Innovative mapping and surveillance of railway sites using UAV-based solutions

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What is UAV?

- Drone
- Unmanned Aerial Vehicle (UAV)
- Unmanned Aerial System (UAS)
- Classification by Size, Design & Usage

Fixed Wing Type

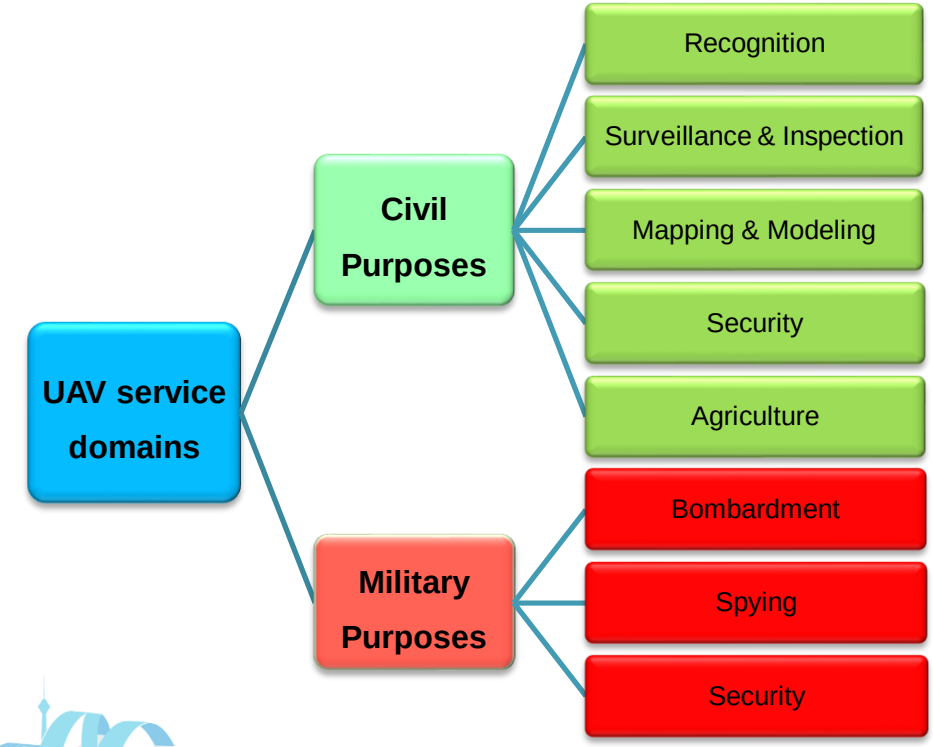
Why using UAV?

- The best choice for remote sensing
- Suitable for inaccessible areas and high-risk situations
- High performance in surveillance and inspection
- Less labour more Efficiency

Multi-rotor Type

Different types of sensors could be mounted on UAVs

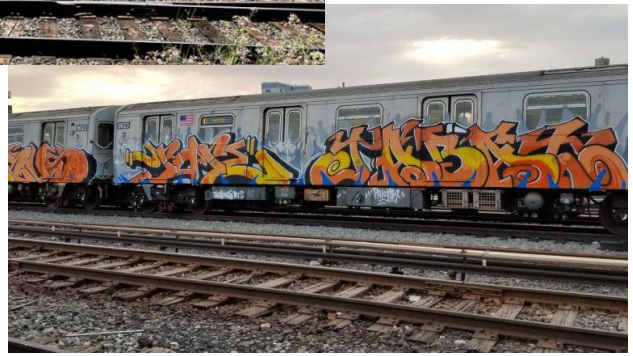
UAV areas of interest

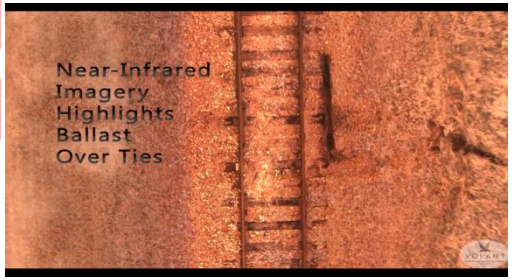


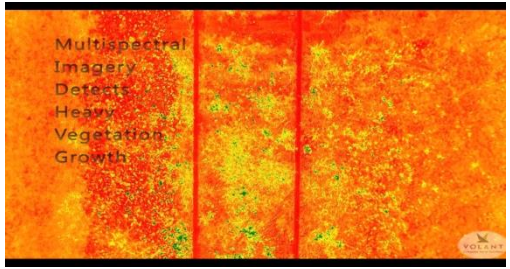
A worth of $91 billion over the next decade!

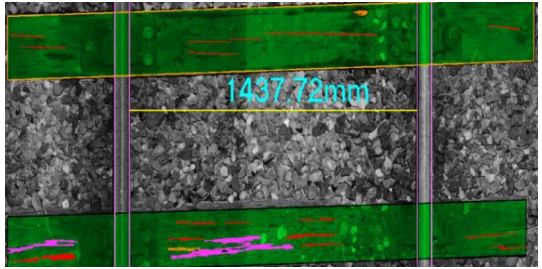
UAV applications in Railway Industry

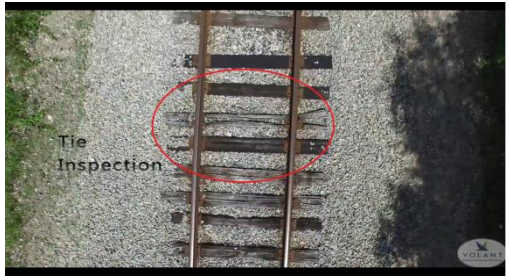
- Superstructure surveillance and defect detection
- combat graffiti on railways property









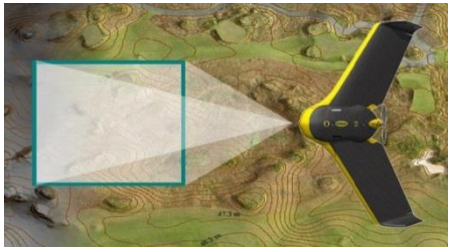


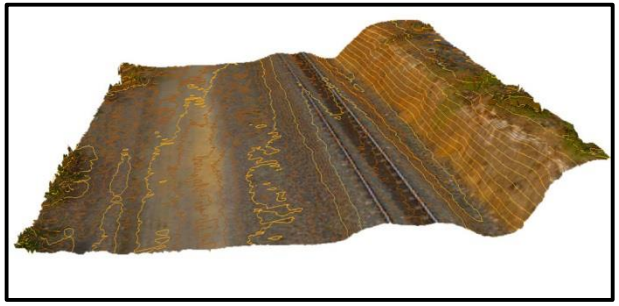
UAV applications in Railway Industry

- Mapping vulnerable areas close to the railway tracks
- Accident and train collision and derail investigation

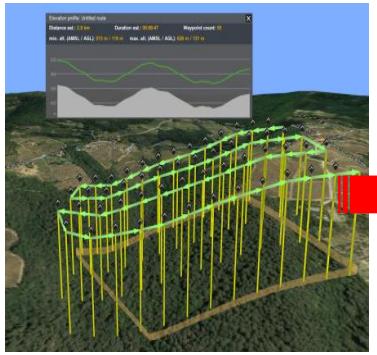
UAV applications in Railway Industry

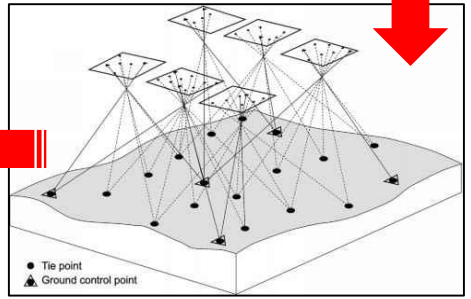
- Inaccessible infrastructure inspection like bridge pier and deck
- Aerial surveying to provide As-built plan and 3D models

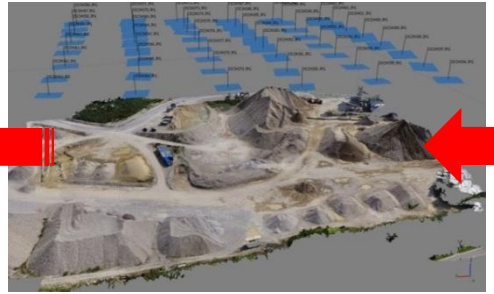


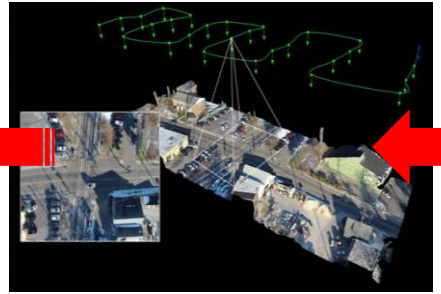


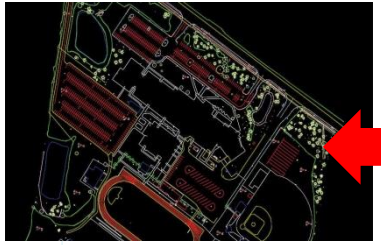
UAV-based 3D Mapping Procedure











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Case Study: Tehran Station

Tehran Station redevelopment master plan study project

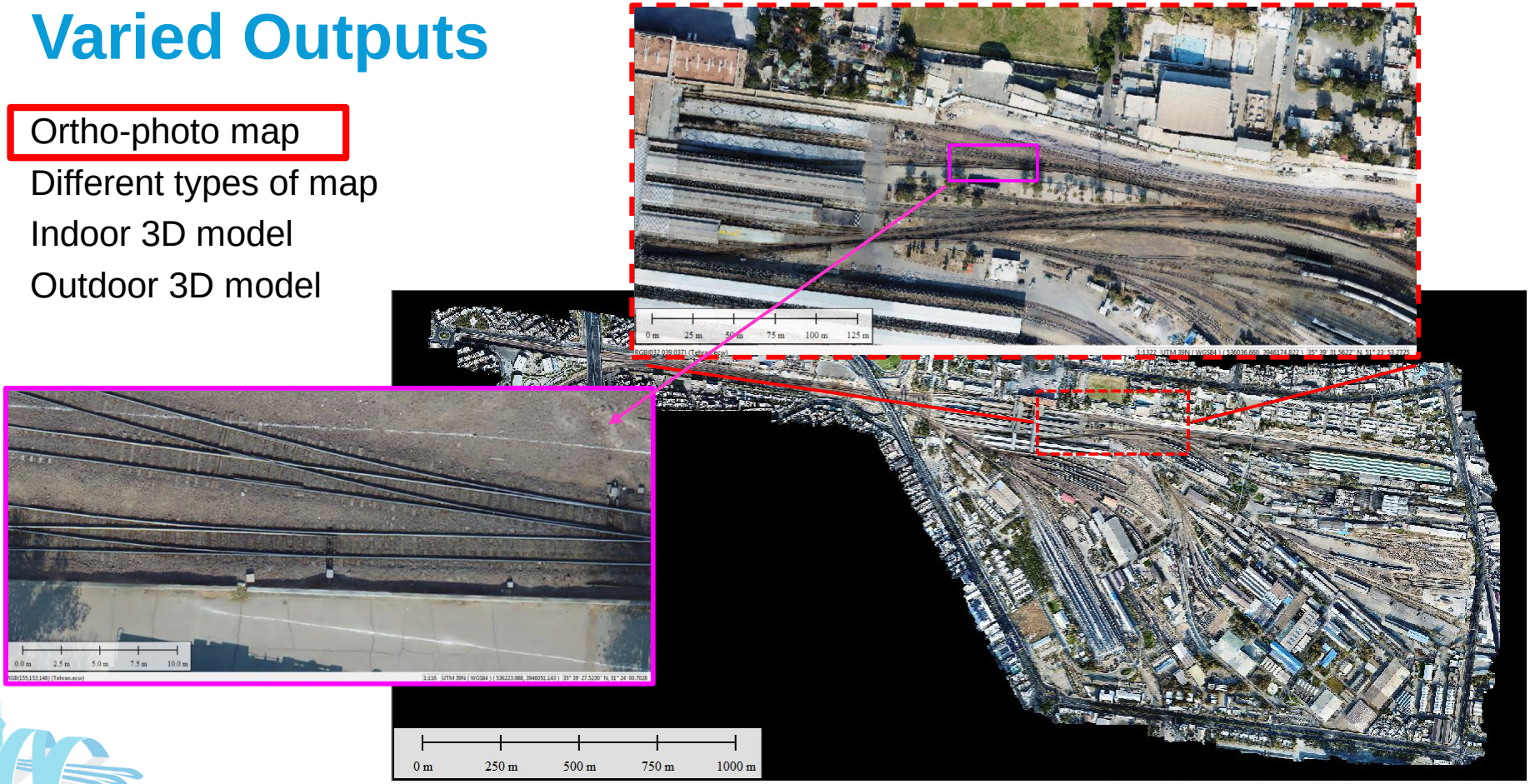
Tehran Station Indoor/Outdoor mapping and 3D Modelling

UAV-based Photogrammetry

Terrestrial Laser scanning

Varied Outputs

- Ortho-photo map
- Different types of map
- Indoor 3D model
- Outdoor 3D model



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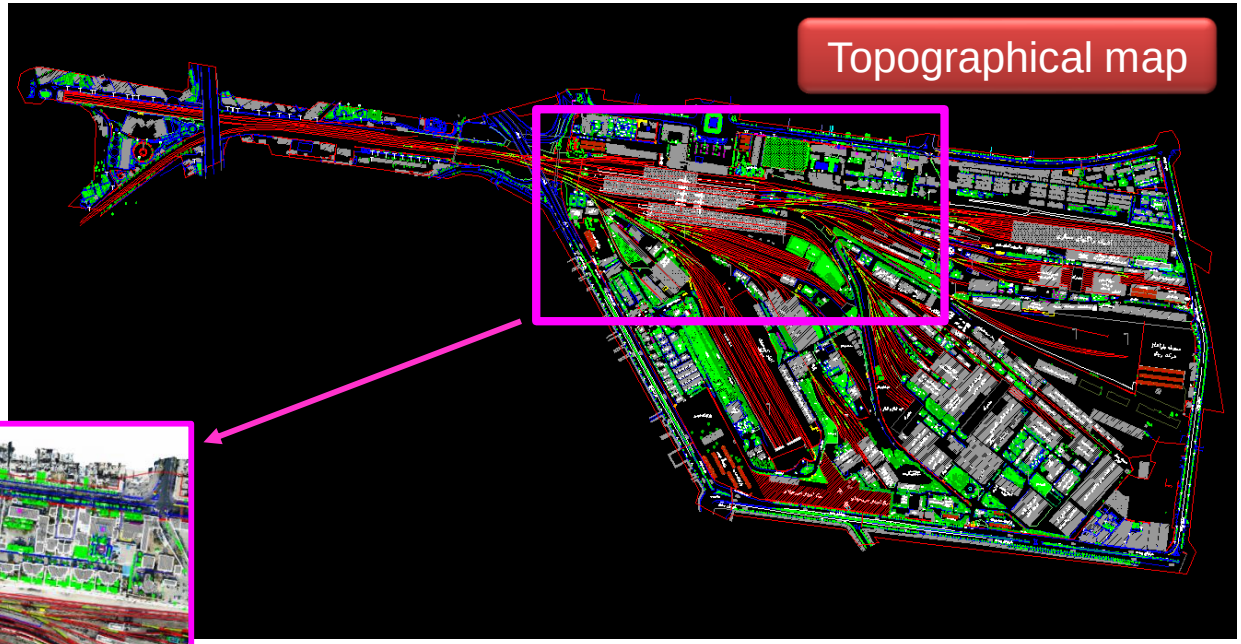

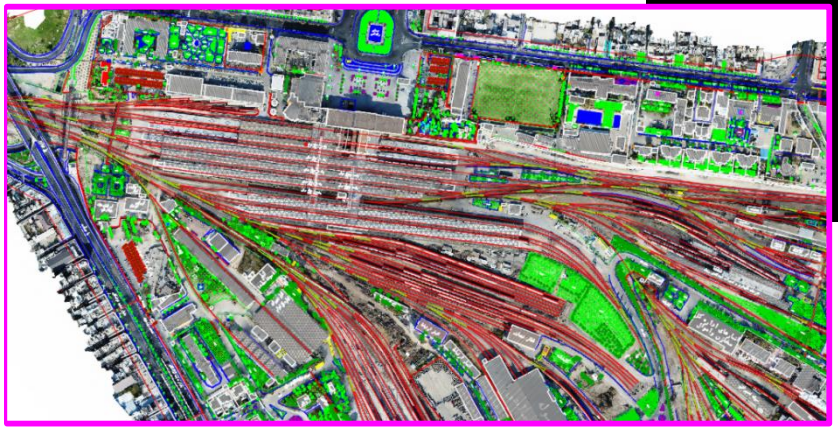

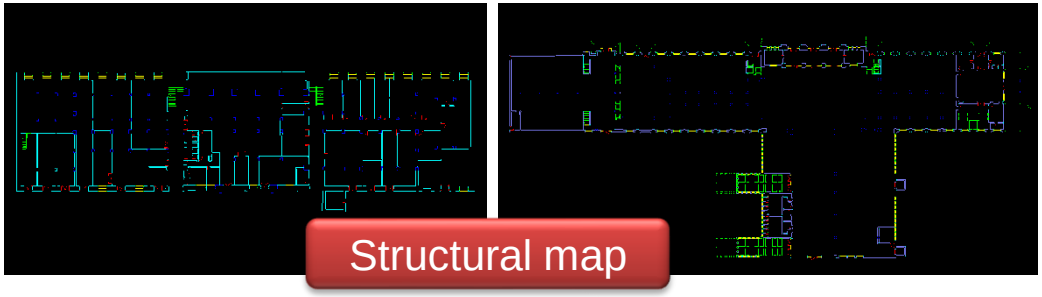

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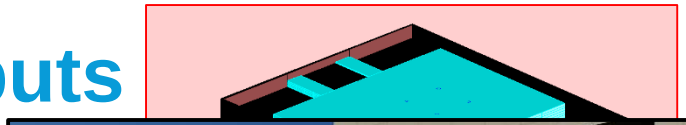

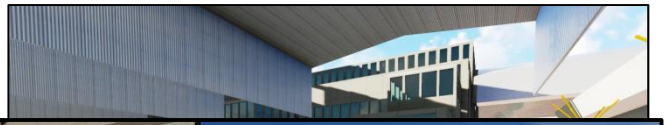

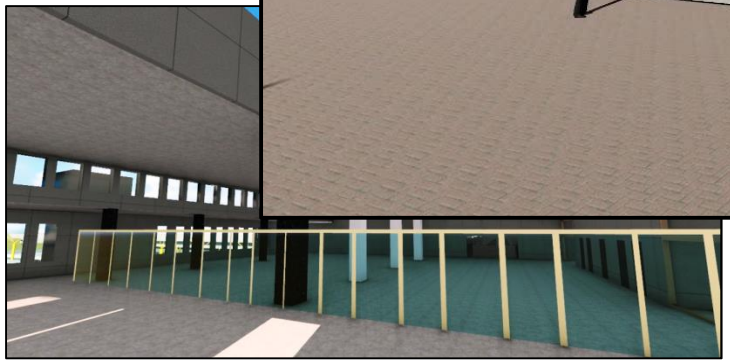

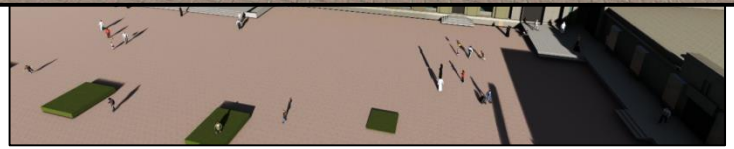

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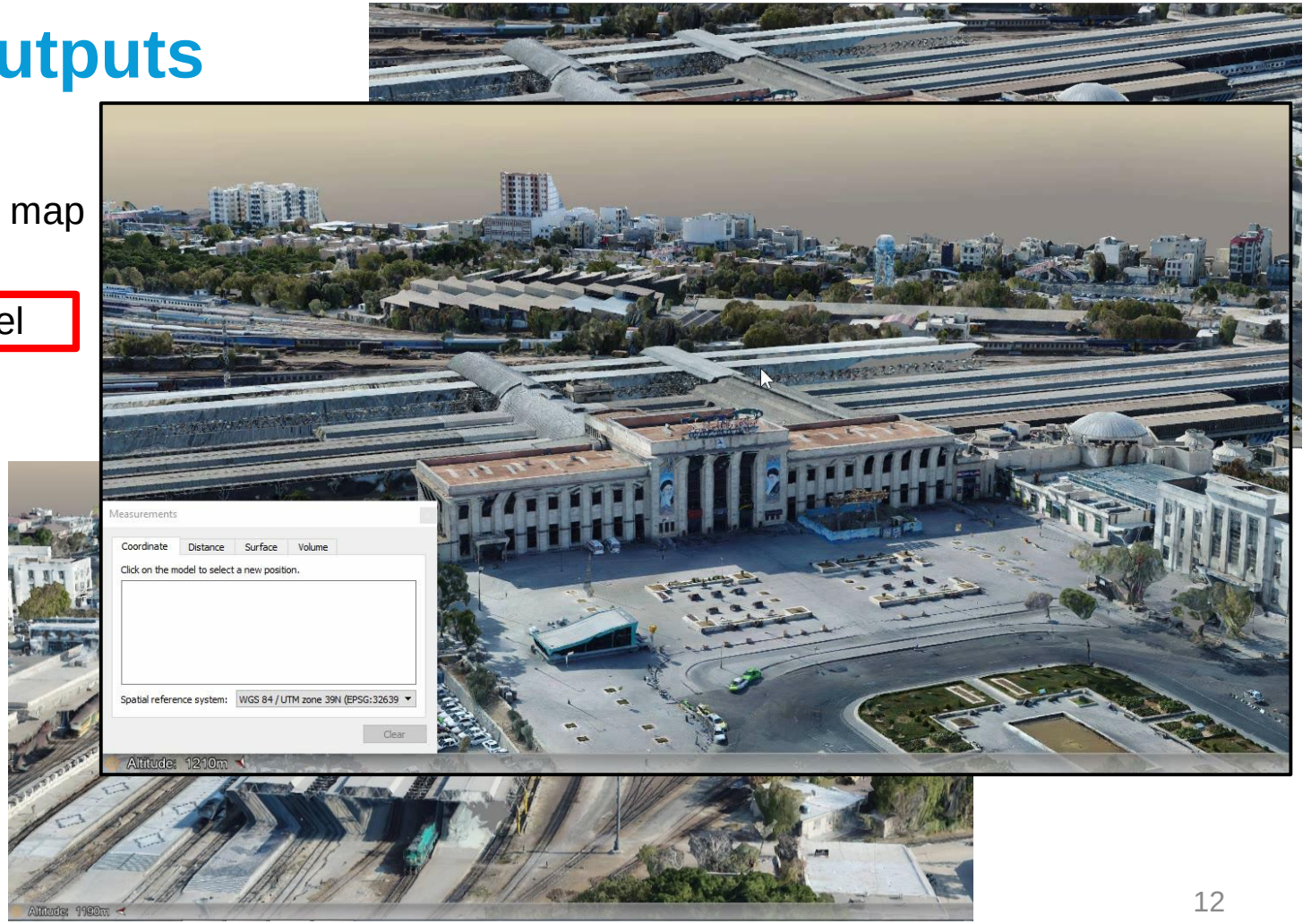


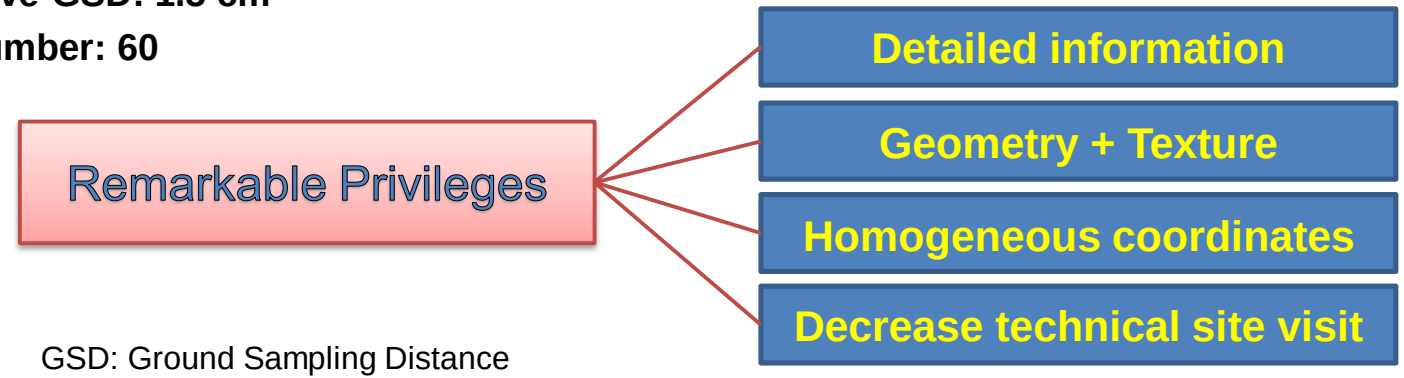
Numerical Results & Conclusion

Project Specification:

- Operation Area: 220 hectare
- UAV: DJI Phantom-4 Pro Quad copter
- Camera Resolution: 20 Mega pixel
- Image number: over 9000 images
- Image Overlapping 80%
- Flight mean altitude: 60 meters
- Executive GSD: 1.5 cm
- GCP number: 60

Achieved Results:

- Average ground resolution: 22.3304 mm/pixel
- GCP positioning precision: 1 cm
- Resampled Ortho-photo GSD: 2.5 cm
- Planar precision: 4 cm
- Height precision: 6 cm
- Achieved Map Scale: 1:500



GSD: Ground Sampling Distance
GCP: Ground Control Point

Thank you

for your kind attention

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