iTwin-Context - Reality + Spatial Modeling

Q4 2021

Bentley®
Advancing Infrastructure

Disclaimer Statement

Release plans and timelines are forward-looking estimates and projections only. There can be no assurance that Bentley will be able to meet such estimates or projections by the dates specified, or at all. Do not make purchase decisions based on forward looking roadmaps.

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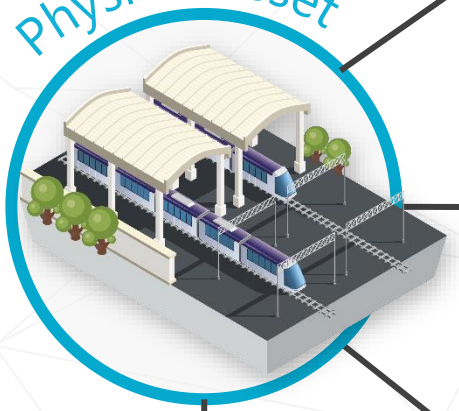
What is a Digital Twin

An iTwin enables you to visualize the asset, track change, and perform analysis to better understand and optimize project and asset performance.

Engineering

- Specs
- Drawings
- Documents
- Models
- Analyses
- Geotech
- OEM specs

Physical Asset



Context

- Imagery
- Photos
- Panoramas
- Meshes
- Point clouds
- Maps
- GIS Features

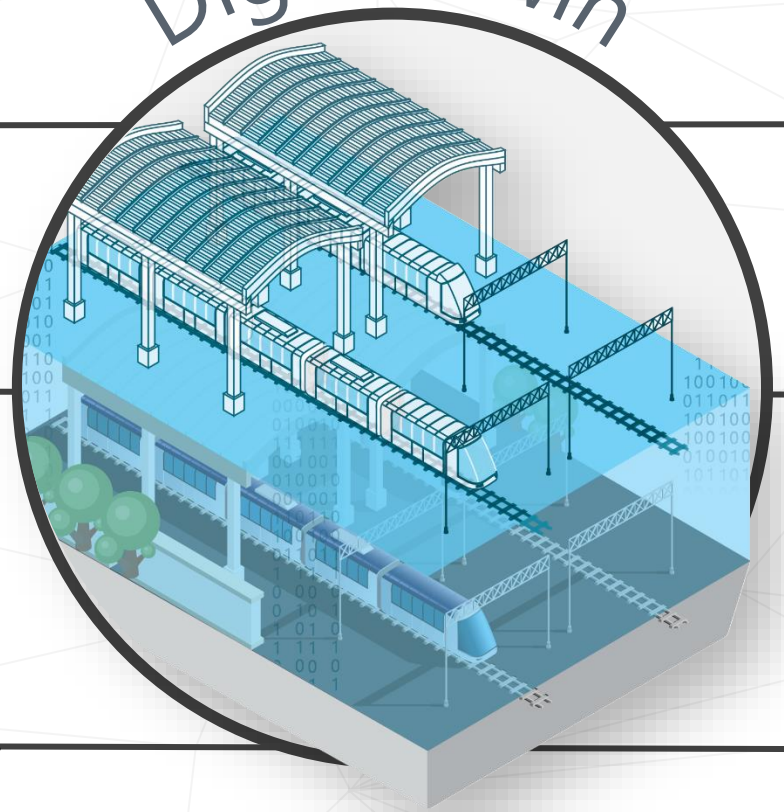
Information

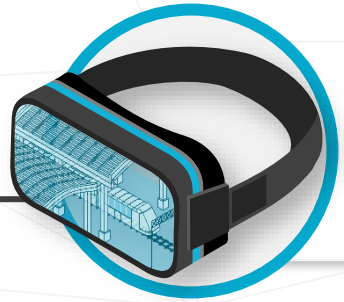
- Asset tags
- Work orders
- Maintenance records
- Inspection records

Operations

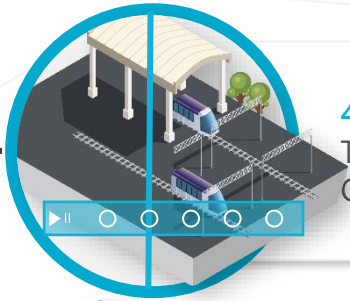
- IoT feeds
- Sensors
- Drones

Digital Twin





3D/XR
Immersive Visualization



4D
Timeline of Change

AI/ML
Analytics Visibility

iTwins are Infrastructure Digital Twins

They are continuously updated with data from the physical asset.
This data is used to understand and model the asset's performance.

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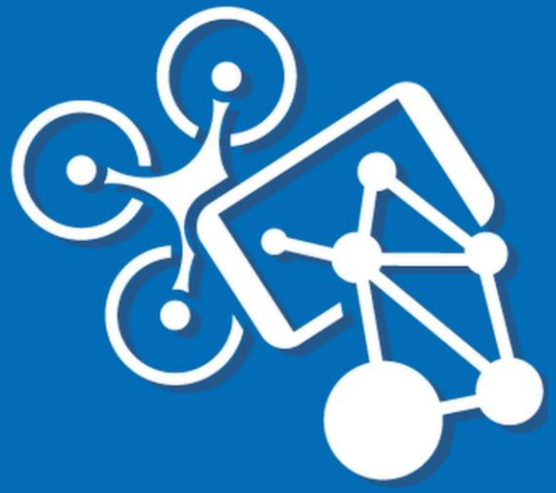

Reality + Spatial Modeling

Top Problems our software helps resolve

- Reality + Spatial Data usage & benefits are too frequently not enough accessible **to engineering practitioners,** although value is recognized. **BIG** data management and visualization challenge
- Desire to keep increasing Reality data capture frequency, speed and fidelity to get a Twin updated at higher frequency : even **BIGGER**
- Infrastructure owners want to apply reality modeling to more complex asset types. Getting reliable results is hard
- Complexity behind Photogrammetry, Lasergrammetry, Geo-coordination and data size is slowing down adoption: **Too much complexity surfaced to practitioners.**
- Cities, owners and engineering firms want to quickly and easily share their plans, in a rich context, with a broad group of stakeholders.
- Cities, owners and engineering firms need to get the best of all technology providers and cannot be locked by one or another.

Thematic Reality + Spatial Modeling Roadmap | **Product Strategy**

Reality + Spatial Modeling product line addresses the need to accurately **capture** and update the state of infrastructure assets and projects, **manage** that data, **analyze** and extract more value from it and **share** it with as broad an audience as possible.

Acquire leading companies & converge capabilities across all reality and spatial data types

Leverage best of IT & Science such as Cloud, AI/ML , Web based apps, Hardware

Openness : Developers, technical and non-technical stakeholders

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Thematic Reality + Spatial Modeling Roadmap | **Implementation by theme**

Capture

- #1 Accuracy / Quality /Scalability / Automation
- Accessibility & Democratization
- Leader/innovation – support of latest technology

Analyze

- Streamlining insights extraction out of growing amount of Reality Data
- Increase ROI by Accessibility & Democratization
- Leverage AI/ML opportunity by developing dedicated algos and Detectors

Manage - Reality Modeling

- A unified repository accessible by iTwin apps : PWCS
- Embrace multiplicity
  - Type: all reality data types & intelligence (classification, etc...)
  - Structure / Unstructured
  - Purpose: Web App, Third parties/Archiving…

Manage – Spatial Modeling

- Data compliance for geospatial workflows
- Lots of geospatial data repository out of Bentley eco-system
- Lots of legacy mapping data nonaligned with today GIS paradigm (implicit business information onboarded in symbology)

Share

- Grant access to wider audience (web, generic and specific apps)
- Empower users to create custom/ad hoc scene (Orbit Publication / Scene for a purpose)
- Empower users with tools to extract info

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Thematic Reality + Spatial Modeling Roadmap | **Product portfolio**

Product Line Description and Value Proposition

- **Our reality and spatial modeling portfolio helps cities, engineering firms and asset owners to capture the current state of their projects and assets; manage the data that is collected; get more value from that data through analytics; and share it with as broad an audience as possible.**
- **This helps to enable better and faster planning decisions, improves visibility and collaboration across departments and organizations, makes distributed information more accessible, and results in cities and infrastructure that better satisfy the requirements of stakeholders**
- **Capabilities are increasingly available via API as part of our iTwin platform**

Key components of the Product Line

- ContextCapture & ContextCapture Cloud Processing service
  - Turn photos and pointclouds of unlimited size into reality meshes
- OpenCities Maps
  - Engineering-quality GIS and Mapping Software
  - Authors GIS Features & Maps with the power of MicroStation & direct integration in your GIS database.
- ProjectWise ContextShare, Orbit Content Manager & Orbit 3D Cloud
  - Manage large image/pointcloud datasets to serve digitization or inspection workflows
  - Store and share large amounts of reality data to empower cross-project teams
- Pointools, Descartes / CCEditor
  - Analyze reality data by cleaning, measuring or drawing over reality meshes
- Reality Data Web-Viewer, Orbit 3D Viewers & plug-ins
  - Share your reality data across teams and review it in web-based environnement
  - Enable access to your Reality Data in practitionners env.
- OpenCities Planner
  - Plug and play solution for stakeholder engagement federating Reality, Geospatial and BIM data.
  - Acts as gateway layer before getting deep access to dedicated/advanced solution

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Thematic Reality + Spatial Modeling Roadmap | **Reality Modeling**

	Short Term (Last 3 months & next 3 months)	Season Plan (6 months)	6-18 months
Capture	• Orthophoto retouching tools • Better interoperability within product line • Revamped job architecture	• Leverage new Lidar capabilities from iPhones in CC Mobile app • Texture retouching • ContextCapture Cloud Processing Service public frontend API	• Improved quality of hybrid reality meshes • Retouch workflow in the cloud
Manage	• OBJ 2 LODS • Extension of OPC format to deal with Classification • Permission scheme review	• ContextShare as primary storage for Orbit Cloud and Open Cities Planner	• ContextShare 3DTiles support in OCP • Multiple mesh management (iMesh HUB) • ContextShare API to support iTwin platform
Analyze	• Automatic detection (AI-driven) of objects/regions from photos/pointclouds • Enrich our AI-pre-trained detector library • AI-detected objects and regions (Annotations) are all viewable in ContextCapture Master	• Automatic terrain extraction based on reality data • AI/ML cloud service running on reality data • Automatic detection (AI-driven) of objects/regions from photos/pointclouds is supported in Orbit products	• Automatic change-detection tools running on reality data • AI-capabilities fit specific Chinese context (no data out of the country for sake of AI-model training)
Share	• Microsoft Teams integration • Integration with PowerPlatform • Resource Comparison (4D)	• Web ready scalable mesh support from ContextShare • Switch to iModel.JS rendering and UX • Ortho-mosaic as new Reality Data Type	• iModelHub UI • Project Usage dashboards

ContextCapture features in white
Orbit features in yellow
Maps features in green
OpenCities Planner in blue
Reality Data Viewer in orange
ProjectWise ContextShare in pink

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Thematic Reality + Spatial Modeling Roadmap | **Spatial Modeling**

	Short Term (Last 3 months & next 3 months)	Season Plan (6 months)	6-18 months
Capture	• Orthophoto retouching tools • Better interoperability within product line • Revamped job architecture	• Leverage new Lidar capabilities from iPhones in CC Mobile app • Texture retouching	• Improved quality of hybrid reality meshes • Retouch workflow in the cloud
Manage	• Smartly convert CAD elements into geospatial features • Simplify the map setup workflow	• ContextShare point clouds support • Increase interoperability capabilities	• Better integration of reality data into geospatial workflows • Interconnect engineering data with GIS environment
Analyze	• Automatic detection (AI-driven) of objects/regions from photos/pointclouds • Enrich our AI-pre-trained detector library • AI-detected objects and regions (Annotations) are all viewable in ContextCapture Master	• Automatic terrain photos/pointc extraction based on reality data • AI/ML cloud service running on reality data • Automatic detection (AI-driven) of objects/regions from louds is supported in Orbit products	• Automatic change-detection tools running on reality data • AI-capabilities fit specific Chinese context (no data out of the country for sake of AI-model training)
Share	• Microsoft Teams integration • Integration with PowerPlatform • Resource Comparison	• IMS authentication • Switch to iModel.JS rendering and UX • Ortho-mosaic as new Reality Data Type	• iModelHub UI • Project Usage dashboards

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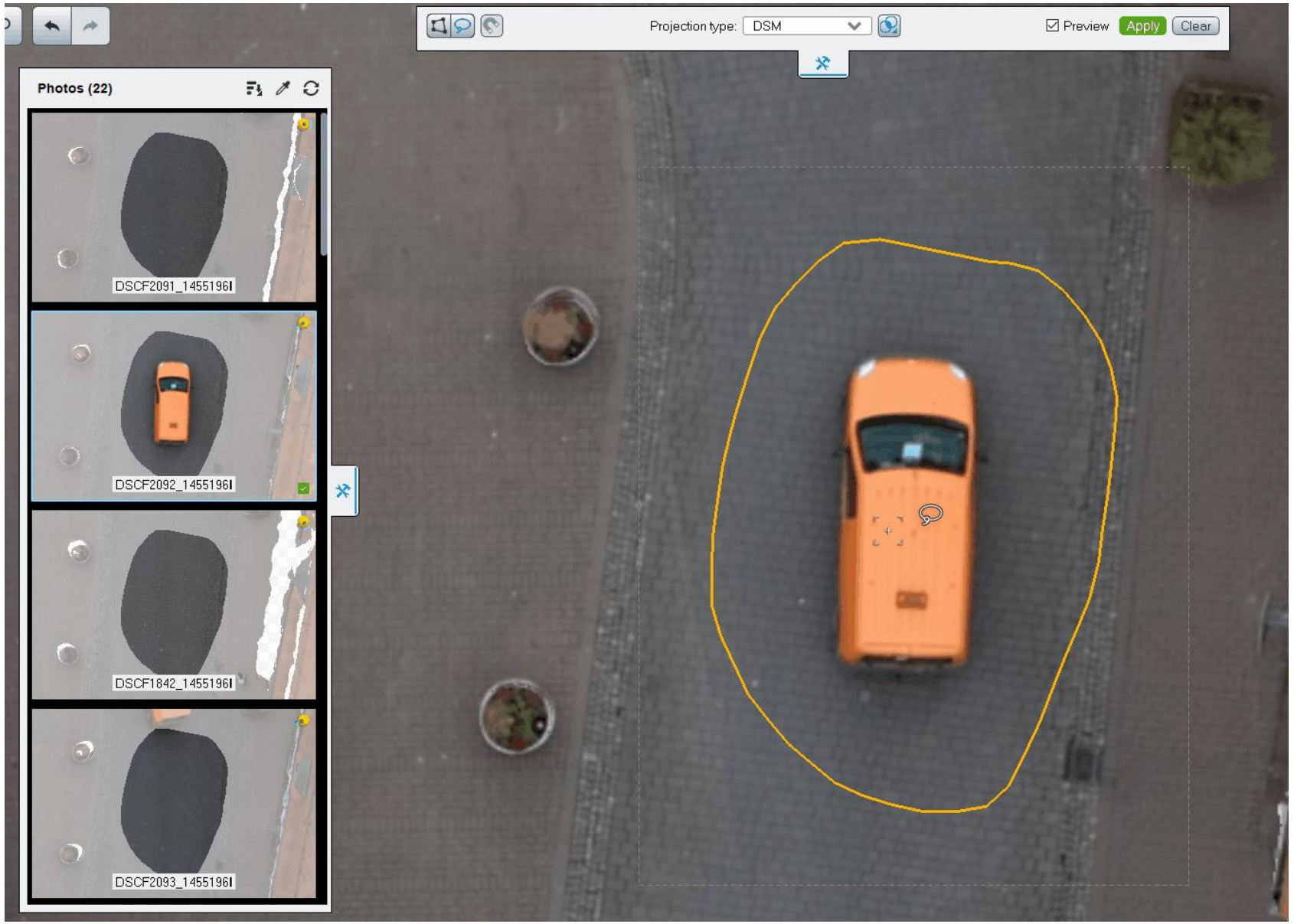
Capture | Orthophoto retouching tools

ContextCapture

- *Problem/Pain* | Raw production usually ends up displaying undesired elements.
- *For* | Surveyors, Mappers
- *Value* | Better quality deliverable
- *When* | Q4 2021



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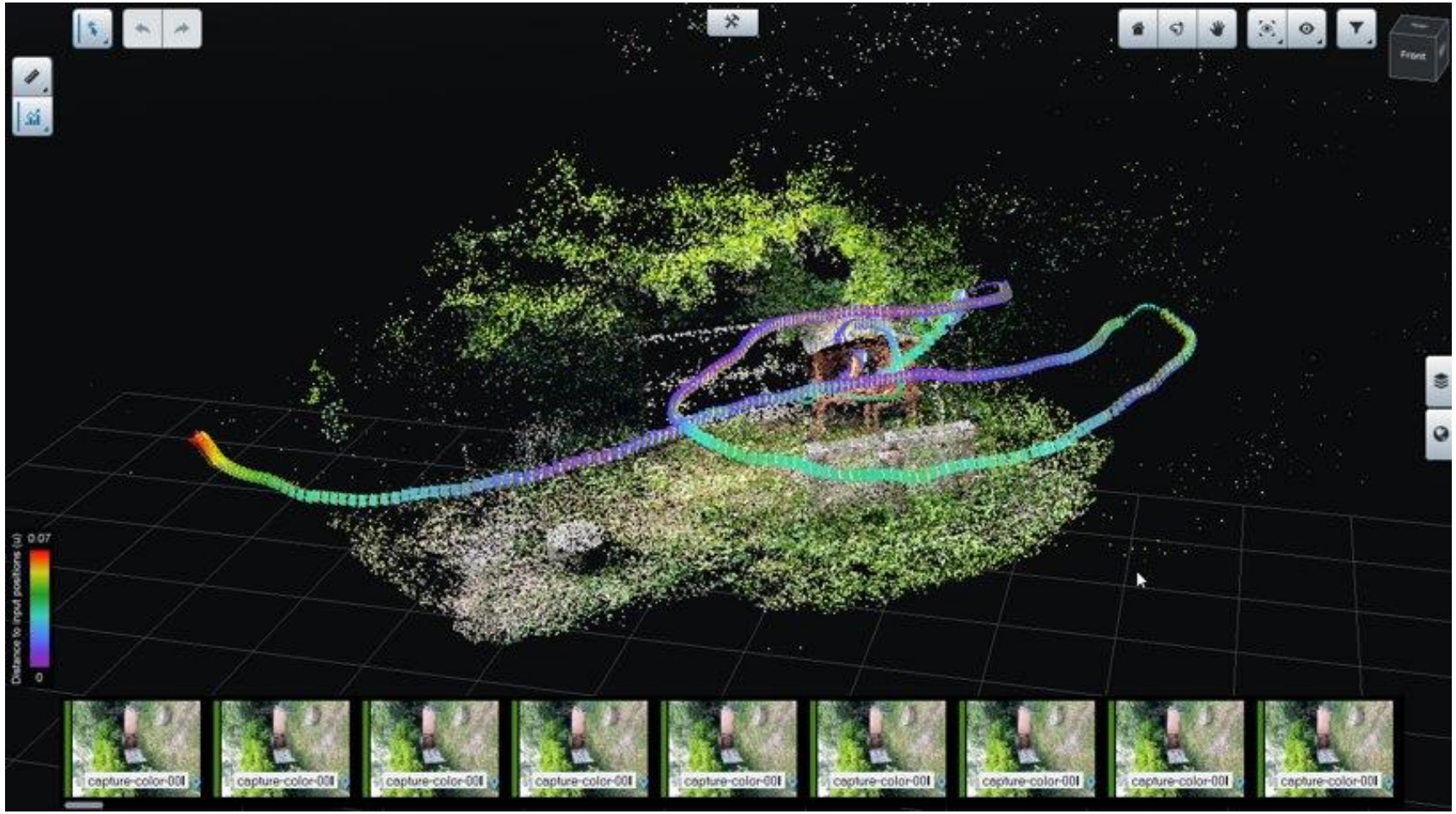
Capture | iPhone LIDAR in CC Mobile app

ContextCapture Mobile

- *Problem/Pain* | High quality reality mesh requires complex capture and device
- *For* | Inspectors, Field workers
- *Value* | Accurate Reality Modeling technique available in all hands
- *When* | H1 2022



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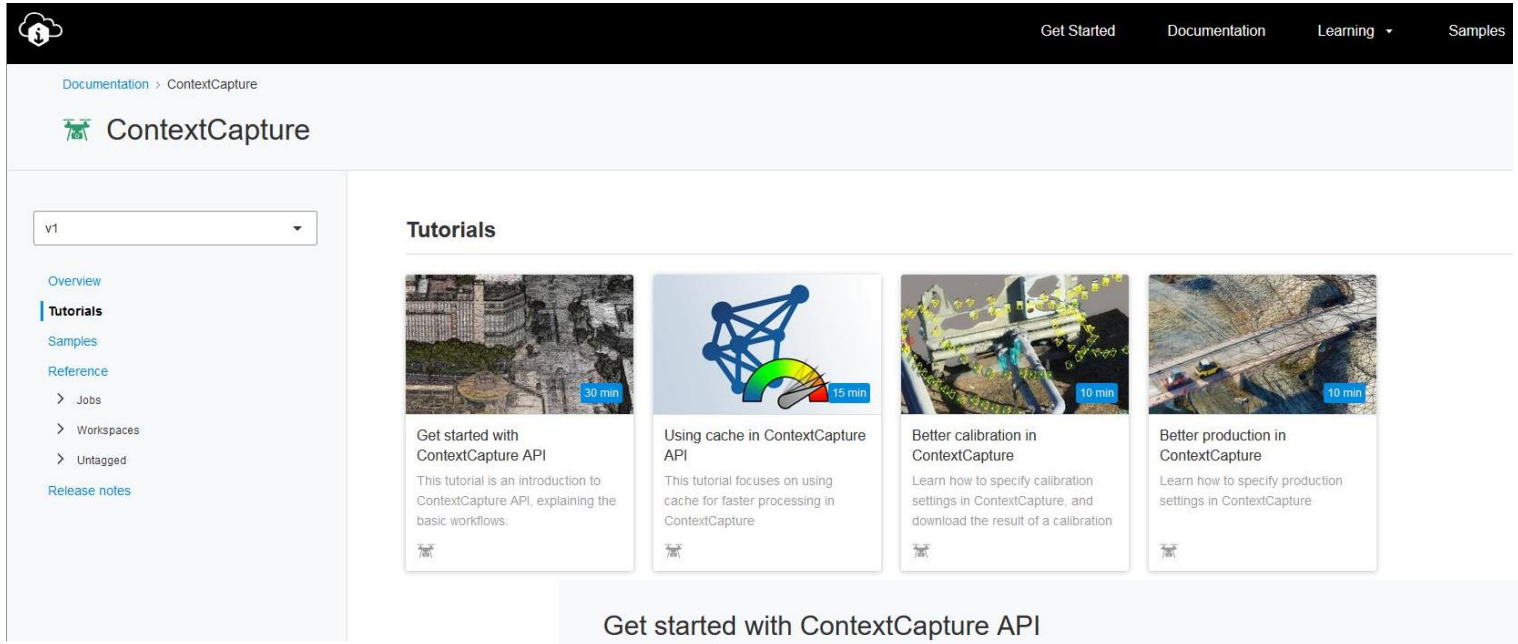
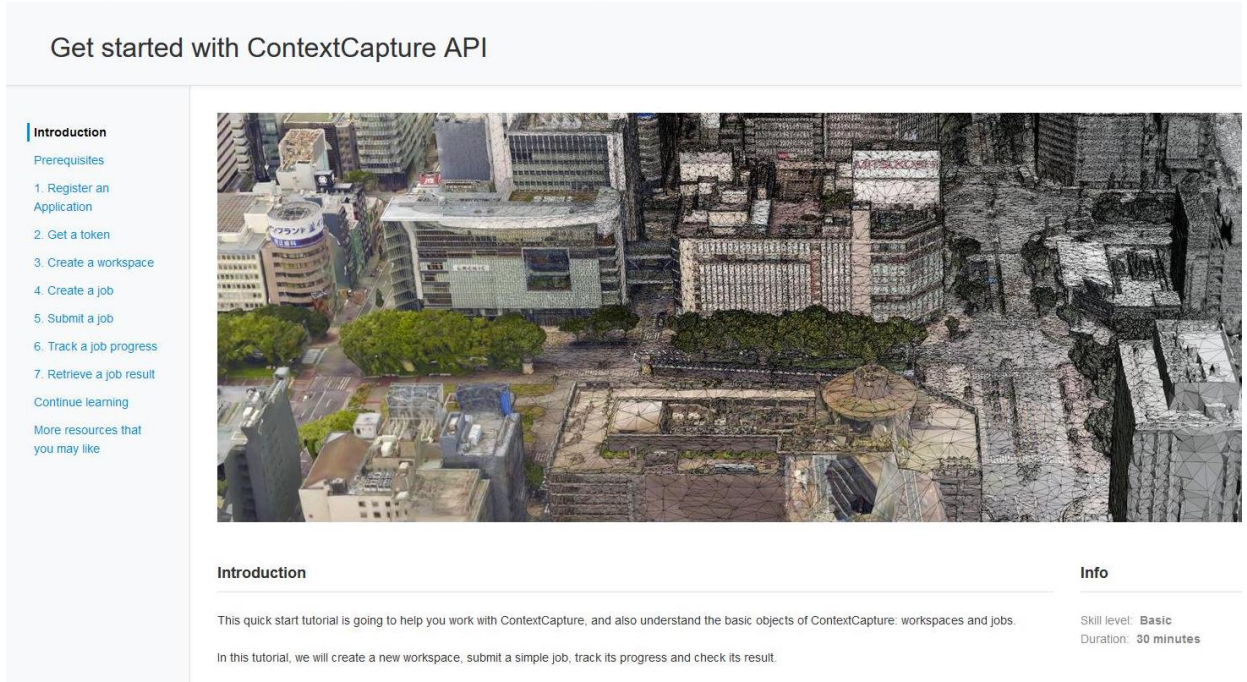
Capture | CC Cloud Processing Service public frontend API

ContextCapture Cloud Processing Service

- *Problem/Pain* | Bentley CCCS is not easily accessible and documented
- *For* | Developers
- *Value* | Benefit from CC Cloud Service to support large volume productions
- *When* | Q4 2021





Analyze | AI-detection in photos & pointclouds

ContextCapture Orbit 3DM Cloud Service

- *Problem/Pain* | Large amount of data are not fully exploited because of complexity, time, etc…
- *For* | Inspectors, GIS-experts, Urban mappers
- *Value* | Time or safety saves
- *When* | H1 2021 (CC)
  H2 2021 (Orbit)
  H1 2022 (Cloud)

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Analyze | AI-detection in photos & pointclouds - Vectorization

ContextCapture Orbit 3DM Cloud Service

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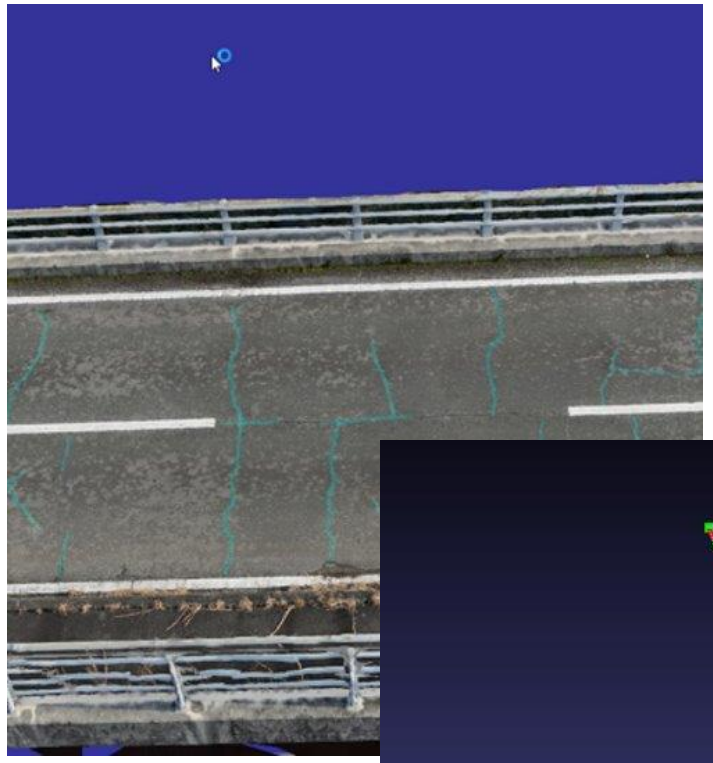
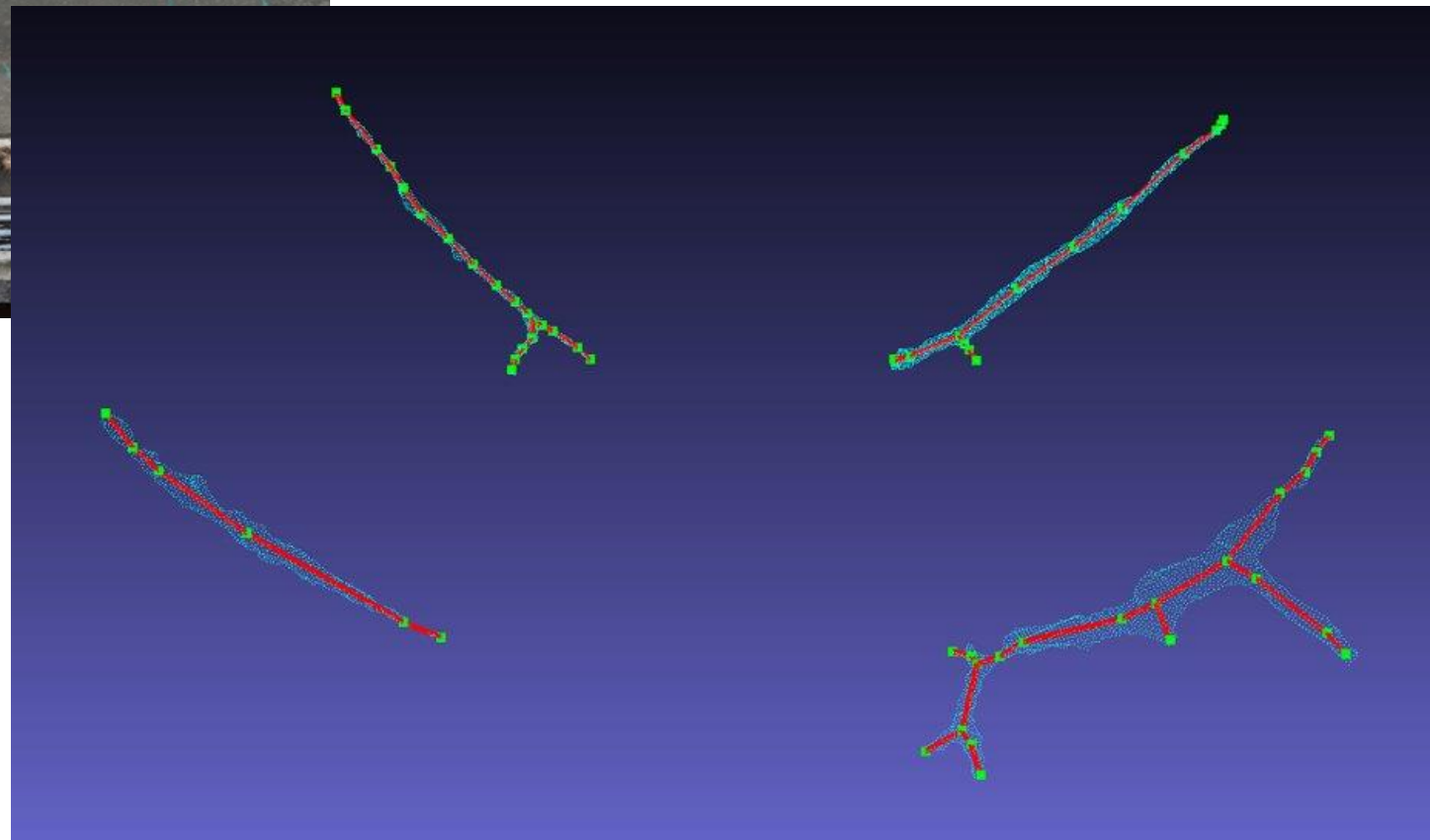
- *When* | Q1 2022





Analyze | Automatic terrain extraction

ContextCapture

- *Problem/Pain* | How to accurately extract terrain from context to enable design on large scale
- *For* | Civil engineers
- *Value* | Design engineerings operations can be driven dtraigh after Capture
- *When* | H1 2022 (ContextCapture)

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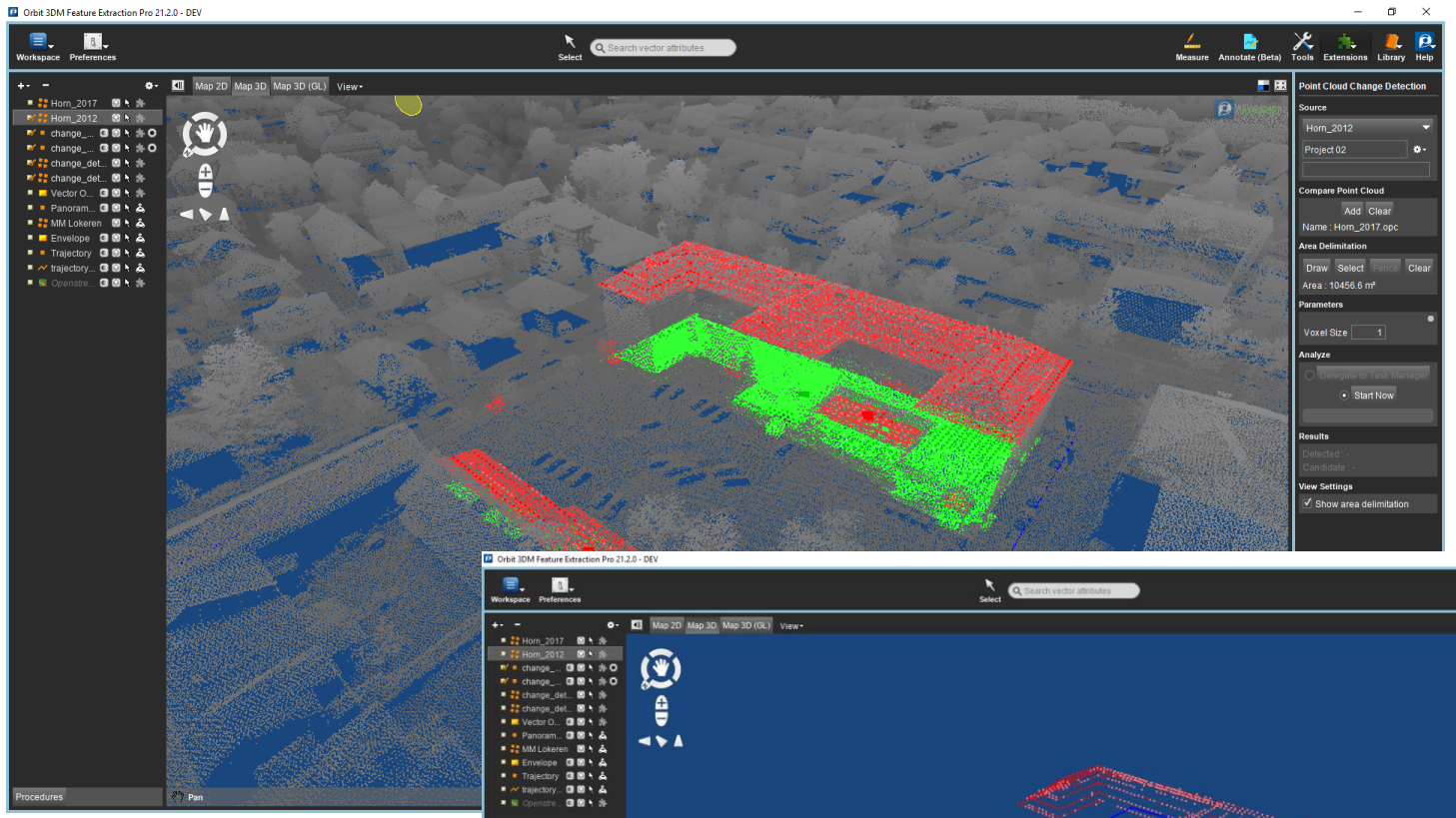
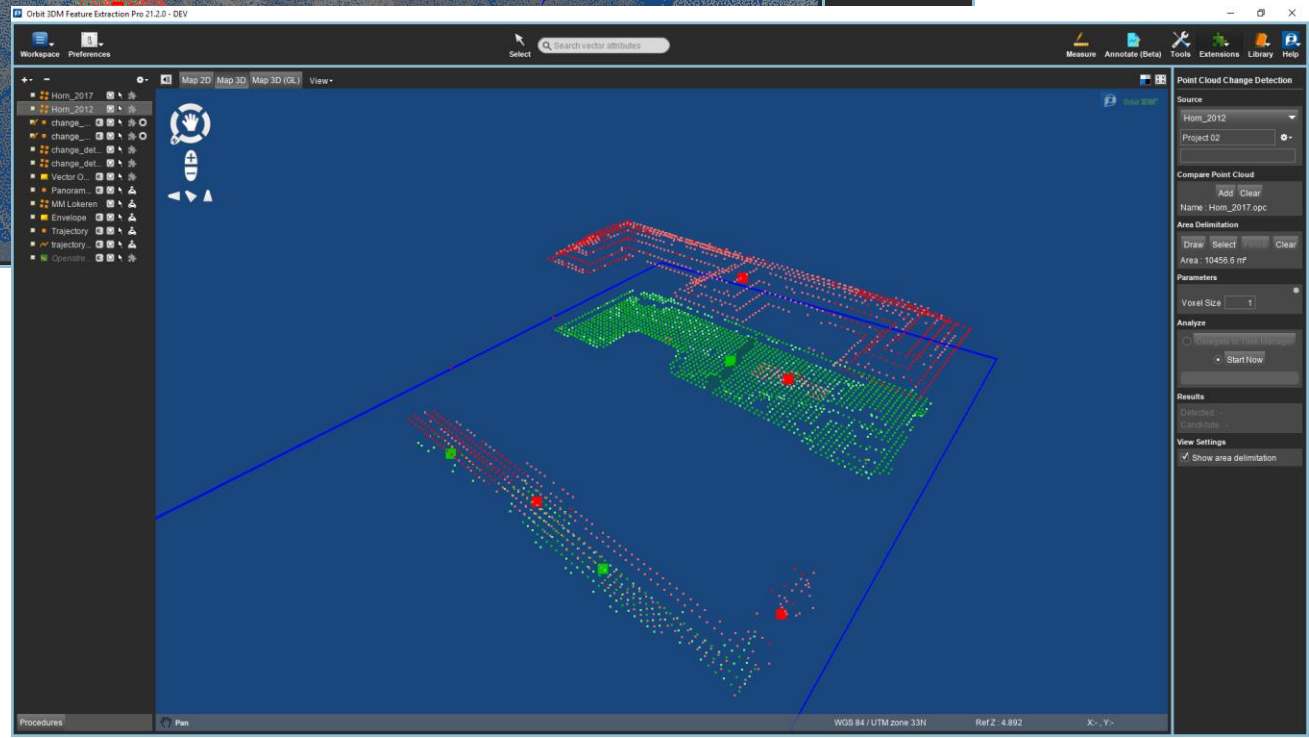
Analyze | Automatic change detection

Orbit 3DM

- *Problem/Pain* | How to locate and monitor changes in a given scene over time
- *For* | Inspectors, Construction engineers
- *Value* | Ensure compliance for inspection or as-built/as-design operations
- *When* | H1 2021-2022 (Orbit)

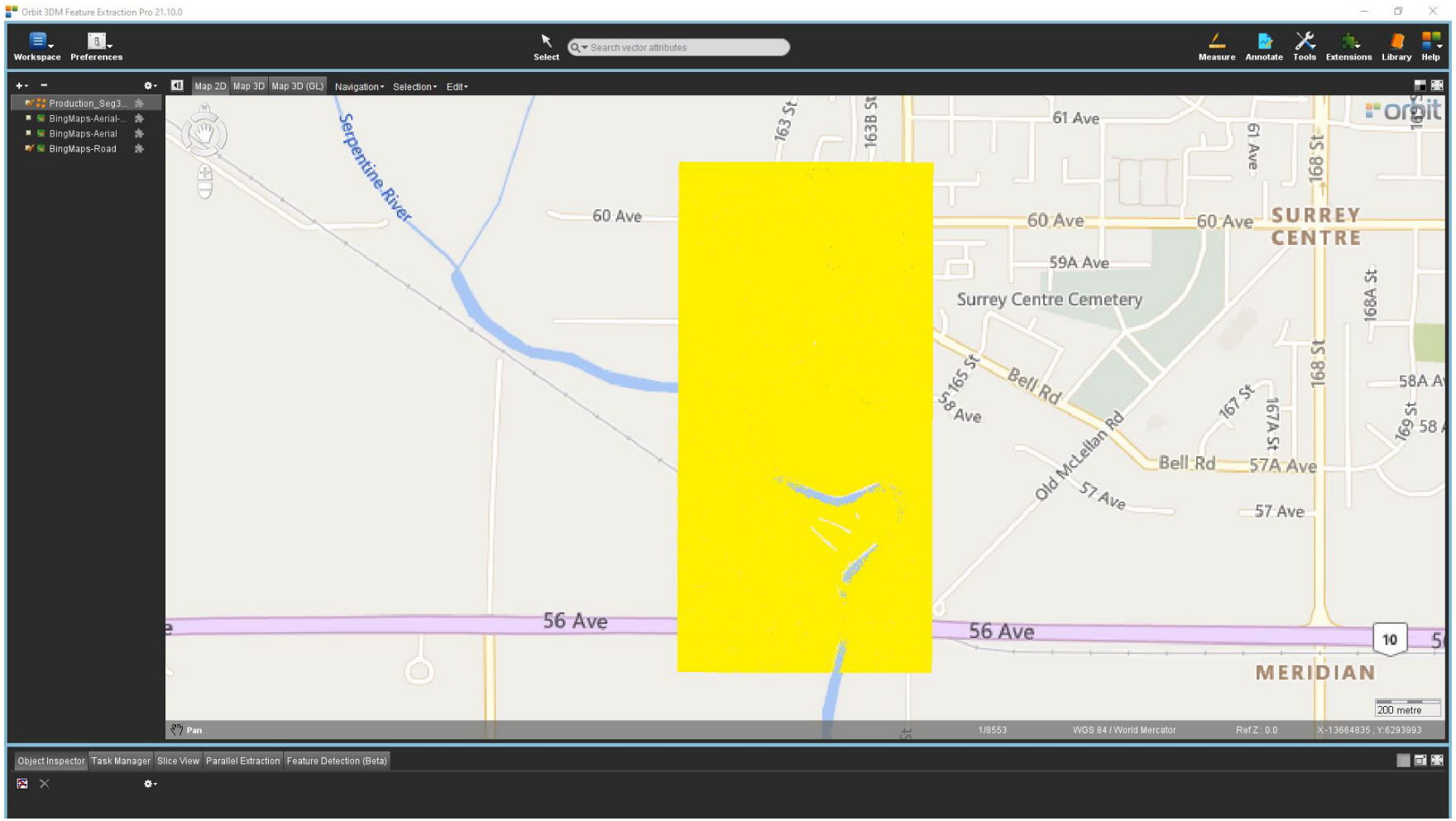




Analyze | Classified pointclouds (OPC format)

Orbit 3DM

- *Problem/Pain* | How to run focused analysis on pointcloud data
- *For* | Inspectors, surveyors
- *Value* | Ease access to important information by filtering out what's irrelevant
- *When* | Q4 2021



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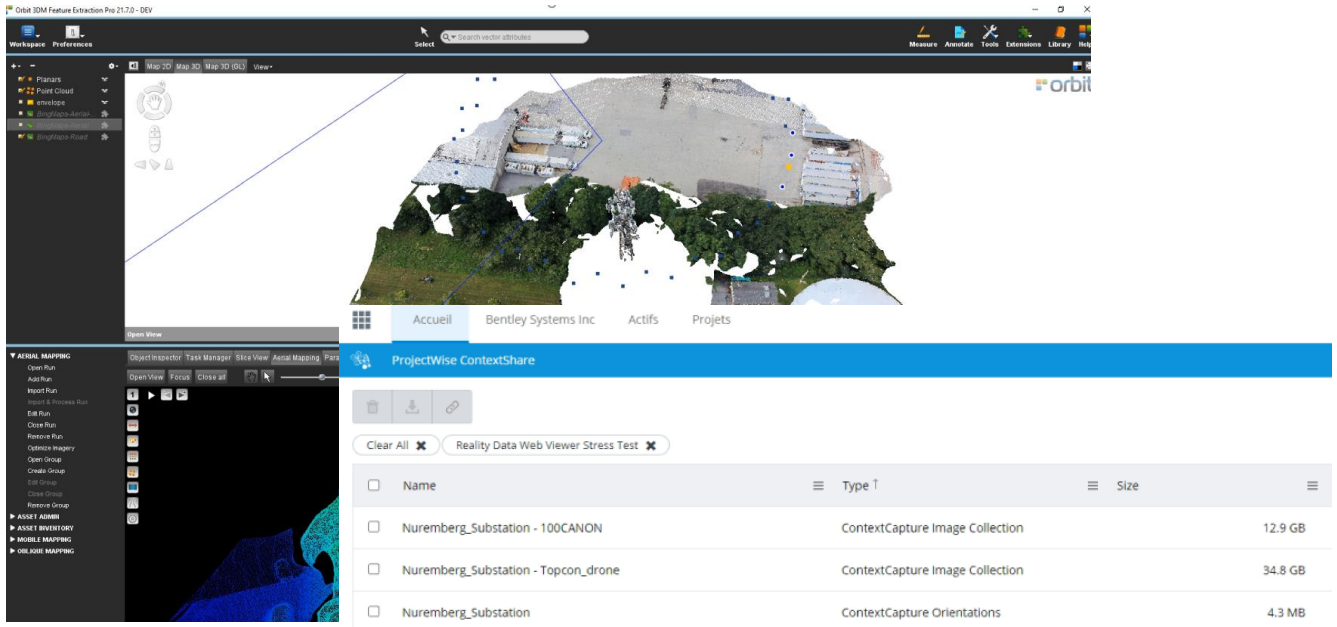
Manage | ContextShare as primary storage platform

ProjectWise ContextShare

- *Problem/Pain* | Multiple storage platforms – confusing/duplication
- *For* | Data managers
- *Value* | A unified storage platform for everything related to Reality Data
- *When* | H1 2022



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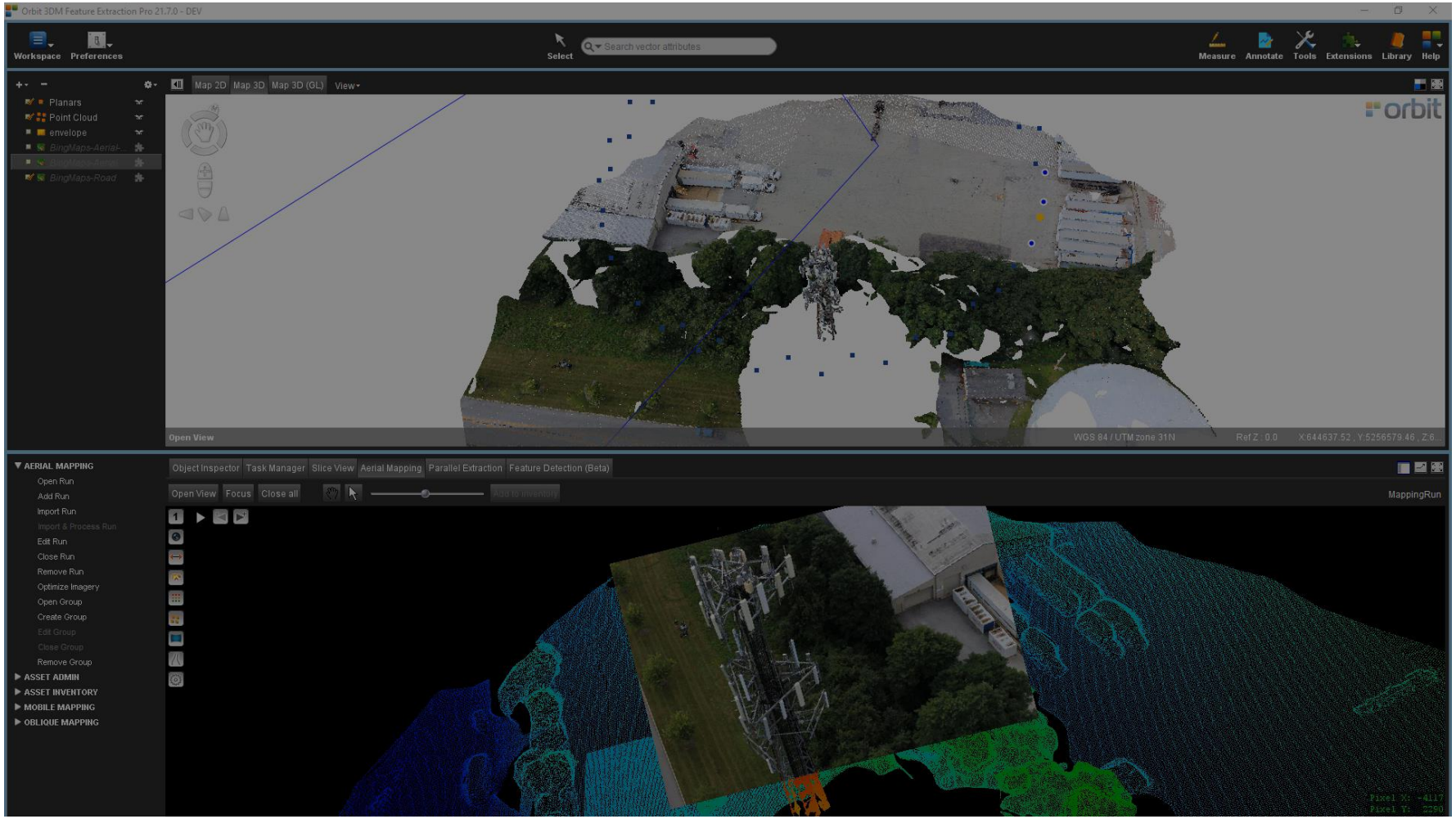

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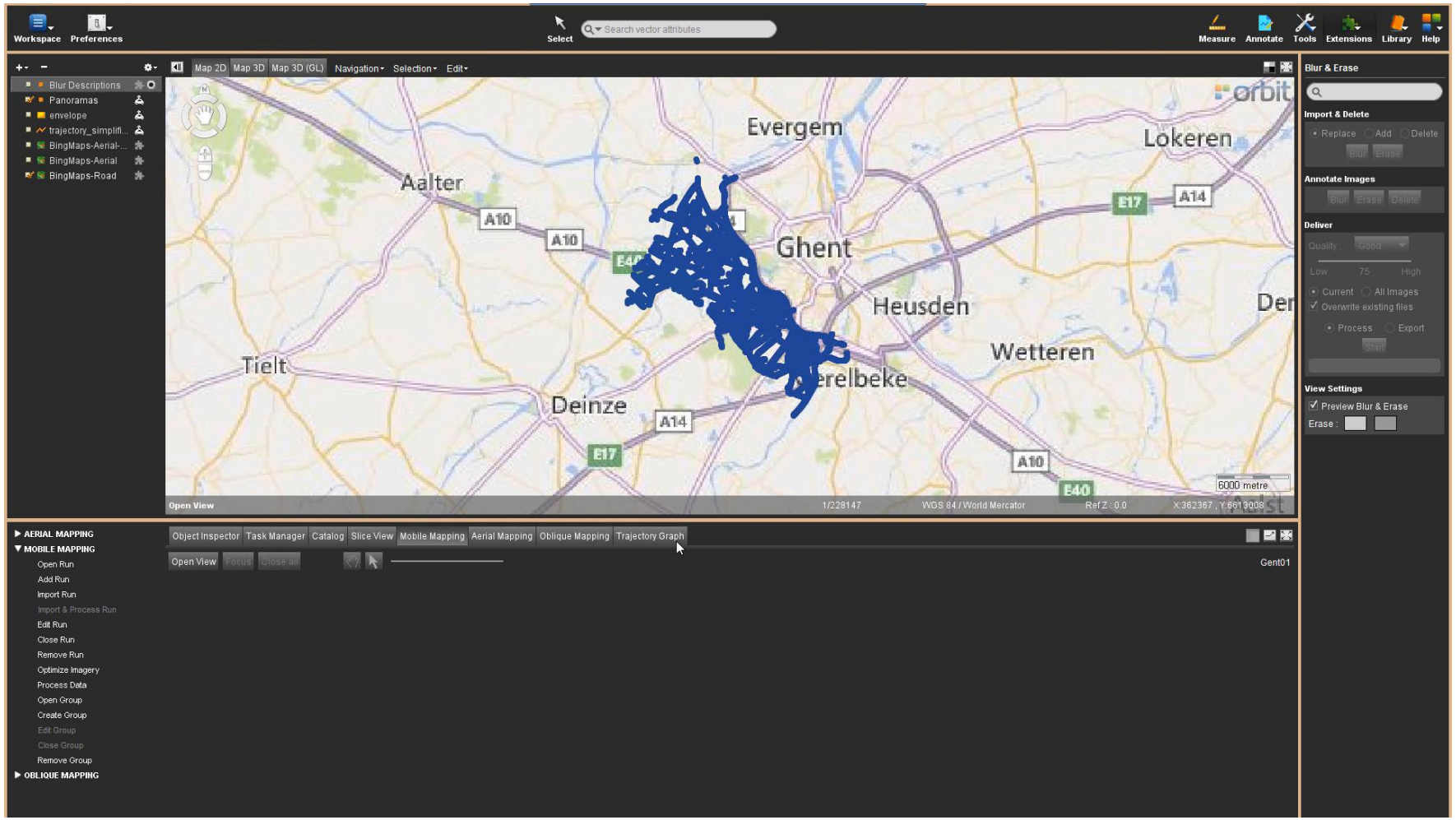
Manage | Enable anonymization workflows

Orbit Content manager

- *Problem/Pain* | Share large terrestrial image-runs without exposing personal information
- *For* | Data managers, surveyors
- *Value* | A fast and easy way to anonymize your data before public exposure
- *When* | Q1 2022



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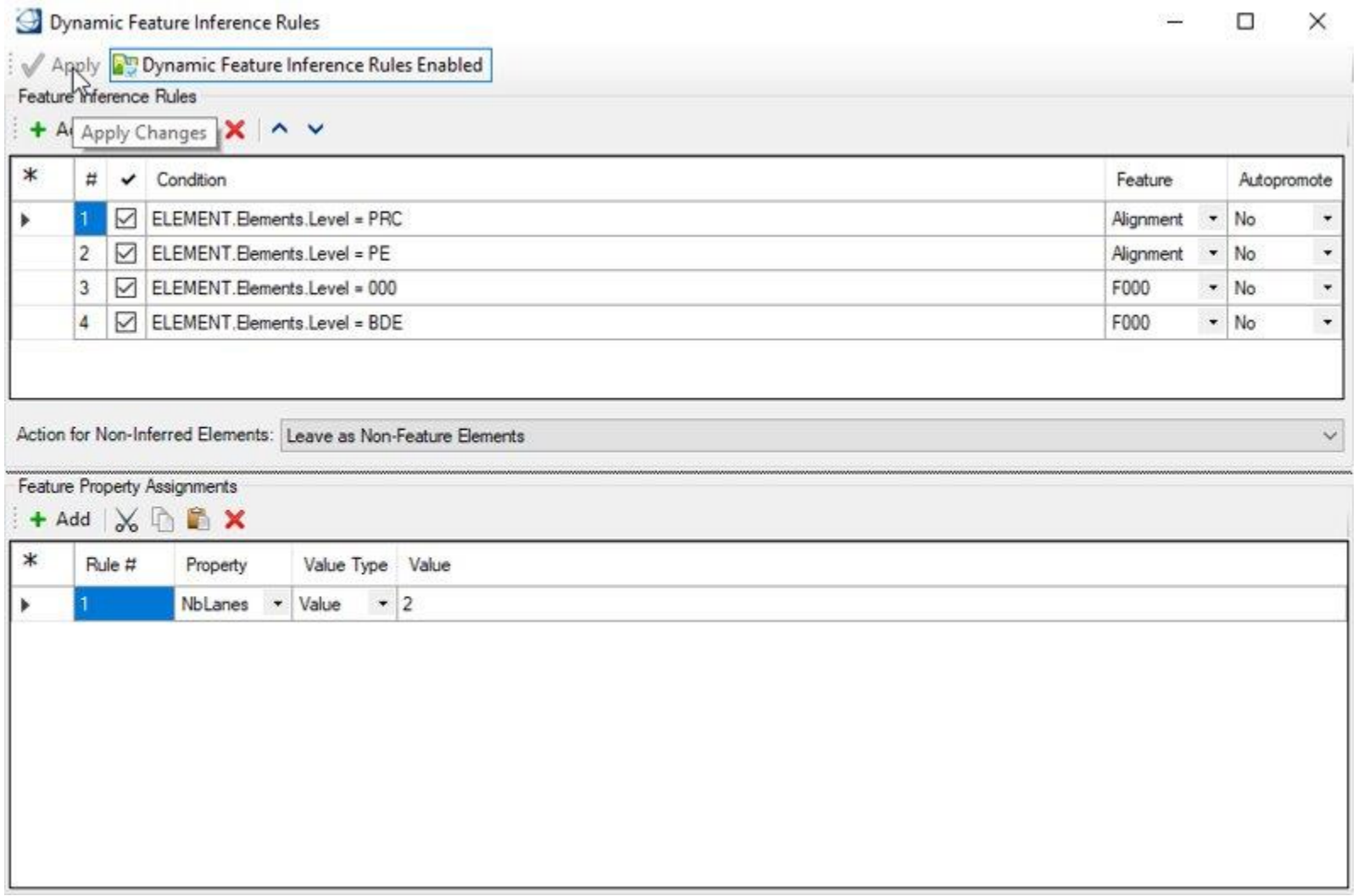
Manage Geo| Convert CAD elements into geospatial features

OpenCities Map

- *Problem/Pain* | Struggle to convert CAD elements into GIS features
- *For* | Mappers
- *Value* | Time saves
- *When* | H2 2021



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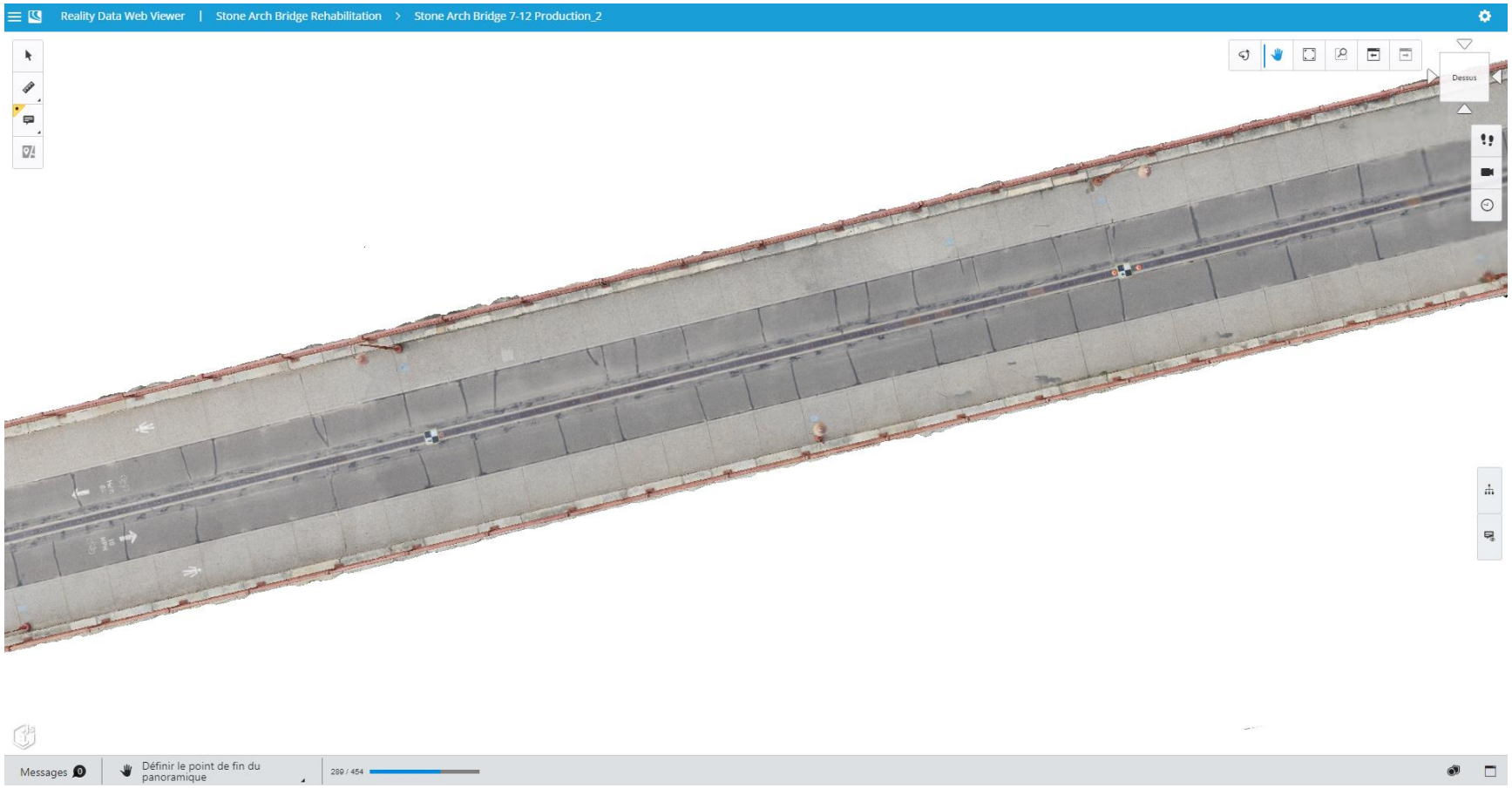
Share | Ortho-mosaic as new reality data type

Reality Data Viewer

- *Problem/Pain* | 2D is sometimes easier to manipulate but isn't currently available in our web environment
- *For* | Mappers, GIS managers
- *Value* | Support for usual mapping deliverable in web-environment
- *When* | H1 2022



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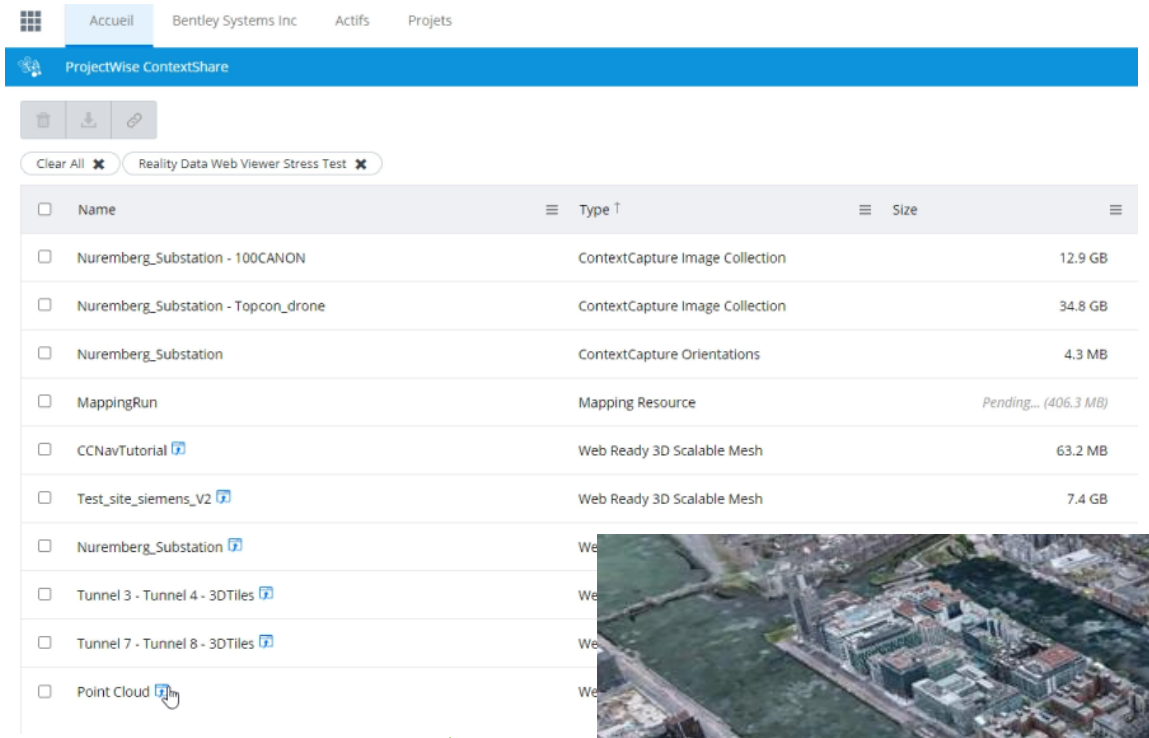
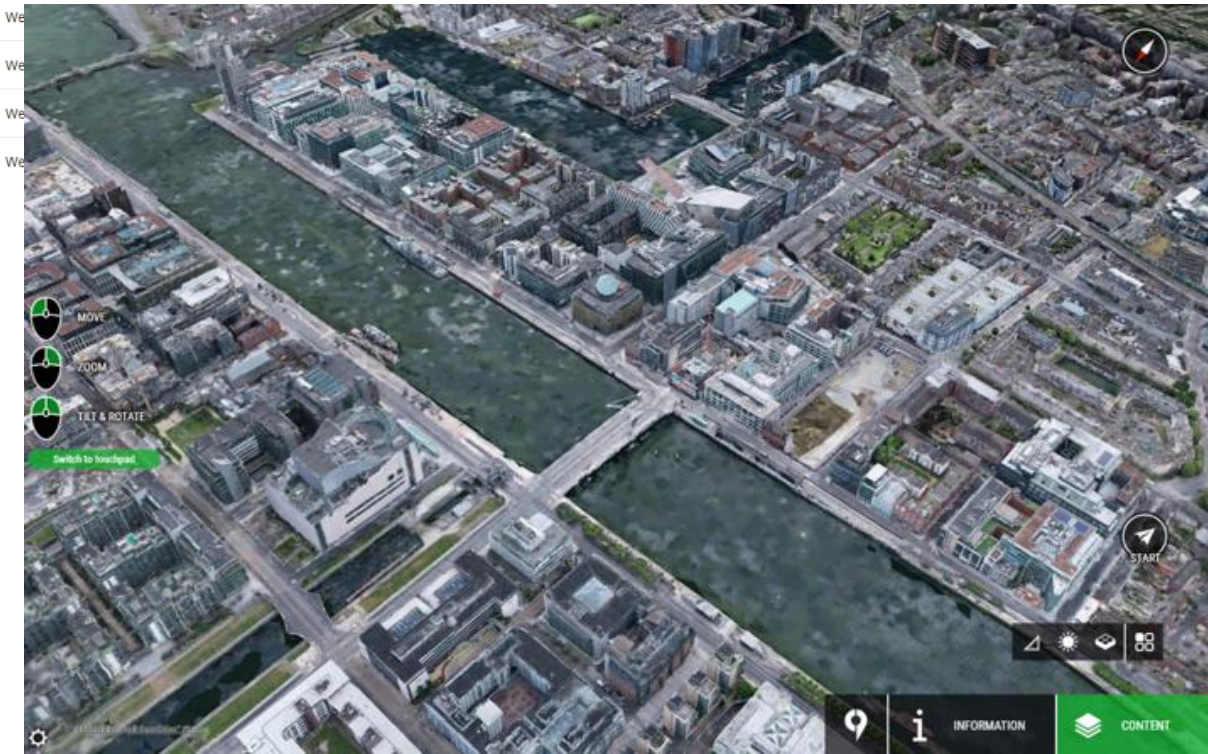
Share | Web ready scalable mesh support from ContextShare

OpenCities Planner

- *Problem/Pain* | Reality Mesh cannot currently be streamed straight from preferred sharing platform
- *For* | Mappers, GIS managers
- *Value* | Unified behavior between creation and consumption environment
- *When* | H1 2022





Share | Resource comparison – 4D

Reality Data Viewer

- *Problem/Pain* | Hard to compare a single scene at different times
- *For* | Inspectors, Designers, Construction engineers
- *Value* | Fast comparison helping decision making
- *When* | Q3 2021