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Bentley[®]
Advancing Infrastructure

Digital Cities

Reality Modeling for Going Digital



Digital Cities – Processes, Data, and Technology to Connect People

As urban populations grow and governments struggle to improve their aging infrastructure, digital cities are the solution for managing and mitigating risks associated with changing environments. To connect people with the processes, data, and technology they need to interact with their environment, city planners are adopting a going digital strategy, a phrase that is quickly becoming part of the infrastructure lexicon.

City governments are leveraging innovative new technology for reality modeling to capture existing site conditions through the use of digital photography or point-cloud data. These 3D reality models can be easily shared and streamed to accelerate the decision-making process and improve collaboration with outside agencies and services.

Bentley's ContextCapture application generates 3D reality meshes to create engineering-ready and city-wide contextual models, ensuring your information is always up to date to support design, construction, and operations.

The 3D reality models can be used for a variety of purposes, including urban planning, illustrated by Helsinki 3D+ for the city of Helsinki, to detailed engineering design and construction workflows, utilized by Huadong Engineering Corporation Limited for the city of Shenzhen. The following projects in this e-book demonstrate how you can leverage reality modeling to advance your going digital strategy and realize your digital city goals.

www.bentley.com/RealityModeling

Clove Technologies Pvt. Ltd.

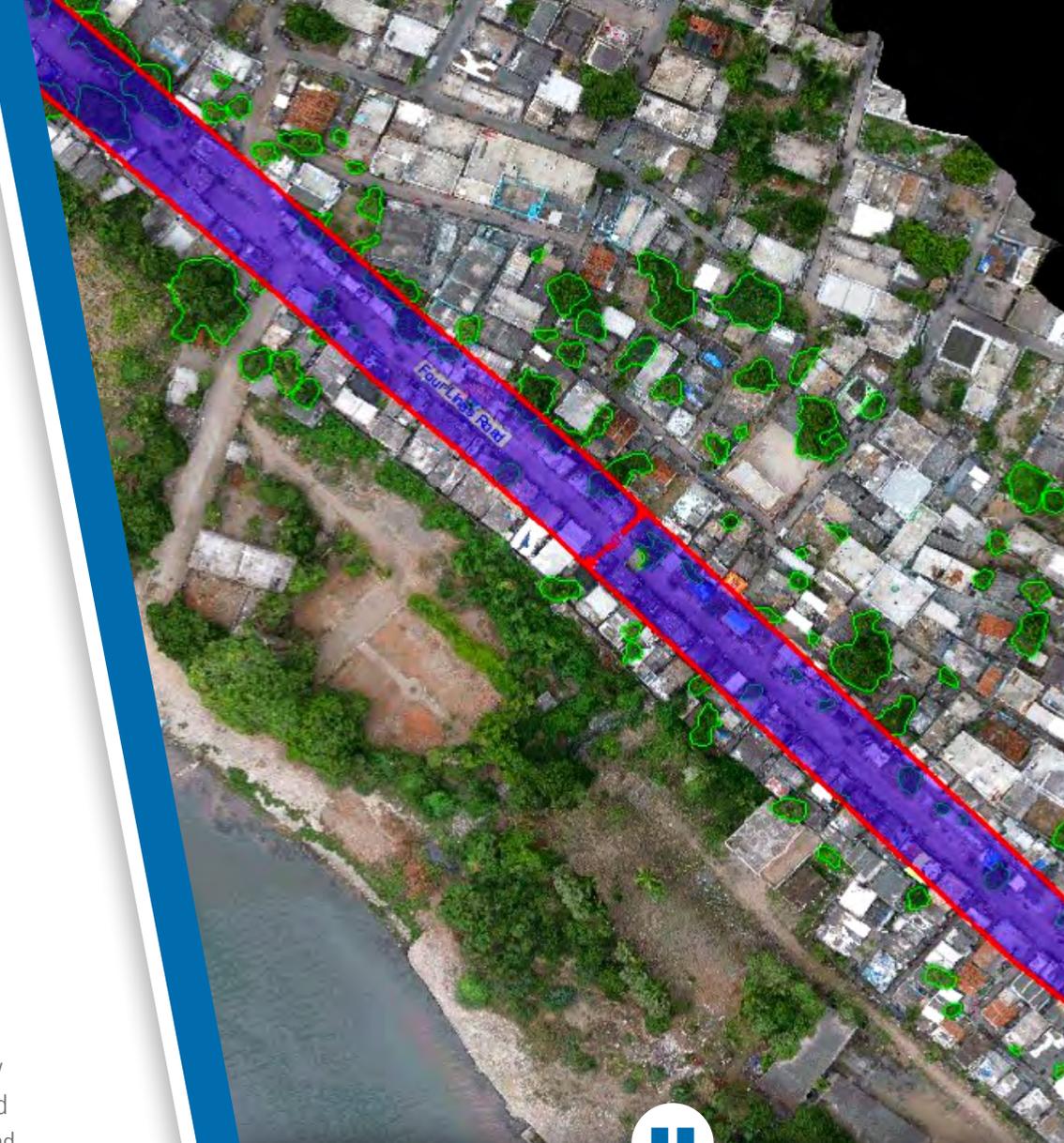
Vijayawada, Andhra Pradesh, India

Krishna River Walk Proposal

The capital city of Amaravati is planning to build a world-class river walk community along the banks of the Krishna River in Andhra Pradesh, India. Clove Technologies was tasked with providing a virtual 3D model that combines existing data with planned environmental development and facility designs, as well as highly precise models for engineers, architects, designers, and city officials to use for conceptual planning and cost analysis. The project team faced challenges capturing the 14-kilometer project along the river, which was set amid islands and hills.

Using ContextCapture, the project team created a 3D reality mesh from UAV images and DGPS data with 3.2-centimeter accuracy. It used LumenRT to animate the proposed solution for beautifying the shores, and created flood simulations for flood management planning. Bentley's integrated and automated technology saved significant time generating the reality mesh compared to traditional survey and modeling methods and improved collaboration among stakeholders. The model facilitated detailed planning and analysis for this INR 1.5 million project.

Project Playbook: ContextCapture, LumenRT, MicroStation®



ContextCapture and LumenRT have fulfilled the dream of a landscape designer during the planning of the riverbed of Amaravati. The creativity in a virtual world was presentable to government officials, ministers, and other project stakeholders. The government was able to [receive] pre-estimates of the budgets required, and understand the impact of floods on the landscape and settlements.

– KKVNRaju, Managing Director, Clove Technologies Pvt. Ltd.



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Bentley's 3D digital technology platform eliminated the tough problems of overall technical and management planning for the Qianhai infrastructure construction project. By dealing with the error, omission, clash, and deficiency problems at the project planning and design stage, and by carrying out construction simulation in advance, we avoided the management and control risks and investment waste caused by imperfect design. We achieved digital engineering construction, laying a solid foundation for building Smart Qianhai.

— Jinfeng Wang, IT Director, POWERCHINA Huadong Engineering Corporation

Huadong Engineering Corporation Limited, POWERCHINA Huadong Engineering Corporation Limited

Shenzhen, Guangdong, China

Application of BIM Strategy for Shenzhen Qianhai Municipal Infrastructure

In Shenzhen, Guangdong, China, the Qianhai Cooperation Zone is undergoing intense development, with nearly CNY 390 billion of dense construction covering 14.92 square kilometers. The planned activity includes more than 180 kilometers of roads and 32 kilometers of rail lines aboveground and belowground, as well as CNY 68.2 billion in infrastructure. Huadong Engineering Corporation (PowerChina) is responsible for the infrastructure and other major projects.

Huadong Engineering's daily management and coordination of BIM implementation ensured the team leveraged the technology to solve numerous challenges. A 3D reality model of the zone, used with the project's multidiscipline 3D design models, created a GIS-based view for resolving errors, omissions, collisions, and deficiencies. The 3D collaborative design helped save more than CNY 21 million in rework alone.

Project Playbook: Bentley Raceway and Cable Management, ContextCapture, Descartes, LumenRT, MicroStation, Navigator, OpenBuildings™ Designer, OpenRoads™ Designer, OpenRoads Navigator

Haiwei Spatial Information Technology LLC

Yangzhou, Jiangsu, China

3D Reality Modeling of Yangzhou City

The Yangzhou Municipal Planning Bureau retained Haiwei Spatial Information Technology to perform data acquisition and reality modeling services to establish an accurate 3D city model for decision-making, planning, and the development of Yangzhou, China. The resulting model gave government officials and planning designers the ability to visualize potential development initiatives and served as a basis for using reality modeling for urban development in other Chinese cities.

Using ContextCapture, the project team processed 800,000 photos captured with UAVs and generated a 3D reality mesh in 20 days, compared to 10 months using manual processes. Descartes enabled the team to edit 400 surface models in three days. MicroStation provided the interoperability needed to integrate multi-sourced data and produce a digital, urban 3D GIS platform. Bentley's integrated applications allowed the team to deliver the project 10 days ahead of schedule and save an estimated CNY 1.2 million on this CNY 4.5 million project.

Project Playbook: ContextCapture, Descartes, MicroStation



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Bentley's reality modeling technology provides a complete solution, from data production, model editing, and model optimization to model application, so the incompatibility of data formats between different pieces of software and the conversion risks for data formats are avoided. [Bentley technology]...reduced the time costs of data conversion and the delivery costs of the project.

– Ming Zhang, Director of Marketing, Haiwei Spatial Information Technology, LLC

[VIEW 3D MODEL](#)[WATCH VIDEO](#)

Future cities need advanced tools and innovative city models for creative design and well-grounded decisions.

— Jarmo Suomisto, Architect, Project Manager, Helsinki 3D+

City of Helsinki

Helsinki, Finland

Helsinki 3D+

The city of Helsinki, Finland has a long tradition of 3D city modeling dating back to the mid-1980s. As part of a three-year project completed in 2017, the city of Helsinki launched a EUR 1 million initiative to generate a 3D representation of the entire city. The model is now provided as open data to involve the public and encourage commercial research and development.

The team used OpenCities Map to create accurate base maps and geo-coordinate utility networks. ContextCapture was used to generate a 3D mesh representation of the city and Pointools was used to model the surface and terrain. LumenRT enlivened designs. Lastly, the team used ProjectWise® to collaborate and manage all the data that would be uploaded to a web portal for distribution and general access. As part of its digital city initiative, the 3D model improves Helsinki's internal services and promotes smart development. The project also showcases the technology and promotes its use in higher education.

Project Playbook: ContextCapture, Descartes, LumenRT, OpenCities™ Map, Pointools

AEROMETREX Pty., Ltd.

Philadelphia, Pennsylvania, United States

Reality Modeling for the Papal Visit to Philadelphia

The Pope's visit to Philadelphia in September 2015 was the largest public event held in the United States that year. Attracting more than 1 million people, the Papal visit required extensive preparations. AEROMETREX developed a 3D reality model of the city to assist in planning. Accurate to within 5 centimeters, the photo-realistic 3D model included every stationary object in the area including landscaping, sculptures, and buildings.

In a four-week period, the team obtained and processed more than 28,000 images using ContextCapture, saving an estimated 200 hours of survey time and AUD 24,000 in costs. By providing perspectives from any vantage point, the model's utility extends beyond its original use for facility and security planning, and will be used in the future for urban planning, and disaster and transport management.

Project Playbook: ContextCapture



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This project was not only a technical and financial success but was also a showcase of the capabilities of ContextCapture for realistic, comprehensive, 3D reality modeling. We believe this is the mapping system of the future.

— David Byrne, Technical Director, AEROMETREX



Bentley's reality modeling solutions allowed us to exceed the initial objectives by providing us with complete tools for the processing and rendering of 3D modeled data.

— Julien Heitzmann, Head of Geomatics Services of the City of Grenoble

Geomatics Services of the City of Grenoble

Grenoble, Auvergne-Rhône-Alpes, France

3D Digitization of Physical Model of the City of Grenoble Created in the 19th Century

To help the city of Grenoble obtain a “City of Art and History” certification, Geomatics Services proposed digitizing a physical 19th century model commissioned by Napoleon Bonaparte. The model is part of a unique collection of 150 models preserved at the Museum of Plans Reliefs in Paris and was in Grenoble for three months. After several attempts to process and broadcast the 3D model to the public, Geomatics Services decided to implement reality modeling.

The team used ContextCapture to automatically generate a textured 3D mesh from photos. Using the software's editing features along with Descartes, users could correct the errors in the automated processing. Bentley's reality modeling software helped complete the 3D rendering four times faster than other methodologies and preserved a heritage work, which is now integrated into the city of Grenoble's digital terrain model.

Project Playbook: ContextCapture, Descartes, LumenRT, MicroStation

Soarscape Technology Development (Shanghai) Co., Ltd./IFA Technology

Yancheng, Jiangsu, China

Realistic 3D Map of the Smart City of Yancheng

Yancheng Municipal Planning Bureau retained Soarscape Technology Development to deliver a 3D digital city model of Yancheng. The project required Soarscape to obtain oblique photography data at a 3-centimeter resolution, covering a 40-square-kilometer area. The team needed to produce the reality mesh within one month. With approximately 400,000 high-resolution photos to process and topography models to modify, it was difficult to load data onto the existing GIS platform.

The team used ContextCapture to process the photos, Descartes to modify the models, and MicroStation as the browsing platform to support 160 gigabytes of 3D reality meshes. The team produced the 3D reality meshes for the entire area in 20 days, compared to six months with manual modeling. Descartes enabled three employees to revise 400 water surface models in three days. Overall, Bentley's integrated solutions saved approximately CNY 400,000 in labor and data acquisition costs.

Project Playbook: ContextCapture, Descartes, MicroStation



Bentley software guarantees seamless connections between Bentley and third-party software, saving time and money.

— Mingming Li, Technical Director, Soarscape Technology Development (Shanghai) Co., Ltd.



UAB IT logika

Panevėžys, Lithuania

3D Smart City for Panevėžys City Municipality

The Panevėžys City Municipality approved 14 development projects to establish the Integrated Territory of Panevėžys. The city contracted UAB IT logika to develop a digital 3D city model for the EUR 40,000 digital city initiative. The project required data collection over an 11-square-kilometer area and integration of 3D models from a variety of sources into the reality mesh. The entire city model needed to be accessible via a personal computer and through a web-based application.

Using consumer-grade unmanned aerial vehicles, the team captured more than 50,000 photos in six days. Users processed 100 gigapixels of images in less than three months with ContextCapture. ContextCapture's interoperability helped integrate more than 20 city development models imported from different sources and publish a unified model on an open-source, 3D-web platform for public viewing. With Bentley's reality modeling software, UAB IT logika delivered a high-resolution city model within a limited budget.

Project Playbook: ContextCapture, Descartes

The 3D city model will be used by an expert panel to select the best architectural solution for the Stasys Eidrigėvičius Center of Arts in Panevėžys.

— Rytis Mykolas Račkuskas, Mayor of Panevėžys City Municipality

CCCC Water Transportation Consultants Co., Ltd.

Baodi District, Tianjin, China

BIM Technology Application in the Municipal Infrastructure Phase 1 Project of Zhong-Guan-Cun Science and Technology Town

As part of a coordinated development plan, Zhong-Guan-Cun will integrate the resources of Beijing, Tianjin, and Zhong-Guan-Cun to build a science and technology city. The CNY 2.2 billion project includes the design and construction of roads, utility pipelines, a 174,000-square-meter park, and green roadsides spanning 477,000 square meters. The project consultant, CCCC Water Transportation Consultants, implemented a collaborative BIM process to coordinate the many engineering disciplines to deliver the new digital city.

The team generated a comprehensive 3D model of the entire city with Bentley software. Performing construction simulation improved construction management, shortening the construction period by 64 days and saving CNY 6.6 million in costs. By integrating ContextCapture to generate a reality mesh from UAV terrain data collected on-site, the team facilitated earthworks planning, saving approximately CNY 40 million.

Project Playbook: ContextCapture, LumenRT, MicroStation, Navigator, OpenBridge Modeler®, OpenRoads, ProjectWise, ProStructures



Using Bentley software solutions for our construction project, we easily shared information among stakeholders, improving collaboration and saving time.

— Zhiqiang Lu, Deputy Chief Engineer of China Waterborne Transport Research Institute



Umbra Software Oy and City of Helsinki

Helsinki, Uusimaa, Finland

Bridge between City Models and Game Engines

In 2016, the city of Helsinki released its reality mesh city model, created using Bentley reality modeling applications. Recently, the city of Helsinki partnered with Umbra Software to expand and optimize the city model and its data usage beyond engineering, architecture, and construction uses. Together, the organizations are pioneering the world's first 3D city model as easily accessible open data.

Helsinki continues to update the 3D city model with Bentley software, creating new and more accurate area project reality meshes. The ability to integrate Bentley models with Umbra's fully automated optimization and delivery platform makes the 3D city model available to anyone through cloud-based services. This innovative joint venture opens new collaborative possibilities between Helsinki and businesses, creating a new ecosystem around city data ranging from gaming applications to public transportation.

Project Playbook: ContextCapture, Descartes, LumenRT, MicroStation, OpenCities Map, Pointools

Bentley's reality meshes and the open data policy of the city of Helsinki together with Umbra's real-time 3D technology create completely new opportunities.

— Otso Makinen, CEO, Umbra Software Oy

Shanghai Hangyao Information Technology Co., Ltd.

Ulanqab City, China

3D City Modeling Project of Central Urban Area in Ulanqab

Ulanqab City Planning Bureau commissioned Shanghai Hangyao Information Technology to establish a 58-square-kilometer 3D reality mesh of downtown Ulanqab. The reality mesh will provide digital management and planning for city development. Because the City Planning Bureau will use the model as the foundation for a 3D information platform and the time to capture the aerial photography was extended to accommodate the geographic solar elevation, the timeframe to produce the reality mesh was short.

Shanghai Hangyao Information Technology used ContextCapture to automatically generate an accurate 3D reality mesh of the entire city from aerial photographs. The interoperability of ContextCapture eliminated the need for file conversion during the editing process, which streamlined workflows and improved efficiencies for model creation in other formats by 70 percent. The automated processing capabilities in ContextCapture minimized manual labor, saving hundreds of thousands in project costs.

Project Playbook: [ContextCapture](#)





Bentley's ContextCapture makes data acquisition simpler and more efficient, and has fully automated data production. This saved 80% of our time and 60% of our costs for our 200 square-kilometer multi-source data fusion modeling project.

— Deputy General Manager, Soarscape Technology Development (Shanghai) Co.

Soarscape Technology Development (Shanghai) Co., Ltd./IFA Technology

Xiamen, Fujian, China

Realistic 3D Data Collection and Modeling of 180 Square Kilometers of Xiamen City

Xiamen City Planning and Design Institute retained Soarscape Technology Development (Shanghai) Co., Ltd. to produce 3D reality data and models based on oblique photography for 200 square kilometers of Xiamen City. The CNY 4.5 million project required fusing large amounts of high-resolution data and images from multiple sources to accommodate the restricted ground and air space amid a tight timeline.

The team used Bentley's reality modeling applications, including ContextCapture, to seamlessly process all the images from numerous data capture sources into a high-precision, 3D reality mesh of the area in 90 days. Using mesh editing functions in Descartes and ContextCapture, five designers finished revising models for 1,200 water surfaces in seven days. Compared to 10 months required for manual modeling tasks, it took only four days to perform automated modeling. The integrated reality modeling solution saved approximately CNY 1.25 million in labor and data acquisition costs.

Project Playbook: ContextCapture, Descartes, LumenRT, MicroStation

Shanghai Investigation, Design & Research Institute Co., Ltd. and Yangtze Ecology and Environmental Co., Ltd.

Jiujiang, Jiangxi, China

Application of Digitalization in Jiujiang Smart Water Management Platform

In downtown Jiujiang, China the Yangtze Ecology and Environmental Co., Ltd. and Shanghai Investigation, Design & Research Institute are building a smart water management platform. The CNY 7.7 billion pilot project includes a sewage plant, supporting network, and water ecological restoration. The project team needed to include water business application software, BIM engineering management software, network system monitoring, and a hydraulic model system.

The project team created a simulation and modeling platform for managing decisions and preventing disasters. ContextCapture helped produce a 3D reality model, which covered 220 square kilometers. OpenBuildings Designer helped develop the structures while OpenRoads was used for water supply and drainage systems, as well as managing surveying and mapping. The iModel was uploaded into the iModelHub cloud platform via ProjectWise iModel Bridge service, allowing for better data access and sharing. Bentley applications reduced labor by 80% and cost by 60%, saving about CNY 4 million.

Project Playbook: ContextCapture, Descartes, iModelHub™, LumenRT, Navigator, OpenBuildings Designer, OpenPlant™, OpenRoads, ProjectWise





Civil Engineering and Development Department, Hong Kong SAR Government and AECOM

Hong Kong

*The Digital Design for the Establishment of the
Kwu Tung North, New Development Area*

The Hong Kong government decided to create new development areas (NDAs) to address long-term housing demands. AECOM Asia Co. was engaged as the planning, design, and construction consultant for the NDA in Kwu Tung North. The estimated HKD 100 million project will cover 4.5 square kilometers and will accommodate 119,600 people, becoming one of the most densely populated towns in Hong Kong.

The project team used ContextCapture and OpenBuildings Designer to create 3D spatial models for stakeholders. LumenRT helped conduct analyses to show a 360-degree view of design's ability to withstand wind and seasonal weather. During design review, the team made about 10 significant and 50 minor design changes directly in the model. In 2018, the design was finalized.

Project Playbook: ContextCapture, LumenRT,
OpenBuildings Designer, ProjectWise

GeoCentreGroup LLC

Smalyavichy, Minsk Region, Belarus

Informational Virtual Model of the China-Belarus Industrial Park "Great Stone"

Near the Belarus capital of Minsk, the China-Belarus Industrial Park covers 112.5 square kilometers and includes industrial and residential zones, shopping malls, and financial and research centers. The park's administration requested an informational virtual model of the project development's first stage, which includes 10.5 square kilometers of the park, to attract investors and solve existing engineering issues. GeoCentreGroup was tasked with creating this model and a digital twin for the facilities with a scale accuracy of 1:1000. The team also needed to develop a 3D GIS territorial plan.

Completed in 2018, the project team used ContextCapture to process 26,000 photographs in 14 days. OpenBuildings Designer helped integrate design solutions into the digital twin. The model was uploaded into LumenRT to create a high-quality, interactive visualization of the 3D model. The model helped avoid design errors at the conceptual stage, saving time and cost. Also, existing forests and waterways were preserved, improving groundwater quality standards.

Project Playbook: ContextCapture, LumenRT, OpenBuildings Designer, OpenRoads





Gothenburg City

Gothenburg, Sweden

3D City Model for Public Participation

The second largest city in Sweden, Gothenburg currently has about 1 million inhabitants, with plans to accommodate 150,000 new residents and 80,000 new homes and offices by 2035. City planners needed to clearly communicate plans with the public early to avoid misunderstandings and formal complaints. The project team used a 3D city model to share project information with the public and potential investors.

OpenCities Planner served as the visualization and dialogue platform. City planners created the portal MinStad (translated “MyCity”), a citizen discussion portal using the 3D reality mesh created in ContextCapture. The team can post plans on social media to get citizens’ suggestions, which they can make directly in the digital twin. Contractors can request work permissions in the model, eliminating manual paper processes. The digital twin has increased design clarity while improving security. Because of its work, Gothenburg was listed in second place in Future Today Institute’s global ranking of smart cities in 2019.

Project Playbook: ContextCapture, OpenCities Planner

Secretaria Municipal de Planejamento da Prefeitura Municipal de Teresina

Teresina, Piauí, Brazil

Smart City – Implementing BIM as a Digital Transformation Agent in Teresina City Hall (PMT)

Teresina is the capital and most populous municipality in Piauí, Brazil, with an estimated 861,442 inhabitants in 2018. The city wants to become a digital city, with plans to adopt BIM for maintaining municipal civil construction and infrastructure assets, as well as establish an open, connected data environment and create and curate a digital twin. To begin this implementation, the project team adopted BIM workflows on a primary school to develop a digital model.

OpenBuildings Designer helped generate a 3D model and other construction deliverables. ContextCapture was used to create the digital context while Navigator helped with clash detection, preventing construction mistakes and unnecessary on-site costs. LumenRT helped generate high-level renderings and animations, improving project understanding. Bentley's applications reduced total delivery time by 50%, and executing the project internally with six team members saved BRL 400,000.

Project Playbook: ContextCapture, LumenRT, MicroStation, Navigator, OpenBuildings Designer, OpenRoads, OpenSite®, ProjectWise





Ala Abdulhadi & Khalifa Hawas Consulting Engineering Company (AHCEC) for Madinah Development Authority (MDA)

Madinah Al-Munawarah, Madinah, Saudi Arabia

Reality Modeling for Madinah Al-Munawarah

Madinah Al-Munawarah is the second-holiest city for 1.8 billion Muslims worldwide. To accommodate more pilgrimages to the city, the Kingdom of Saudi Arabia wants to increase the annual number of people who can visit the city from 8 million to 30 million by 2030. The plan would require expanding facilities and infrastructure while preserving historical sites. AHCEC was tasked with creating a 3D reality model for a 55-square-kilometer area of the central region, including the Prophet's Mosque, and performing mobile mapping for 7,104 kilometers of roadway.

ContextCapture helped process the drone-captured images, as well as existing point clouds. The team established a reality model for planning and designing infrastructure to accommodate the additional pilgrims. ContextCapture completed the objective in nine months, saving over a year in surveying time and more than SAR 42 million. The interoperability of the application allowed the model to be exported in web-ready formats for governmental and stakeholder viewing. The project was completed 15 months ahead of schedule.

Project Playbook: ContextCapture

Skymap Global

Itanagar, Arunachal Pradesh, India

Reality Modeling of Government Offices for Planning a New Floor, Existing Solar Panel Inspection, and New Solar Panel Installation

As part of a government initiative in Arunachal Pradesh to implement solar panels for sustainable energy generation, Skymap Global delivered a proof-of-concept project to demonstrate the effectiveness of reality modeling for planning and implementation. The project required modeling three government structures in Itanagar and using the models to repair existing property damage, as well as plan for the installation of solar panels. Faced with collecting and processing a large amount of data, the team required a single comprehensive reality modeling platform to support the volume of information and quickly produce an accurate 3D representation.

The team collected data using unmanned aerial vehicles and ContextCapture to process the data and generate a 3D reality mesh. Using reality modeling automated previously manual, subjective inspections and maintenance processes, saving time and providing consistent and precise visuals for better decision-making and planning. ContextCapture saved time and costs, and validated reality modeling as a sustainable solution to support efficient energy planning.

Project Playbook: [ContextCapture](#)





UAB IT logika – DRONETEAM.It

Vilnius, Lithuania

Divine Mercy 3D

In preparation for Pope Francis' visit to the Baltic states, the City of Vilnius initiated the Go Vilnius campaign to promote tourism and business development. The project involved developing a 3D model of the Shrine of Divine Mercy, where the original Divine Mercy painting resides. Local 3D scanning and modeling company UAB IT logika – DRONETEAM.It was retained to generate the model and establish a virtual environment for church officials and the public.

The team used terrestrial LiDAR scanning and photogrammetry to capture the inside and outside of the church, including the Divine Mercy painting. ContextCapture was used to process the point clouds and photos into an accurate 3D reality mesh. The application facilitated integration with third-party gaming technology, enabling the team to import the mesh into a virtual reality (VR) platform and publish the model online. Using the reality model as the basis for the VR solution provided virtual access to the original Divine Mercy church.

Project Playbook: ContextCapture

Yeongdeok County Office

Yeongdeok, Gyeongsangbuk, South Korea

3D Map Creation for Development Plan

For effective urban planning development, land registration, administration, and cultural heritage preservation in Yeongdeok, Gyeongsangbuk, South Korea there is an increasing need for 3D maps. Using existing 2D numerical maps and overviews has proven to be time-consuming and costly, requiring follow-up on-site visits. This KRW 50 million project involves creating a 3D map of the Yeongdeok district and generating digital data for regional development and management.

The team used drones to survey the district and ContextCapture to generate a high-resolution 3D model from the captured images, accurately digitalizing land information. The model provides the basis to efficiently create a development plan for administration and abandon obsolete on-site measurement methods. Compared to the previous manual 2D methods, Bentley's reality modeling solution reduced costs by five times and accelerated the mapping process by eight times.

Project Playbook: ContextCapture





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About Bentley Systems

Bentley Systems is a leading global provider of software solutions to engineers, architects, geospatial professionals, constructors, and owner-operators for the design, construction, and operations of infrastructure. Bentley's MicroStation-based engineering and BIM applications, and its digital twin cloud services, advance the project delivery (ProjectWise) and the asset performance (AssetWise) of transportation and other public works, utilities, industrial and resources plants, and commercial and institutional facilities.

Bentley Systems employs more than 3,500 colleagues and generates annual revenues of more than \$700 million in 172 countries. From inception in 1984, the company has remained majority-owned by its five founding Bentley brothers.

For additional information, visit www.bentley.com.

About ContextCapture

ContextCapture is Bentley's reality modeling software that can quickly produce 3D models of existing conditions for infrastructure projects of all types, derived from simple photographs and/or point cloud. Without the need for expensive or specialized equipment, ContextCapture enables users to quickly create and use these highly detailed 3D engineering-ready reality meshes to provide precise real-world context for design, construction, and operations decisions throughout the lifecycle of projects. Project teams can easily and consistently share reality modeling information, consumable and accessible, on desktop and mobile devices, in many formats, including native use within MicroStation for any engineering, operations, maintenance, or GIS workflow.

For additional information, visit www.bentley.com/ContextCapture.

