



AND **Locate25** | **G**
THE NATIONAL GEOSPATIAL CONFERENCE

Presented at the FIG Working Week 2025,
6-10 April 2025 in Brisbane, Australia
FIG **Geospatial**
Council of Australia
Brisbane, Australia 6-10 April

Collaboration, Innovation and Resilience: Championing a Digital Generation

Pixels to Perception™

Advancing Reality Capture for AI-Driven Decision Making



Dr. Mohsen Miri

Director Strategic Partnerships

PHASEONE
IMAGING BEYOND IMAGINATION



Ludvig Engard

Founder and CPO

 **Spotscale**
Buildings Decoded

ORGANISED BY **FIG** **Geospatial**
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Your journey in this session ...



Pixel

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IMAGING BEYOND IMAGINATION



Process

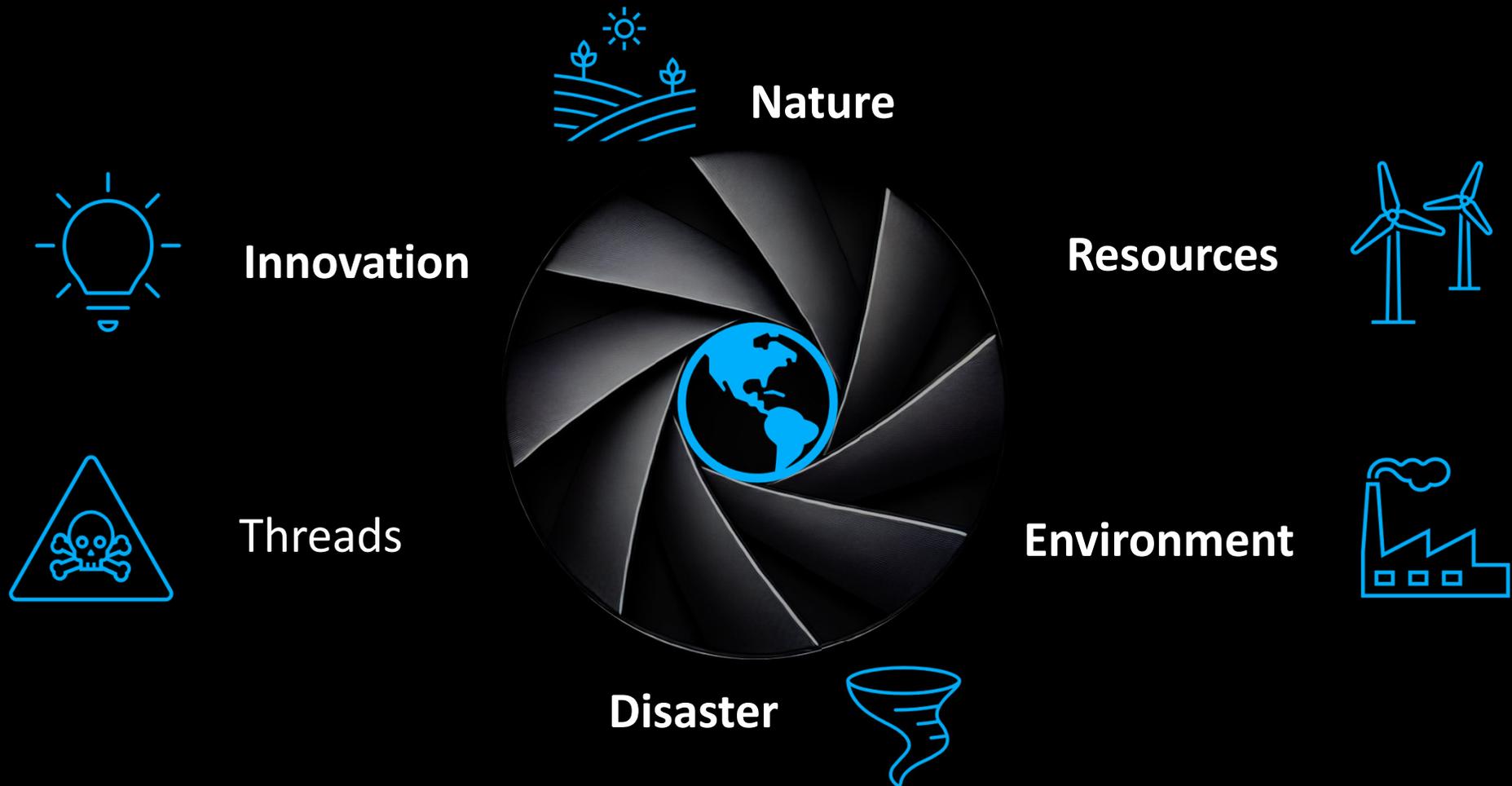
 **Spotscale**
Buildings Decoded



Perception

 **Spotscale**
Buildings Decoded

Why do we Capture Reality?



Let's start with Perception!

- ✓ Smart City
- ✓ Emergency
- ✓ Construction
- ✓ Monitoring
- ✓ GIS
- ✓ BIM
- ✓ Safety
- ✓ Share & Collaborate

GSD = 5 cm



Reality Mapping Experience - City of Ljubljana

Data courtesy:  REPUBLIC OF SLOVENIA
MINISTRY OF NATURAL RESOURCES AND SPATIAL PLANNING
SURVEYING AND MAPPING AUTHORITY OF THE REPUBLIC OF SLOVENIA

Image collection:



Camera system:



PHASE ONE

Your journey in this session ...



Pixel

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Process

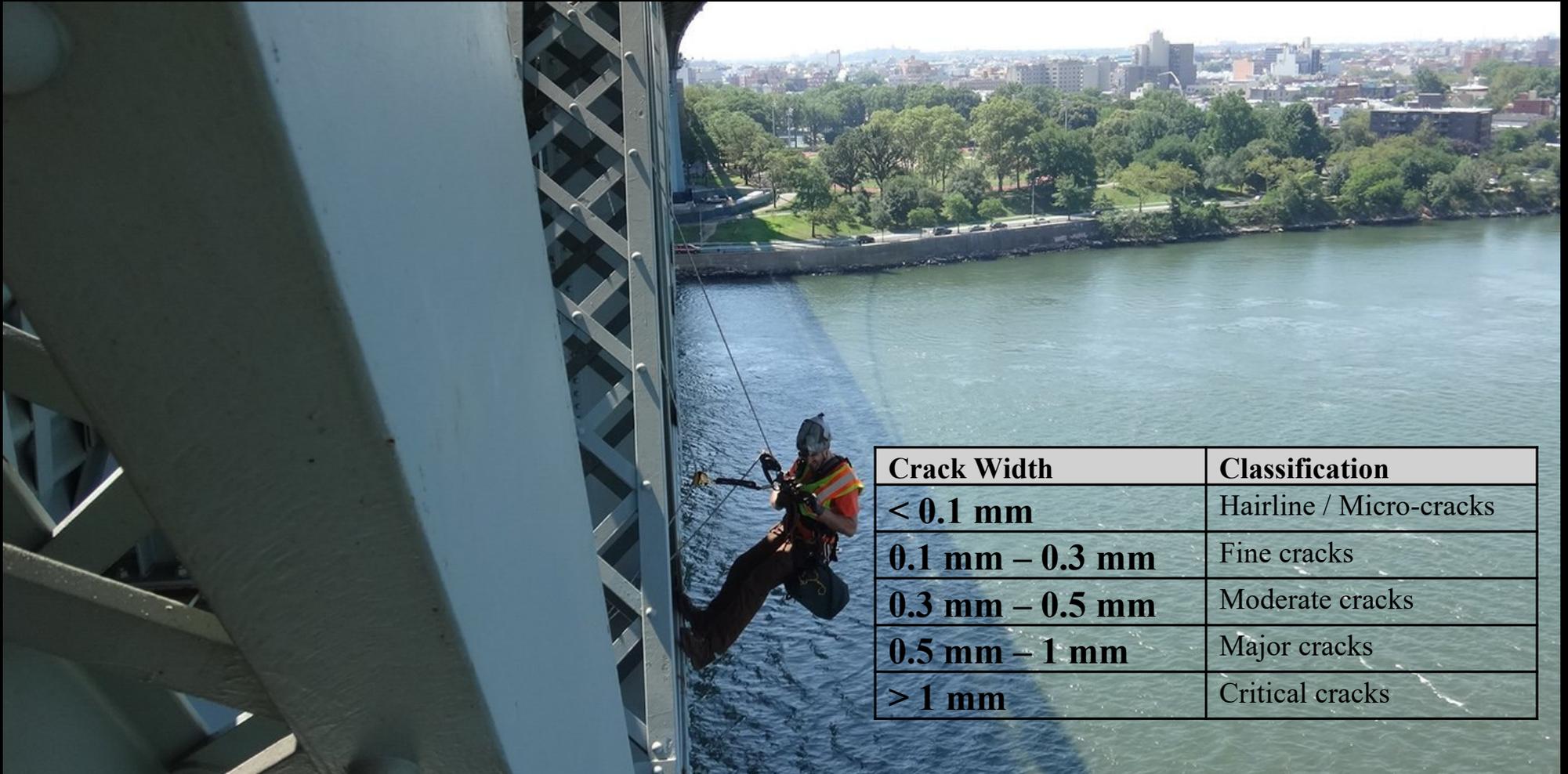
 **Spotscale**
Buildings Decoded



Perception

 **Spotscale**
Buildings Decoded

Manual Inspection Methods



Crack Width	Classification
< 0.1 mm	Hairline / Micro-cracks
0.1 mm – 0.3 mm	Fine cracks
0.3 mm – 0.5 mm	Moderate cracks
0.5 mm – 1 mm	Major cracks
> 1 mm	Critical cracks

Pixels to Perception™ in Inspection!



GSD = 0.1 mm

QUALITY in Color Fidelity

Illumination

Brightness

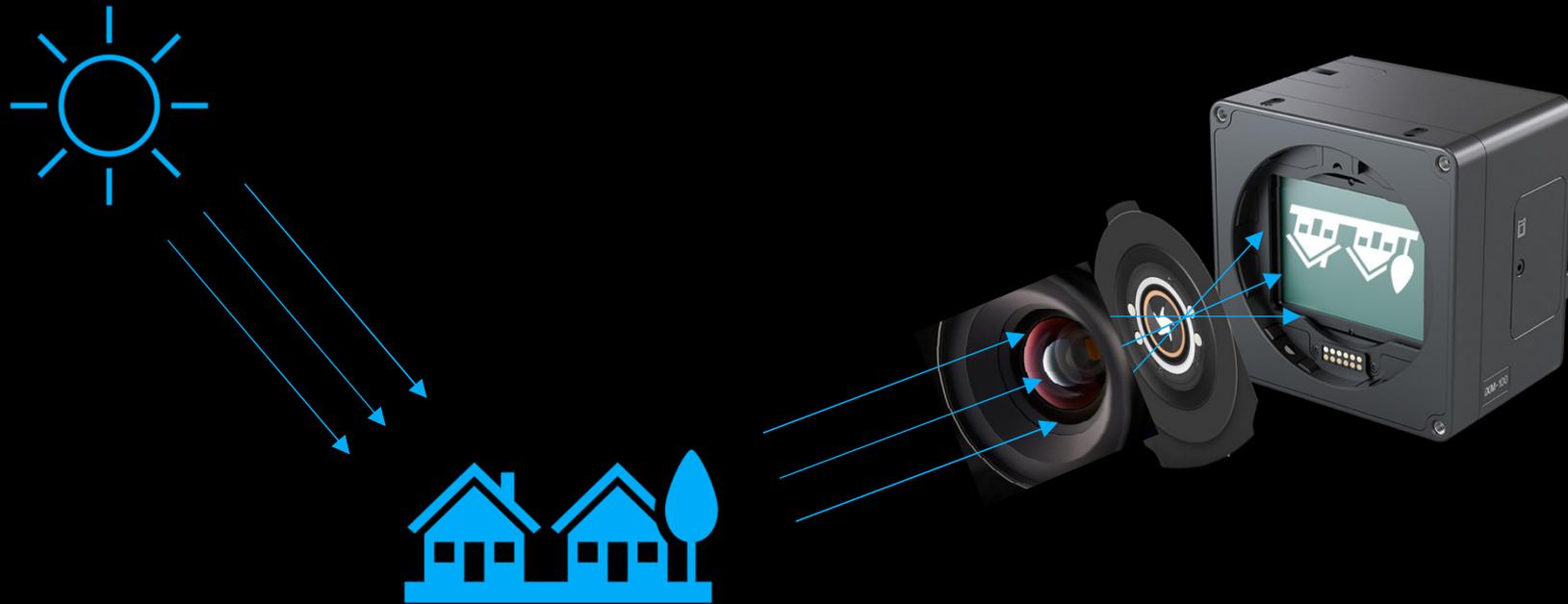
Exposure

Contrast

Sharpness



The journey of a Pixel ...



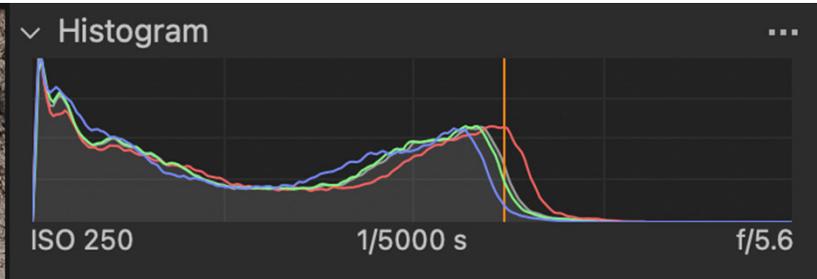


Bright

Dark

7
6
6
6

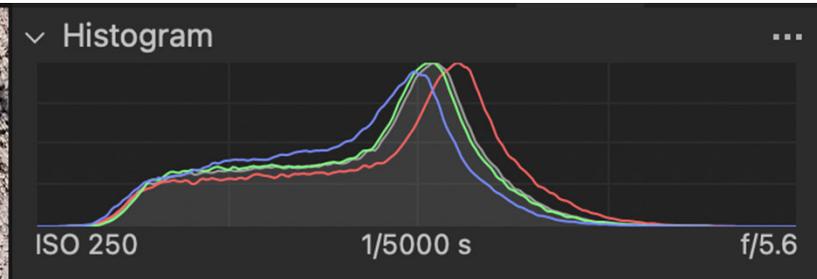
145
133
128
136



Channel	Roof	Shadow	Δ
RED	145	7	138
GREEN	133	6	127
BLUE	128	6	122
Grey	136	6	130

P5 | 80mm | 60m

High Dynamic Range

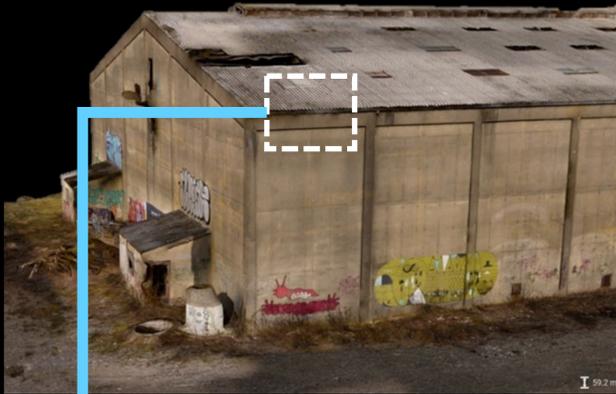


Channel	Roof	Shadow	Δ
RED	196	101	95
GREEN	183	101	82
BLUE	181	103	78
Grey	187	101	86

P5 | 80mm | 60m

High Dynamic Range

Concrete crack inspection with P3 – GS 120

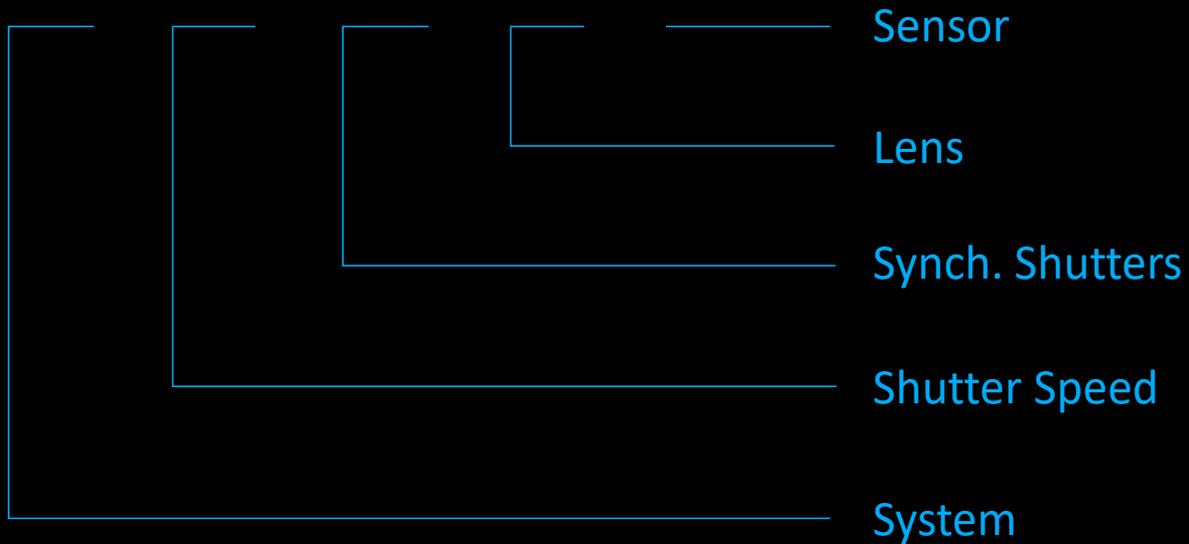


Before Radiometric Adjustment

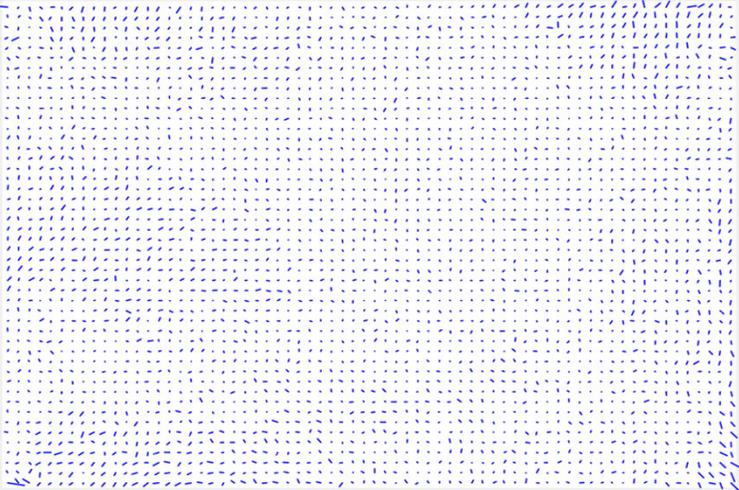


After Radiometric Adjustment

GEOMETRY with Calibration



P5 Sensor



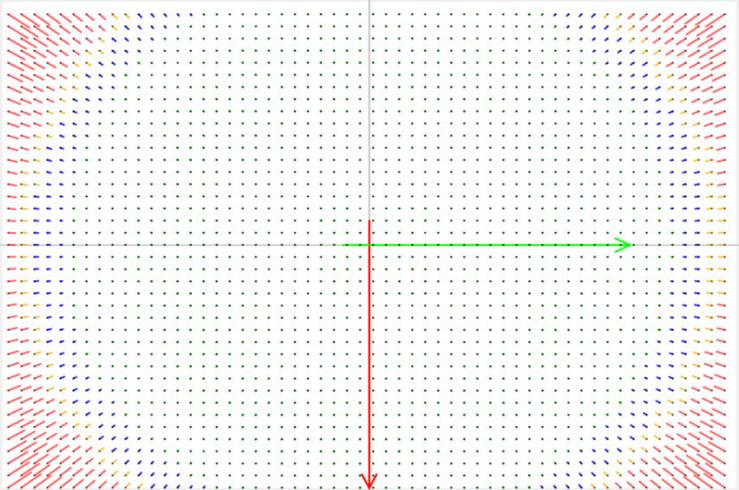
P5 | 35mm | 120m

Back-projection of adjusted points
(green small residuals)

Average residual: 0.077 [pixel]
Max. residual: 0.606 [pixel]

< 1/5 pixel !

35mm Lens



**Homogeneous
Lens Distortion**



PHASE**ONE**

Your journey in this session ...



Pixel

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Process

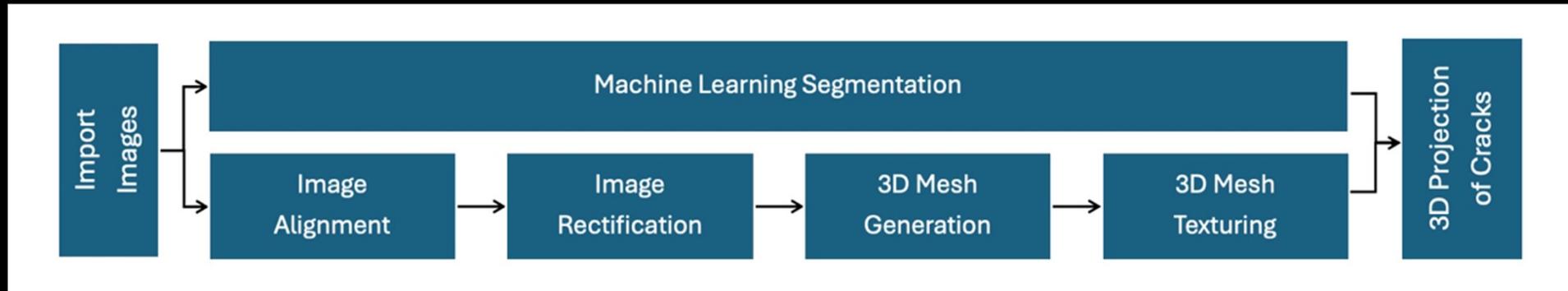
 **Spotscale**
Buildings Decoded



Perception

 **Spotscale**
Buildings Decoded

Workflow



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Process

 **Spotscale**
Buildings Decoded



Perception

 **Spotscale**
Buildings Decoded

Airport pavement inspection with P5



Airport pavement inspection with P5



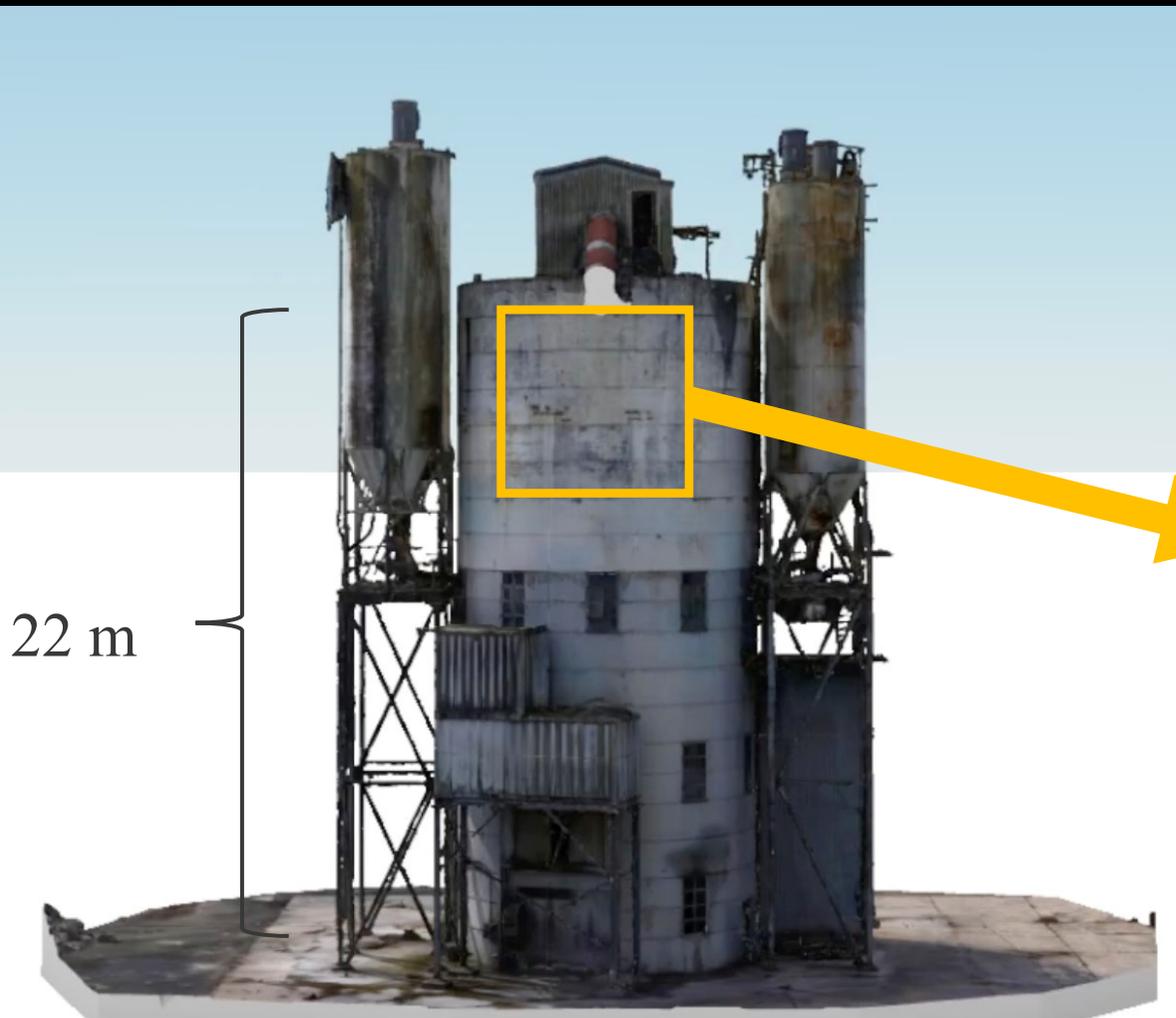
Airport pavement inspection with P5



Airport pavement inspection with P5



Concrete crack inspection with P3 – GS 120



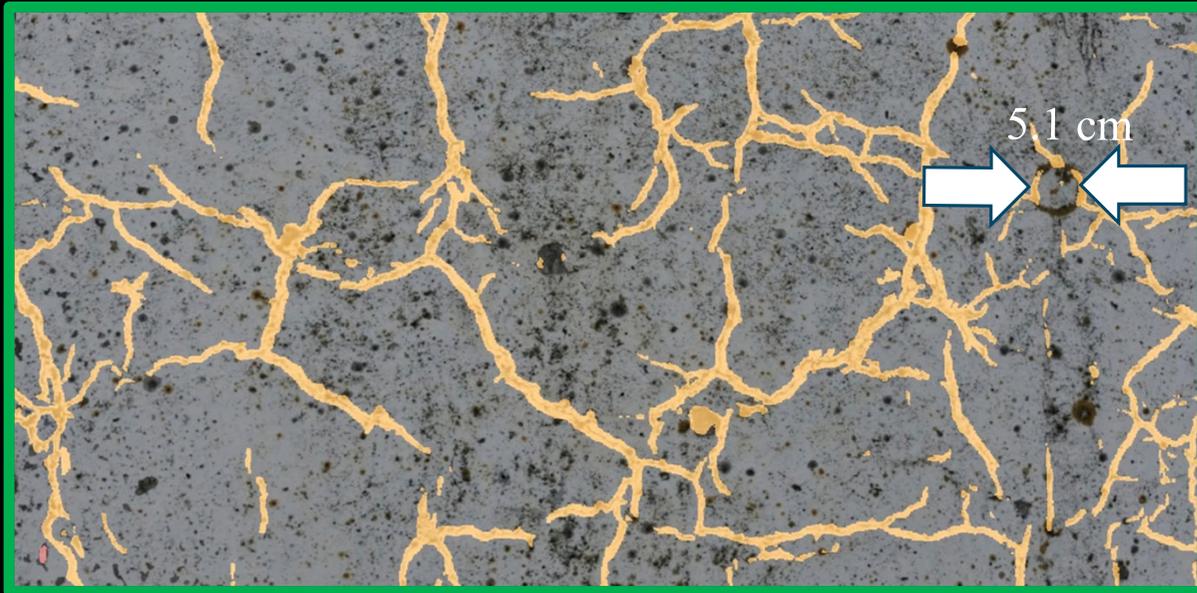
Concrete crack inspection with P3 – GS 120



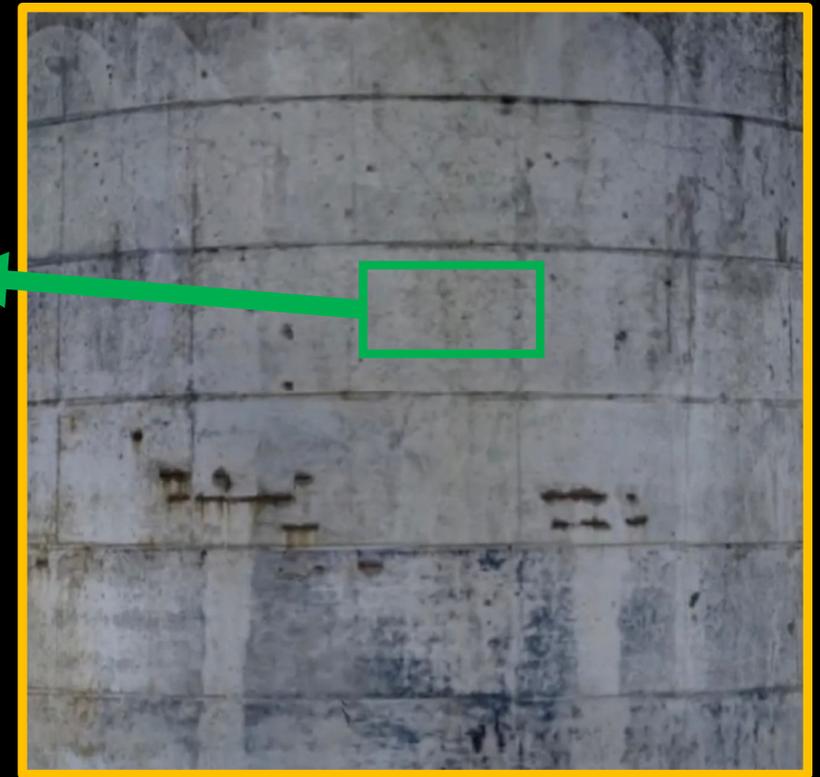
Before crack detection



Concrete crack inspection with P3 – GS 120



After crack detection



The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



2nd relevant SDG

11 SUSTAINABLE CITIES AND COMMUNITIES



3rd relevant SDG

17 PARTNERSHIPS FOR THE GOALS



SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals



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THANK YOU!

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Director Strategic Partnerships

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