

# THW: The Federal Agency for Technical Relief



**Civil Protection Operations – Gaps and Future Trends  
Instrumentation-based Disaster Response and Damage  
Assessment - Michael Markus**

# Agenda

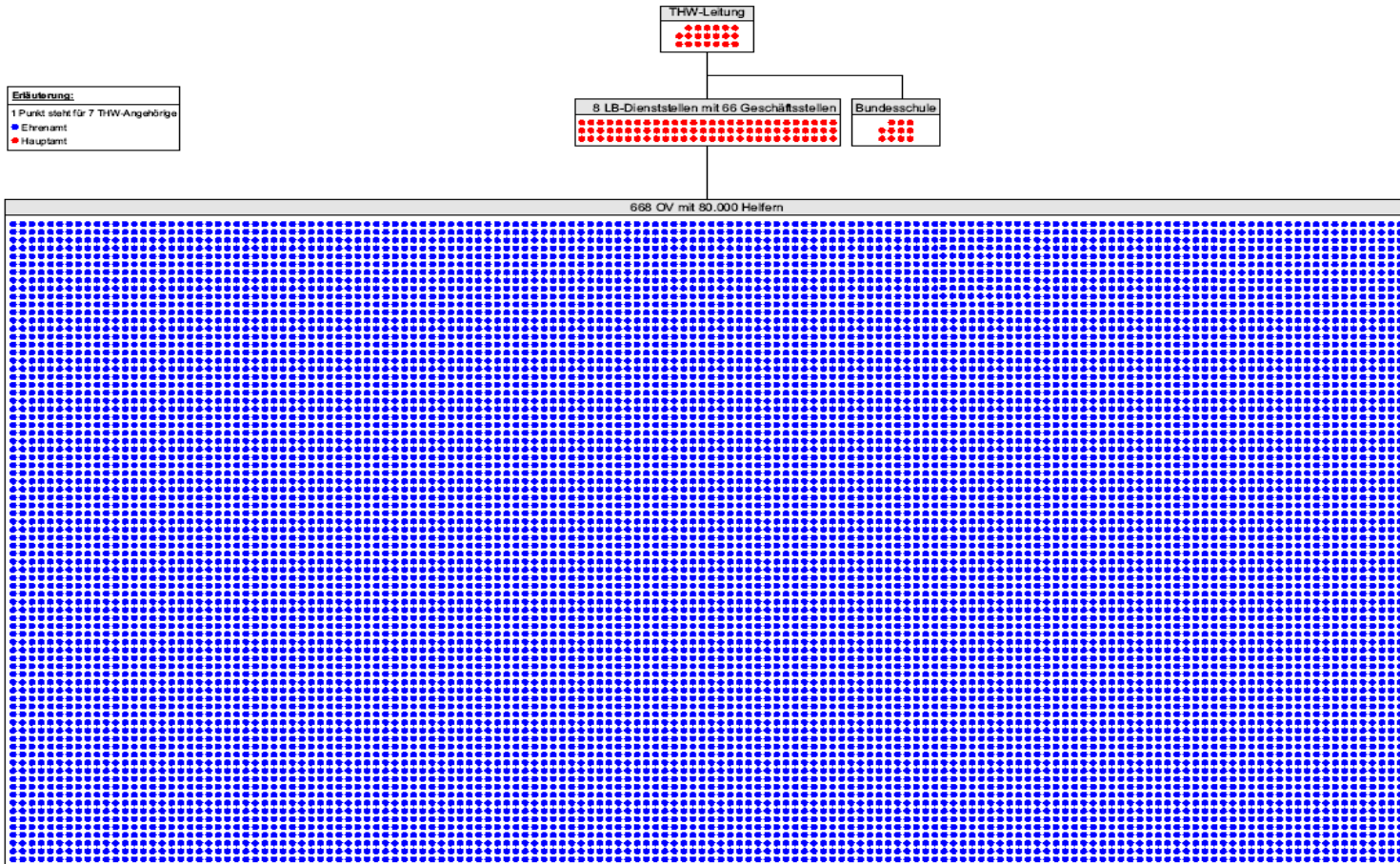
- Short Presentation of the THW
- Damage assessment and monitoring
- Mission examples
- Further development

# THW

- Founded in 1950 as a federal agency belonging to the Federal Ministry of the Interior
- 80,000 Volunteers
- 800 full time only
- Annual budget of 180 million EUR



# THW: Volunteers & Employees



# THW abilities



Locate



Clean



Vacate



Coordinate



Repair



Pump



Catering



Illuminate



Wire



Blast



Re-build



Purify

# Agenda

- Short Presentation of the THW
- **Damage assessment and monitoring**
- Mission examples
- Further development



# Risk Assessment- Mobile Flood Gauge



# Mobile Flood Gauge



[christian.praegitzer@thw-backnang.de](mailto:christian.praegitzer@thw-backnang.de)

[steffen.hoffmann@thw-backnang.de](mailto:steffen.hoffmann@thw-backnang.de)





# Mobile Flood Gauge

## Websurface

Erprobung mobile Hochwasserpegel - THW Backnang

Home

Pegelstände:  
Demonstration  
Auffahrt Stadtparkhaus  
Murr Murrhardt

Gefährungsdatenbank:  
Demonstration  
Auffahrt Stadtparkhaus  
Murr Murrhardt

Meldungen

Telefonliste

Alarm eintragen  
Demonstration  
Auffahrt Stadtparkhaus  
Murr Murrhardt

Admin

Downloads

Profil

Log Out

Pegel Auffahrt Stadtparkhaus

Der Meßbereich ist von 0 bis 800 cm

**Achtung, es traten Messfehler bzw. Störungen auf**  
Darstellung in Listenform

Übersicht der letzten 5 Tage

■ cmH

Erprobung mobile Hochwasserpegel - THW Backnang

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Eingetragene Alarme:

Pegel	Rufnummer	Bemerkung	
100 cm	+491727479881	Pegelstand Murr Stadtparkhaus	<a href="#">löschen</a>
110 cm	+491727479881	Pegelstand Murr Stadtparkhaus	<a href="#">löschen</a>
120 cm	+491727479881	Pegelstand Murr Stadtparkhaus	<a href="#">löschen</a>

Neuer Eintrag

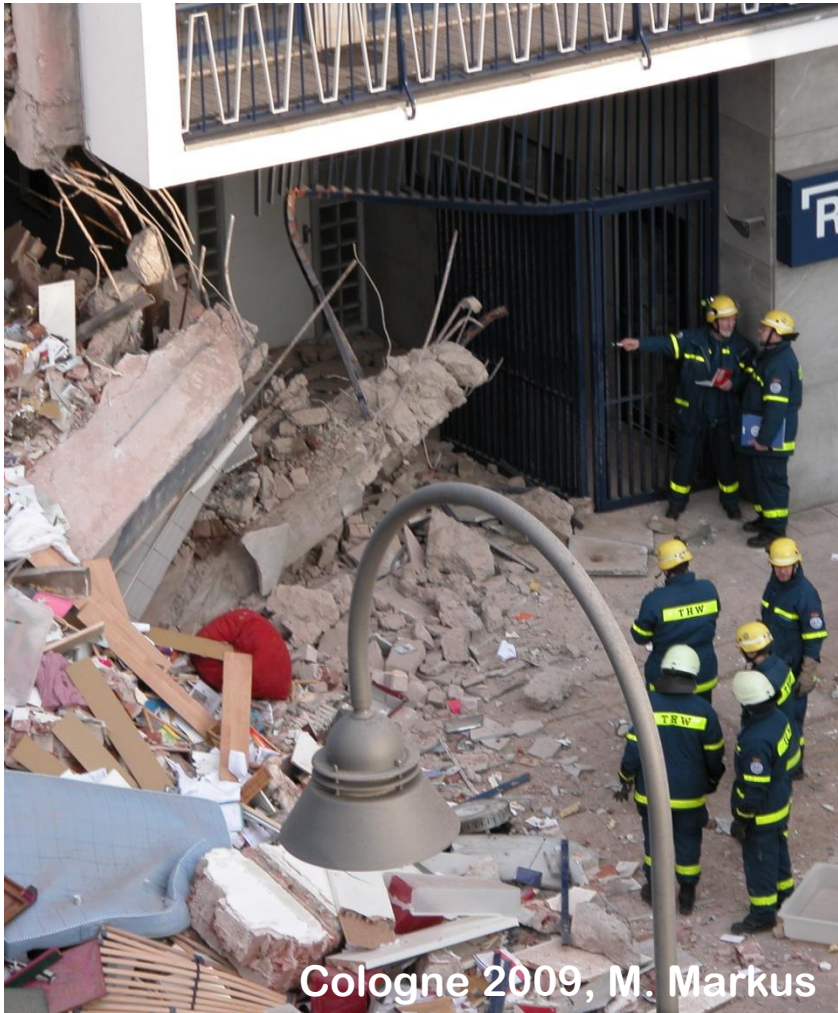
Rufnummer:

Pegel:  cm

Text:

Hinweise:  
Bitte tragen Sie Ihre  
Handynummer nur wie im  
folgenden Beispiel ein:  
+491757570255

# Structural Specialist/Safety and Security Officer

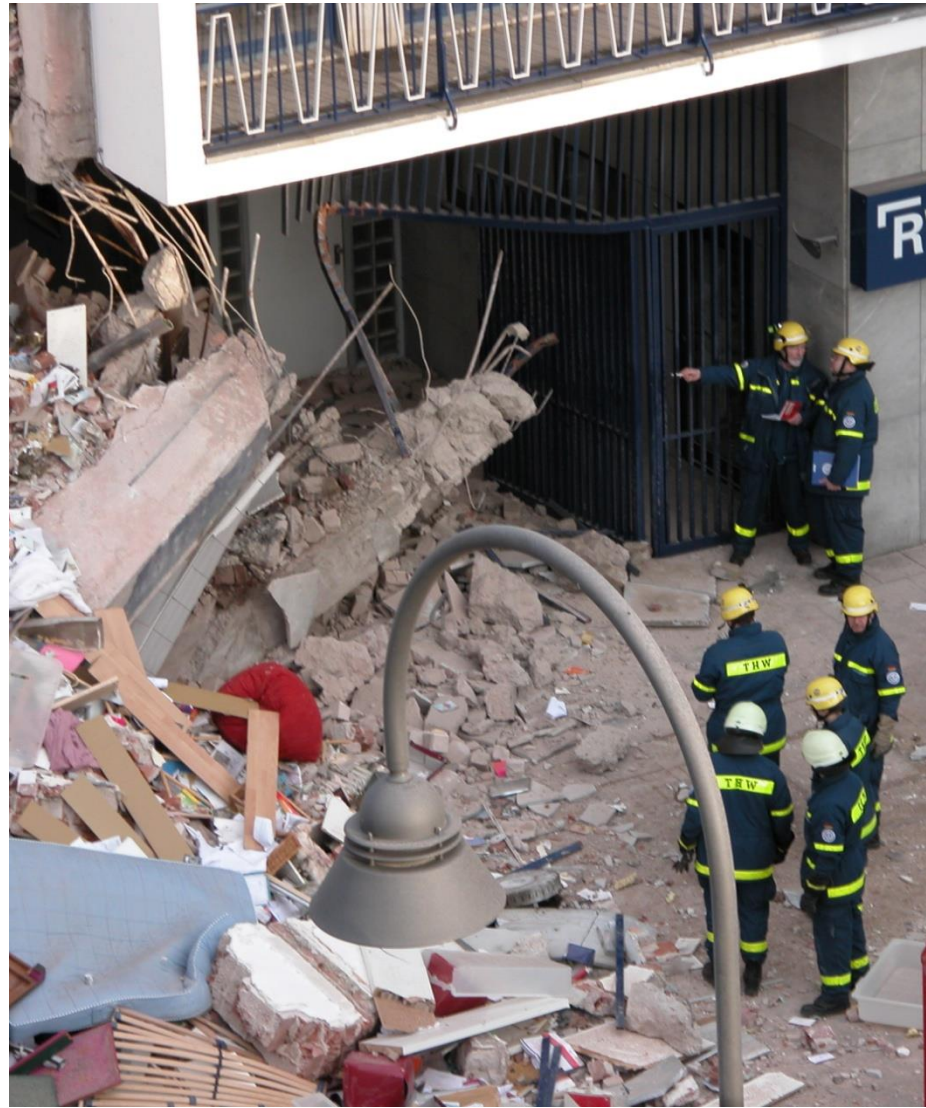


Cologne 2009, M. Markus

## Supports head of operations with advice:

- Hazards from damaged or collapsed structures
- Hazards during further operations
- Securing measures, e.g. shoring, monitoring
- Possible positions of victims under the debris
- Possibilities to advance to victims
- Rescue techniques









# Monitoring of partly damaged structures

Damaged buildings and the risk of further collapse endanger

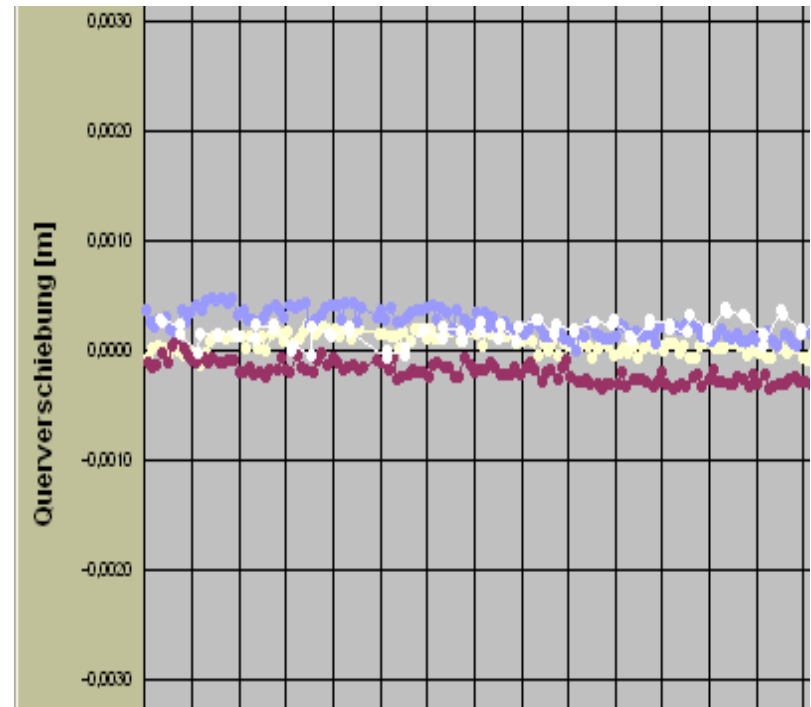
- Fire fighters working in or near damaged structures
- Urban search and rescue missions saving trapped victims
- Technical teams reinforcing damaged buildings
- .. and victims under the rubble.





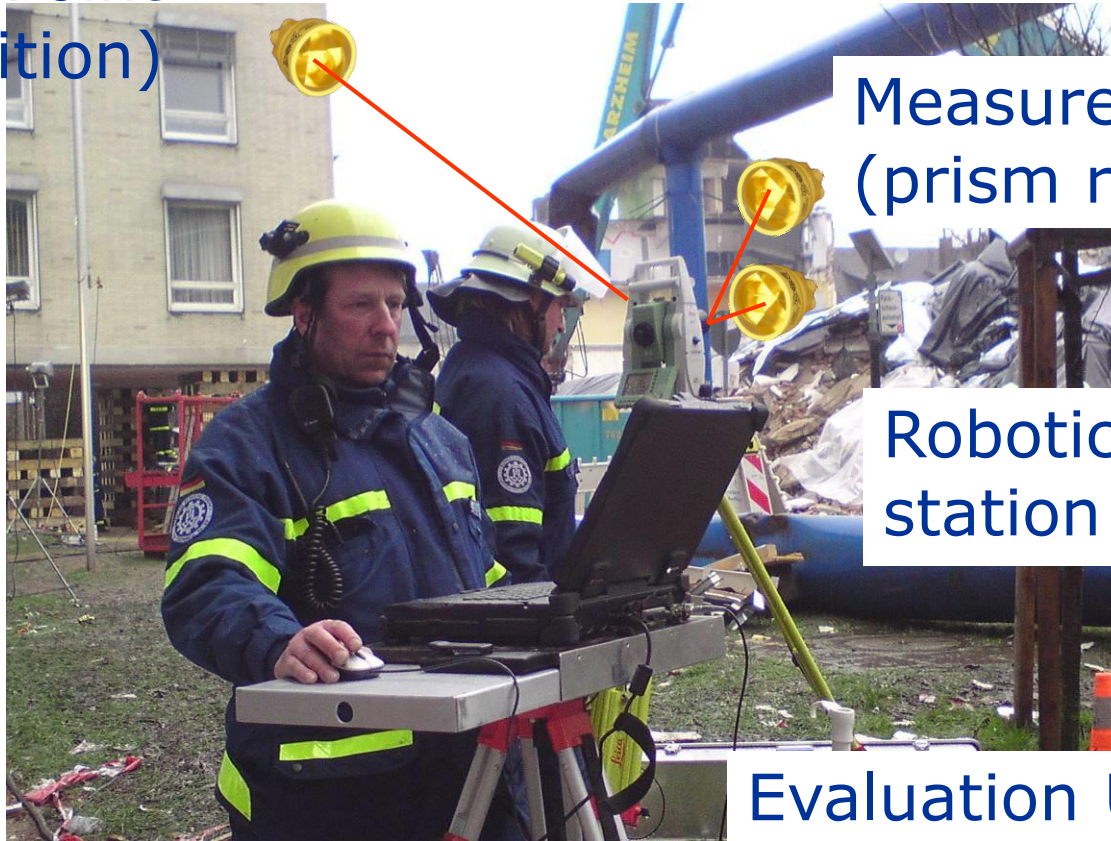
# Monitoring of partly damaged structures

- THW uses a Leica monitoring system
  - A total station automatically measures the 3D position of different specified points
  - Slightest movements can be detected (less than 0,1 mm resolution)



# Monitoring System

Control Point  
(fixed position)



Measurement Points  
(prism reflectors)

Robotic total  
station

Evaluation Unit

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# Example 1: Konstanz, 23.12.2010





























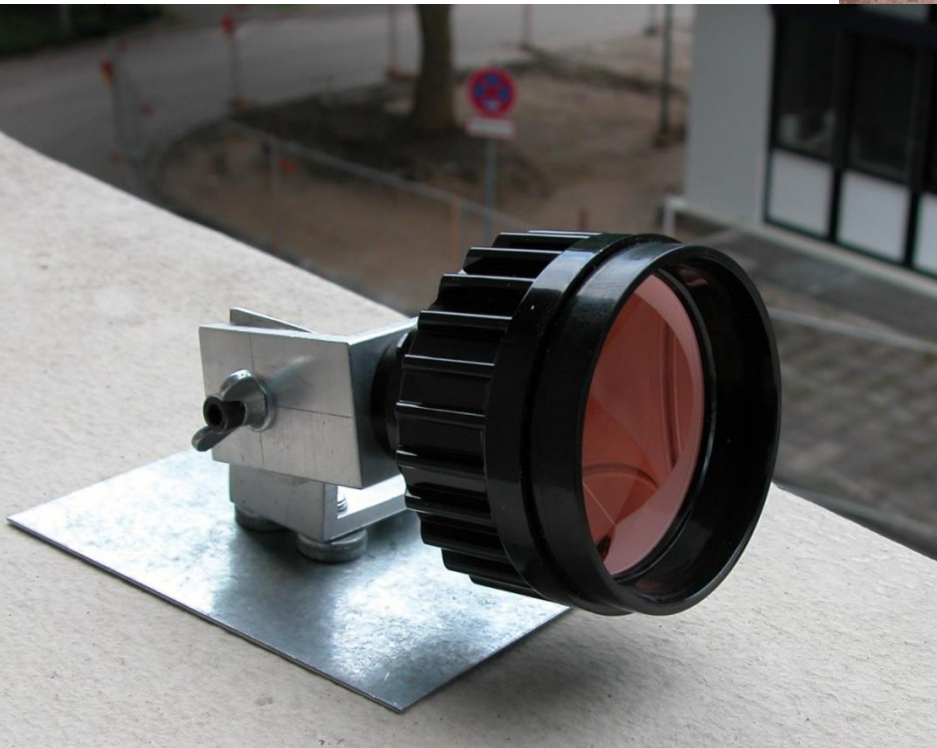
# Example 1: Konstanz, 23.12.2010





# Attachment of prism reflectors

Gas actuated  
fastening tool



Magnetic mounting device  
with prism reflector on a  
metal sheet

# Attachment of the metal sheet



Konstanz  
2010,  
M.Markus



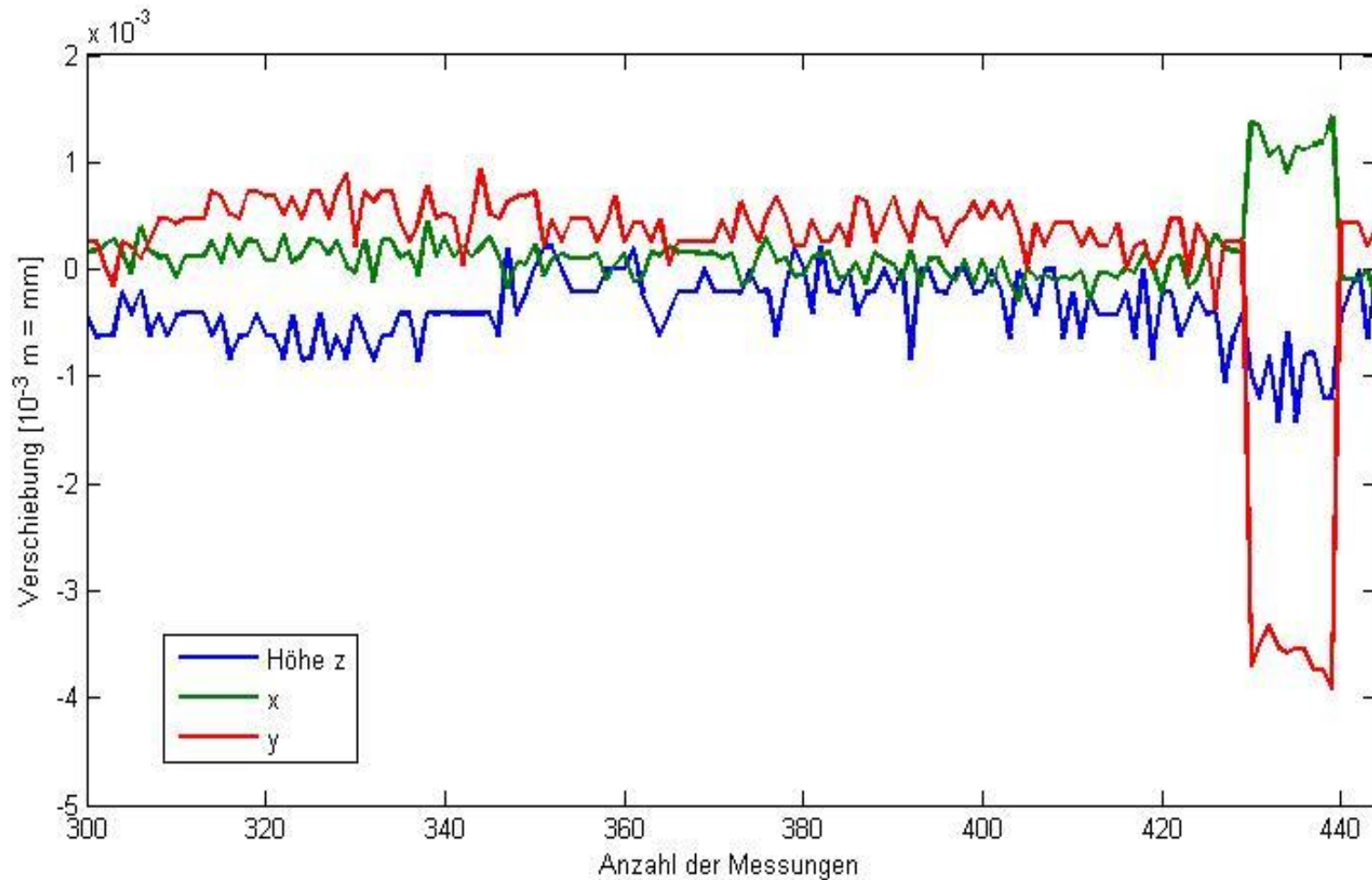
# Single point observation



SW  
m  
in  
20



# Konstanz, measured event





## Example 2: Landslide in Mössingen near Stuttgart



irrespective of their physical or mental  
condition



## Example 2: Landslide in Mössingen near Stuttgart



## Example 2: Landslide in Mössingen near Stuttgart



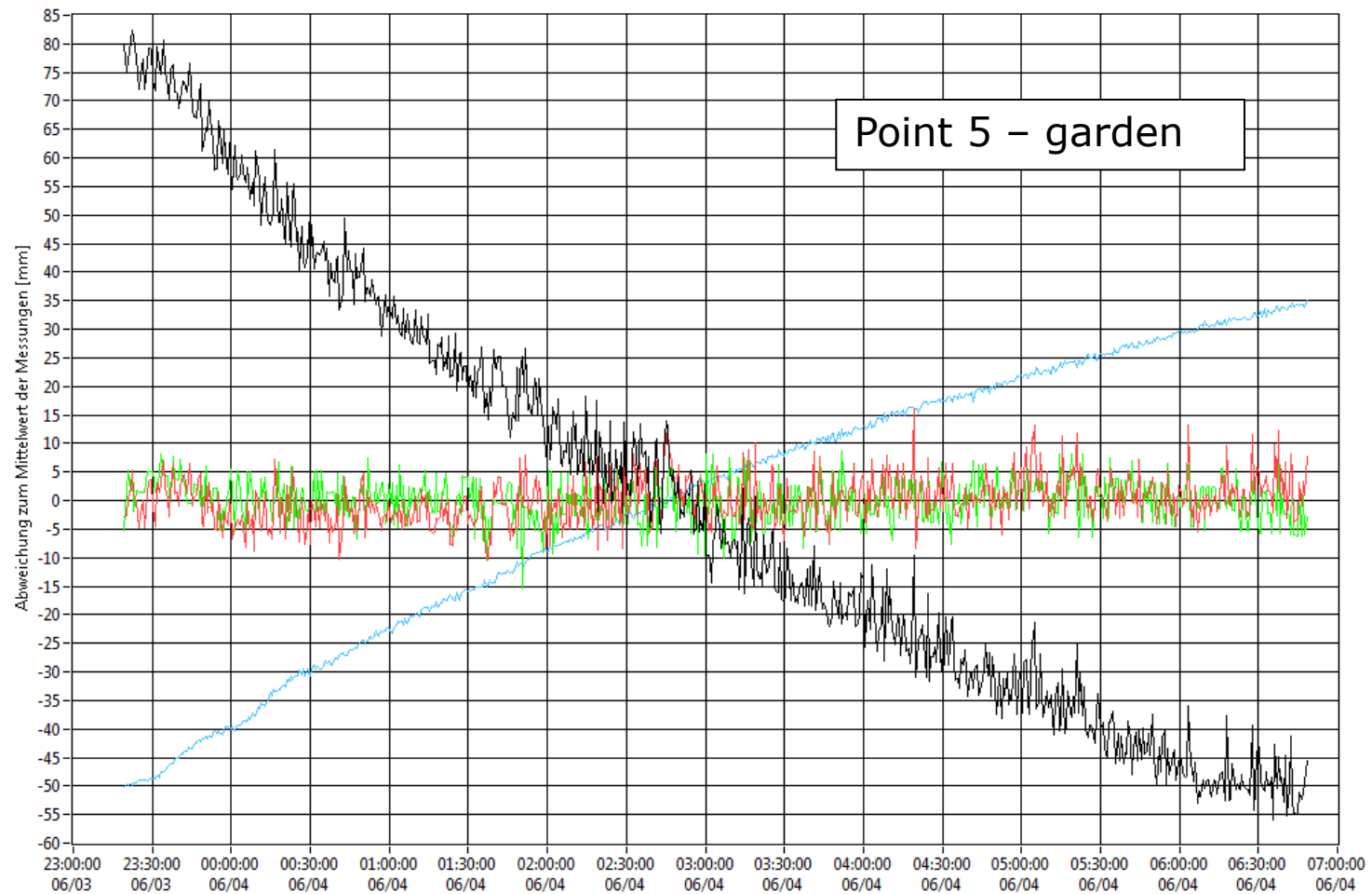


## Example 2: Landslide in Mössingen near Stuttgart

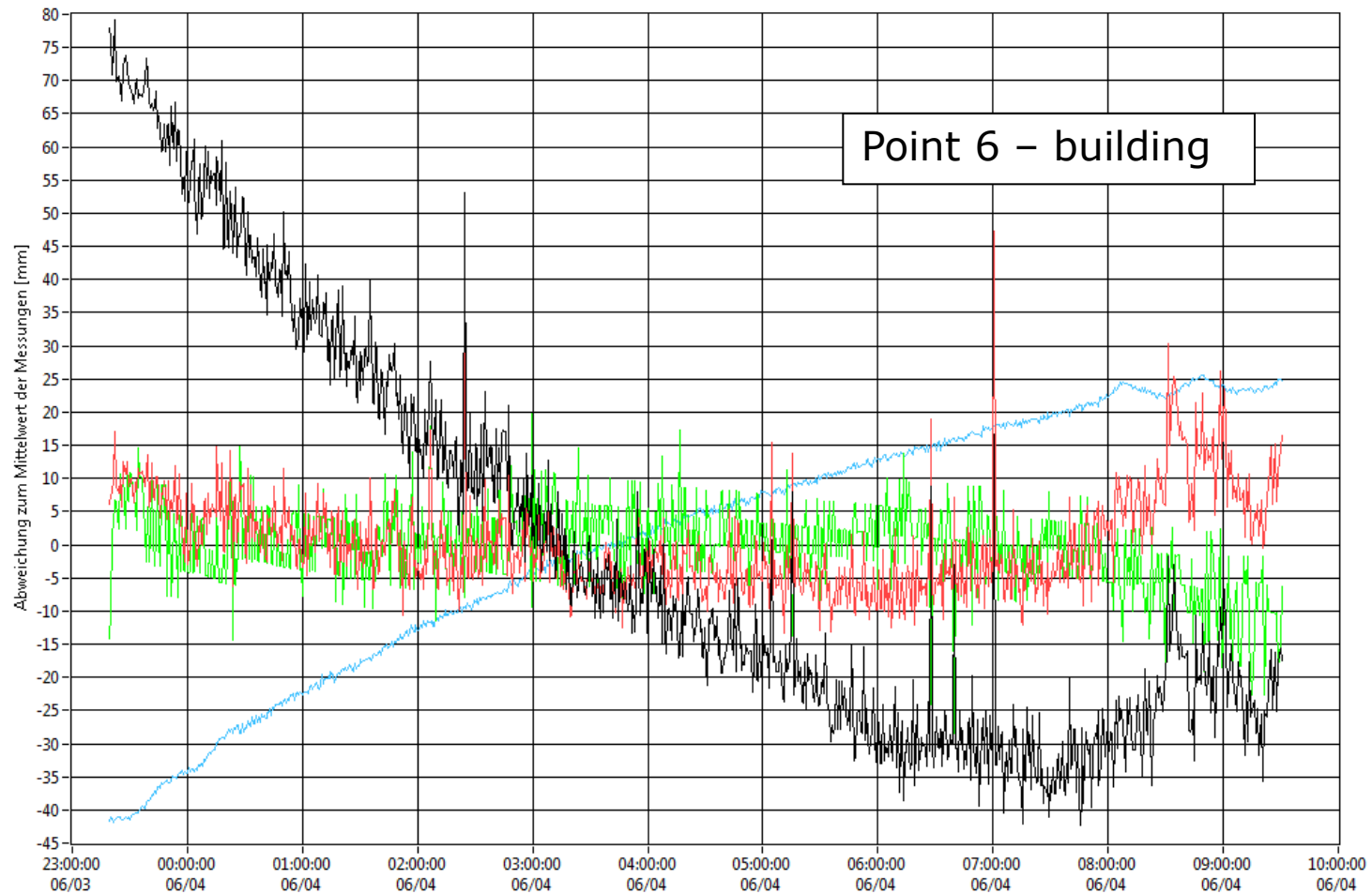




## Example 2: Landslide in Mössingen near Stuttgart



## Example 2: Landslide in Mössingen near Stuttgart



## ■ What we need (in this field)

- To look into the buildings/structures, visually and structural conditions
- To detect changes fast in a large observed area
- Detect living persons under the debris
- Reliable information



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## THW Consortium Coordinator in two H2020 projects:

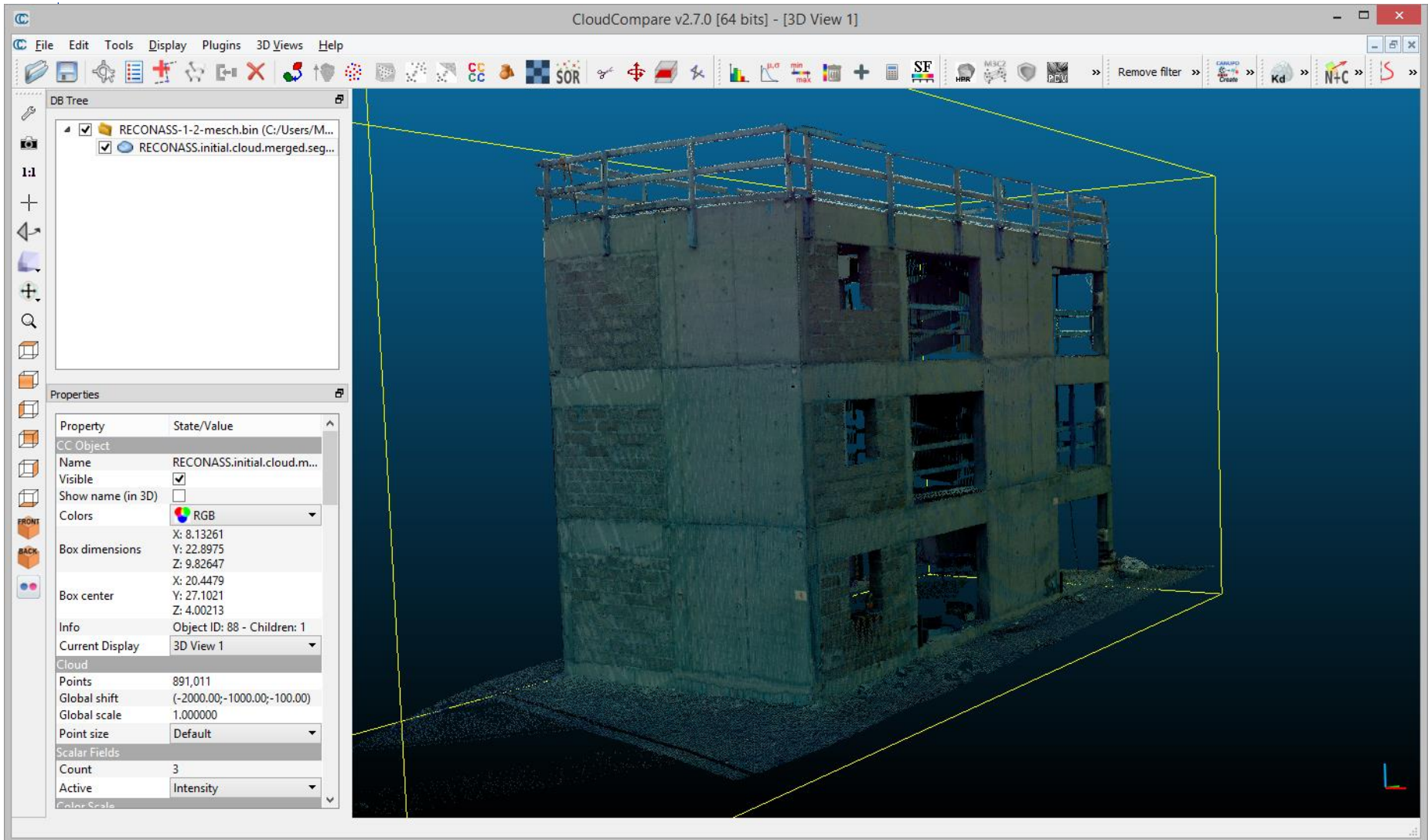
- **SAY-SO (SEC-02-DRS)** – Situational awareness systems to support civil protection preparation and operational decision making
- **DAREnet (SEC-21b-GM)** – Practitioners (end-users) from different disciplines and concerned with current or future security or disaster risk and crisis management issues in the Danube River Basin

## HW Consortium Partner in 1 H2020 and 2 FP7 projects

- **FireIn (SEC-21-GM)** – Practitioners (end-users) from different disciplines and interested in improving national and European Fire and Rescue capabilities
- **DRIVER** (EU FP7) – monitoring and assessing innovative technologies supposed to assist civil protection entities
- **RECONASS** (EU FP7) – remote detection and assessment of structural damages to buildings



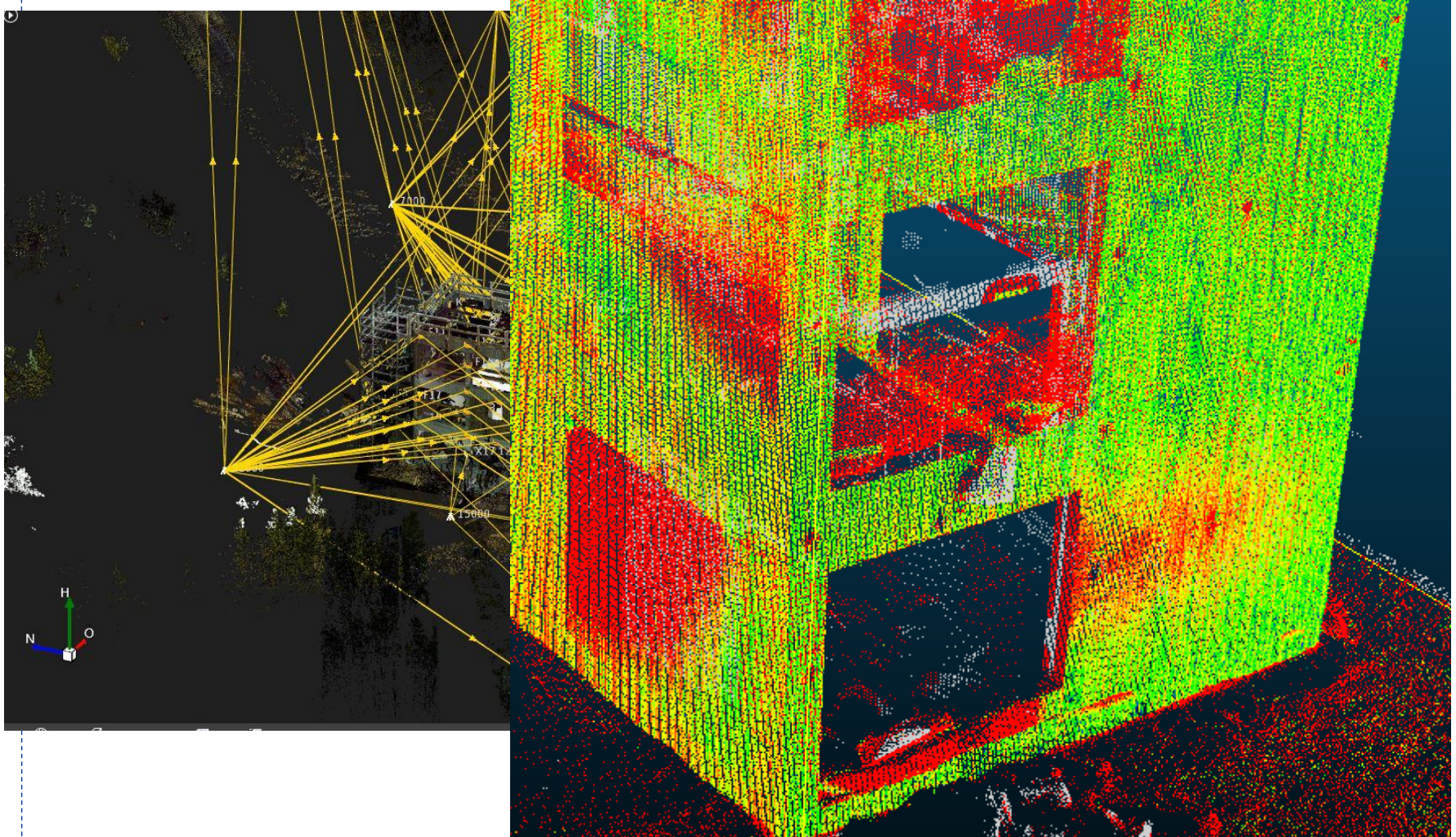
## Example: 3D scanning using a Leica total station





## Example:

## 3D scanning using for deformation detection





## Current national projects

- **PRAKOS** – (social) interaction / communication in disaster management
- **RAWIS** – monitoring structural integrity / movement of buildings
- **REBEKA** – resilience of responder organizations / involving citizens in disaster management
- **BERKoS** – project assisting German enduser organizations to submit H2020 proposals.

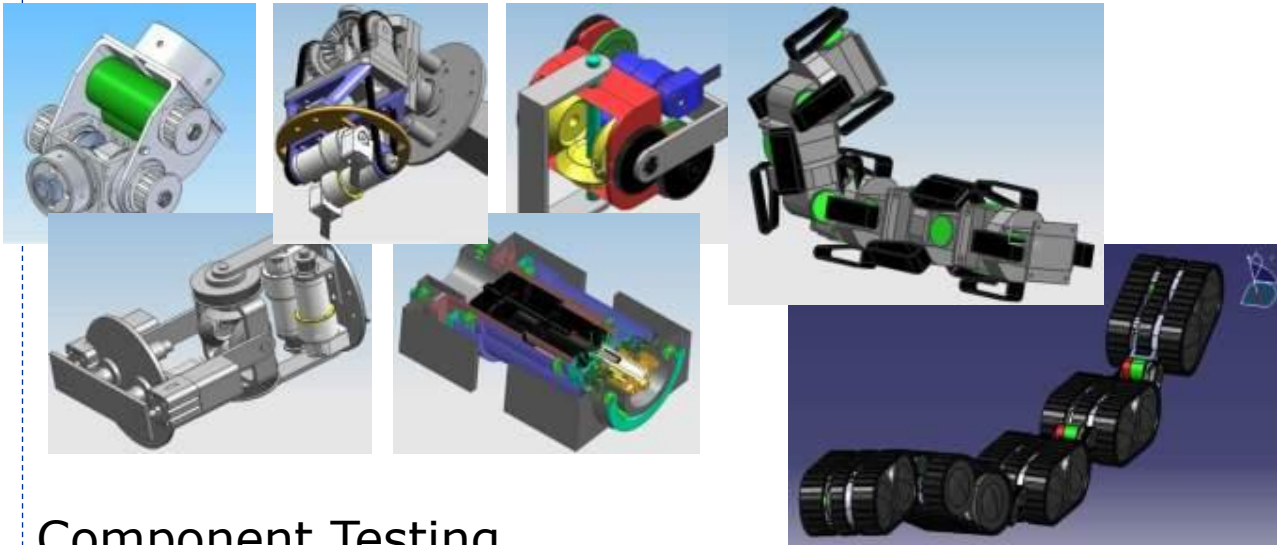
## Example: **RAWIS mimo RADAR monitoring system**





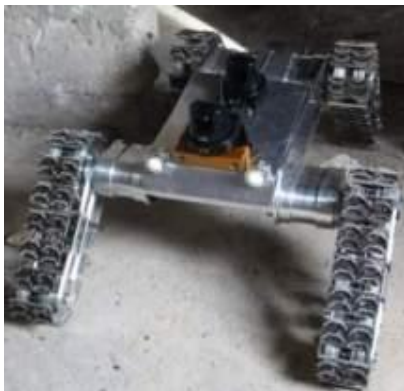
## Example: Reconnaissance Robotics

### Constructive Implementation



- installation space
- weight
- space utilization
- complexity
- manufacturability
- ...
- roadworthiness
- maneuverability
- all-terrain capability
- ...

### Component Testing



#### Actuators



#### Sensors



#### Electronics



- capability
- reliability
- ...
- mobility (traction)
- stability
- ...