



Project Summary

Organization:
Helsinki

Solution:
Reality Modeling

Location:
Helsinki, Finland

Project Objective:

- Generate 3D reality models of the city of Helsinki for visualization and city analyses to promote digital city initiatives.
- Implement an open data approach with city residents and companies for commercial research and development.
- Deliver pilot projects that demonstrate the power of reality modeling technology for applications.

Products used:

Bentley Map[®], ContextCapture,
Descartes, LumenRT, Pointools,
ProjectWise[®]

Fast Facts

- Helsinki used ContextCapture to generate a 3D model of the city to improve Helsinki's internal services and promote smart development.
- The reality mesh was created from more than 50,000 oblique images covering 500 square kilometers.
- ProjectWise served as the collaborative interface to manage and share data across internal and external teams.

ROI

- Bentley's advanced software capabilities enabled the team to generate two 3D models at lower than expected costs.
- Using the software on other projects will help the city meet its carbon neutral goals.
- Integrating the models with the city's internal processes provides realistic timetables, reduces errors, and digitizes operating chains.

Helsinki Creates 3D City Models to Promote Commercial Research and Development

Helsinki Heads Digital City Initiatives by Leveraging Bentley's Reality Modeling Technology

A New Generation of City Models

Helsinki, Finland's capital and regional center, is experiencing booming development and a growing urban population of more than 600,000 residents. Helsinki has a long tradition of 3D city modeling dating back to the mid-1980s. To support city growth, promote digital city initiatives, enable new commercial ventures, and implement programs with university partners, Helsinki has developed a new 3D representation of the entire city using innovative, advanced modeling technologies. "The first models of Helsinki were made in 1985. Lots of people worked with them and we are continuing this heritage. Our project is delivering a new generation of city models to Helsinki," explained Project Manager Jarmo Suomisto.

As part of a three-year initiative, Helsinki launched the EUR 1 billion undertaking to capture city assets and create rich 3D city models of the present-day infrastructure that could be shared with internal and external stakeholders, as well as the public, and showcase the power of reality modeling through a collection of pilot projects. Known as Helsinki 3D+, the project required surveying more than 500 square kilometers, mapping more than 600 ground control points, and managing and sharing large amounts of data. To meet these challenges and deliver accurate city models within the prescribed period and budget, Helsinki required integrated, comprehensive reality modeling and information management capabilities.

Integrated Applications Facilitate Reality Modeling Options

Helsinki used Bentley's reality modeling technology for geo-coordination, optioneering, modeling, and visualization. The team produced large-scale base maps and geo-coordinated utility networks with Bentley Map. Using a combination of LiDAR laser scanning and oblique photogrammetry, they gathered terrain and surface data, and captured more than 50,000 images of the city and surrounding islands, comprising 11 terabytes of data. ContextCapture enabled Helsinki to produce the final detailed 3D reality model with an overall accuracy of up to 20 centimeters.

In addition to delivering the reality mesh, the Helsinki 3D+ project required the generation of a 3D city semantic

information model in CityGML format. The model is based on a city scan made in 2015 but includes new point clouds and oblique images. Point clouds were used to generate terrain and surface models while the oblique images generated textures for the CityGML model and to process the reality mesh model. The interoperability of Bentley technology enabled the team to use the same raw data gathered for the model to produce this digital city model, which is a database model that enables versatile, advanced city analyses and simulations that can be enriched with analytical results.

Bentley's powerful integrated reality modeling capabilities significantly lowered the cost of producing both models covering the entire Helsinki city and outlying archipelago, with the city model being one of the largest consistent reality models in existence. "It is not only the reality mesh or only the CityGML intelligent model. We need both," stated Suomisto. Having two models extends applications for digital city initiatives, research, and development.



Helsinki used Bentley applications to create a reality mesh and a CityGML intelligent model of the city.

An Open Data Approach Optimizes Information Mobility

Significant to the success of the Helsinki 3D+ project was the ability to efficiently and effectively share the models and project data and collaborate with stakeholders and the public. "We want to get the people of the city of Helsinki involved with these models and understand them," explained

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*— Jarmo Suomisto
Helsinki Project Manager*

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Suomisto. “For example, we have [implemented] a new citizen interaction platform for city planning.” The team enlivened the models and produced animated visualizations and presented them to the public and private sector using LumenRT, enhancing understanding to achieve citizen buy-in and make the best use of the models for the benefit of the community.

ProjectWise served as the collaborative interface to manage information and share data across internal and external teams. The project management software enabled distribution and general access via a web portal, facilitated accurate data sharing, optimized document management, and streamlined workflows to keep the three-year project on track.

Utilizing Bentley applications, Helsinki has opened up its data to a host of stakeholders, optimizing information mobility and the utilization of the models to ensure the city is at the forefront of digital city initiatives. With an open data approach, Helsinki is making the models available for free to citizens, private companies, and universities for use in commercial planning and development spanning the tourism, telecommunication, and power supply industries.

Reaping the Benefits

With two innovative city models, optimal data management, and open data sharing, Helsinki has built a platform for developing new ways of working. When integrated into the city’s internal processes, the models provide realistic timetables, reduce errors, and digitize operating chains because they have real-time data flow, resulting in significant savings. City vendors can rely on consistent detailed models at their disposal, allowing resources to be allocated for the actual work as opposed to modeling each individual project.

Furthermore, having visual representations of the city that are capable of being simulated and analyzed to improve infrastructure, support alternative energy sources, and ensure environmental sustainability facilitates communication and understanding of new development objectives and optimizes decision making. With up-to-date capabilities available for assessing issues facing an urban community, Helsinki not only can promote digital city development in

Helsinki but also can participate in frontline progress.

“I don’t know any other city in the world that has a ContextCapture model of the whole city and a City GML model of the whole city,” stated Suomisto.

Piloting the Power of Reality Modeling Technology

In addition to creating the models, Helsinki also has a required deliverable of demonstrating the power of reality modeling through a collection of pilot projects. The city’s open data approach supports this deliverable because Helsinki enlisted the help of outside business partners and universities to ensure they optimize utilization of the models. With more than 12 pilot projects in the works, Helsinki has expanded the application of the models to projects such as refining energy analysis methods to achieve carbon-neutrality by 2050 and reduce dependence on fossil fuels.



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The models have been applied to analyze the utilization of solar power and conduct flood assessments and noise calculations. Combining 3D models with an open data approach, the city of Helsinki has pushed the boundaries of reality meshes, demonstrating to the world what a digital city can accomplish with 3D city models.