Presented at the FIG e-Working Week 2021,
21-25 June 2021 in Virtually in the Netherlands

SMART SURVEYORS FOR LAND AND WATER MANAGEMENT
CHALLENGES IN A NEW REALITY

FIG NL THE NETHERLANDS

e WORKING WEEK 2021
20-25 JUNE

Rossi Paolo

11011

# Commercial Devices for a Quick and Non-Invasive 3D Survey and Geometrical Monitoring of Buildings

23 June, 17:30-19.00

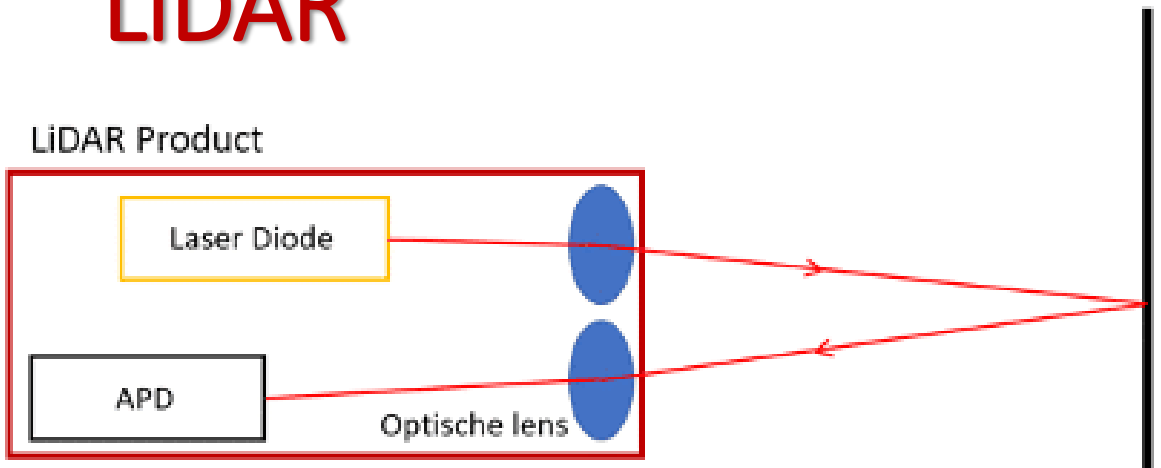
ORGANISED BY FIG GIN Geo-Informatie Nederland kadaster ITC UNIVERSITY OF TWENTE.

PLATINUM SPONSORS Trimble. esri THE SCIENCE OF WHERE

# SUMMARY

- Mobile devices' LiDAR sensor
- Commercial apps for 3D surveying and information extraction
- Fixed cameras for crack monitoring

# LiDAR





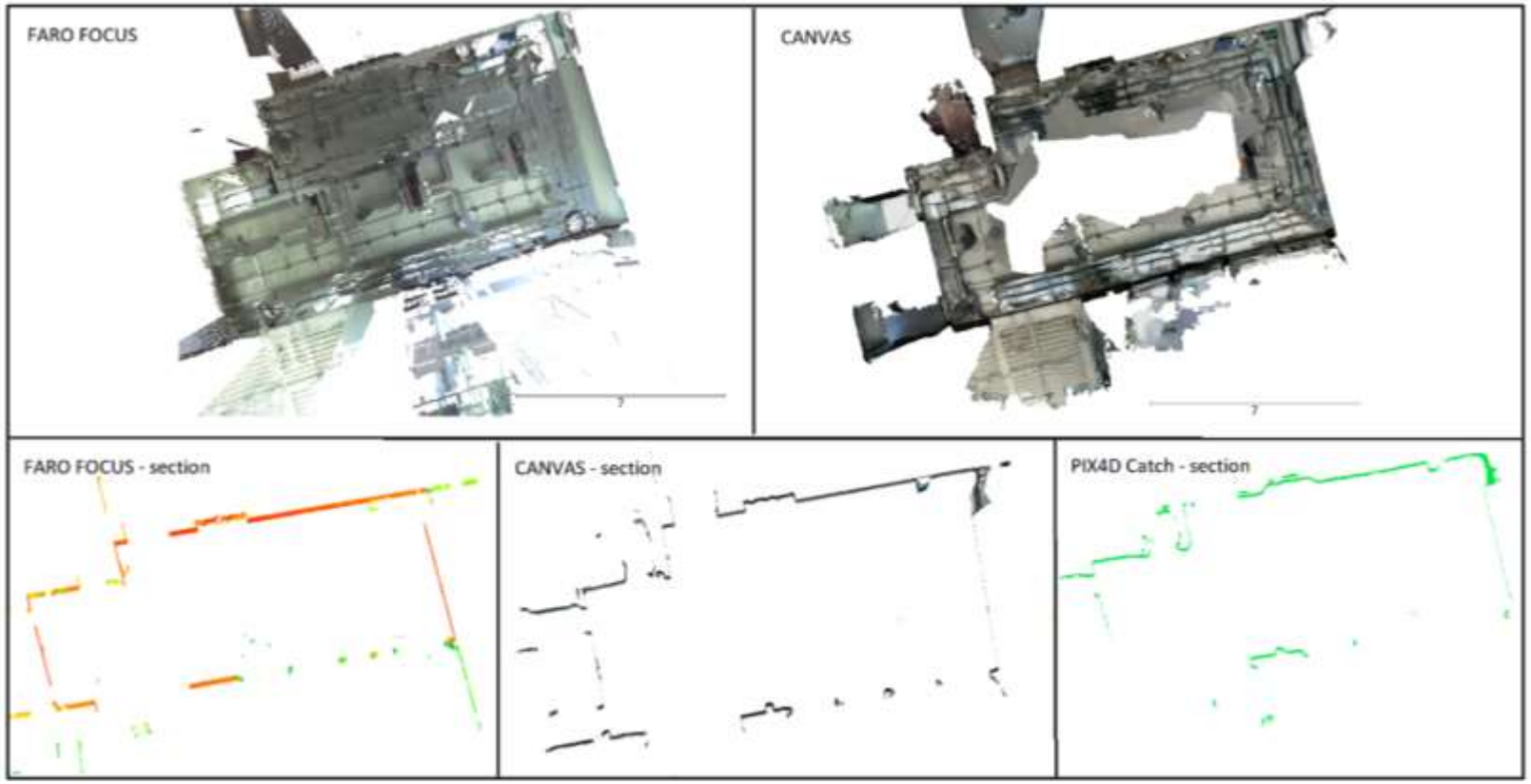
- Light Detection and Ranging
- Time of Flight technology
- Reflected light

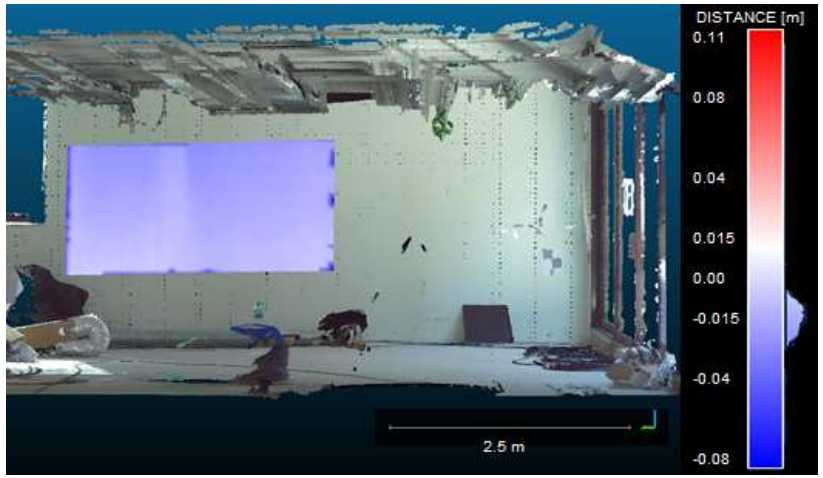
- Emitting and receiving arrays combining time and further info to create a 3D map
- IR wave length
- Resolution & Range

# COMMERCIAL DEVICES

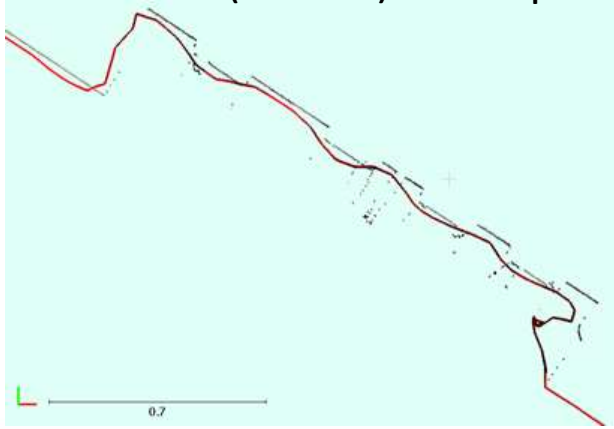
GNSS + IMU

# COMMERCIAL DEVICES vs TLS




Reprocessed mesh(Canvas) vs TLS point cloud



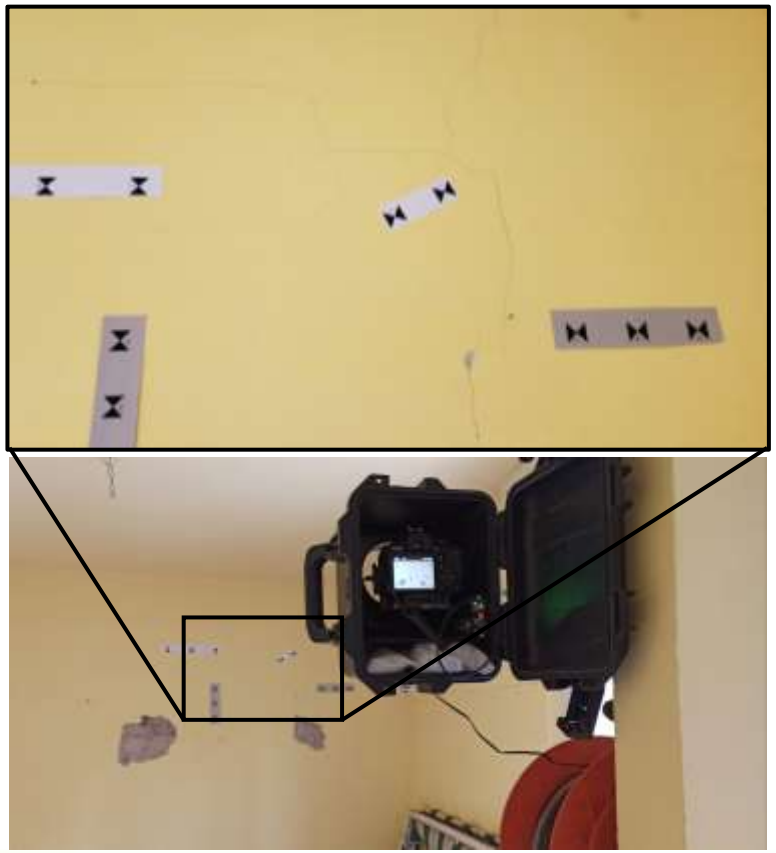
# FIXED CAMERAS for MONITORING

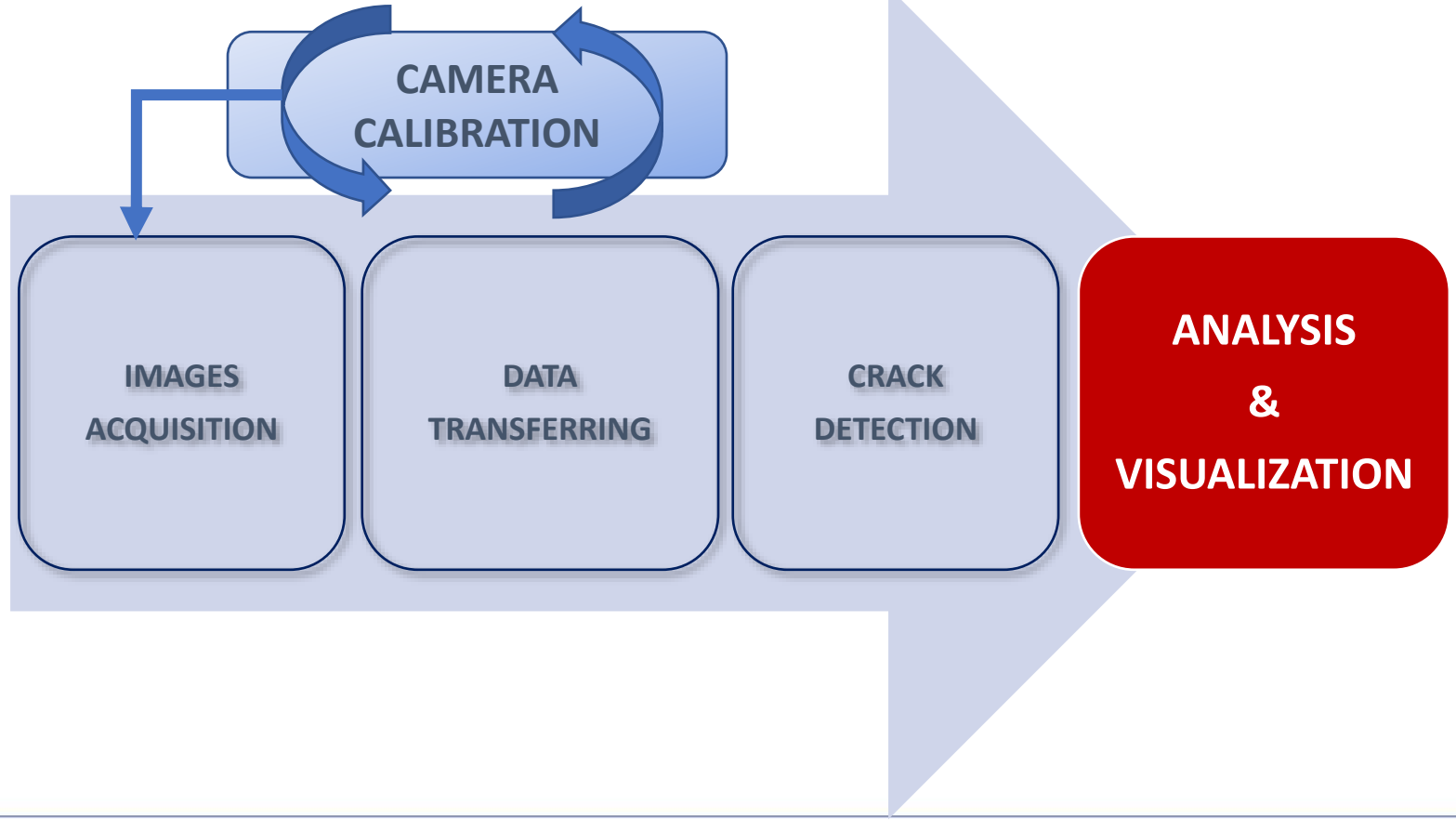
Cyclapse

Bixion

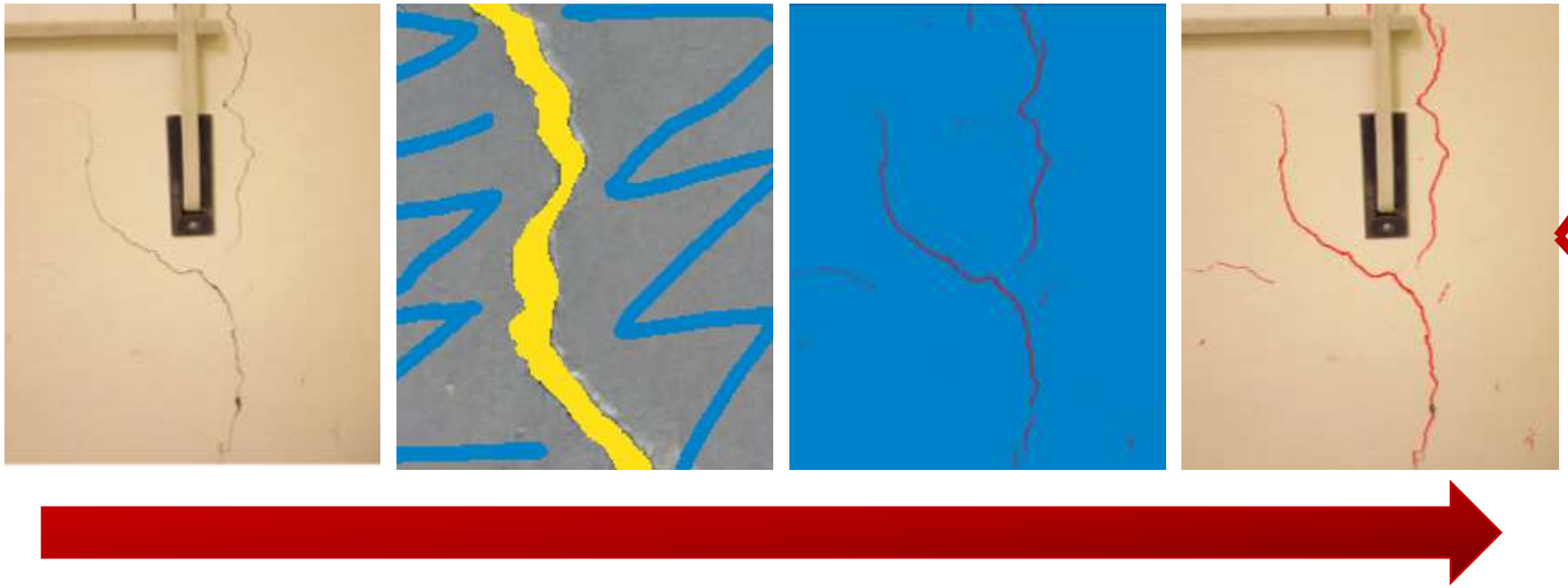
- High repeatability of the survey
- Single / multiple cameras
  - 3D products
- Acquisition rate
- Triggering
- Pixel-based analysis

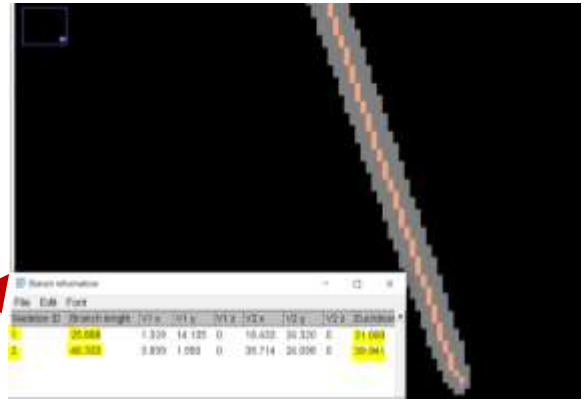
# SINGLE CAMERA for CRACK MONITORING



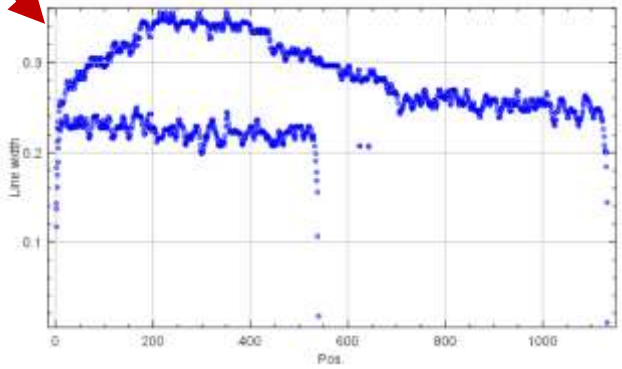


# CRACK MONITORING





Crack / Line length & width



# CONCLUSIONS

- "Commercial LiDAR":
  - great potential of the technology, low operative range and resolution, smoothed geometries;
  - difficult to reconstruct  an entire apartment within a single project, merging of different projects is required
- Fixed cameras
  - Proper installation (stability, power supply, data transferring);
  - Automatic data acquisition;
  - Processing requires improvements in terms of automation of data processing and analysis, and automatic crack detection (machine learning approach)
- Consumer grade sensor are suitable for 3D surveying and monitoring of buildings
- Different applications require different methodologies - sensors