

# Bentley User Group Denmark, 2022 ContextCapture

November 8<sup>th</sup>, 2022

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Advancing Infrastructure

# ContextCapture

1. General introduction
2. Key features
3. Digital twin workflow

Denmark user group, November 8<sup>th</sup>, 2022



# 1- ContextCapture general introduction

Denmark user group, November 8<sup>th</sup>, 2022

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ContextCapture creates reality meshes, terrain models and orthophotos from photos and/or lidar point clouds

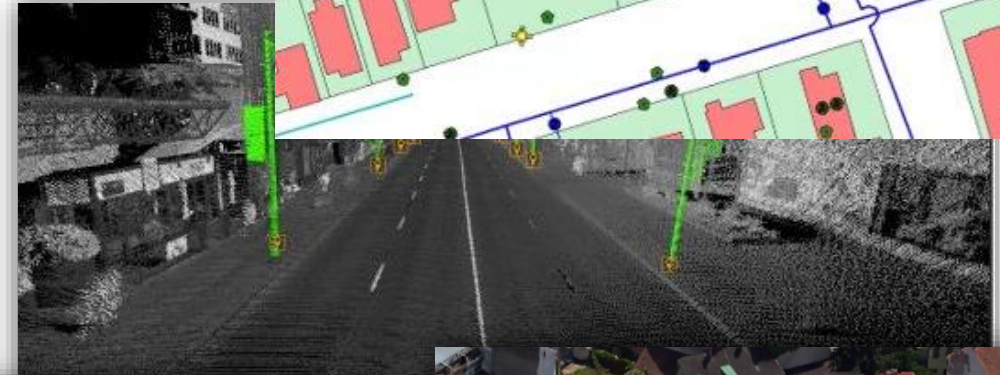


# Mission

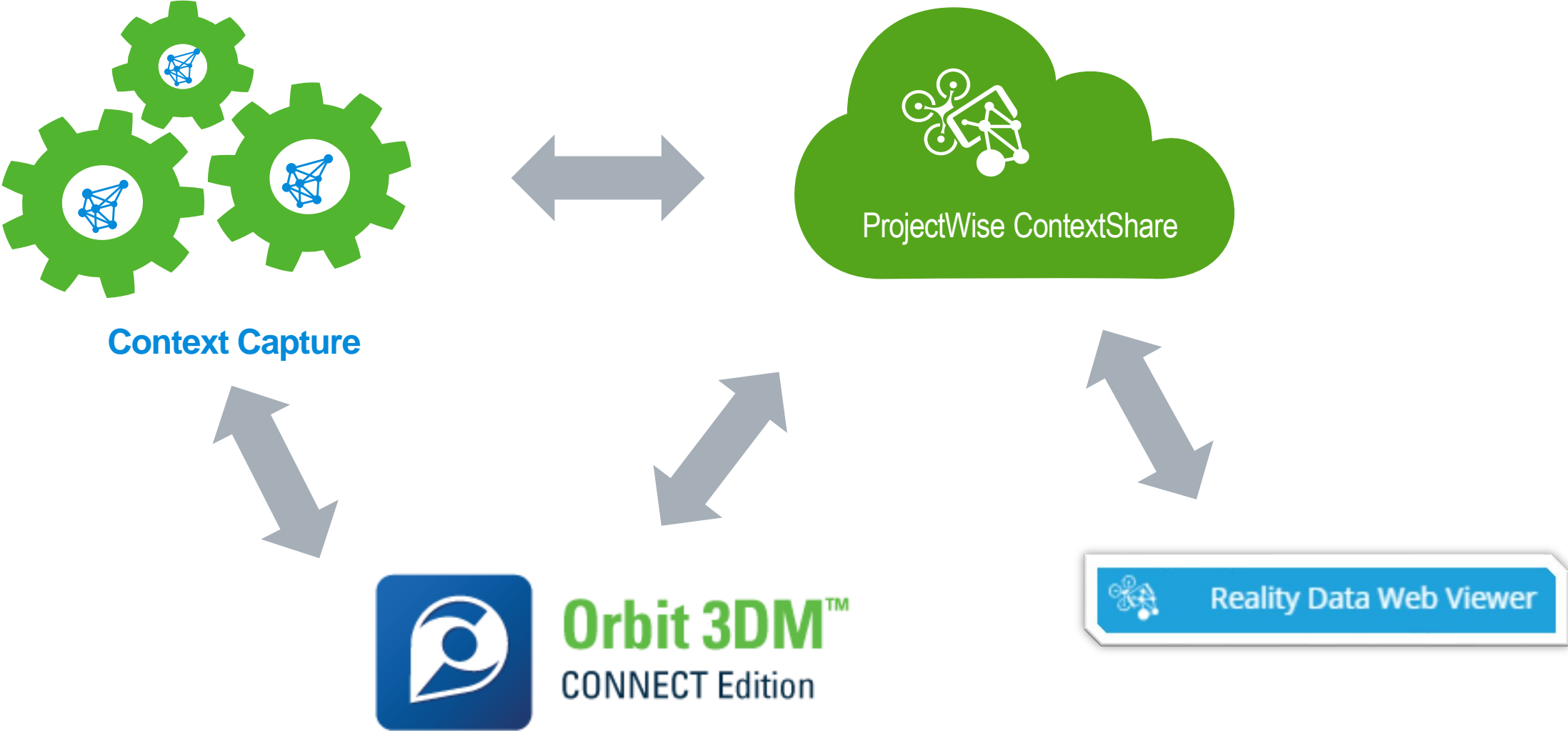
ContextCapture is part of Bentley's **iTwin Context** solutions with products such as Orbit 3DM.

iTwin Context mission is to help users capture, manage, analyze and share **4D digital context** for digital twins.

**ContextCapture mission** is to enable users with the creation of reality data to provide digital context to support the design, construction, operation and maintenance of infrastructures.

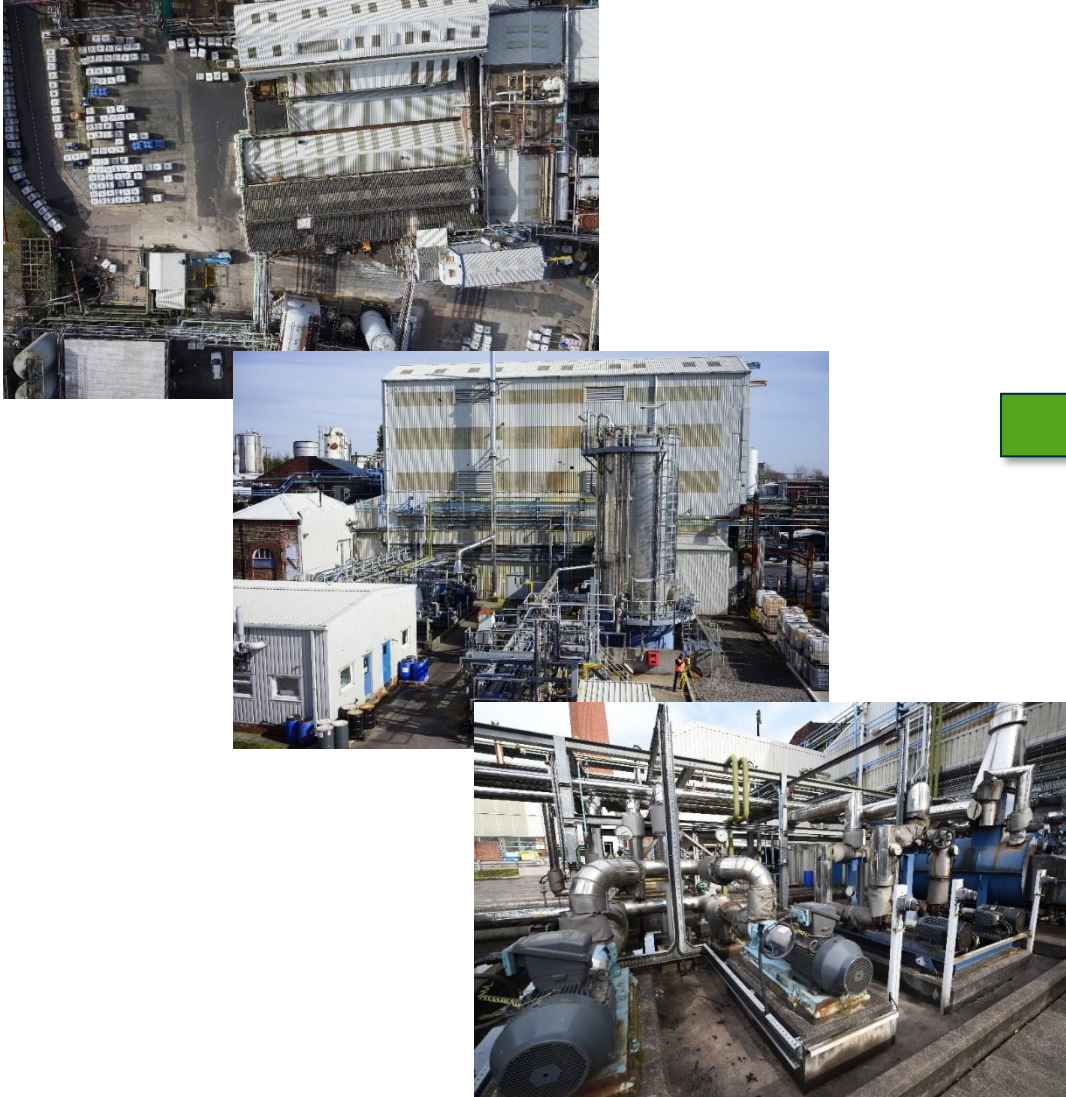


# iTwin Context - Reality Data Creation & Consumption



# Mixing all sources in a single multi-resolution mesh

Photos



3D Model



# Laser point cloud import

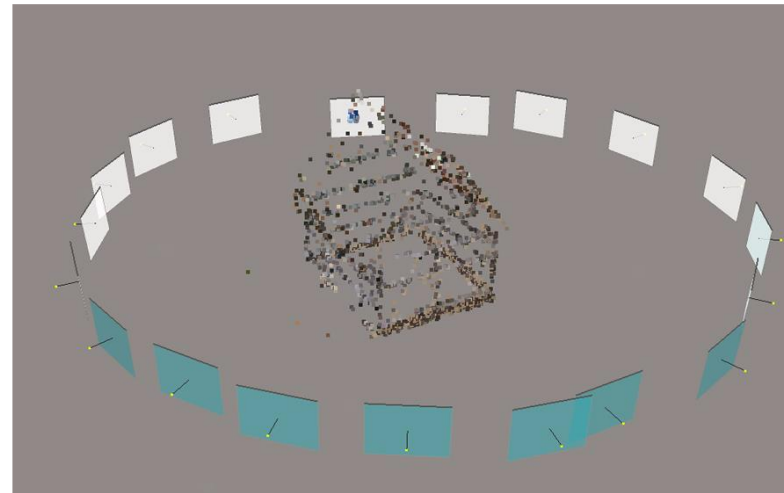
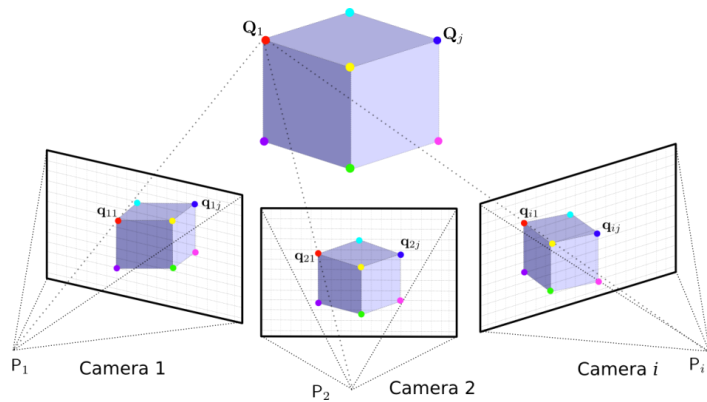
- Supported files: opc, .e57, .las, .ptx, pod, .ply (mobile)
- Import in existing block
  - Known scan position or trajectory
  - Consolidated and Geo-referenced
  - Photo block adjustment (auto-fitting)
- Scan/photos merging
  - Hybrid 3D model
  - Texture/geometry priority





# Key Principles

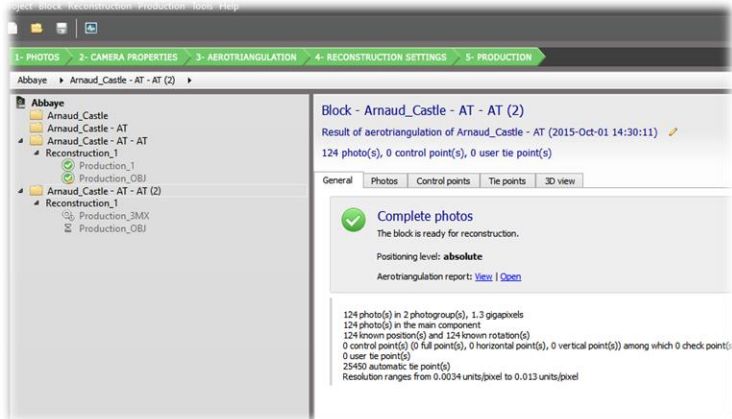
- **Spatial relationship between images**
- **Scaling / georeferencing**
- **Reconstruction & 3D Reality Model production**



# Software architecture



## ContextCapture MASTER

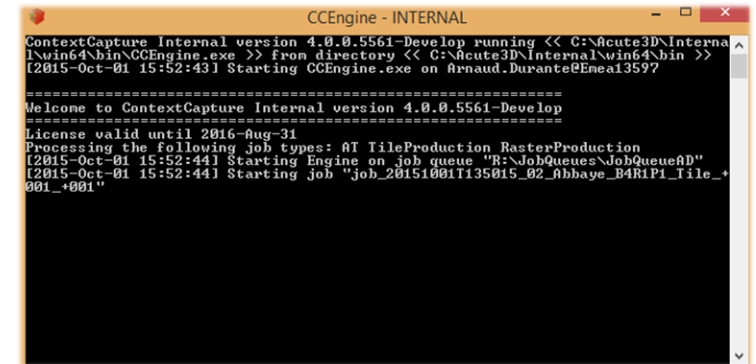


User interface:

- Data management
- Sending jobs to job queue
- Can be closed once a task is submitted



## ContextCapture ENGINE



Processing application:

- Listening to job queue
- Processing the jobs
- 3D model production by tiles

### Job-Queue



Shared Folder

# Versions

## – Desktop

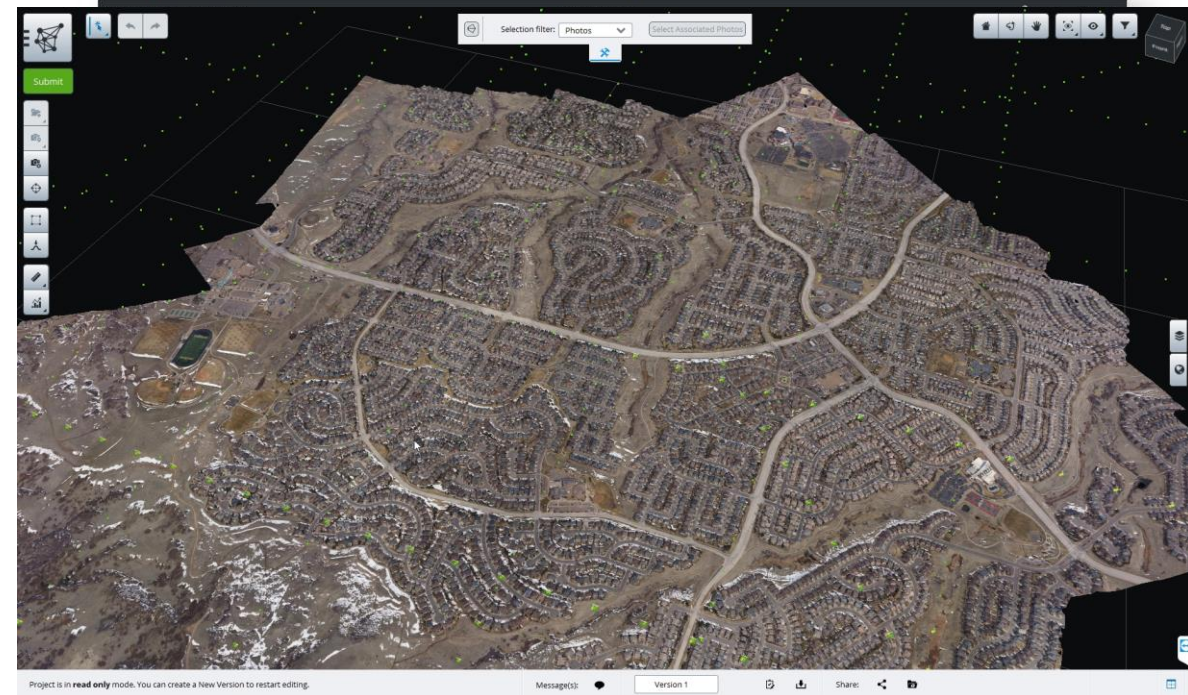
- 1 Master project viewer
- 2 engines maximum

## – Center (processing parallelization)

- Unlimited input
- Multiple Engines

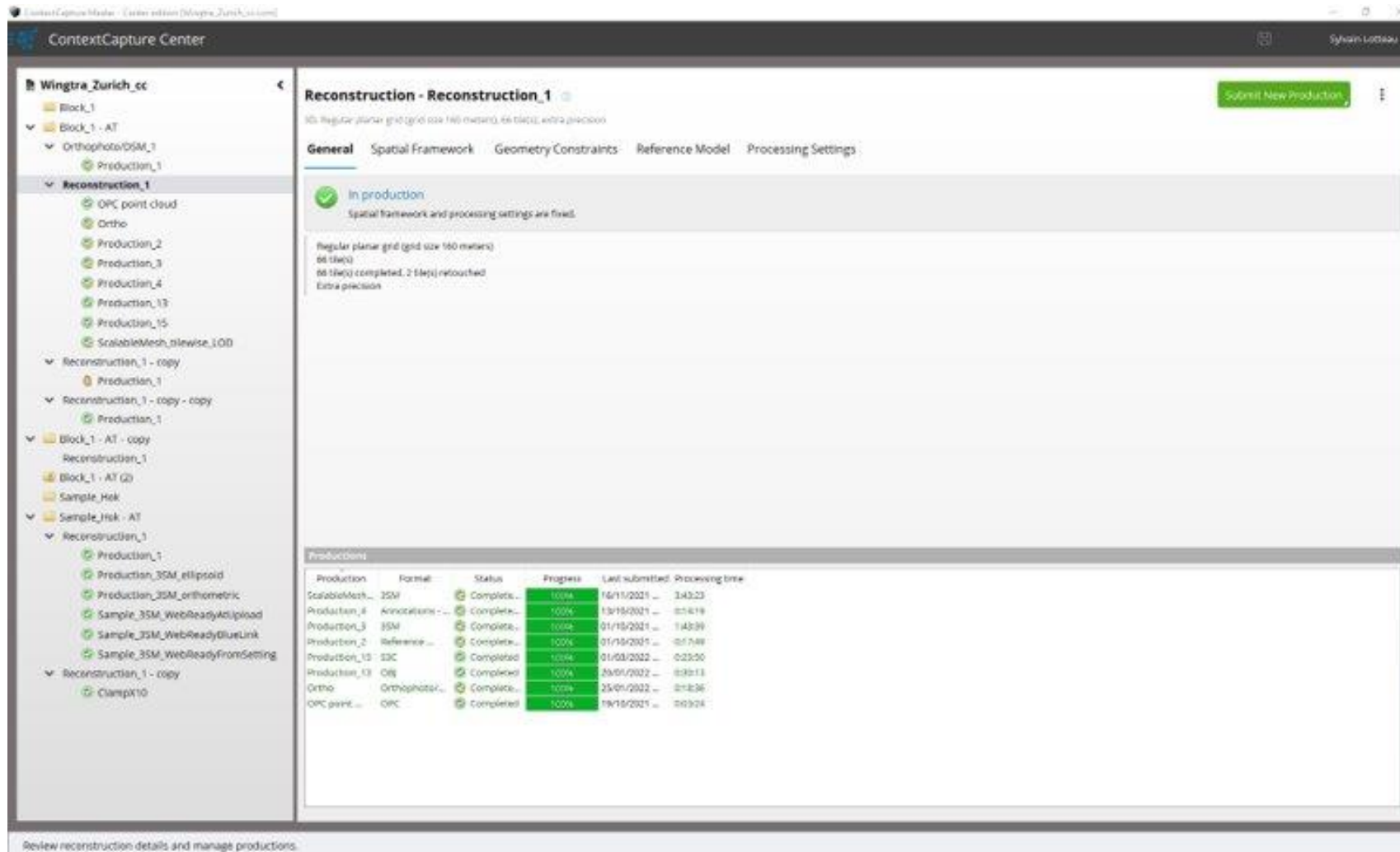
## – Cloud Console

- Online processing
- Direct link to ContextShare



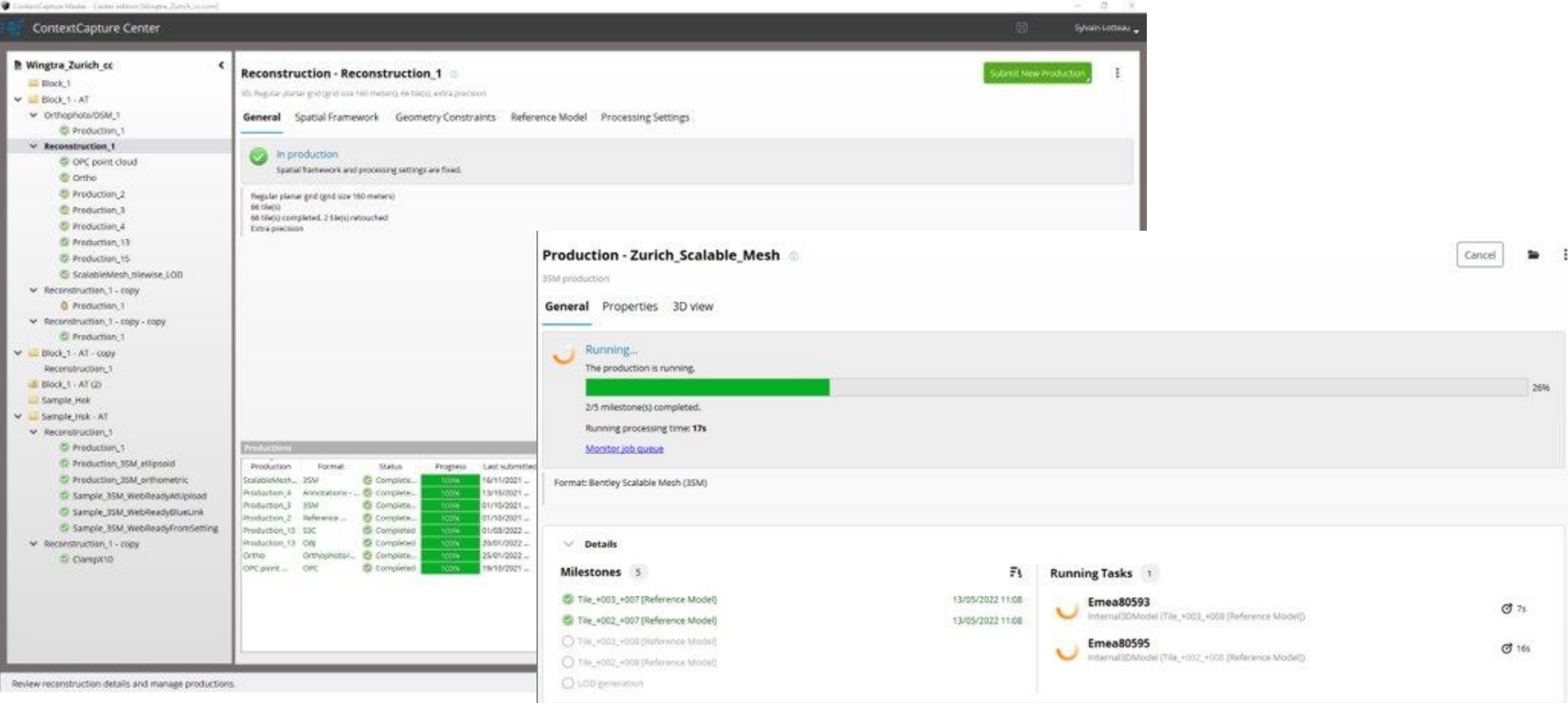
# ContextCapture updates

## New interface



# ContextCapture updates

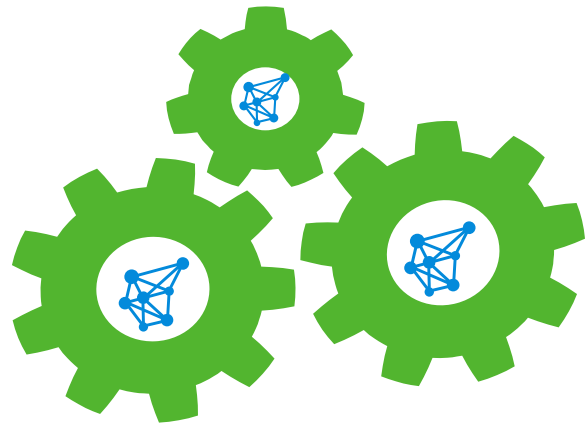
## New interface



# ContextCapture updates

More compatibility with Orbit

- ContextCapture block to Orbit Run export
- Point cloud production: OPC
- 3Dtiles and w3sm compatible with Orbit 3DM cloud
- Insights annotation export



ContextCapture



Orbit

# ContextCapture

## New user guide

ContextCapture | 2022 Quick Start guide

Bentley

### ContextCapture Quick Start guide

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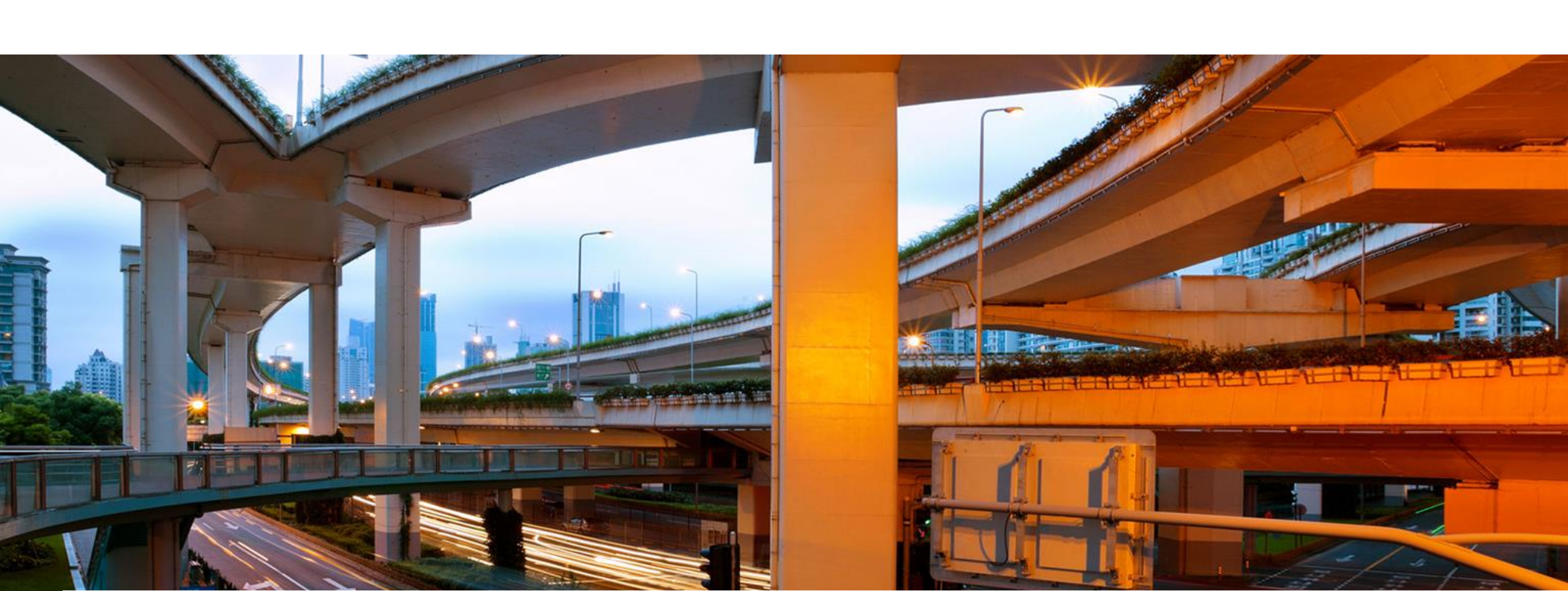
#### Abstract

The purpose of this document is to help a user to start working with ContextCapture. Therefore, the workflow and explanations are based on the ContextCapture desktop edition (the same principles and options are available on other versions).

After a brief statement on the software key principles, you will be guided through the steps to install the software and create a blank project. Then a typical workflow will be explained in detail with a step-by-step exercise on a drone captured image dataset. The test dataset that is used in this exercise can be downloaded [here](#).

At the end of this guide, you will know the basic principles of ContextCapture and should be able to process your own dataset within the application.





## 2- Key features

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# ContextCapture: key features

- New Aerotriangulation
- New automatic image equalization
- Optimized processing speed and job structure
- Reconstruction: manual ROI edit
- Mesh touch-up
- Orthophoto instance and touchup

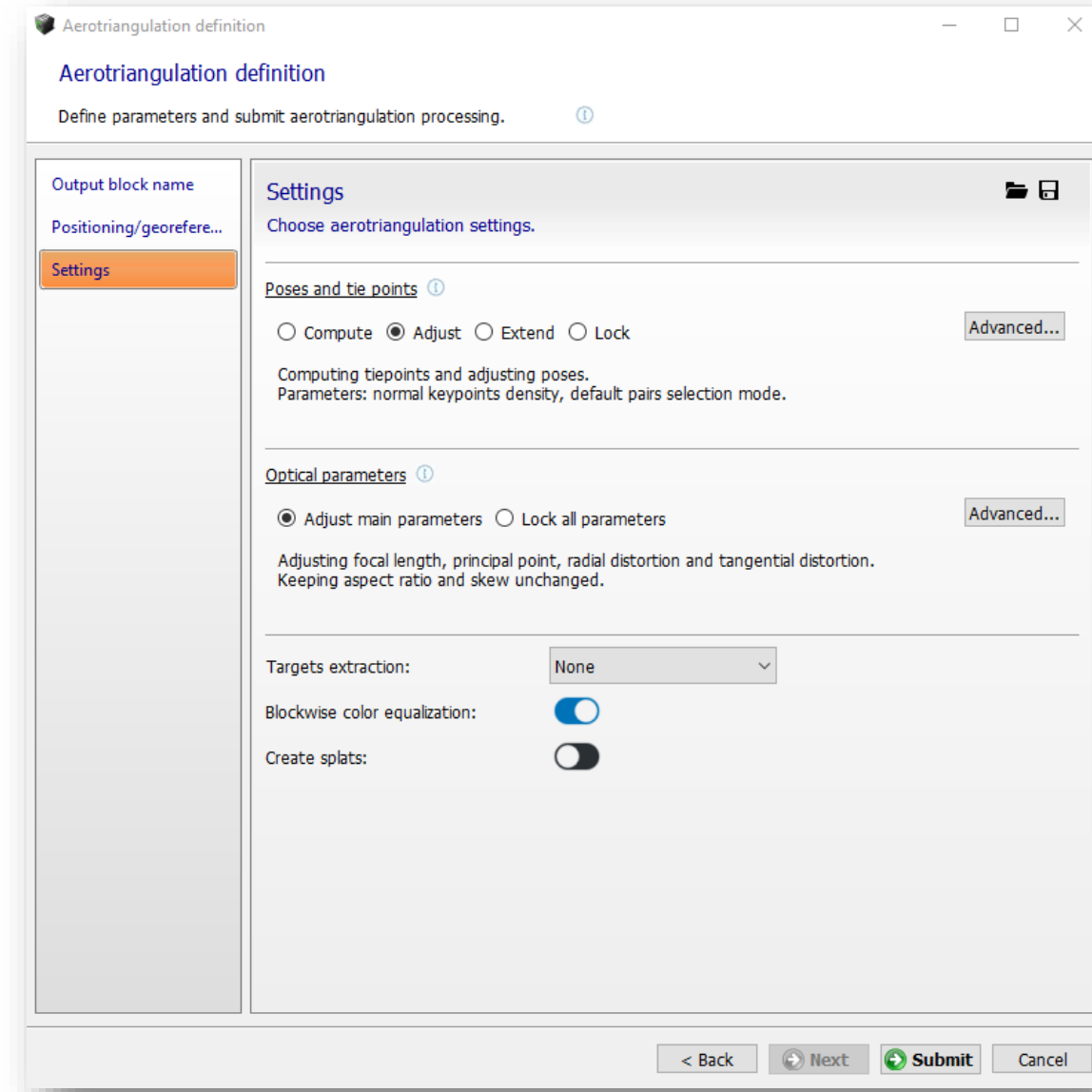
# New Aerotriangulation

A simpler interface to submit aerotriangulation

ContextCapture Update 19 & 20

## Features

- Simplified wizard
- More weight on RTK image position
- Combine scaling constraints



# Input Image color equalization using AI/ML

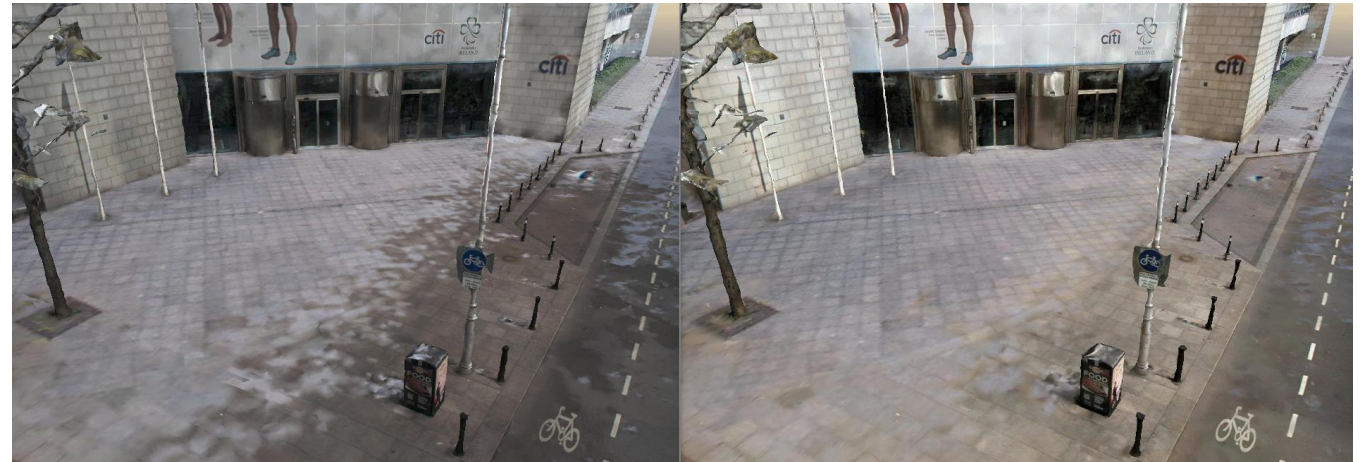
ContextCapture Update 20

*Improve the color coherence of your input dataset for more uniform textures*

Particularly Useful when the input dataset combines photos

- with large color differences
- coming from different cameras
- Captured under changing weather conditions

Original



After AI correction

Original



After AI correction

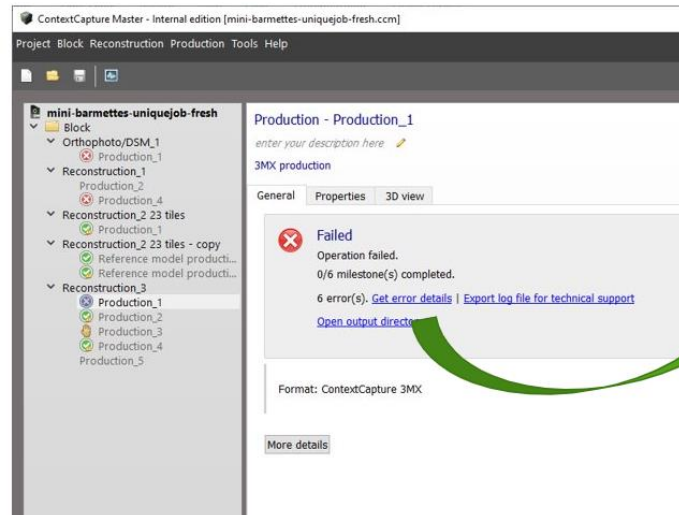
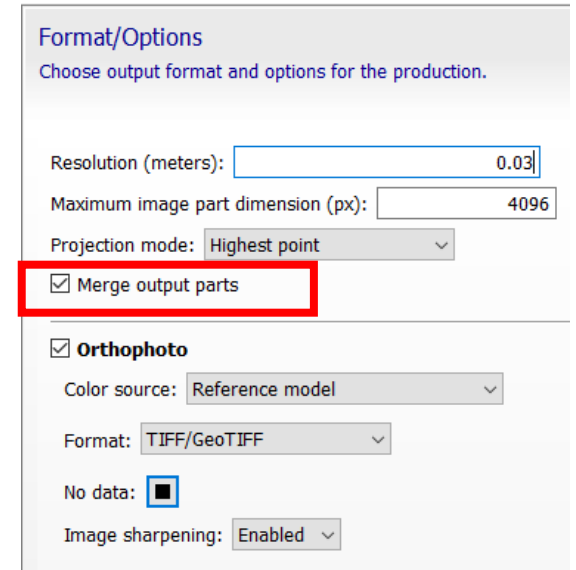
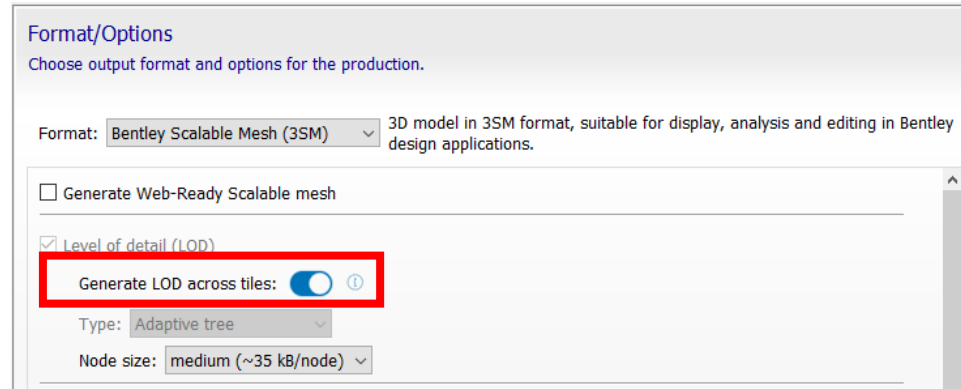


# New job structure for simpler workflows

All jobs are now unique and can queue multiple tasks

## Benefits

- User interface is much more responsive, especially when submitting, updating, cancelling large jobs (seconds VS tens of minutes).
- Orthophoto parts merging and point cloud merging are now production settings
- Simplifies the generation of optimal LOD structure for better performance a display in local and cloud viewers
- More detailed error details summary



Date	Description	Task	Host
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+001_+000)	Emea80616
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+001_+001)	Emea80616
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+000_+000)	Emea80616
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+002_+000)	Emea80616
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+000_+001)	Emea80616
20/07/2021 11:17	[Error -1073741819] Engine Failure.	TileProduction (Tile_+002_+001)	Emea80616

6 error(s), 0 warning(s)

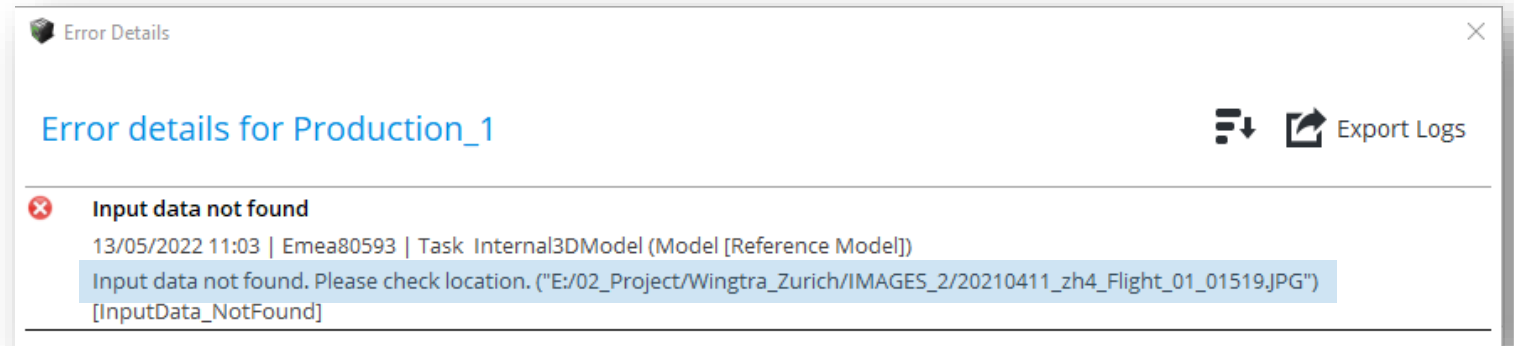
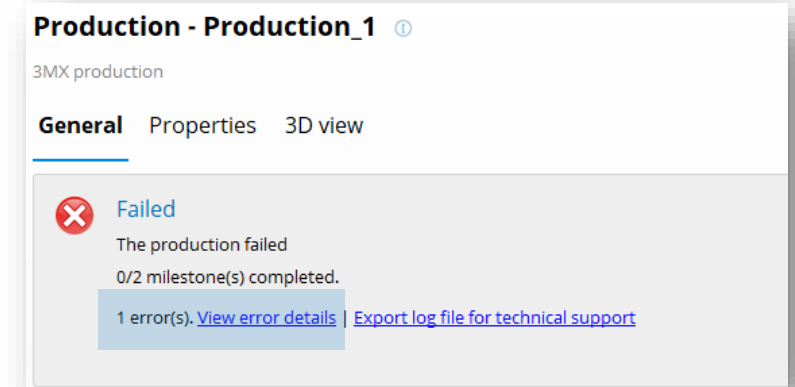


# Improve error feedback and reporting

*The error feedback now provides more information on the cause of the issue and potential issue resolution advice.*

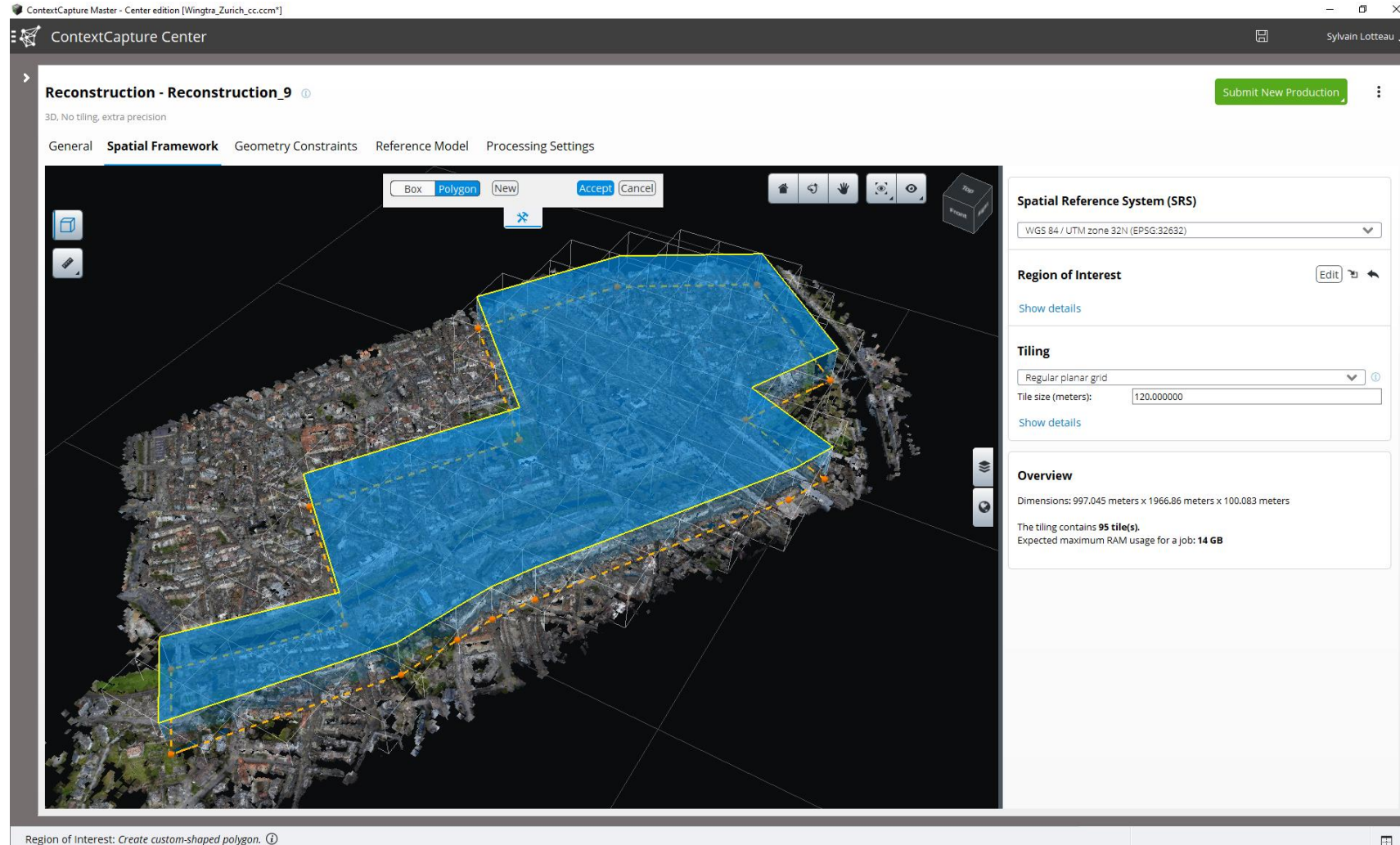
- Error messages are more user oriented
- New error feedback UI

ContextCapture Update 20



# Reconstruction: manual ROI edit

*The region of interest can now be drawn directly in the 3D view.*



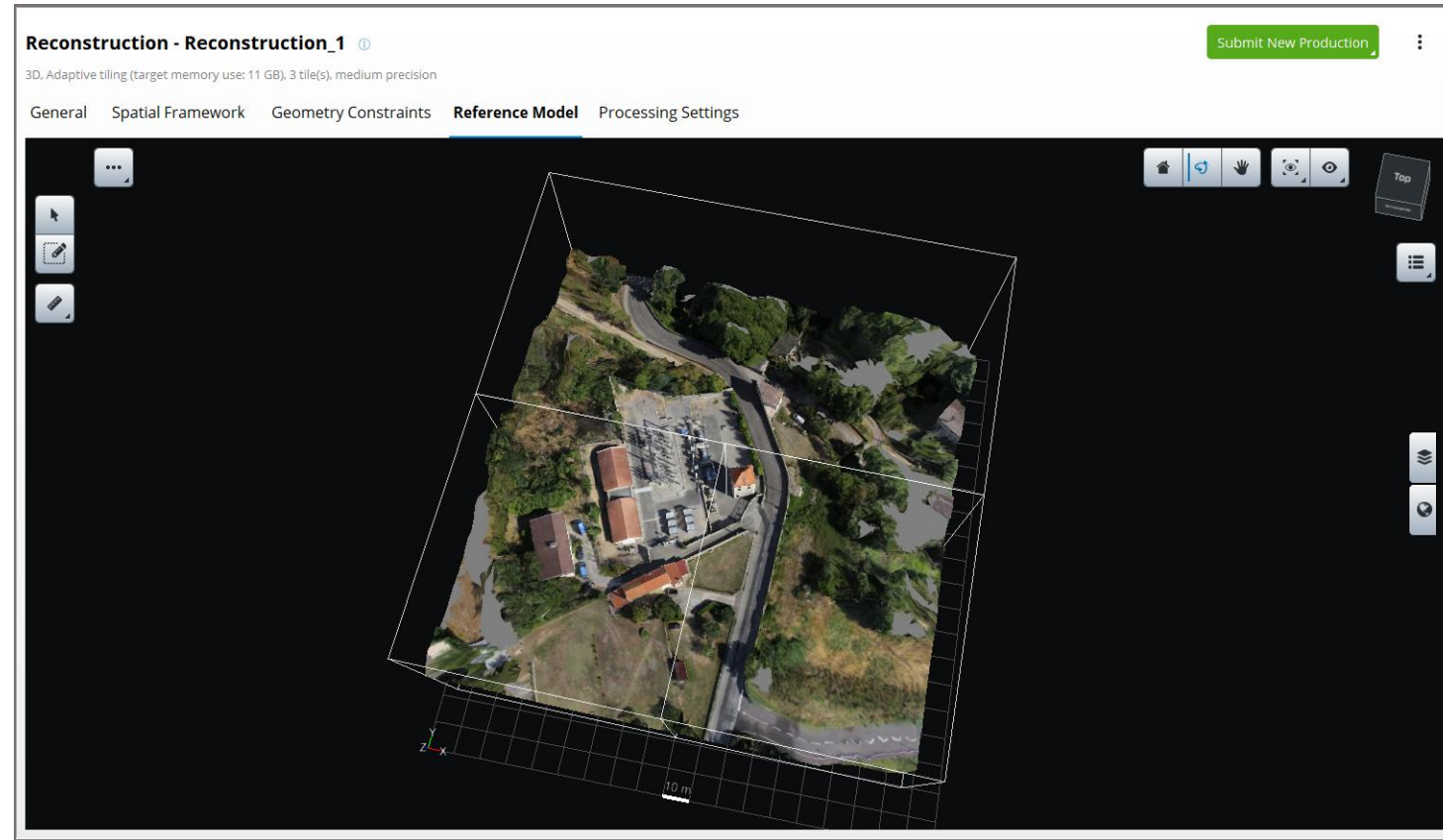
# Reference model and mesh touch-up

ContextCapture Update 18,19 & 20

Now available in Desktop mode

## Features

- Simplified view and tile selection
- Manage reference 3D cache
- Mesh Touch-up tools

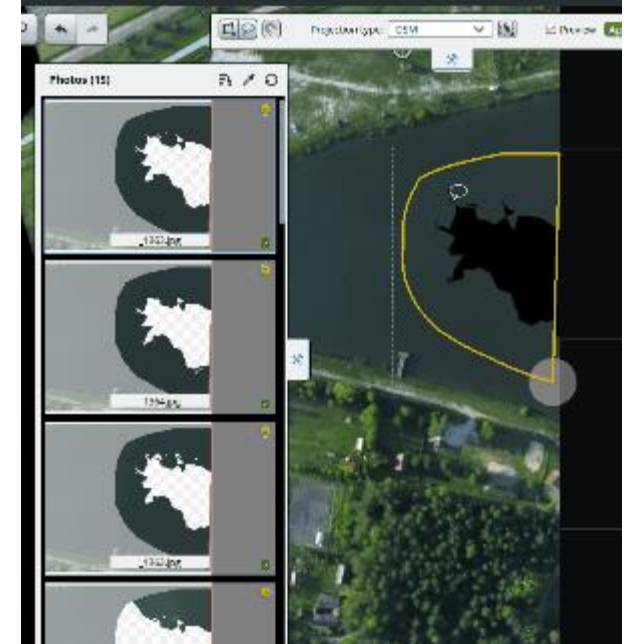
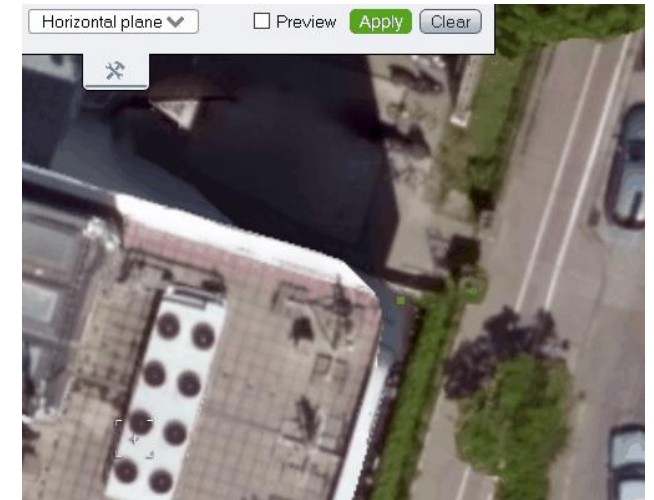


# Orthophoto dedicated instance

A set of tools integrated in ContextCapture Master to create and edit orthophotos

## Benefits?

- True orthophoto
- Dedicated retouch menu
- Correct artifact due to coarse DSM
- Fix building edges





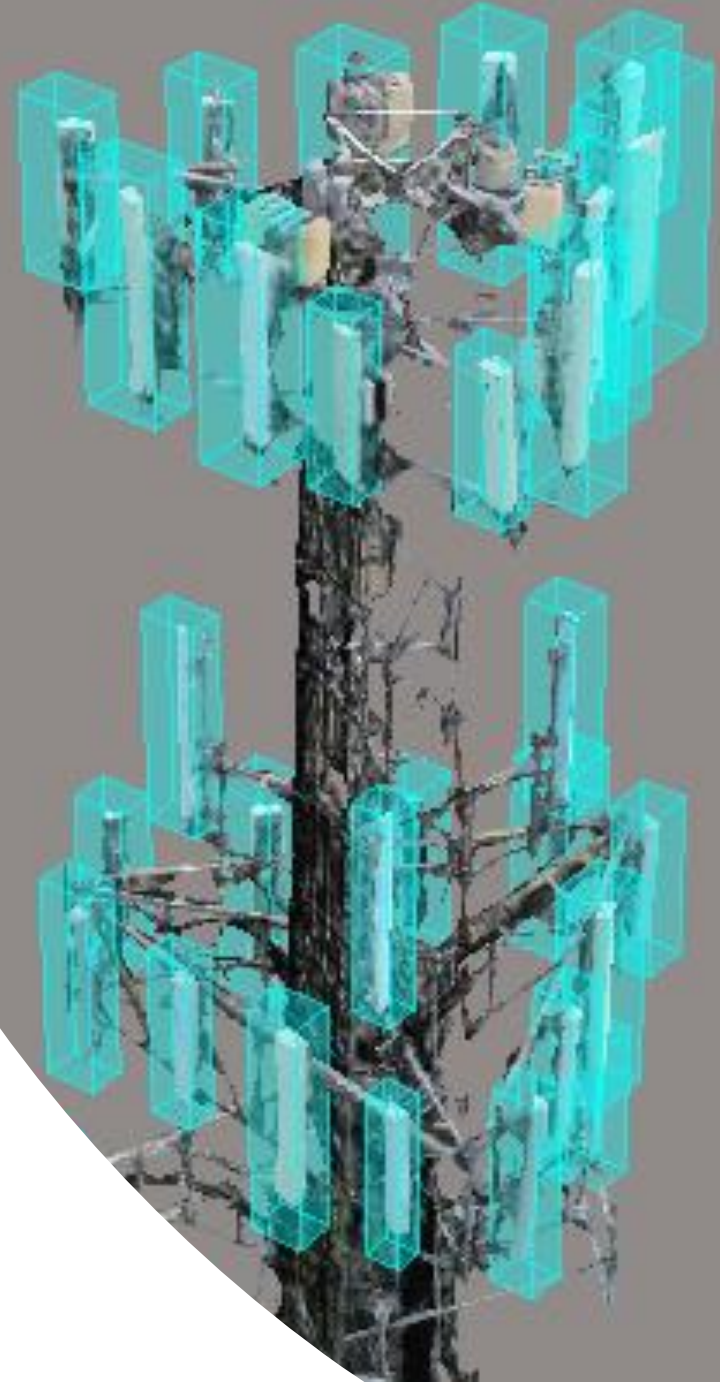


# 3- Digital twin workflow

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# Automatic detection ContextCapture Insights!

*Streamline the **detection and 3D location of objects from 3D Reality Data** using unique **3D Machine Learning***



# ContextCapture insights

## Current

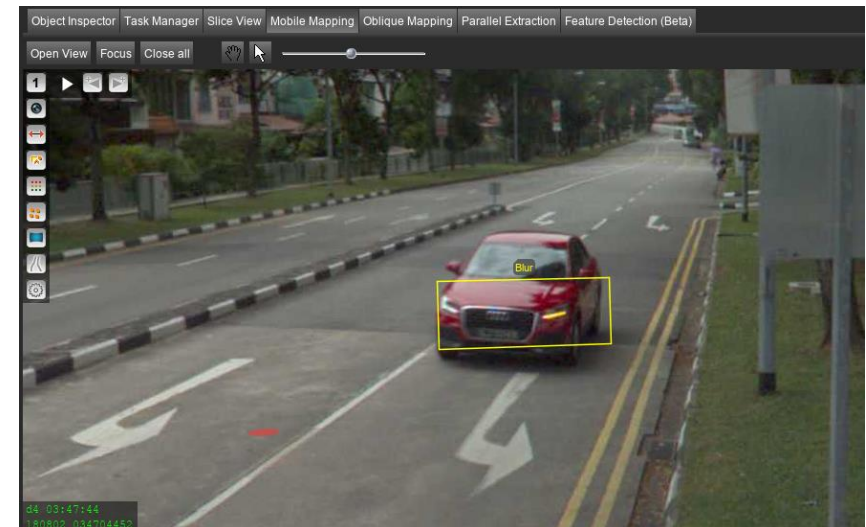
- Automatic image enhancement
- Automatic water detection
- Buildings (roofs) detector
- Cracks



# ContextCapture insights & Orbit

## Benefits?

- Propose automatic object and region extraction in Orbit eco-system
- Anonymization, Asset inventory, Defect detection
- Support QA on this automatic detection
- Optimize reality data and aggregated information before publication



# ContextCapture insights: coming soon

Automatic ground extraction





# ContextCapture Q&A

Thank you! Any question?

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