



Collaboration, Innovation and Resilience: Championing a Digital Generation

Brisbane, Australia 6-10 April

Pixels to Perception™

Advancing Reality Capture for AI-Driven Decision Making



Dr. Mohsen Miri

Director Strategic Partnerships

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IMAGING BEYOND IMAGINATION



Ludvig Engard

Founder and CPO



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Your journey in this session ...



Pixel

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Process



Spotscale
Buildings Decoded

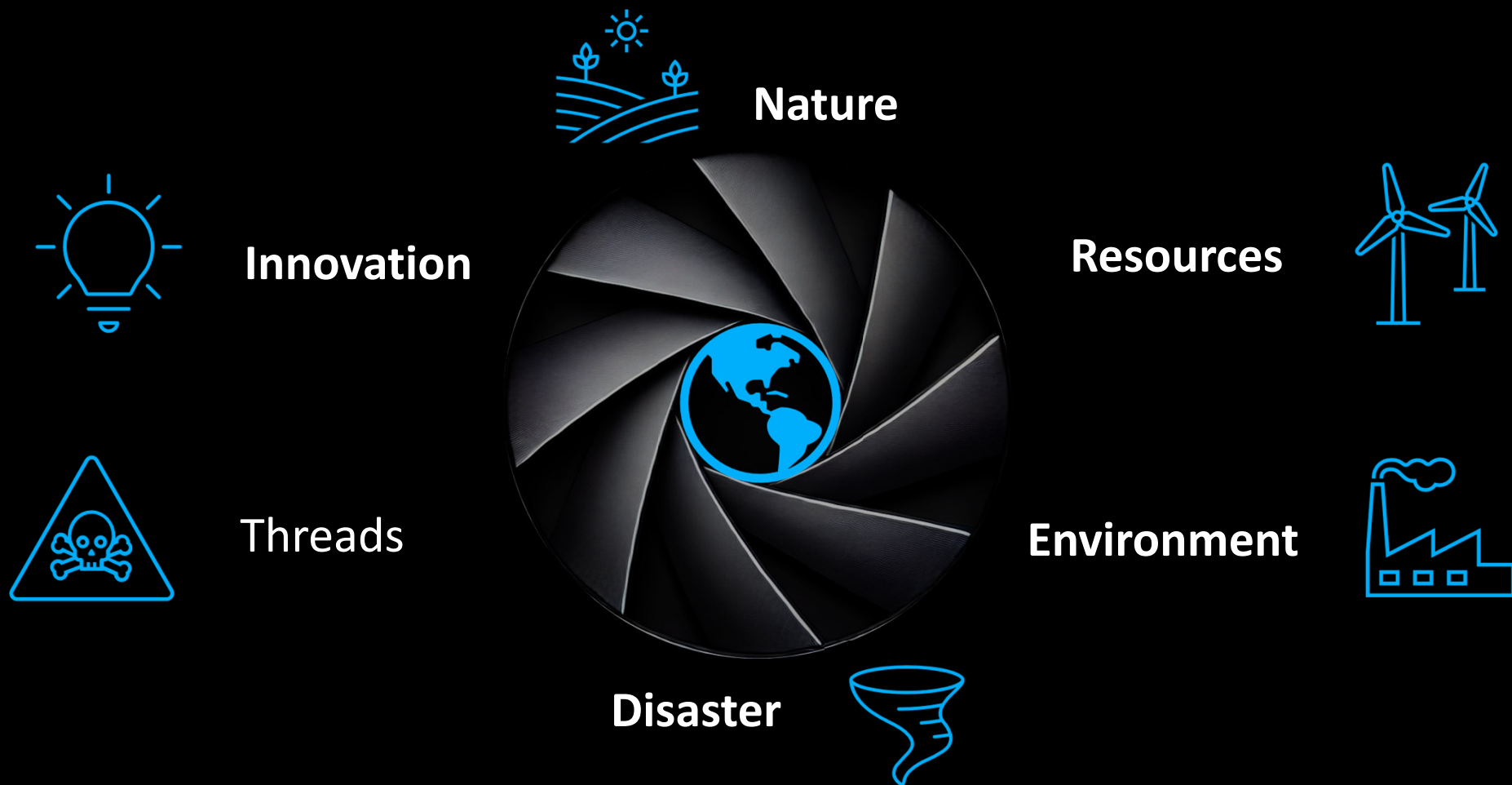


Perception



Spotscale
Buildings Decoded

Why do we Capture Reality?



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4.000+

Cameras in geospatial

200+

Global Team



55+

Countries worldwide



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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:
 FLYCOM
TECHNOLOGIES

Camera system:
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IMAGING SYSTEMS

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Your journey in this session ...



Pixel

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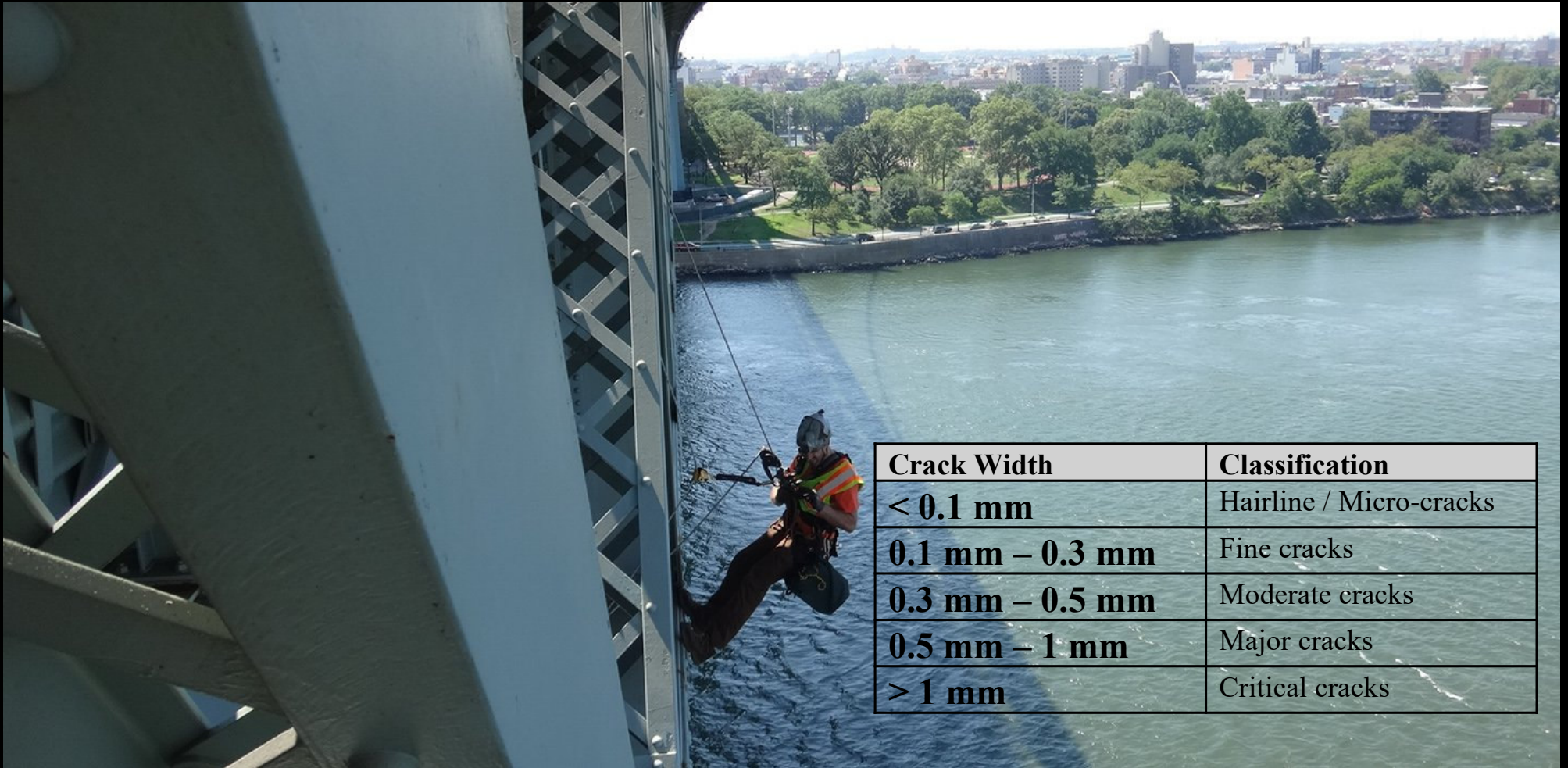
Process



Perception



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



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QUALITY in Color Fidelity

Illumination

Brightness

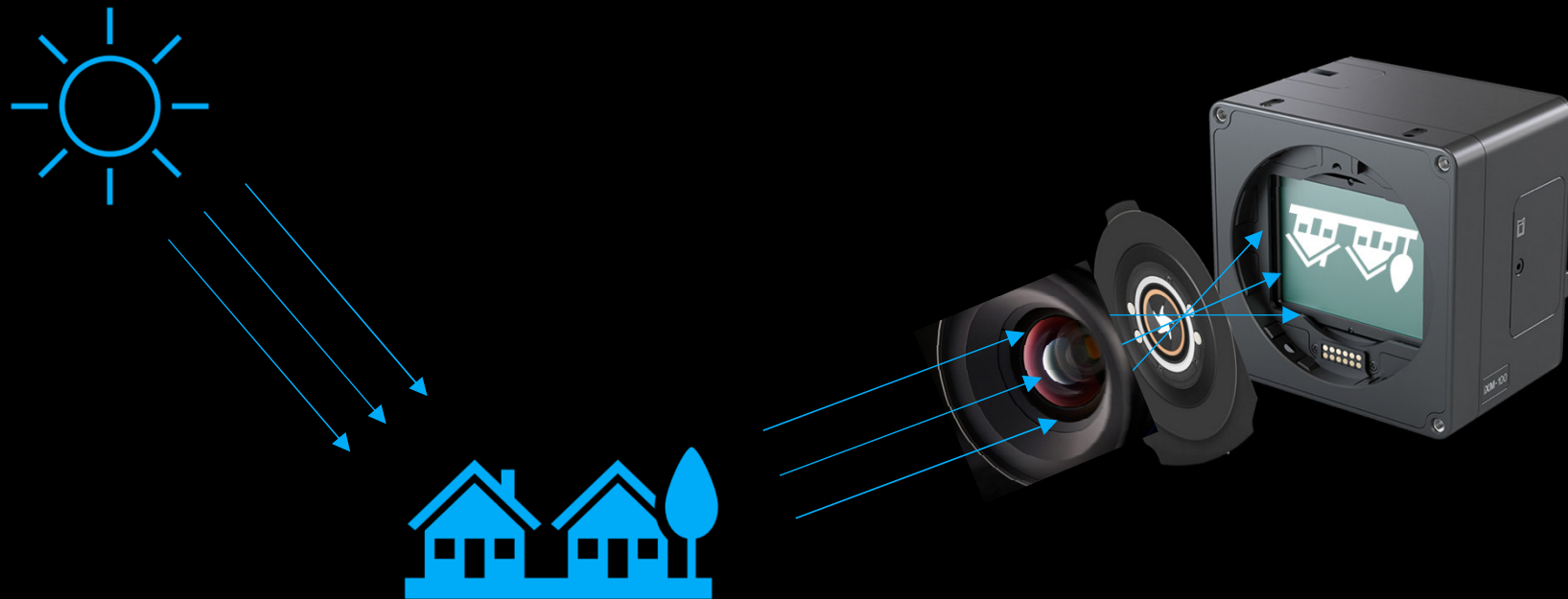
Exposure

Contrast

Sharpness



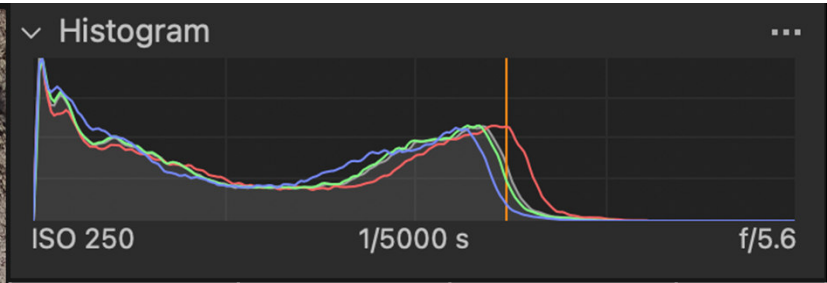
The journey of a Pixel ...





Bright

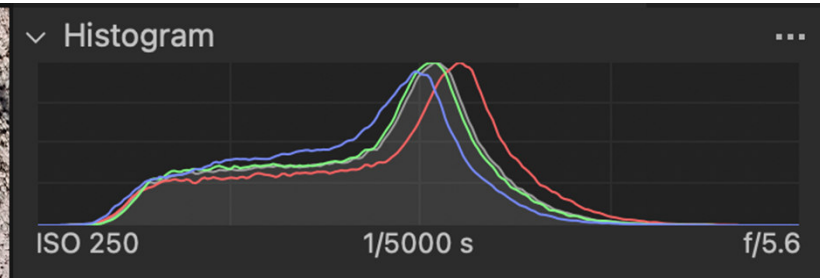
Dark



| 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

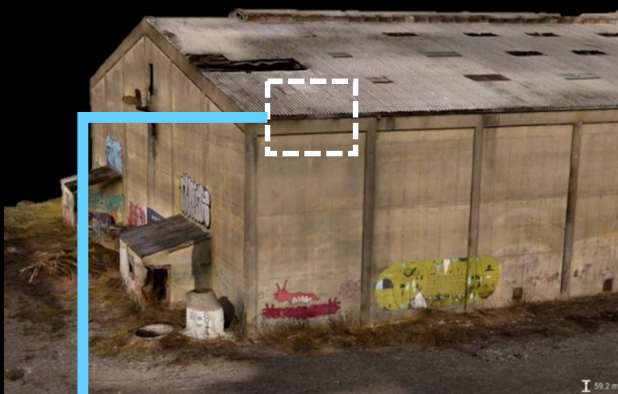


| Channel | Roof | Shadow | Δ |
|---------|------|--------|----------|
| RED | 196 | 101 | 95 |
| GREEN | 183 | 101 | 82 |
| BLUE | 181 | 103 | 78 |
| Grey | 187 | 101 | 86 |

P5 | 80mm | 60m

High Dynamic Range

Concrete crack inspection with P3 – GS 120

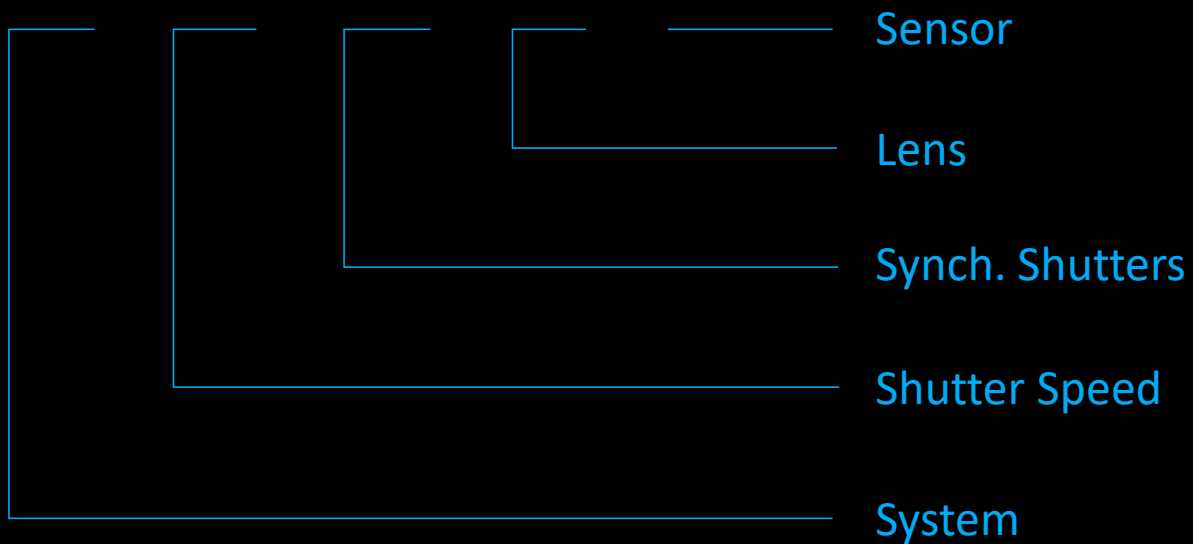


**Before Radiometric
Adjustment**

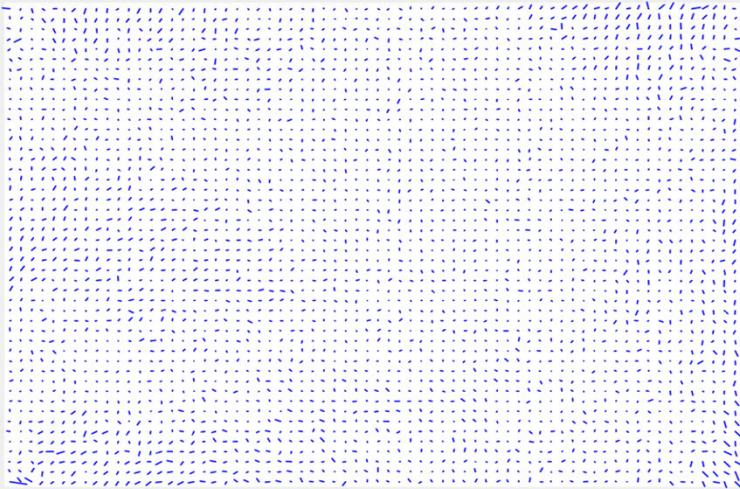


**After Radiometric
Adjustment**

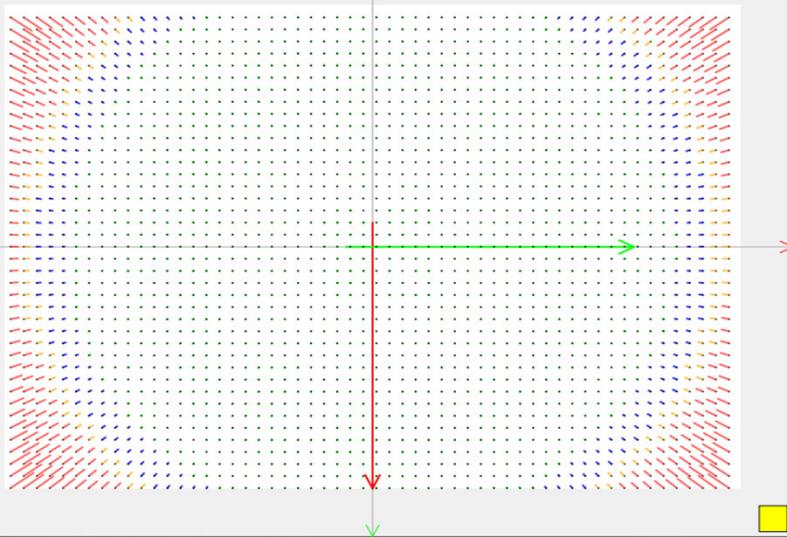
GEOMETRY with Calibration



P5 Sensor



35mm Lens



P5 | 35mm | 120m

Back-projection of adjusted points
(green small residuals)

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

< 1/5 pixel !

**Homogeneous
Lens Distortion**



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Your journey in this session ...



Pixel

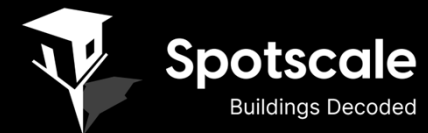
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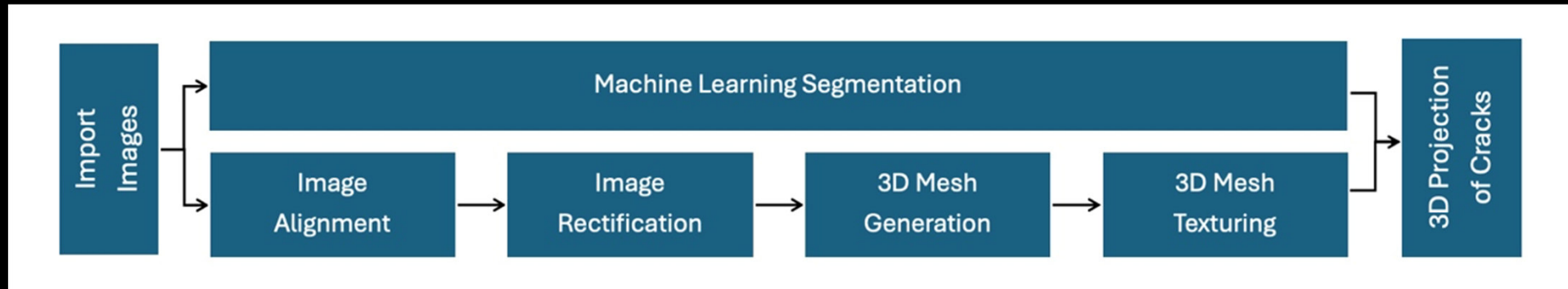
Process



Perception



Workflow



Your journey in this session ...



Pixel

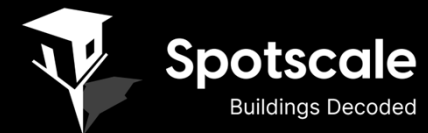
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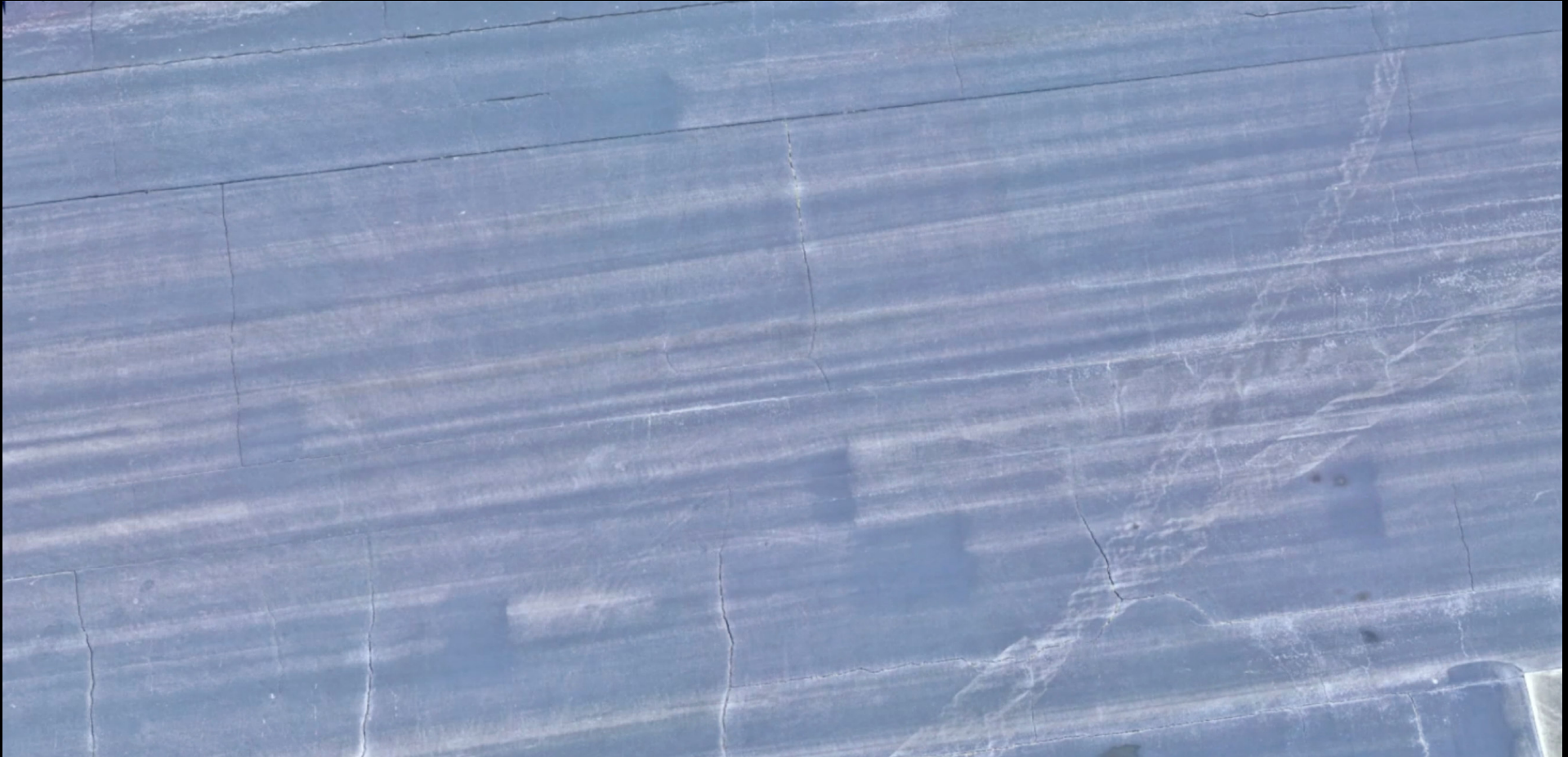
Process



Perception



Airport pavement inspection with P5



Airport pavement inspection with P5



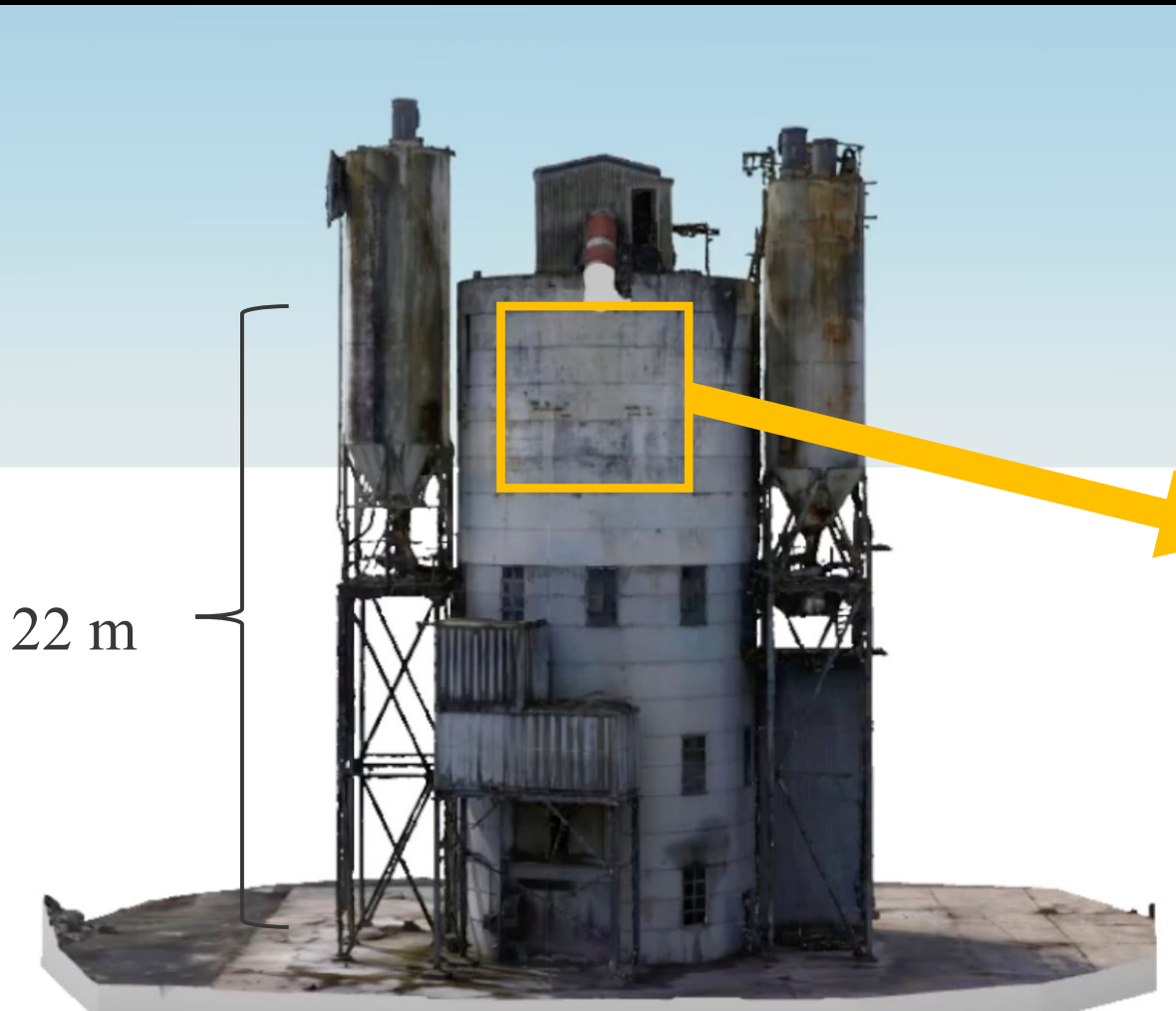
Airport pavement inspection with P5



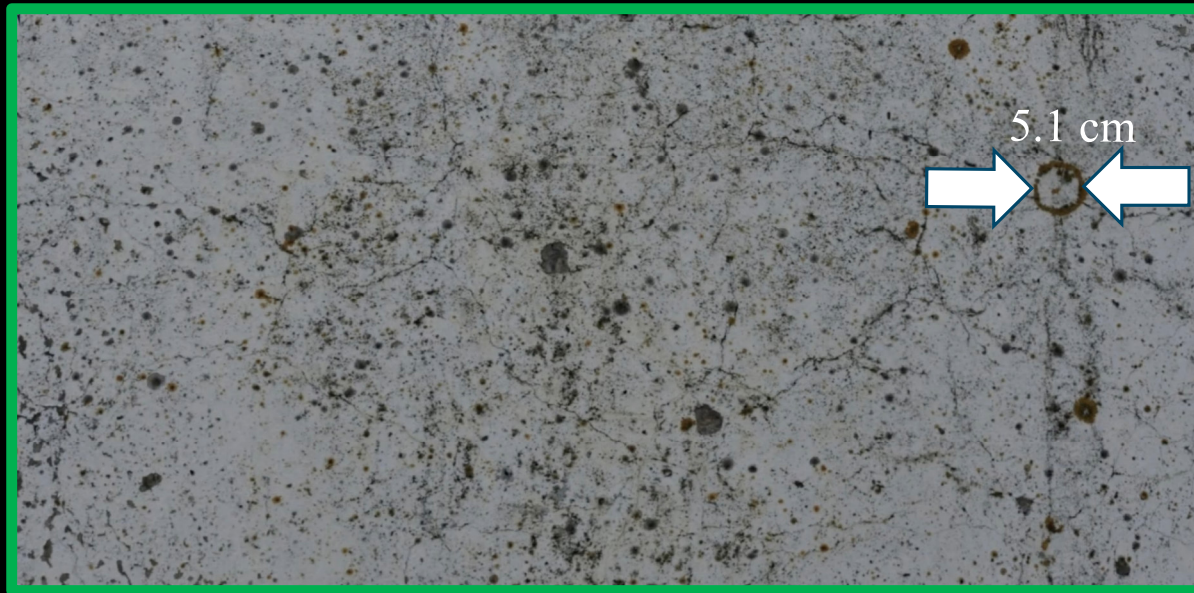
Airport pavement inspection with P5



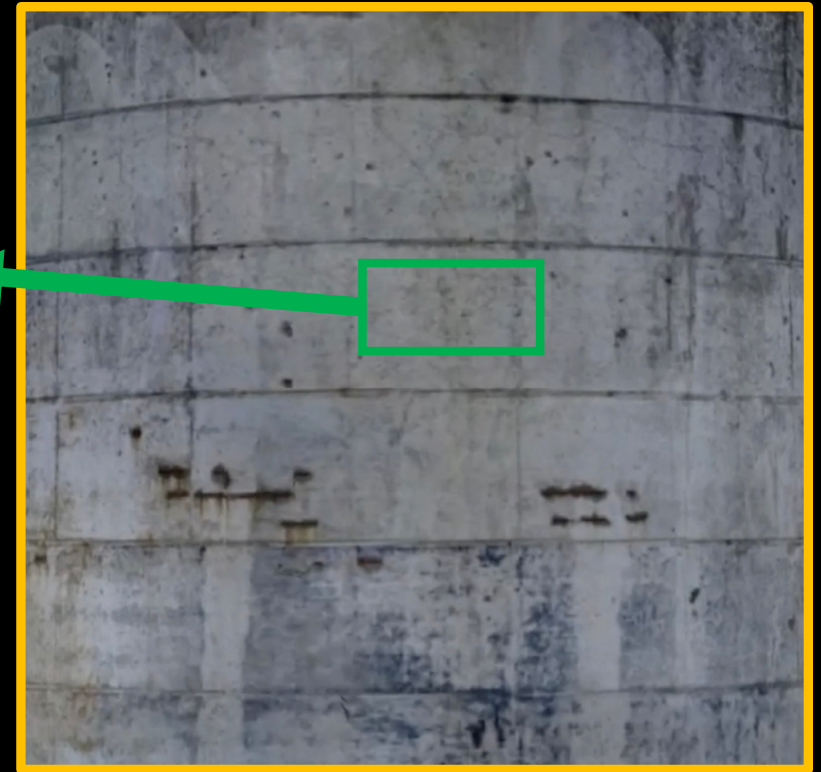
Concrete crack inspection with P3 – GS 120



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



**SUSTAINABLE
DEVELOPMENT GOALS**

International Federation of Surveyors supports the
Sustainable Development Goals

THANK YOU!

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mir@phaseone.com

www.phaseone.com

Ludvig Emgard

Founder and CPO



Spotscale

Buildings Decoded

ludvig.emgard@spotscale.com

www.spotscale.com