Publishing Bentley Systems’ reality meshes to the Web using Cesium 3D Tiles

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Bentley’s offerings span the infrastructure lifecycle-- from buildings to bridges, transit to utilities, offshore or underground. Here you see our ‘playlists’ of applications comprising the best mix of software for their respective disciplines on a given project.
Advancing Reality Modeling with ContextCapture

- Reality Modeling: *Processing observations of existing conditions into representations for contextual alignment within design modeling and construction modeling environments*
  - Not having to start from a blank canvas
  - Using the reality as context whether you are designing, building or operating something
ContextCapture Technology Breakthroughs

Can automate the generation of high-resolution, fully-3D representations from digital photographs, taken with any camera, whether embedded in a smartphone, mounted on a drone or highly specialized, multi-directional photograph acquisition systems.
Reality Meshes as an Alternative to Point Clouds

- More compact (30×)
- More immersive, more intuitive
- Align better with design models
- Render more efficiently
- Massive datasets require level-of-detail

⇒ 3MX format supported by MicroStation CONNECT Edition

⇒ Good fit for web publishing with Cesium 3D Tiles!
- Infrastructure like a plant

- Done only from the air in this case, shooting with a DSLR from the window of a microlight
- Good illustration of conceptual design

- Start from existing conditions and start the design from there, not to start from a blank canvas

- In this case, the city of Stockholm wants to integrate future infrastructure projects.

- They asked Blom to acquire vertical and oblique images from the air and they integrated the conceptual design for the future infrastructure projects and put this on a touch table in their house of culture.

- Citizens can come and navigate with their fingers through the city to see the impacts of the new projects.
- IKEA swedish corporation

- Customer wants to map all utilities and pipes, equipments on the roofs of the buildings

- UAV is flying, looking at the top structures, and in the same time, capturing images of parkings, surroundings.
Surveying | Sewers

- Proof of concept

- Reconstruction of Sewers in Paris, 500km long

- Proove the ability of this kind of technology to properly reconstruct the conditions of the tunnels and pipes, and cables.

- Checking at the same time the existing conditions.
- Junction in Japan with Asia Air Survey customer

- This junction has been constructed over many years.

- The owner had no 3D model of the global installation and surroundings.

- AAS has used an helicopter to fly over the junction to capture photos.

- Now they have the 3D model which will be used for future projects.
- Stockpile: Very common use case for UAV operators with fixed wings (Quarry, open-pit mine)

- Reconstruct very quickly the area and measure the volume, cubature of a specific stockpile.

- Goal: The owner wants to control the invoice sent by the supplier moving piles.
- NHK: One of the top news TV channel is using the software to produce 3D contents
- Flying with an helicopter over disasters areas, acquiring still images and videos
- They turn this into 3D models, which are used in the evening news by using a Viewer.
Cesium 3D Tiles from ContextCapture: motivation

- Existing Acute3D Web Viewer based on 3MX has very limited functionality: more intended as a POC
- Cesium allows to easily build custom apps with a mashup of several geospatial data types: exactly what our users want!

And moreover:
- Cesium has a nice track record since its first release in April 2012
- Cesium’s licensing is compatible with commercial use
- Cesium 3D Tiles fills a gap in existing standards, for streaming massive heterogeneous 3D datasets
Cesium 3D Tiles from ContextCapture: howto

1. Submit a 3D production in Cesium 3D Tiles format
ContextCapture generates a Cesium 3D Tileset + a base Cesium app
Cesium 3D Tiles from ContextCapture: howto

2. Obtain a Bing Maps API key to set in the base Cesium app
3. (optional) Customize the Cesium app
4. Upload the tileset and the app to your web server or to cloud storage
5. Use your app!
Cesium 3D Tiles from ContextCapture: implementation

- Just a variant of existing LoD export capabilities: 3MX, ESRI i3s, OpenSceneGraph, GoogleEarth KML, ...
- Implementation was easy!
  - Precise and well written specs for glTF and Cesium 3D Tiles
  - Excellent developer resources. We used:
    - Tutorials
    - Node.js based development server
    - SandCastle
    - HTML reference documentation
  - Quick fix for a non-blocking issue on external tilesets (#3517)
Cesium 3D Tiles from ContextCapture: demos
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