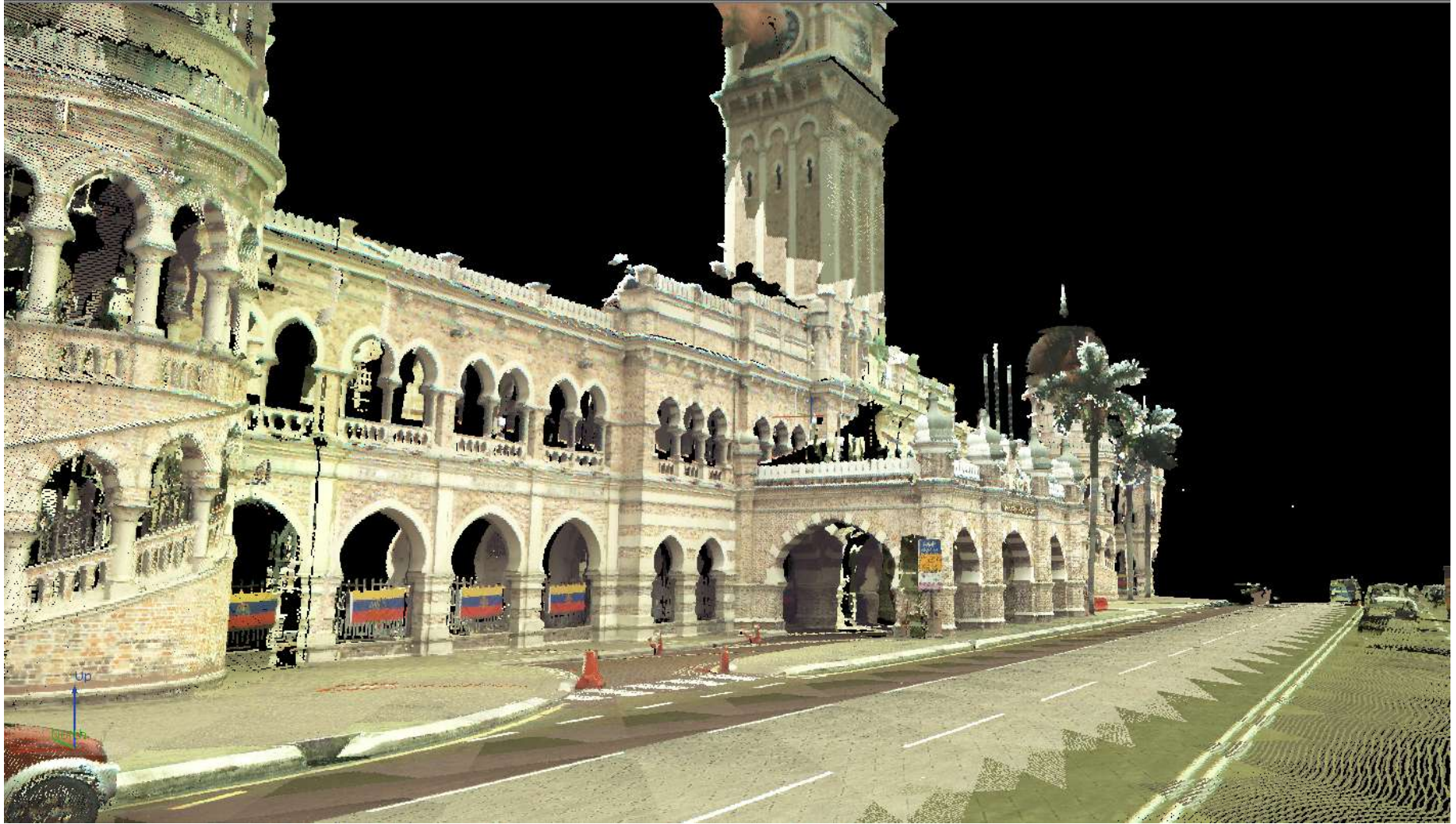
Sample Point Cloud Data



Sample Point Cloud Data



Sample Point Cloud Data



Sample Point Cloud Data



Sample Point Cloud Data



Summary

	MX1	MX8
Purpose	High quality 360° image capturing	High precision laser point cloud capturing
Feature Extraction	<ul style="list-style-type: none">• Photogrammetry• up to 50cm accuracy	<ul style="list-style-type: none">• Point cloud extraction• up to 1cm accuracy
Automatic Extraction	N/A	Possible using eCognition
Possible Products	360° street view image	<ul style="list-style-type: none">• RGB colored LAS• 3D model

THANK YOU