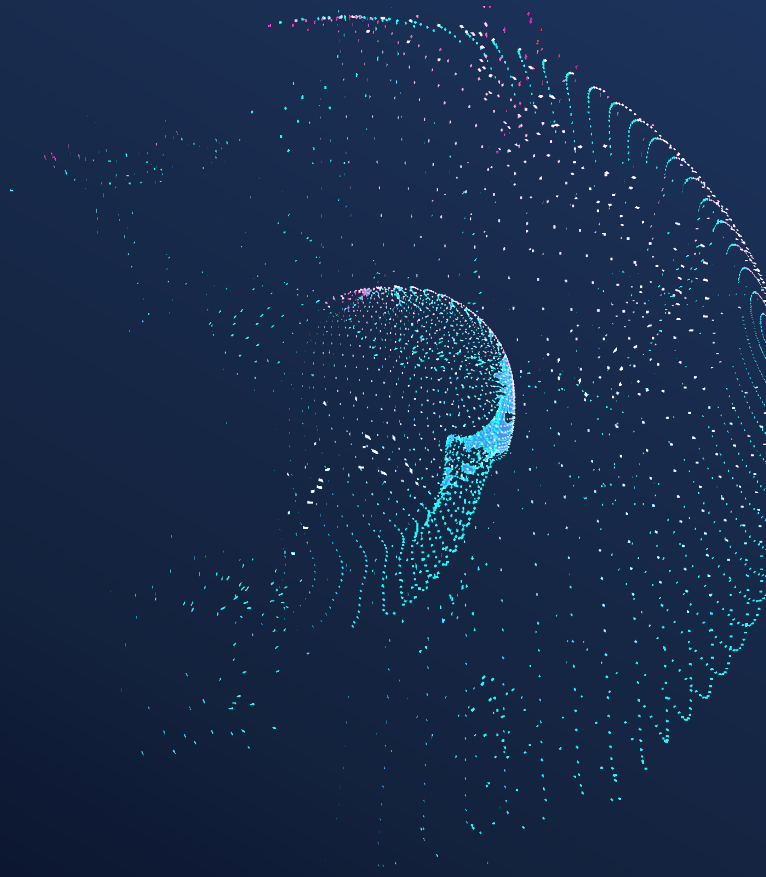
I-CONIC Vision

Photogrammetic Software for Real-Time Real-World 3D



I-CONIC

Real-time Landslide Mapping with Drone Video

Mikael Stern

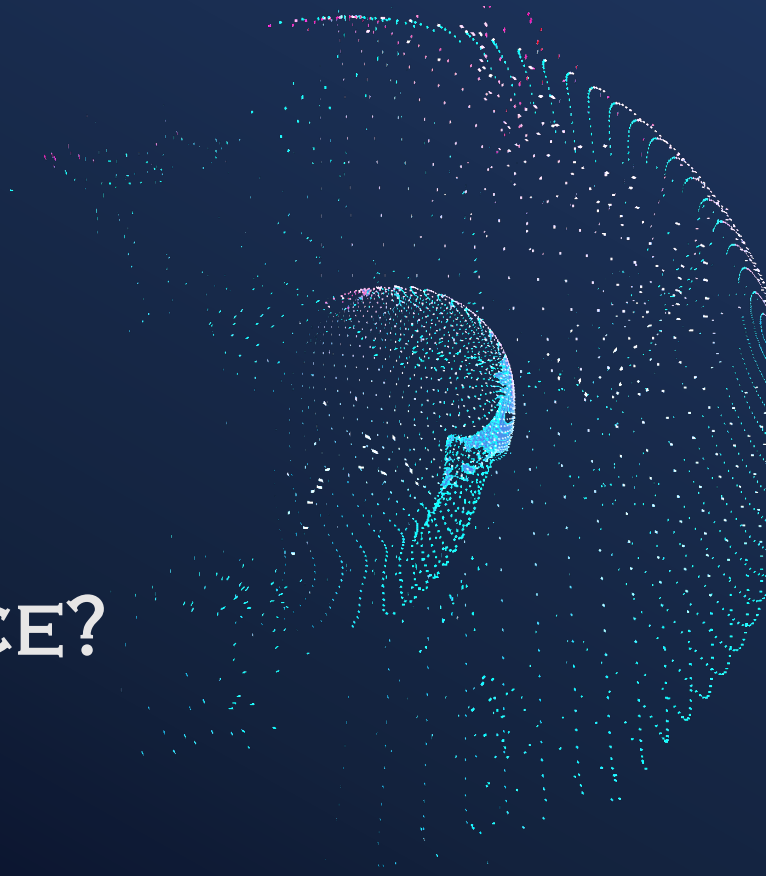
I-CONIC Vision

Geospatial World Forum 2021, Amsterdam

Disaster Management Session, 22 October

[Please note, this pdf version of the presentation do not contain the animations and videos.
Hence, some slides might be difficult to understand]

Real-time 3D
Does it Make a Difference?



Gjerdrum, Norway, 30 December 2020

Altitude Limit - Max Flight Altitude: 150
Sport
19:02
WIDE 1.0X
2.0X
SPD
00.0
077.5
ALT
mapbox

3D models took 4-6 hours to create

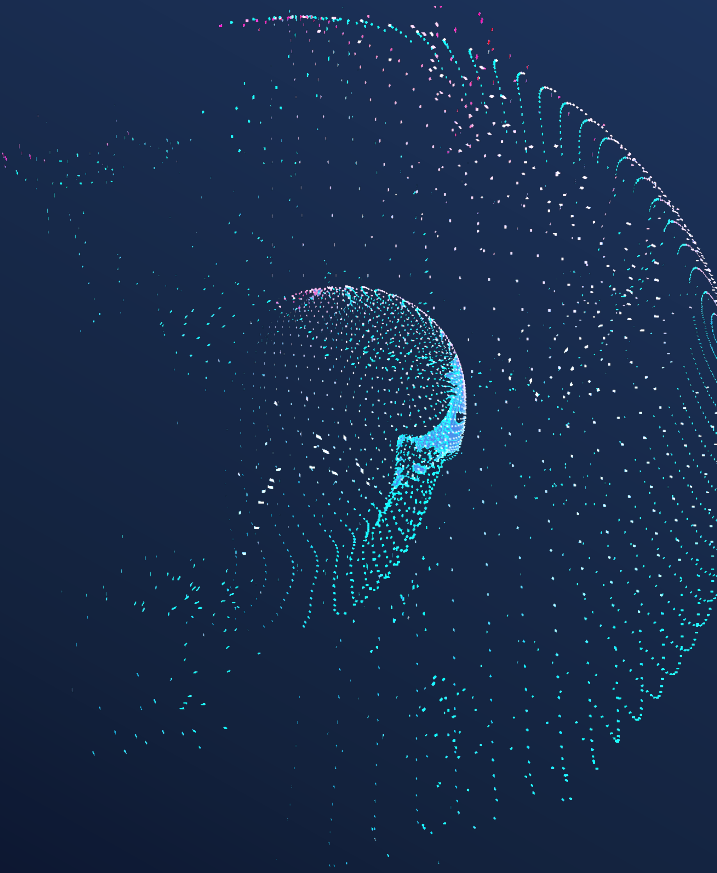
Project: Remote Landslide Mapping On-the-Fly

TYRÉNS

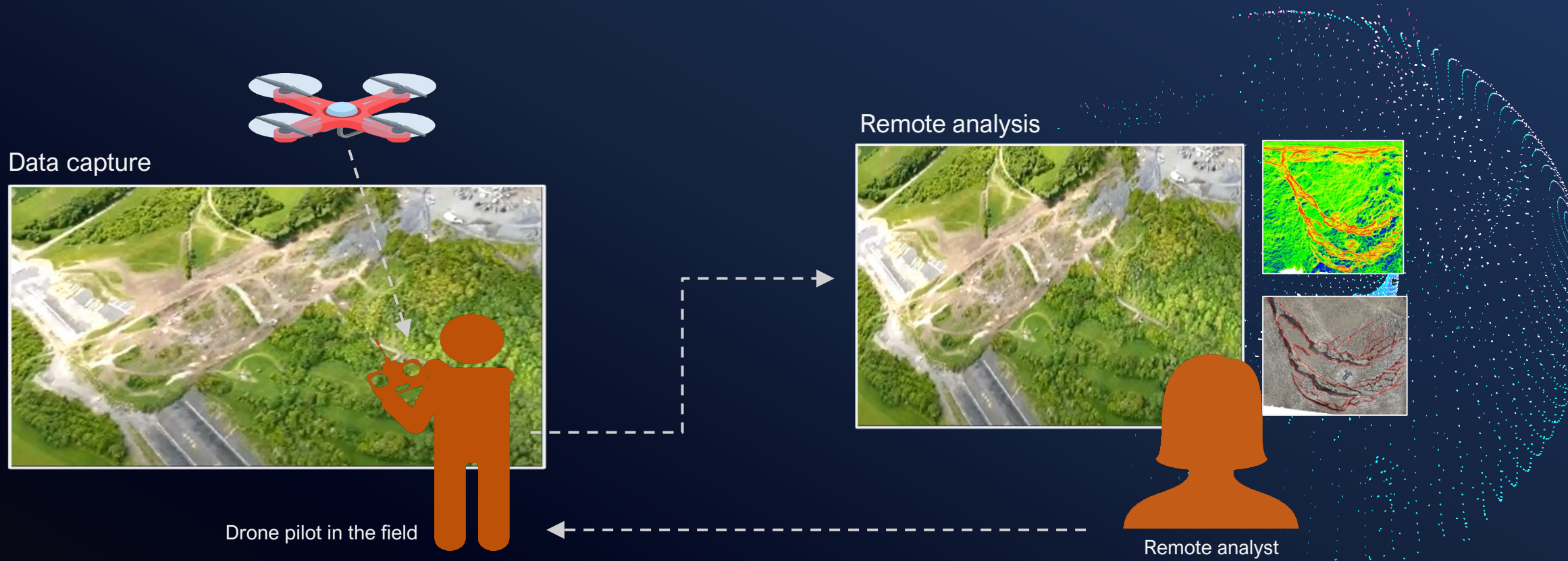
I-CONIC

Customer-driven Project on Real-time 3D

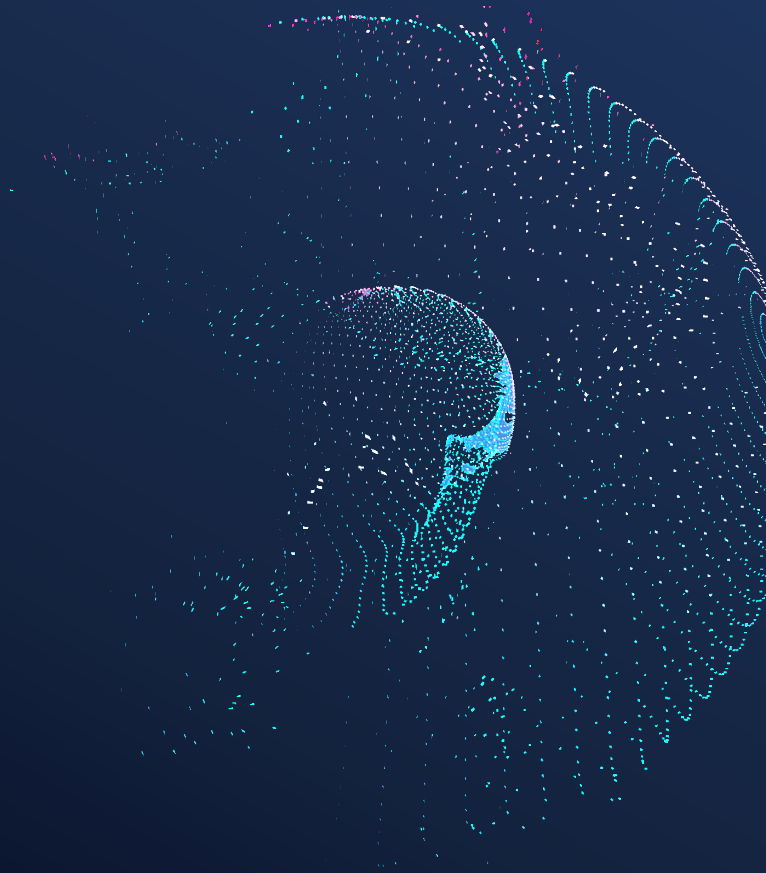
- Tyréns AB, geotechnical consultant company, landslide mapping
- Problem:
  - Small landslide mapping projects all over the country
  - Geotechnical experts located in a few places
  - How to save project time, travel time and money?



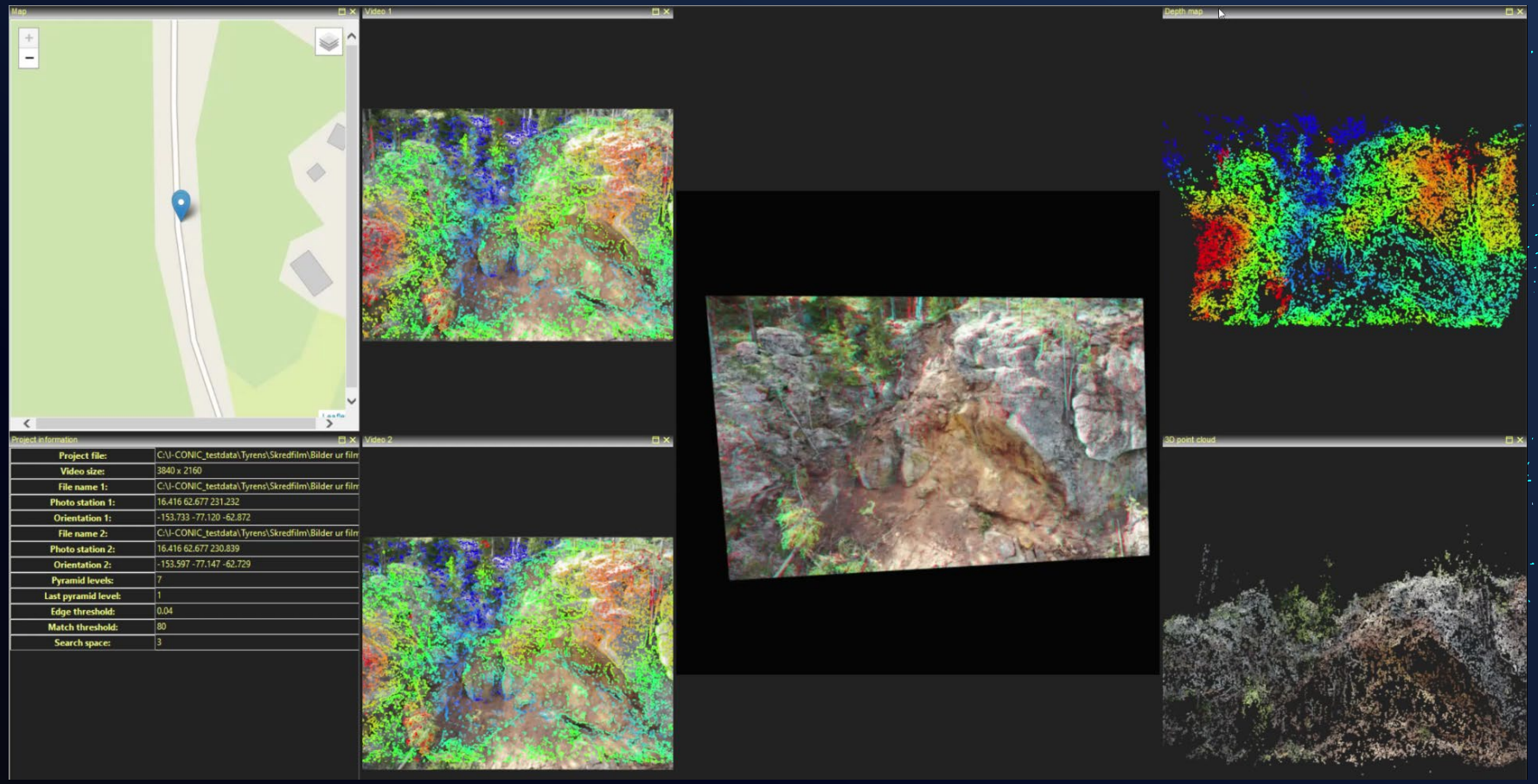
Workflow Concept

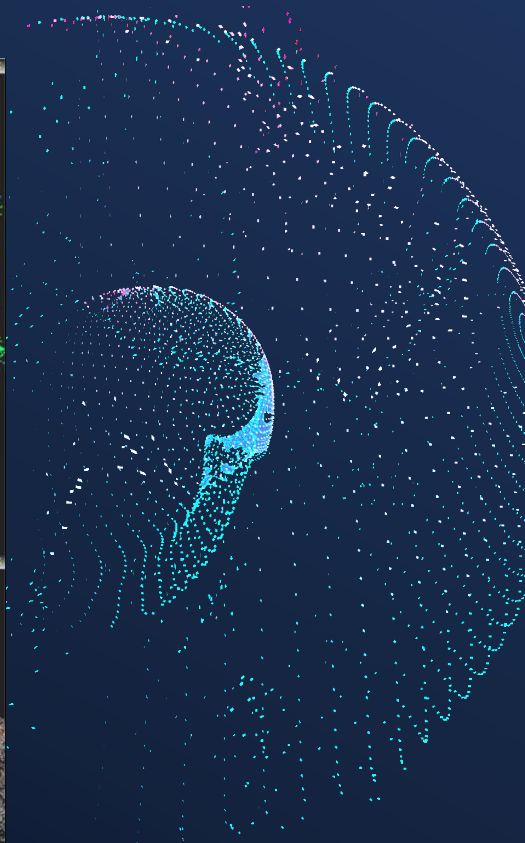


Drone Video of Rockslide



Real-time Processing

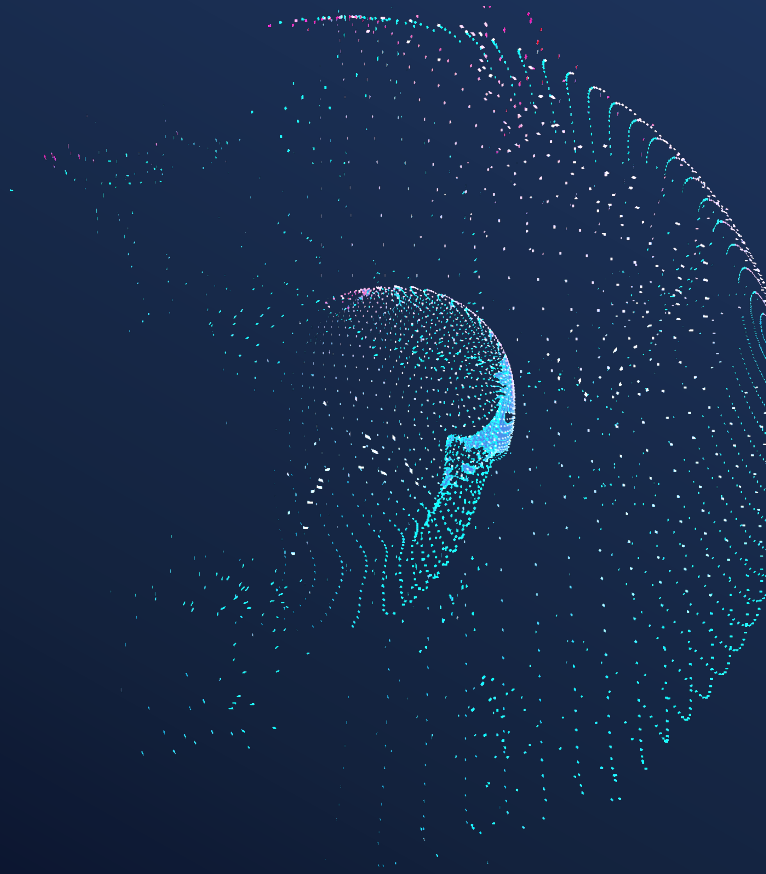




Thoughts and Conclusions on Real-time 3D

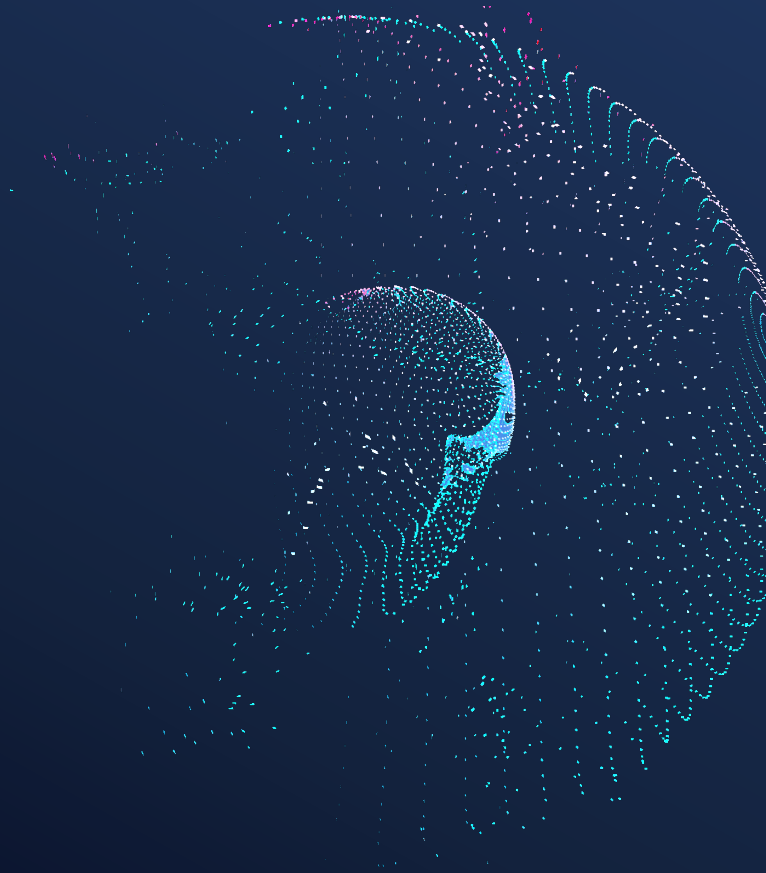
Early Conclusions from the Project

- Known issues
  - Communication
  - Metadata
- Processing time
  - Sufficient



Summary of Advantages

- Saves time
- Experts can be remotely located
- Immediate knowledge about collected data
- Low-cost, no expensive equipment



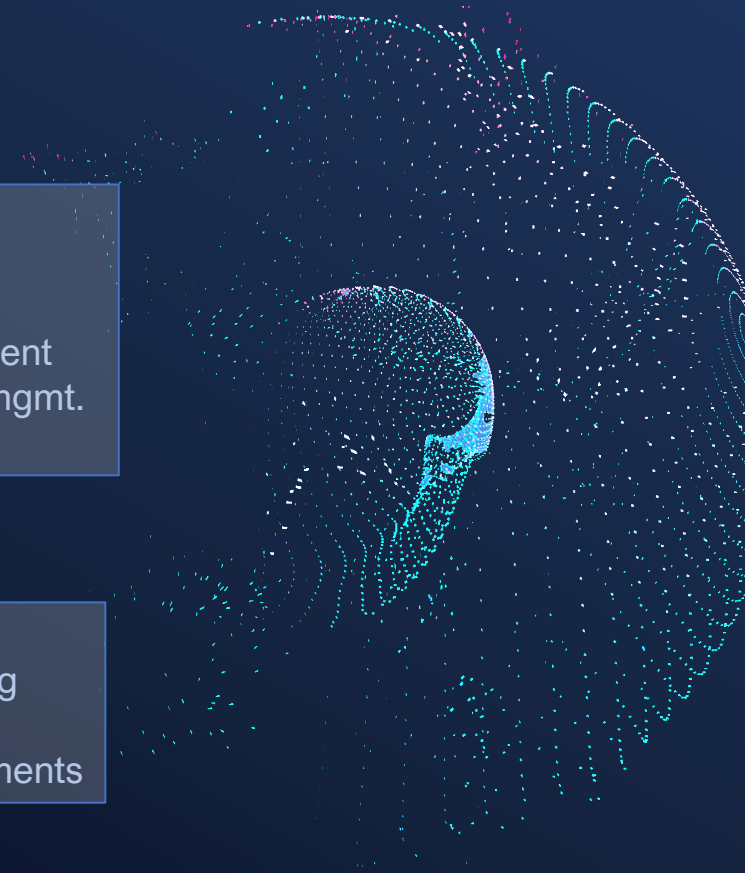
Which Applications Would Benefit

1. Current real-time applications – but no 3D or georeferencing
   - Location knowledge/accuracy
   - Precise real-time measurements
   - Real-time stereoscopic viewing
   - Data capture based on 3D analysis
   - Depth maps as a data layer in real-time AI
   - Saving time and money

Inspection
Firefighting
Law enforcement
Disaster management
Construction site mgmt.
Search & Rescue

2. Current 3D applications – but no real-time
   - Immediate check of data capture
   - Remote analysts to direct data capture
   - Saving time and money

Inspection
Landslide mapping
Mining
Volume measurements

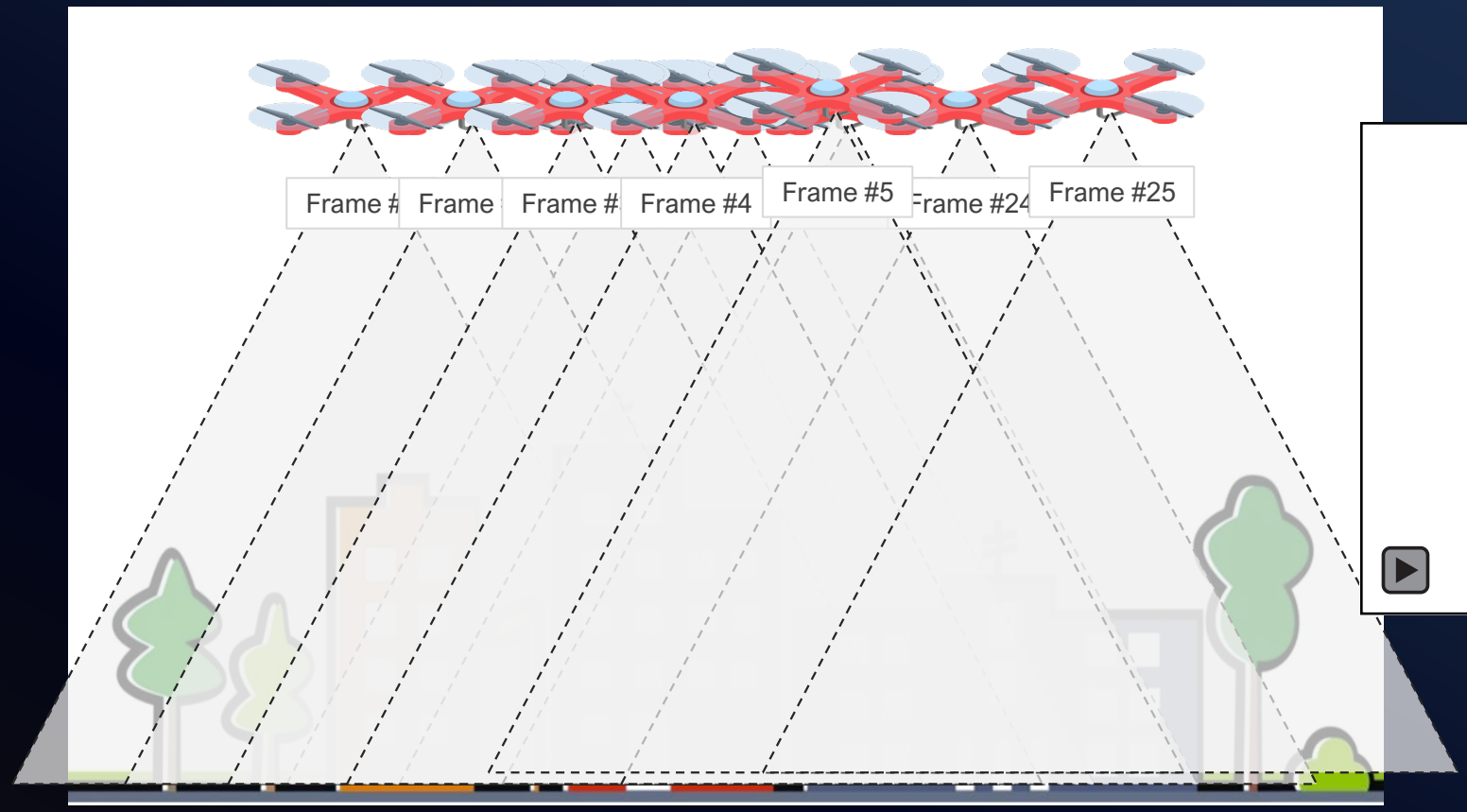


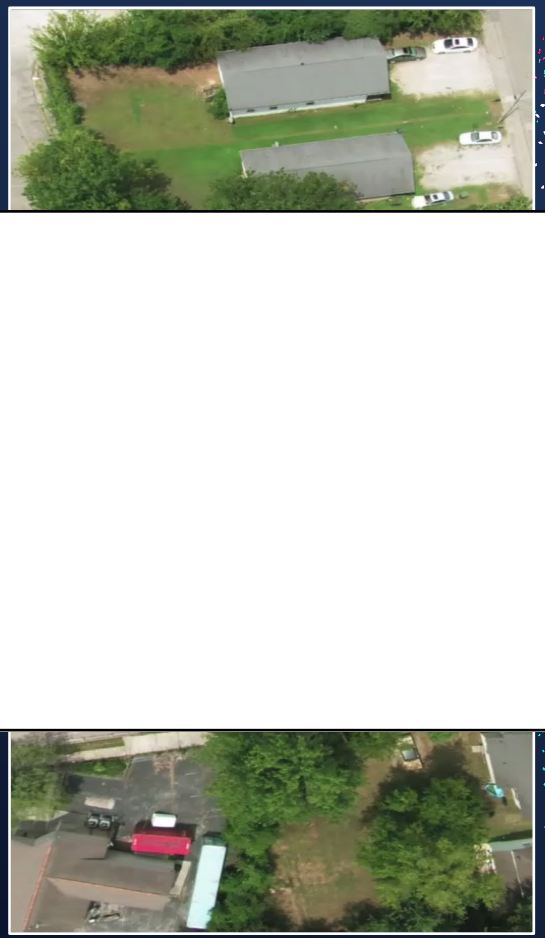
Testing Video Stereoscope

- Stereo video from normal 2D video on-the-fly
- Enhanced visual perception
- Possibilities for precise 3D measurements

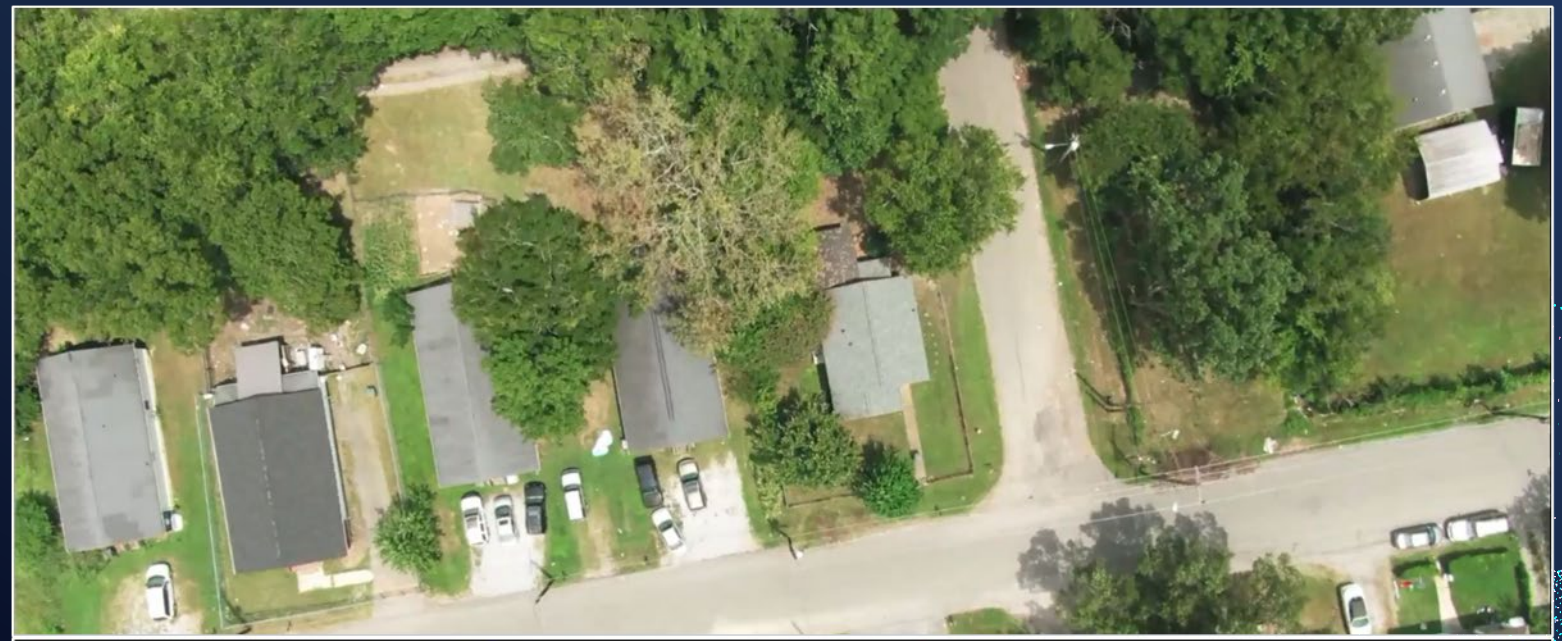
Real-time 3D Photogrammetry

Drone Videogrammetry

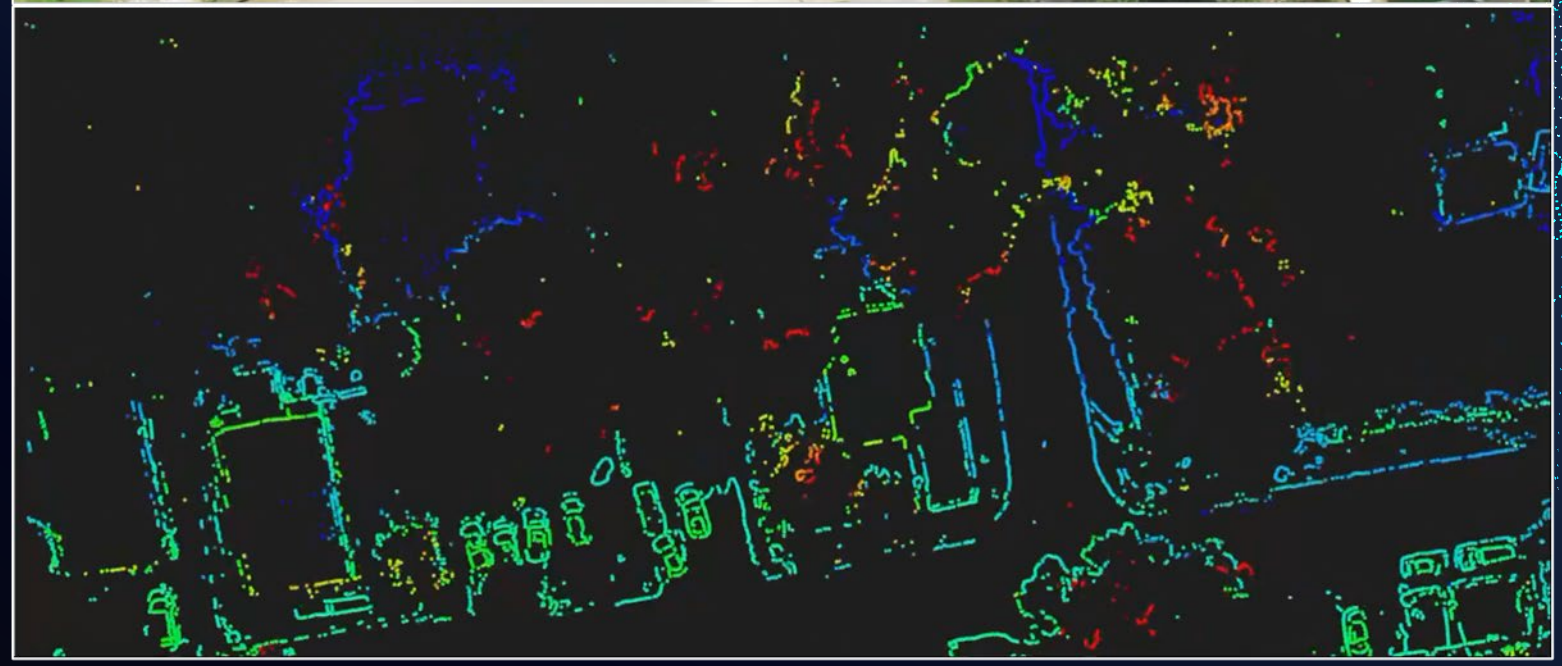


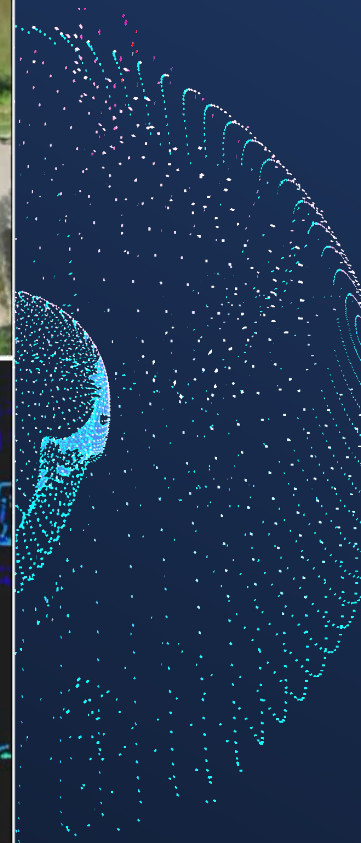


4K Drone video



Sparse Point Cloud





GPU PROCESSING

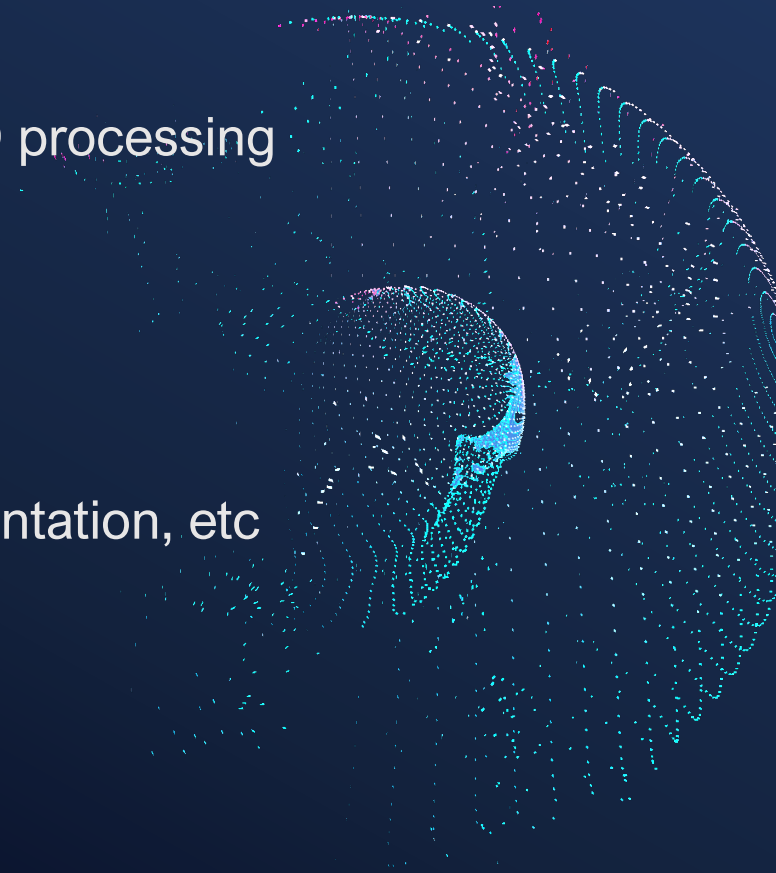
- Steps performed
  - Video decoding
  - Creating image pyramids
  - Filtering
  - Image registration
  - Radial distortion calculation
  - Feature extraction
  - Hierarchical matching
  - Generating point clouds
  - Merging of point clouds
  - Bundle Adjustment
- Processing speed on standard laptop
  - ~ 15 frames/second

What Comes After 3D On-the-fly?

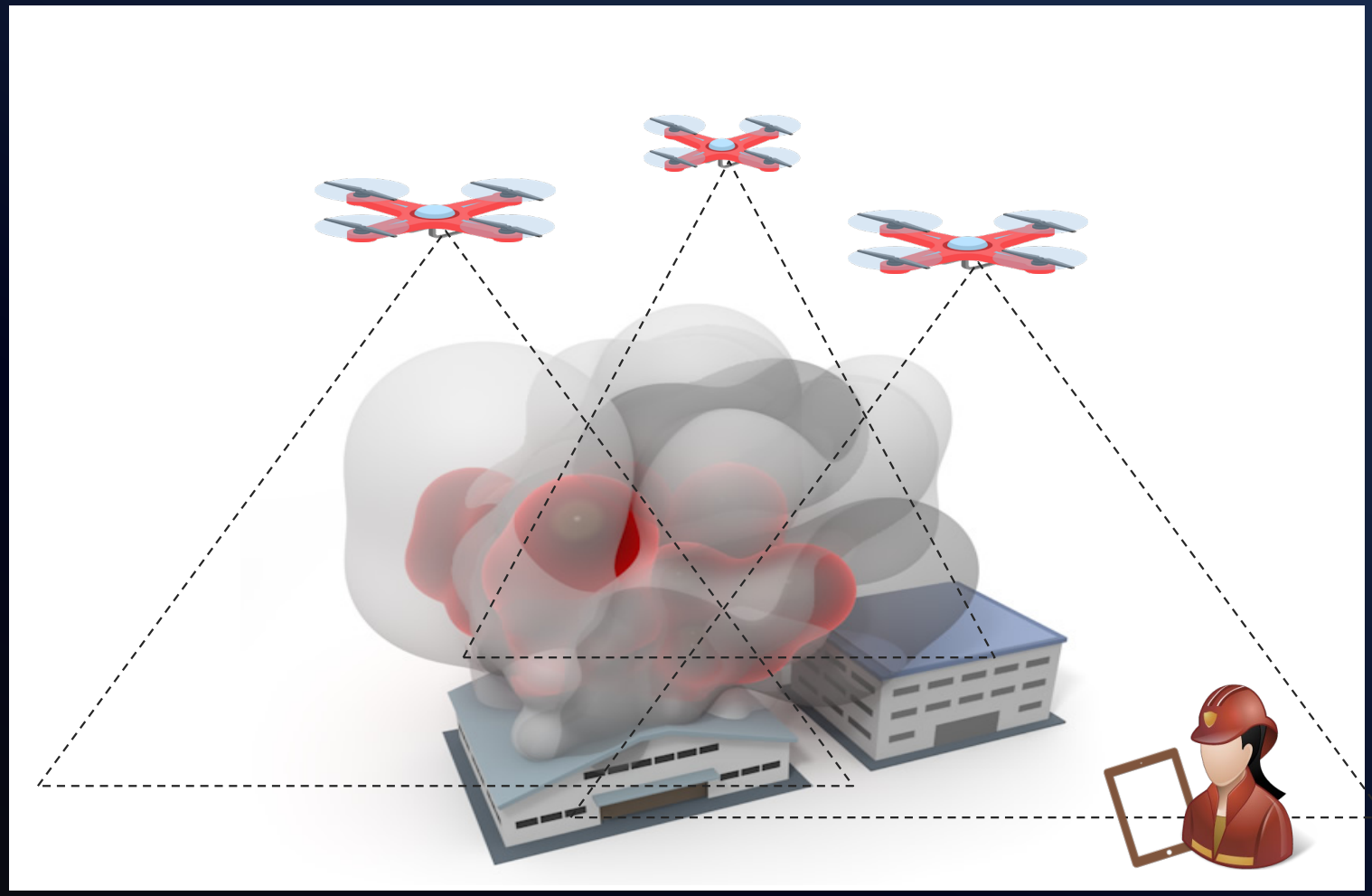
Two Drones Instead of One

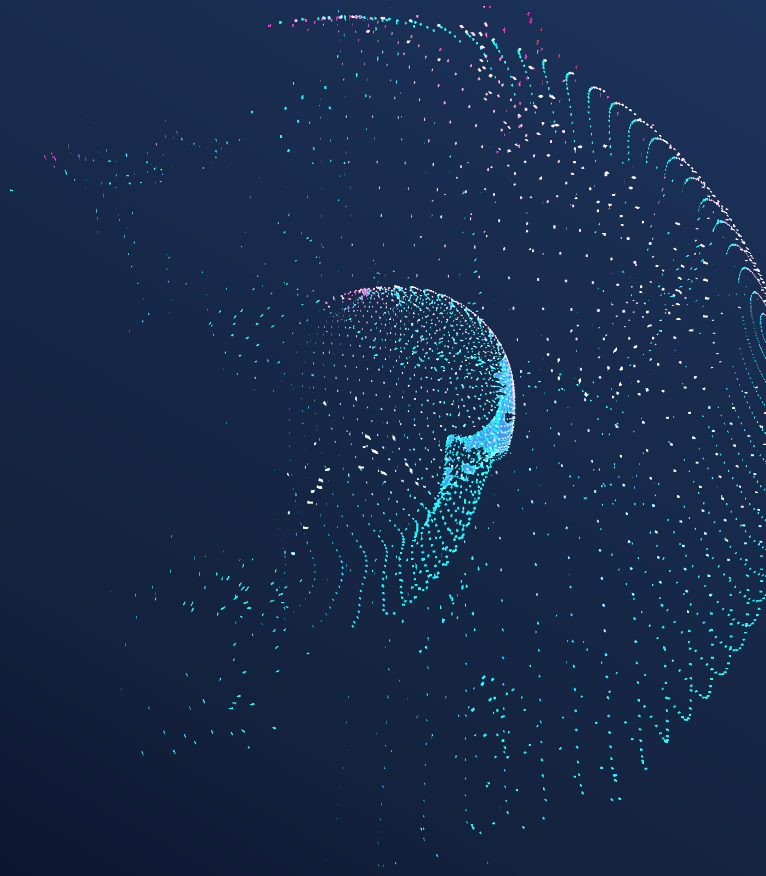
Live 3D

- With two video cameras covering same area, and real-time 3D processing
  - New model at video rate
  - Also moving or changing objects are modelled
- Creating a complete, georeferenced and live model
- Modelling an event, rather than an area
- Live3D model input to technologies for object tracking, segmentation, etc

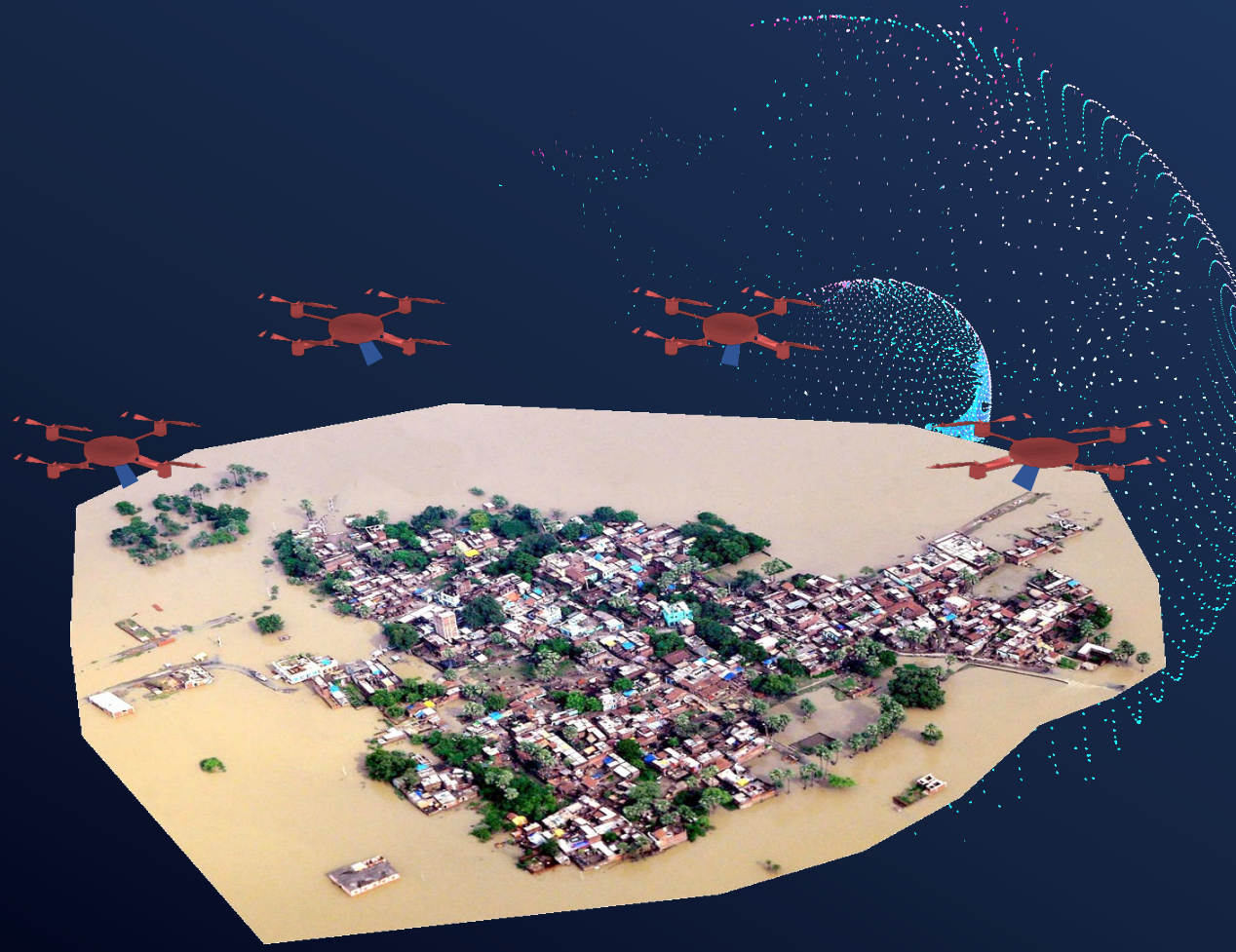


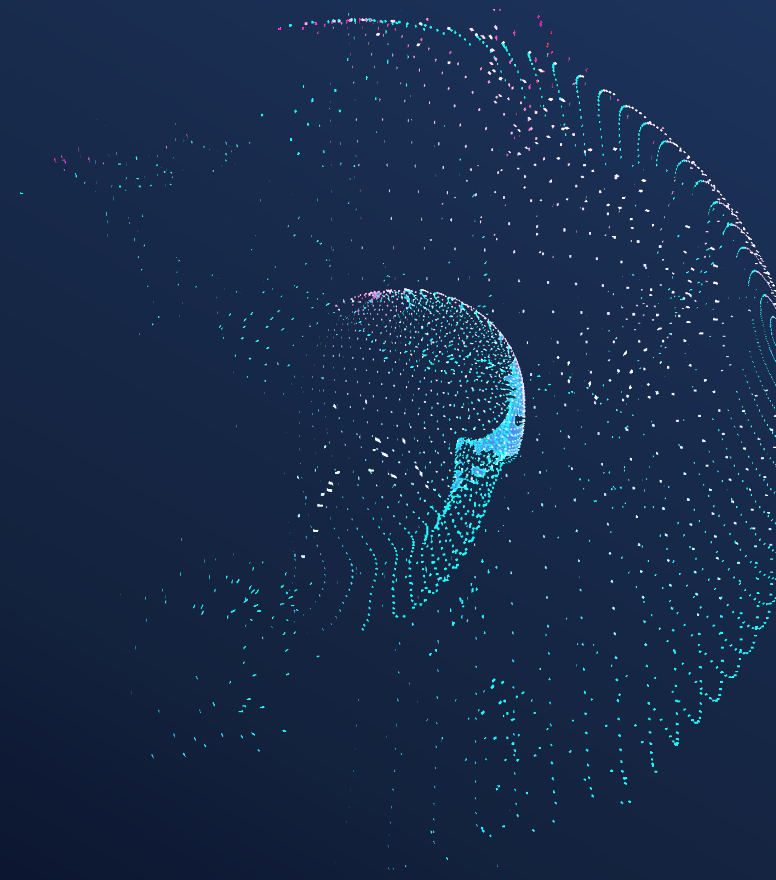
Live 3D in Disaster Management





Other Applications





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