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Effective data collection for digitization of existing assets

- **Laser scanning systems**

JÁN ERDÉLYI

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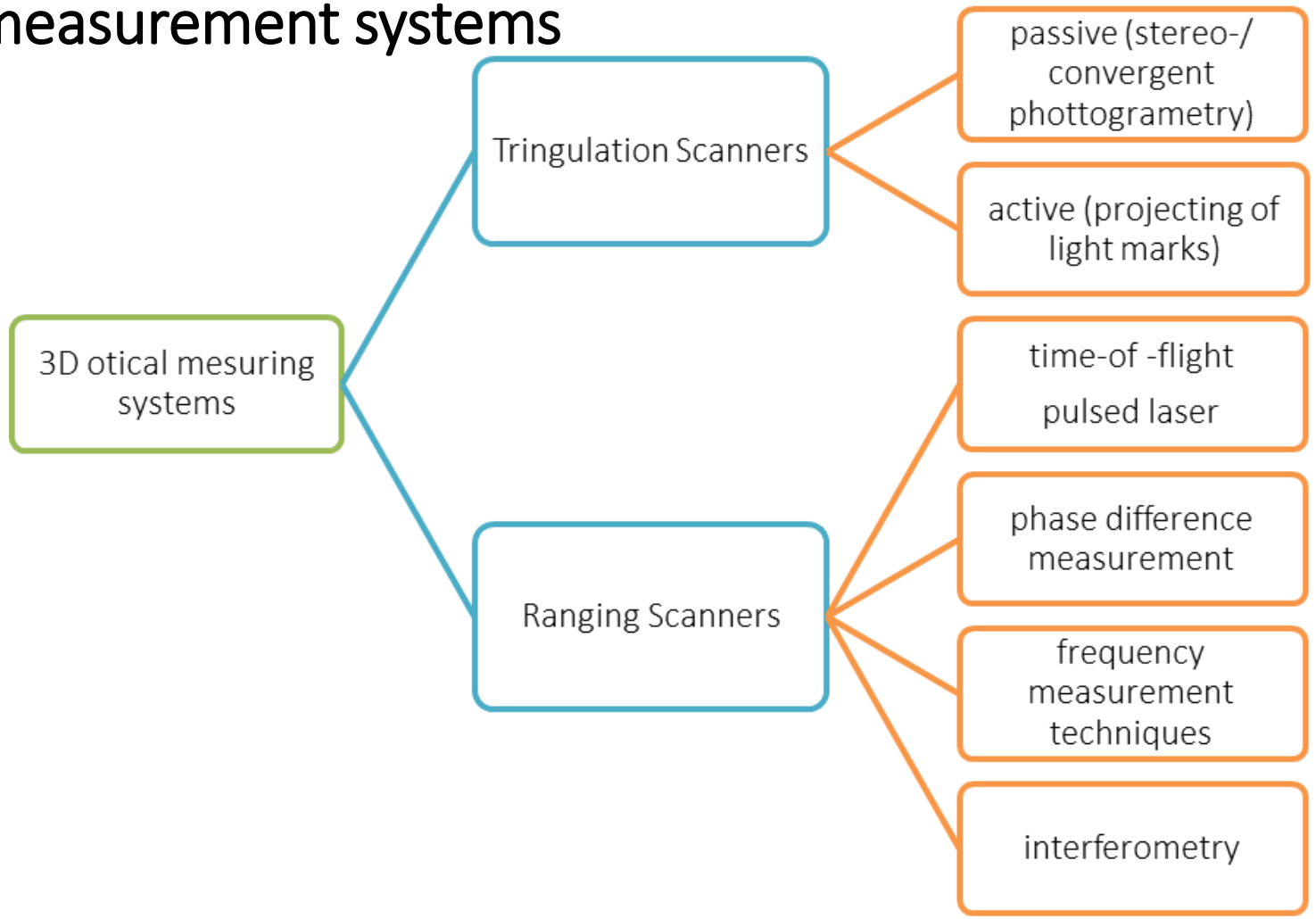
3D optical measurement systems



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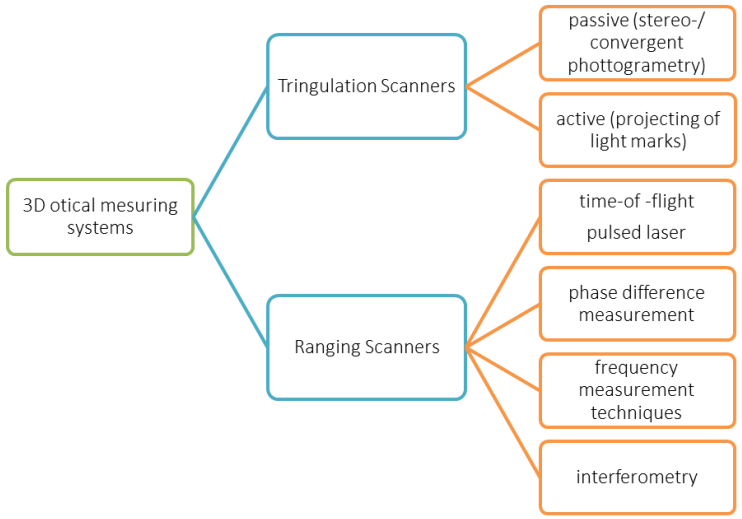
3D optical measurement systems



convergent close-range photogrammetry (bitfab.io, 2020)

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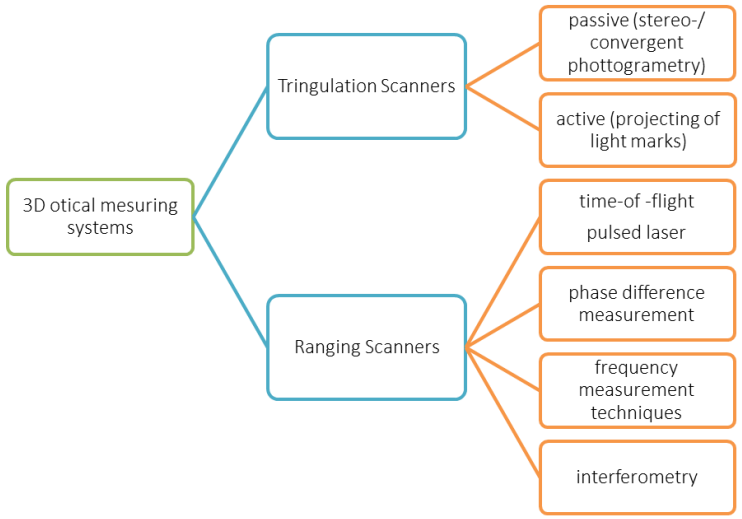
3D optical measurement systems



RPAS prhotogrammetry (Buczkowski, 2018)

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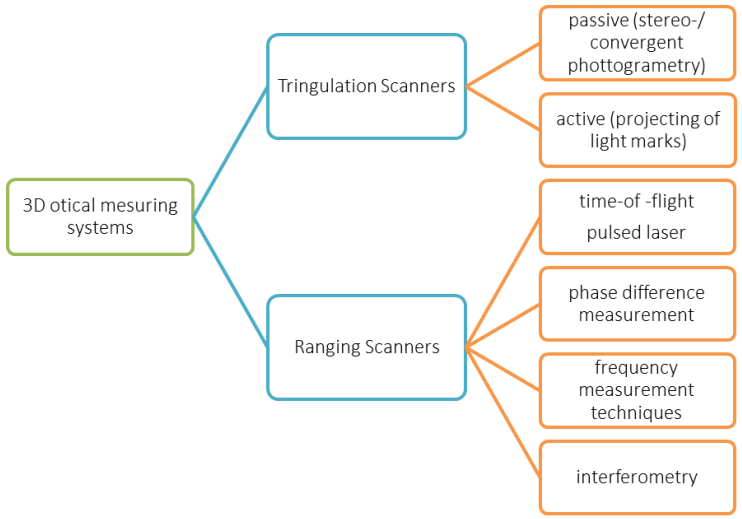
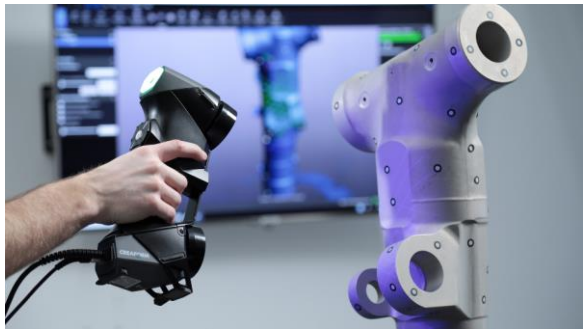
3D optical measurement systems





HandySCAN 3D
(creaform.com, 2020)

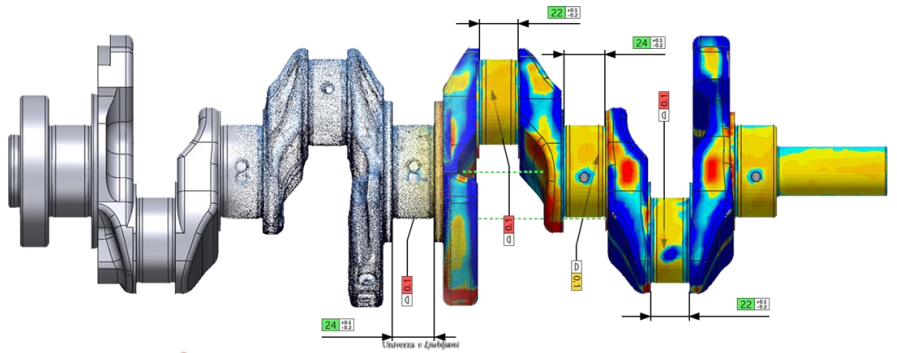
accuracy: 0,025 mm
Measurement range: 0,05 m – 4,00 m

HP 3D structured light scanner PRO S3
(hp.com, 2020)

accuracy: až 0.05% (až 0,05 mm)
Measurement range: 60 mm – 500 mm

Leica T-SCAN
(Hexagon, 2015)

accuracy (dist.): ± 26 µm + 4 µm/m
accuracy (plane): ± 80 µm + 3 µm/m
Measurement range: Φ 60 m



Quality inspection
(artec3D.com, 2020)

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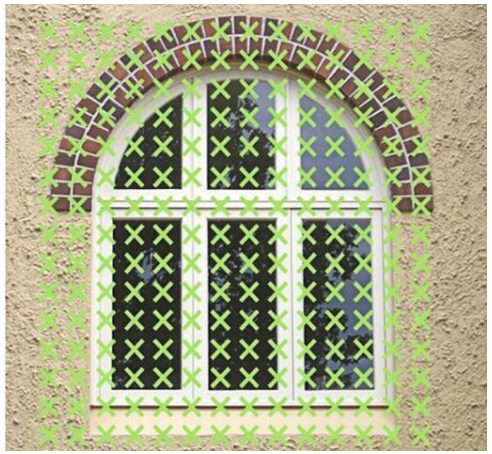
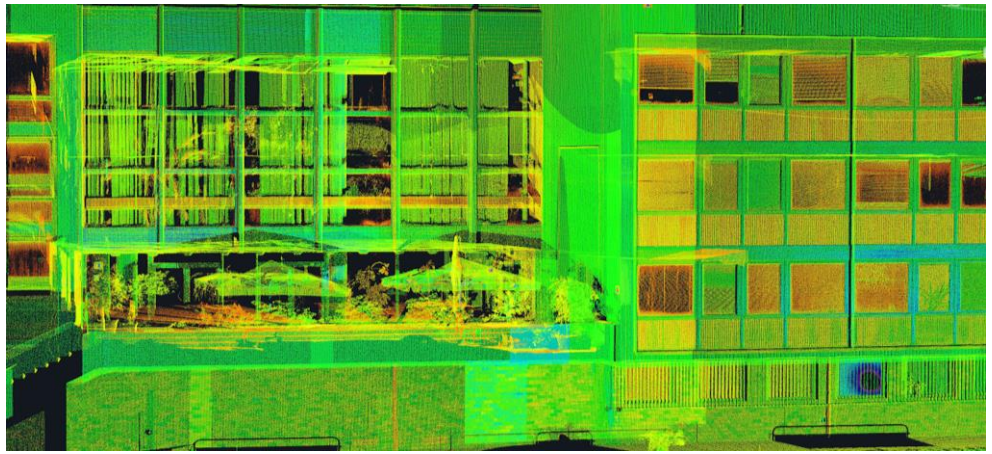
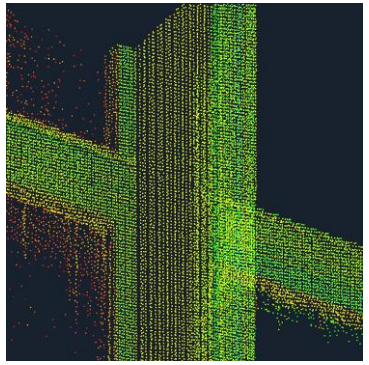
Laser scanning systems

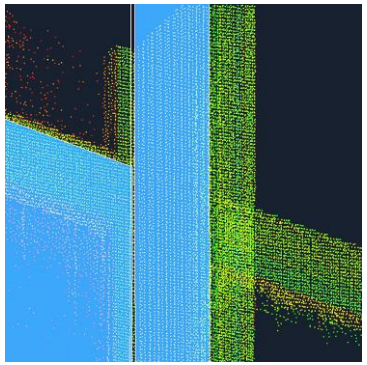
- Non- selective method

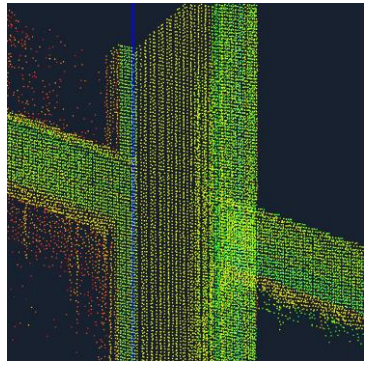


- Point cloud









Modeling of the edge of a frame

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Categorization of laser scanning systems

- According to location
  - Terrestrial (ground-based)

Scanner placed on the Earth's surface, it's close surroundings or on a device moving on the Earth's surface

(Leica Geosystems.com, 2020)

(laserinst.com, 2020)

(Topconcare.com, 2020)

(riegl.com, 2020)

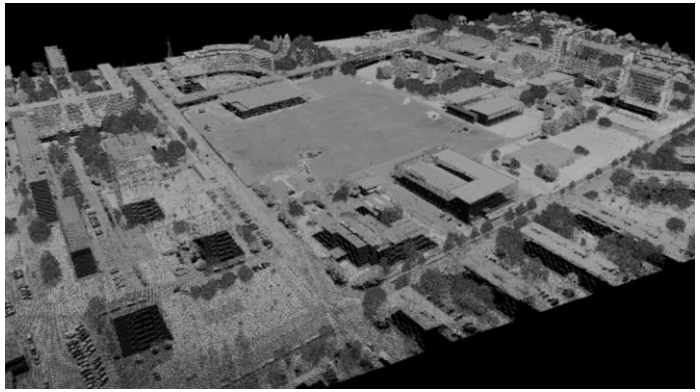
(faro.com, 2020)

  - Airborne

Instrument placed on a flying carrier (aircraft, helicopter, drone)

(lidaretto.com, 2020)

(riegl.com, 2020)



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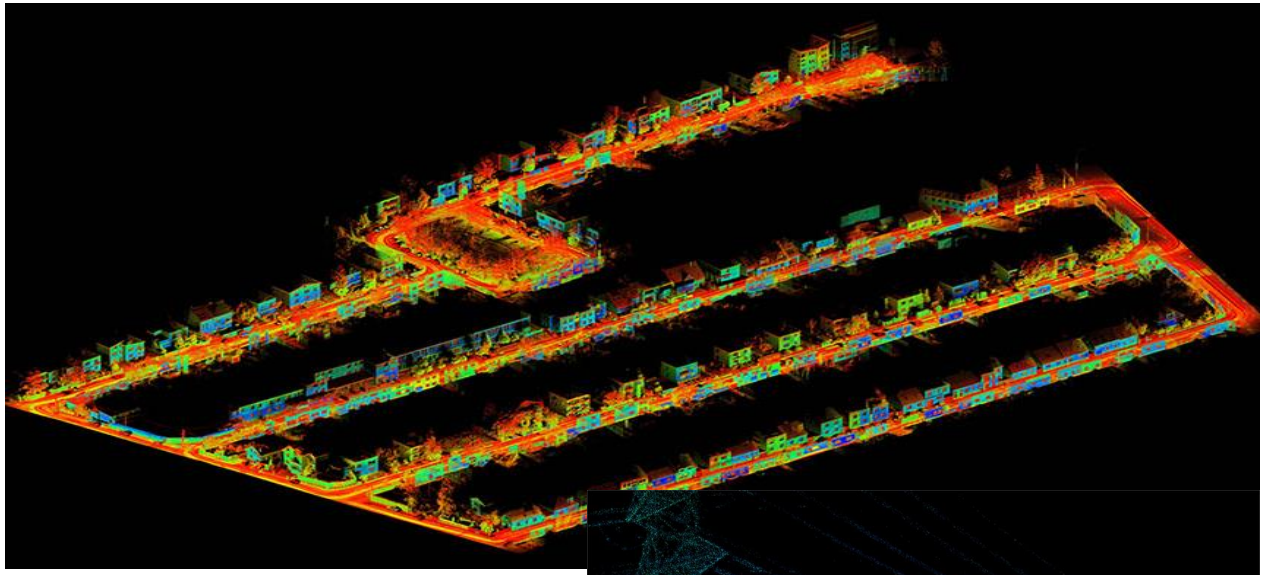
Categorization of laser scanning systems

- Static
- Kinematic

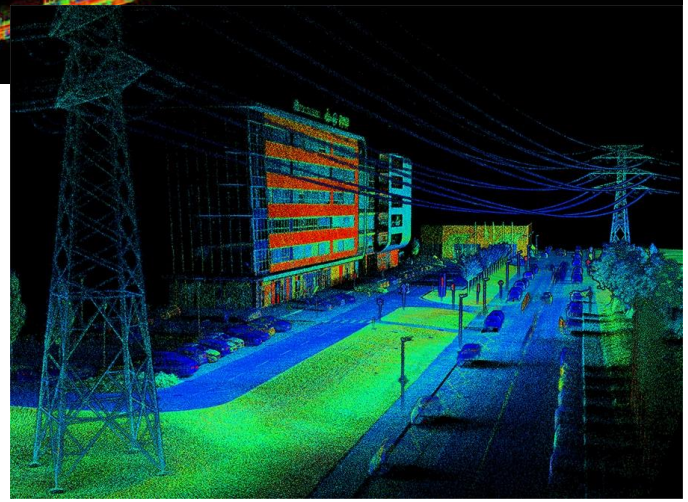
(Leica Geosystems.com, 2020)



(Amberggroup.com, 2020)

(navvis, 2018)

(geoslam, 2018)



(lidaretto.com, 2020)

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Point cloud – combination of static and kinematic measurement

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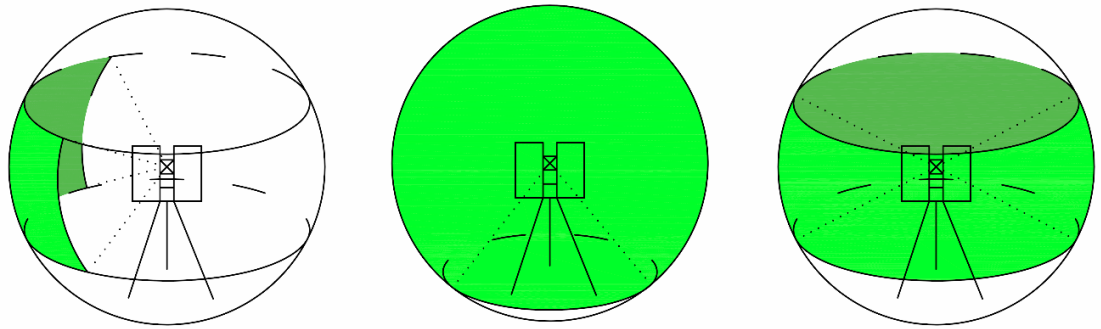
Categorization of laser scanning systems

- Field of view
  - Camera, panoramic, hybrid
- Range
  - Short range up to 150 m,
  - Middle range from 150 m to 450 m,
  - Long range up to several kilometers.
- Accuracy (full range)
  - with accuracy better than 1 mm (most often triangulation scanners),
  - with accuracy from 1 mm to 10 mm (most often short range and middle range scanners),
  - with accuracy worst than 10 mm up to several centimeters (middle range and long-range scanners).



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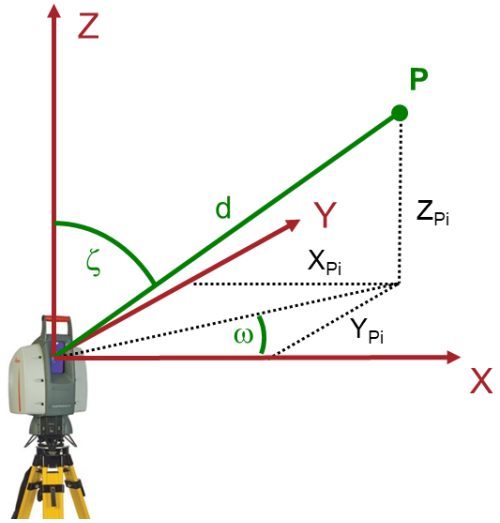
Laser scanning systems

- Polar method



- Distance measurement
  - Pulse time-of-flight,
  - Phase difference measurement.

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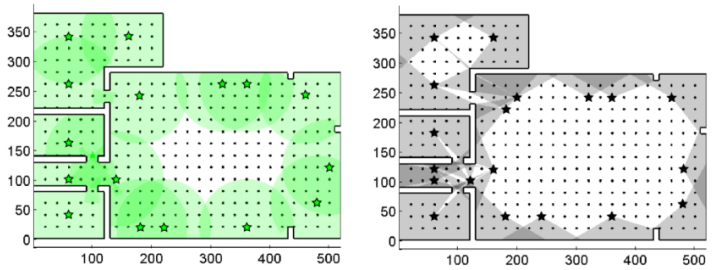
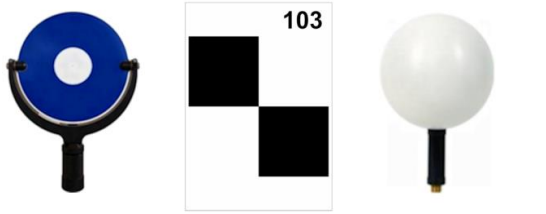
Measurement using TLS

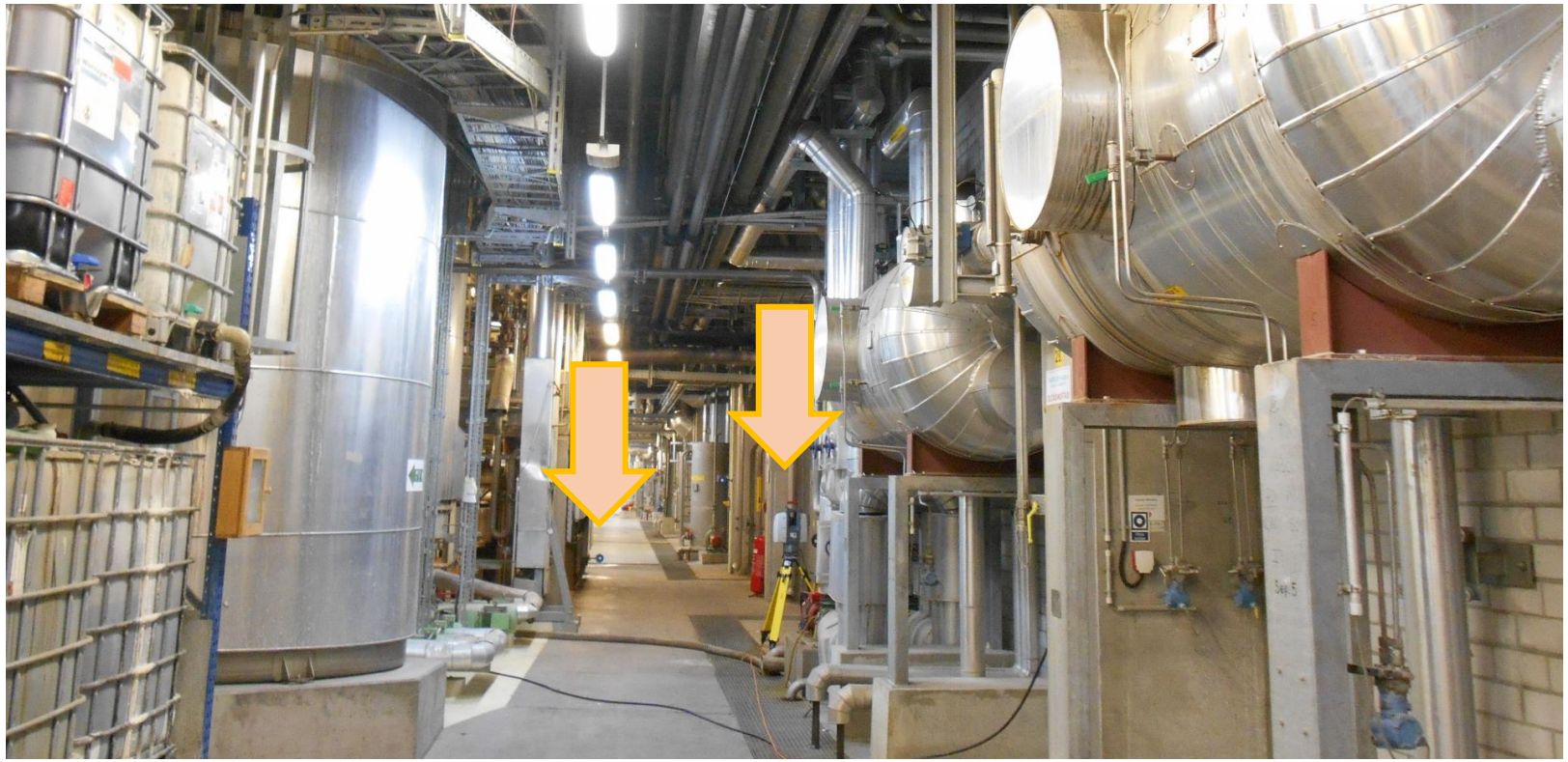
- Preparation for measurement



optimization of the position of TLS



signaling and stabilization of reference points



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Measurement using TLS

- Scanning
  - Field of view
  - Resolution

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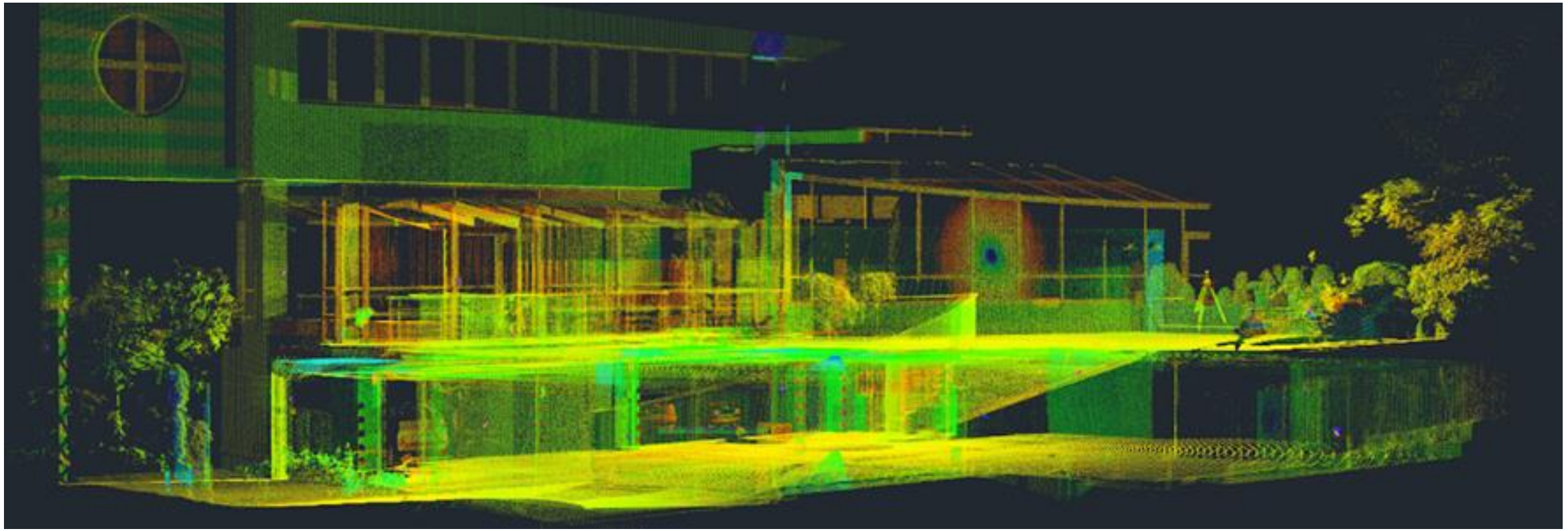
Measurement using TLS

- Scanning



Result of scanning – point cloud

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Thank you for your attention

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