Advanced Reality Modeling Workflows for Digital Cities

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Reality Modeling

Capturing existing conditions in **3D using one or a combination devices**.

to support different applications such as

Mapping, Design, Construction, Inspection and Asset Management



ContextCapture Overview

ContextCapture can use a wide array of acquisition devices









Unlimited Scalability







Overview for a typical drone project

Mission purpose: On a 2km² area, extract the roof surfaces for solar analysis and share information among colleagues



Data capture – Drone acquisition

- Imagery capture:
 - 2km² area
 - 4983 images
 - RIG device: 4 Oblique cameras







Data capture – Drone acquisition

- Imagery capture:
 - Camera positions are known
 - Camera rotations are known
 - 11 GCPs equally spread on target area

- Capture metrics:
 - Flight height 1000m
 - Ground Sampling Distance 6cm



- Project preparation:
 - In ContextCapture Center
 - Imagery import
 - Calibration file import
 - Flight metadata import
 - Ground control points import
 - GCP registration





Aerotriangulation:

- In ContextCapture Center
- Based on Ground control points
- Quality analysis
 - Visual assessment on splats
 - Metrics review in quality report







Bentley

<u>Reality Mesh processing:</u>

- In ContextCapture Center
- Automatic processing on 4 Engines
- 4 processing days









Roof detection:

- Detector creation using ContextCapture Insights
- Image labeling for training
- Application of detector on oriented images





Roof detection:

Images used for detector application	4493
Amount of detected roofs	TBD
Human time dedicated to detector application	1min
Machine time dedicated to detector application	30min

Quality has been assessed and 95% of the roofs have been well identified.

Some difficulties remain on the very large structures that were less populated during training







Data capture – Reality Mesh Management

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Data Sharing:

- From ContextCapture Center to Bentley Cloud Service
- Upload of Reality Mesh, images and positioning data

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Overview for a typical drone project







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ContextCapture Master - Center edition [Utah-Bing.ccm*]
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Project Block Reconstruction Production Insight Tools Help

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contextcapture Center Insight's edition



Overview for a typical aerial project

Mission purpose: Model the Helsinki metropolitan area to consume within an platform for town planning.



Data capture – Aerial acquisition

- Imagery capture:
 - Helsinki metropolitan area 396km² area
 - 42,705 images
 - 3400 GPix
 - RIG device: 1Nadir + 4 Obliques





Data capture – Aerial acquisition

- Imagery capture:
 - Accurate camera positions
 - Accurate rotations
 - High resolution images

- Capture metrics:
 - Flight height ~1500m
 - Ground Sampling Distance 7cm





Project preparation:

- In ContextCapture Center
- XLS block import
 - Camera settings and calibration
 - Images « Pose » (Position, Rotation)
 - Control Points
 - SRS and project settings

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Aerotriangulation:

- In ContextCapture Center
- Based on accurate metadata
- 'structured aerial' mode
- RIG constraint: multi-camera platform



Reality Mesh processing:

- In ContextCapture Center
 - Water surfaces constraints
 - LOD across tile: unique mesh generation
- Automatic processing on 6 Engines
 - 20 processing days
 - 5 processing days for Unique Mesh
 - Total: 25 days





Consumption for project planning



OpenCities Planner





Reality Modeling Other use cases





View 4, 3D Metric Design











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