



Die Augen der Drohnen

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MICRO AERIAL VEHICLES (MAVss)

's not Drones



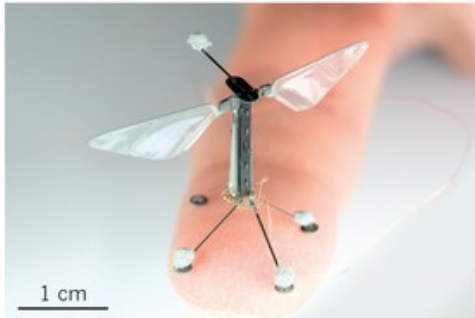
a



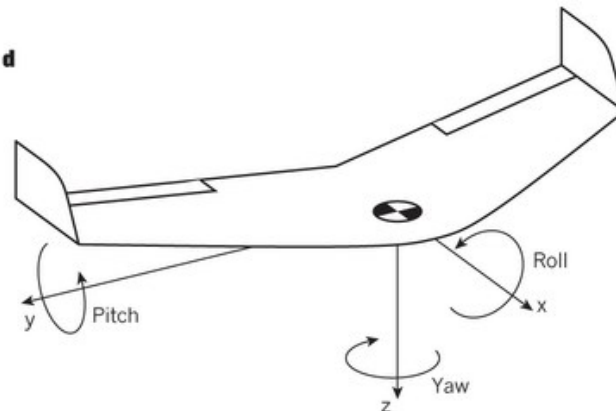
b



c



d



Many Application Areas

- Farming → Continuous Monitoring
- Construction sites → Real time progress
- Mining → Exact volumetric measurements
- Energy & infrastructure → pipelines, roads etc.
- Transportation → medicine in development countries
- Inspection → disaster management, rescue
- Surveillance → large areas
-

Convergence of Technology

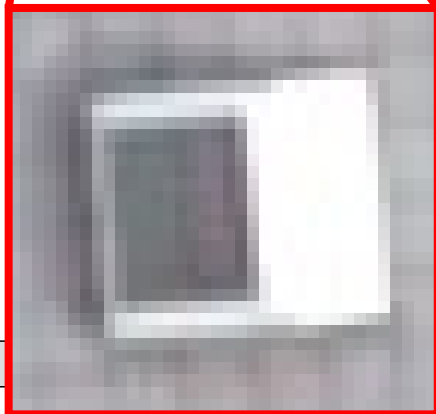
- Flight hardware → control algorithms
- Processing hardware (mobile phones)
- Sensor technology (cameras, IMS, GPS etc.)

Airborne vs. MAVs



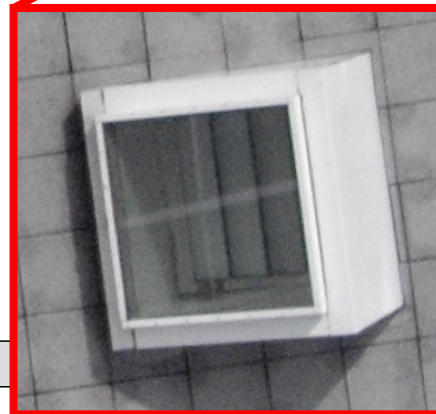
\$500.000

GSD: ~8cm/pixel
HGT: ~900m



\$250

GSD: ~0.5cm/pixel
HGT: ~25m



MAV
Pentax A40
4000 x 3000

Advantages of UAV imagery:

- Nadir and oblique views possible
- Extremely high overlap possible (multirotor UAV can hover)
- Close range possible
- Complete coverage of building possible

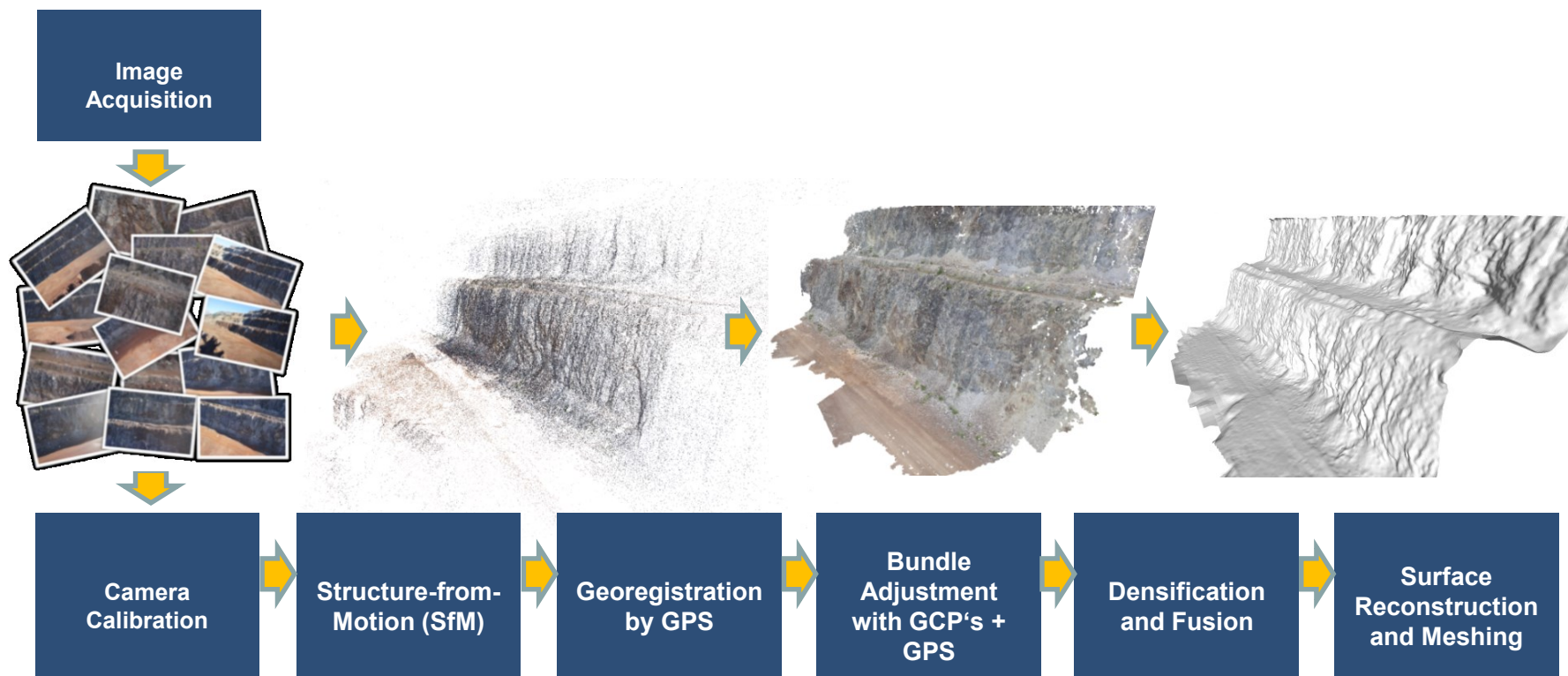
UAV image



Challenges of UAV imagery

- Only low quality IMU/GPS metadata available (typically not synchronized, e.g. Asctec Falcon)
- Flight planning complicated at close range to buildings (obstacles)
- Image registration must cope with erratic camera movements
- Wide baseline matching necessary for image registration

From images to 3D models



- In-house software: I3D, Mavmap

Use case – Side archeological site

- Side east gate (dated 200BC)
- Documentation and digital recreation of the archeological site
- Combination of drone imagery and terrestrial images
- Total 5000 images

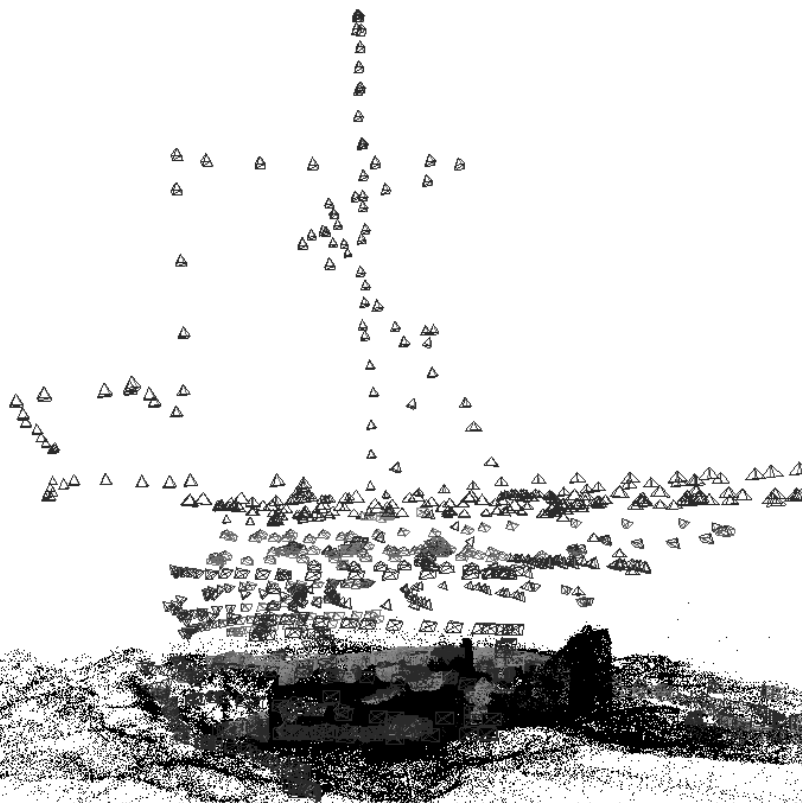








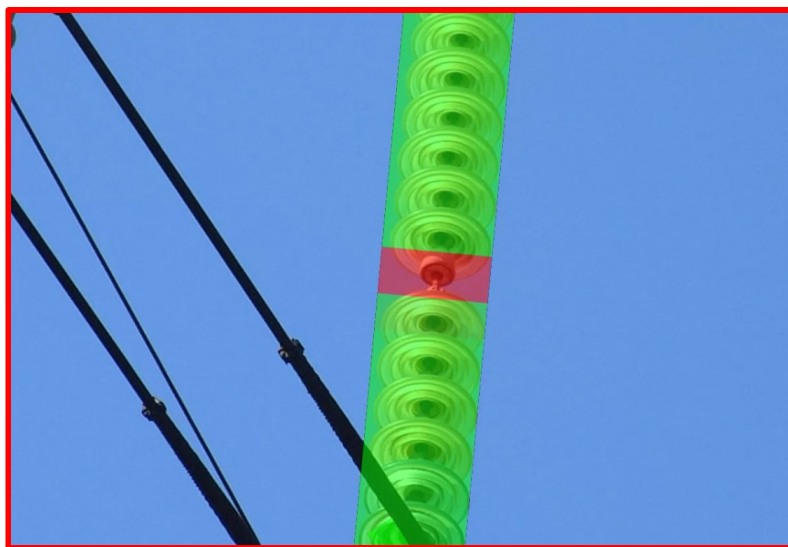
Camera network



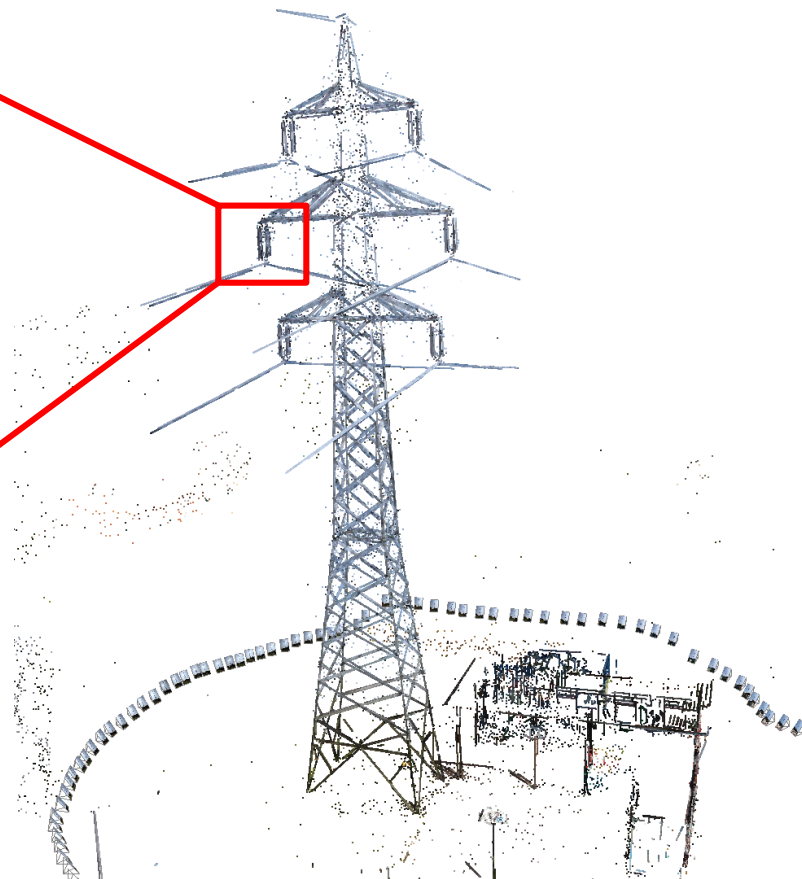
Side east gate



Applications: Power Pylons

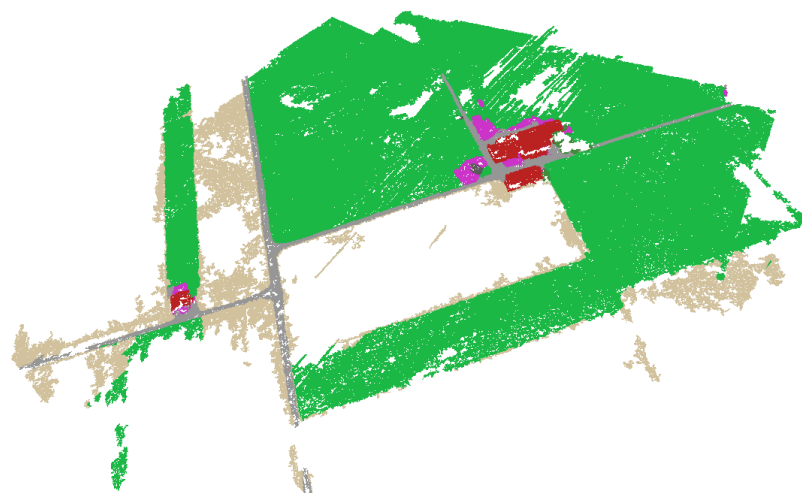
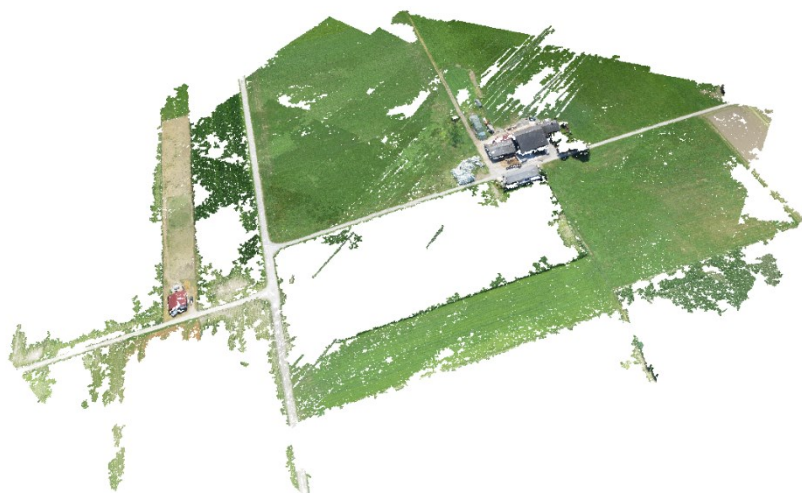
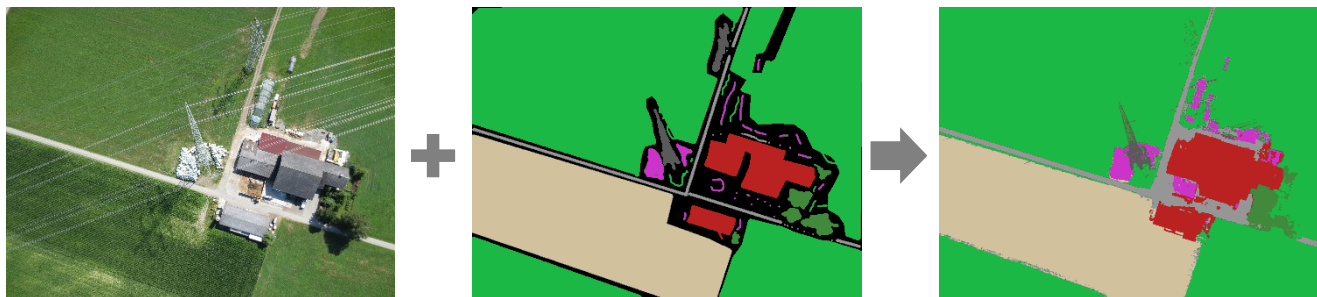


- Automatic fault detection



Applications: Inspection

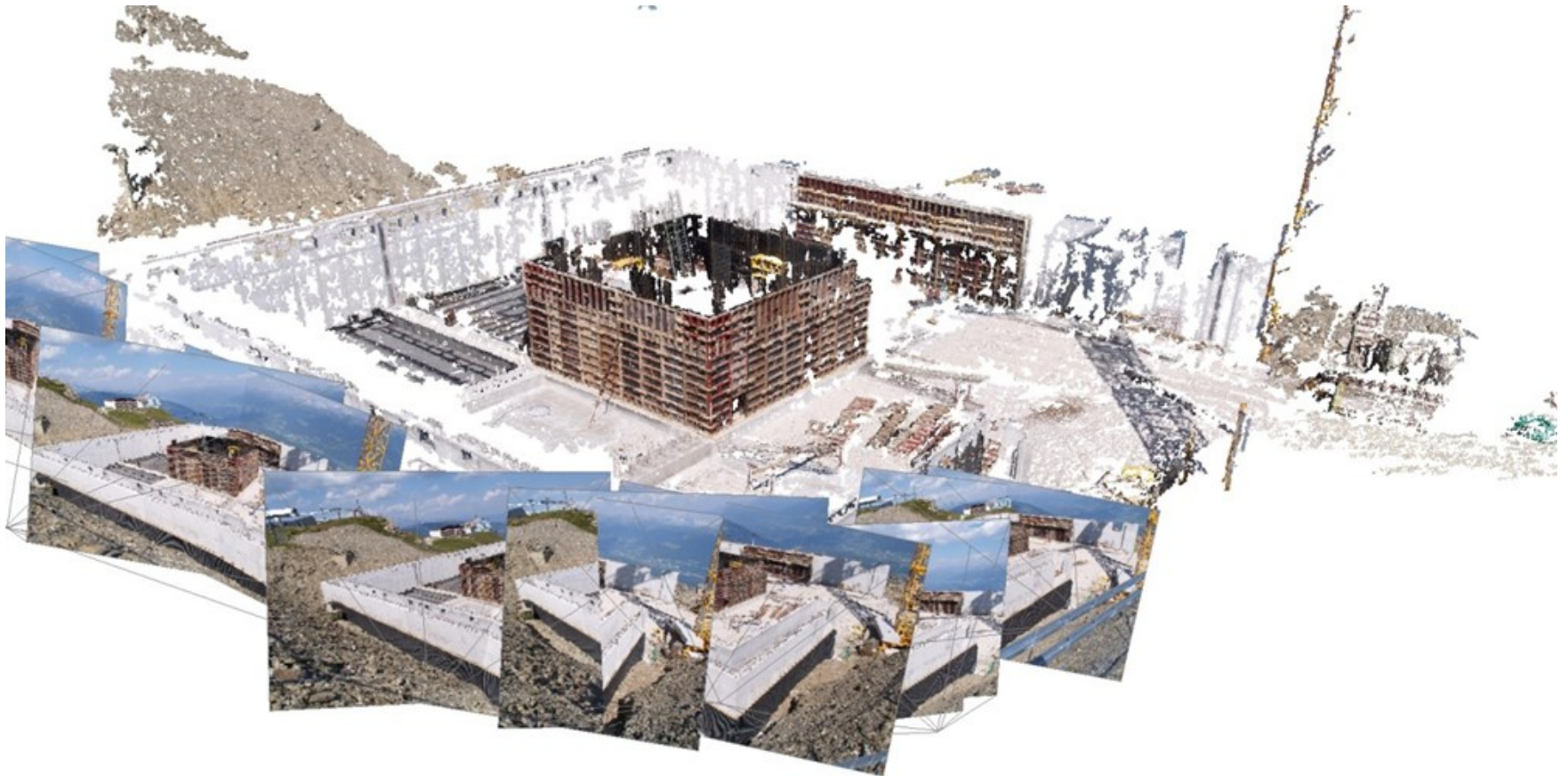
- Project: FreeLine – Inspection of power line corridors



Semantic 3D model



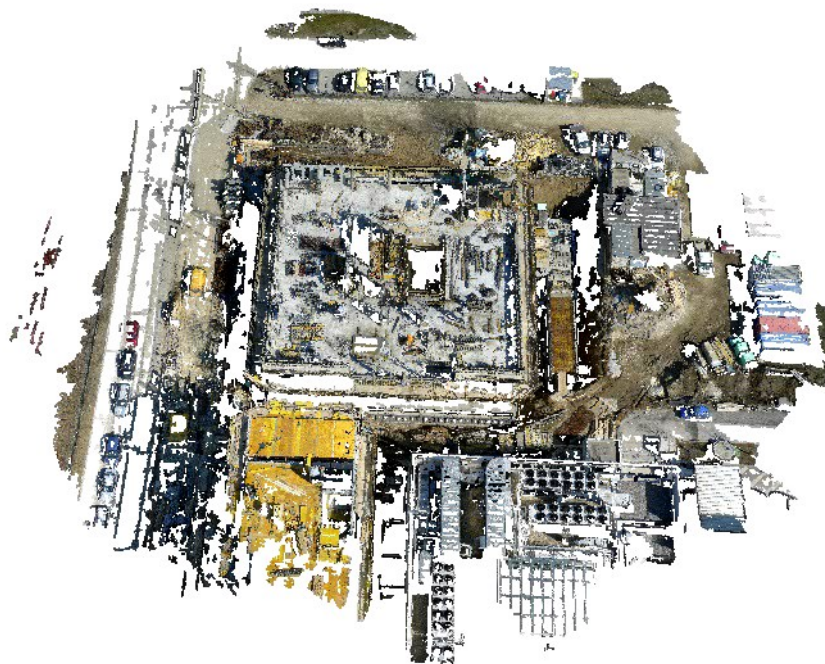
Application: Construction Site Monitoring



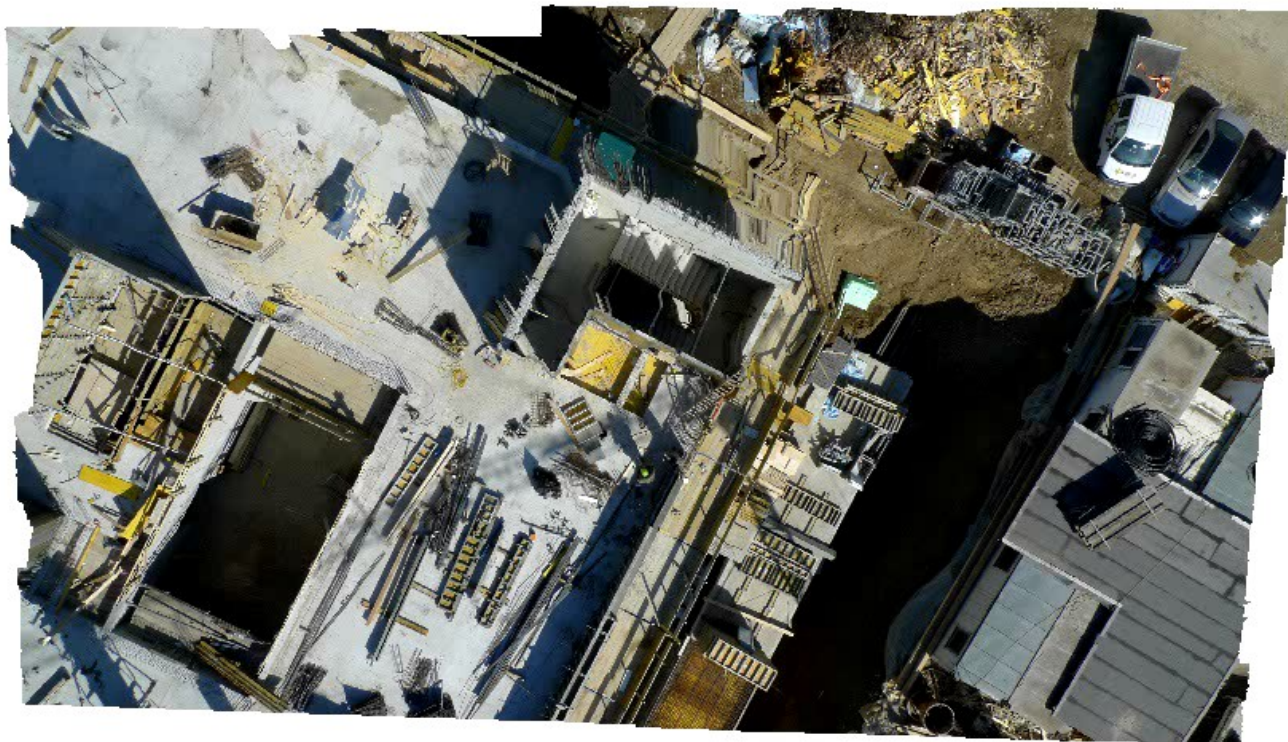
Construction site results



Construction site results



Construction site results



Rescue

August 28, 2016
Team: Graz Griffins



Conclusion

- MAVs just at the beginning
- MAVs & Cameras are ideal mapping & measurement tool
- Many new application areas
- Need of autonomy
- Safe operations

**Don't Forget
thinking about
tomorrow**

Fleetwood Mac