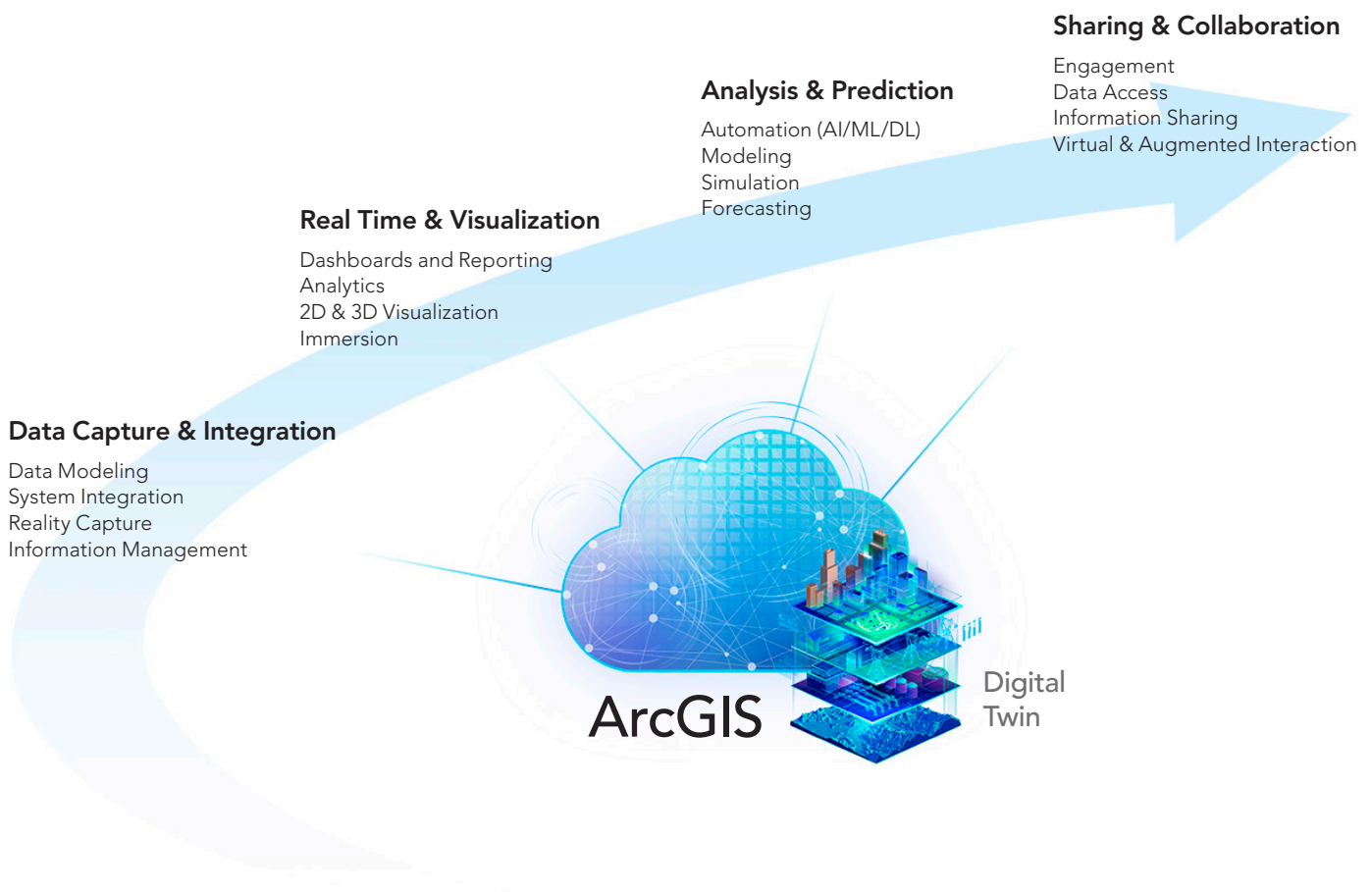
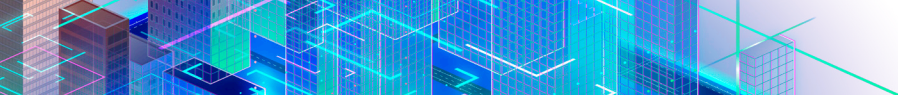
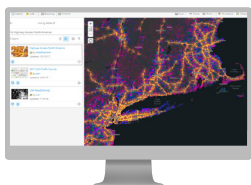


Digital Twin





Content and Core Applications

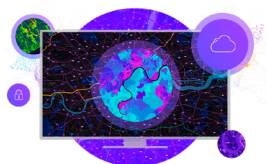


ArcGIS® Living Atlas of the World

is the largest and foremost collection of curated geographic information from around the globe. It includes ready-to-use basemaps, maps, layers, and apps from Esri and the global geographic information system (GIS) user community.



ArcGIS Pro is ArcGIS Pro supports data visualization; advanced analysis; and authoritative data maintenance in 2D, 3D, and 4D. It supports data sharing across a suite of ArcGIS products, such as ArcGIS Online and ArcGIS Enterprise, and enables users to work across the ArcGIS system through Web GIS.

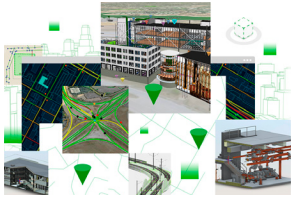


ArcGIS Enterprise the complete software system for all your geospatial needs—make maps, analyze geospatial data, and share results to solve problems. Our market-leading GIS mapping software will support your work behind your firewall or in the cloud and deliver results.

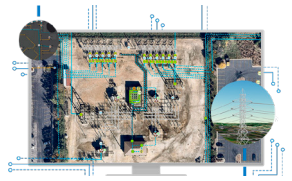


ArcGIS Online is web-based mapping software as a service (SaaS). ArcGIS Online enables users to work effectively across departments and organizations by collaboratively building and using maps and apps. ArcGIS Online allows you to share your insights with specific people or the entire world.

Building and Network Management



ArcGIS GeoBIM is SaaS that delivers an innovative, easy-to-use web-based experience for teams to explore and collaborate on building information modeling (BIM) projects and issues in geospatial context. Architecture, engineering, and construction (AEC) and operations teams can easily connect to linked data and documents across multiple systems using configurable web apps to simplify communication, coordination, and collaboration. Save time on costly file and 3D model conversion while also connecting teams to the latest data they need at every project phase—from design to operations.



ArcGIS Utility Network is the next generation network management information model for electric, gas, telecom, water, and district heating. Utilities can leverage the power of the entire ArcGIS Enterprise system to model, manage, and integrate complex modern networks.

Indoor and Facility Management



ArcGIS Indoors™ software is a complete indoor mapping system for smart building management. It organizes computer-aided design (CAD), drawings building information modeling, site scans, and operational datasets into floor-aware indoor maps to support facilities, workplace operations, maintenance applications, and various use cases. Executives, supervisors, mobile staff, and office employees can better understand, maintain, and operate workplace environments with ArcGIS Indoors.



ArcGIS IPS™ software is an indoor positioning system that allows you to locate yourself and others inside a building in real time. Similar to GPS, it puts a blue dot on indoor maps and uses location services to help you navigate to any point of interest or destination. Real-time indoor navigation, location sharing, and location tracking empower customers, visitors, and contractors. Indoor location data collection and analytics can help your organization increase efficiency and improve customer service.

Real-Time Integration

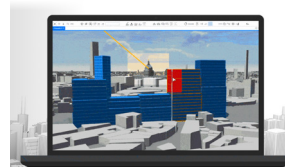


ArcGIS Velocity is a cloud-native add-on capability for ArcGIS Online. It enables users to ingest data from the Internet of Things (IoT) platforms, message brokers, or third-party APIs. It also helps users process, visualize, and analyze real-time data feeds; store those feeds as big data; and perform fast queries and analysis. Use this SaaS capability to better leverage your real-time spatial data for essential operations such as remote monitoring and process optimization.

City Planning and Design

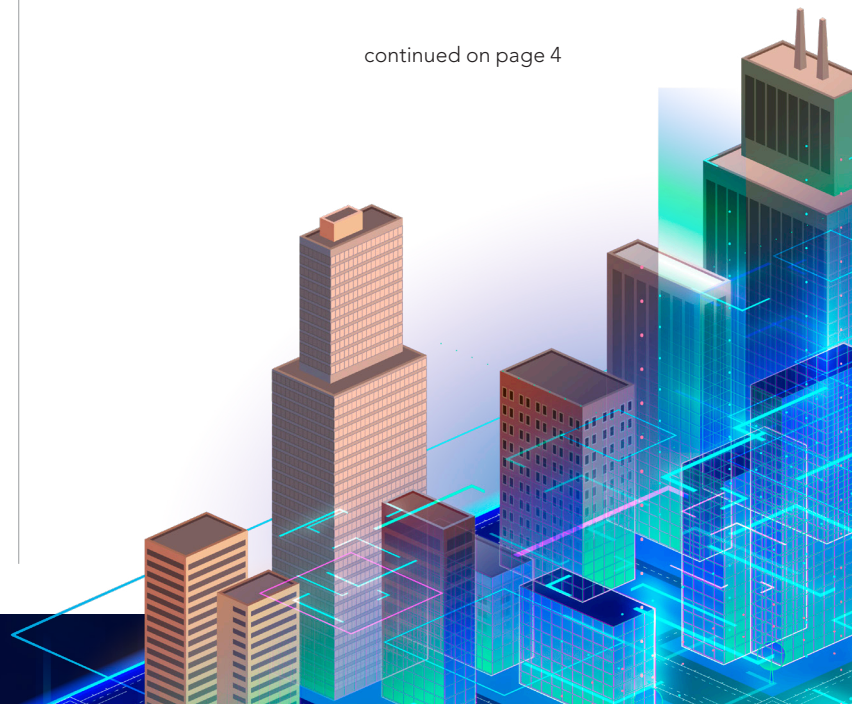


ArcGIS Urban enables planners and design professionals to collaborate across teams with a web-based 3D application that supports scenario planning and impact assessment. ArcGIS Urban enables the digital transformation of city and regional planning to encourage collaboration with community stakeholders and help all groups work toward a more sustainable future.



ArcGIS CityEngine is an advanced 3D modeling application for creating huge, interactive and immersive urban environments in less time than traditional modeling techniques. The cities you create using CityEngine can be based on real-world GIS data or showcase a fictional city of the past, present, or future.

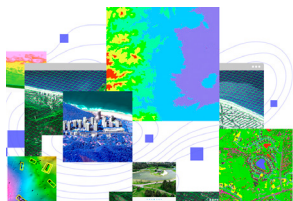
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Reality Capture and Imagery Management



ArcGIS Reality is a suite of photogrammetry software products designed to enable reality capture workflows for sites, cities, and countries. Create the foundation of your digital twin with ArcGIS Reality. Turn drone and aerial imagery into visually stunning and highly accurate maps and 3D models. Interact with a digital world that shows places and situations as they truly are, layered with geospatial data that enriches reality with greater context.



ArcGIS Image for ArcGIS Online is a user type extension for hosting, analyzing, and streaming imagery and raster collections. Save on infrastructure costs and maintenance using a secure, scalable, and performant cloud environment that quickly integrates imagery into all your workflows.



ArcGIS Drone2Map® is the desktop app for your GIS drone mapping needs. Use any modern drone to capture high-resolution imagery where and when you need it. Immediately after the flight in the field, process images on your laptop and perform drone analytics on your natural-color, thermal infrared, or multispectral datasets. Create the outputs you need—including orthomosaics, 3D point clouds, and textured meshes—and then easily share them with your ArcGIS organization for greater collaboration and awareness.

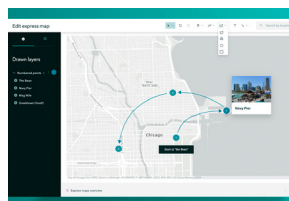


Site Scan for ArcGIS is the suite of end-to-end, cloud-based drone mapping apps designed to revolutionize imagery collection and site management. Maintain your drone flight history while capturing up-to-date imagery when needed. Securely process imagery in a scalable cloud environment, and quickly share high-quality 2D and 3D imagery products throughout your organization.

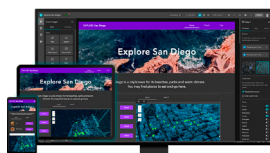
Sharing and Collaboration



ArcGIS Hub is an easy-to-configure SaaS community engagement platform that organizes people, data, and tools through information-driven initiatives. Organizations can leverage their existing data and technology and work together with internal and external stakeholders to track progress, improve outcomes, and create vibrant communities.



ArcGIS StoryMaps™ can give your narrative a stronger sense of place, illustrate spatial relationships, and add visual appeal and credibility to your ideas. A story can effect change, influence opinion, and create awareness—and maps are an integral part of storytelling.



ArcGIS Experience Builder empowers you to quickly transform your data into compelling web apps without writing a single line of code. Build mapcentric or nonmapcentric apps and display them on a fixed or scrolling screen, on single or multiple pages. Perform a drag-and-drop operation to choose the tools you need from a rich set of widgets, design your own templates, and interact with your 2D and 3D content—all within one app. With ArcGIS Experience Builder, your web apps look great and run seamlessly on mobile devices.



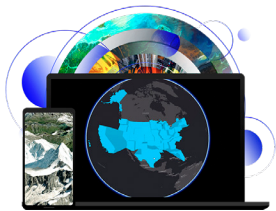
Dashboards and Visualizations



ArcGIS Dashboards enables users to convey information by presenting location-based analytics using intuitive and interactive data visualizations on a single screen. Every organization using the ArcGIS platform can take advantage of ArcGIS Dashboards to help make decisions, visualize trends, monitor status in real time, and inform their communities. Tailor dashboards to your audiences, giving them the ability to slice the data to get the answers they need. Like maps and apps, dashboards are essential information products, providing a critical component to your geospatial infrastructure.

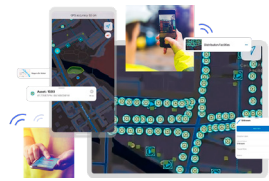


Scene Viewer™ provides a 3D web experience for authoring, analyzing, and editing to support informed decision-making. Scene Viewer provides a holistic web experience that enables users to combine various 2D and 3D datasets and quickly start with 3D context by visualizing, analyzing, communicating, and interacting, as well as run simulations and predictions on the web to share stories with an intuitive user experience.

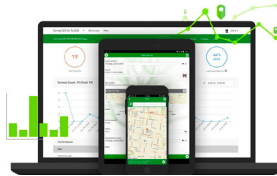


ArcGIS Earth is a free, easy-to-use tool for visualizing and exploring 3D content on desktop and mobile devices. Collaborate and plan with authoritative data on an interactive 3D globe, both online and offline, to gain situational awareness for improved decision-making. Then utilize the visualizations in two different modes for an immersive experience: the mobile augmented reality (AR) tabletop, where digital scenes and objects can be viewed; and a mobile video recorder, which provides a world-scale AR experience.

Mobility



ArcGIS Field Maps is an all-in-one app that uses data-driven maps to help mobile workers perform data collection and editing, find assets and information, and report their real-time locations. ArcGIS Field Maps is the go-to app, powered by maps, that streamlines the critical workflows field personnel use every day. Because it is built on ArcGIS, everyone—whether in the field or the office—will benefit from using the same data.



ArcGIS Survey123 is a complete, formcentric app for creating, sharing, and analyzing surveys. Use it to create smart forms with skip logic, defaults, and support for multiple languages. Collect data via web or mobile devices, even when disconnected from the internet. Analyze results quickly, and upload data securely for further analysis.

Advanced Analytics



ArcGIS Insights™ is analysis software that fuses location analytics with open data science and business intelligence workflows. Answer questions you didn't know to ask, analyze data completely, and unlock new insights. Empower analysts of all skill levels across departments to directly connect data, perform advanced analytics, and take results into third-party systems.



ArcGIS Platform brings market-leading location services to you as a platform as a service (PaaS). Integrate location into your apps and business systems with the most comprehensive, highest-quality set of location services, data, and mapping tools available. Build with the mapping libraries of your choice, or use Esri's full range of mapping libraries and no-code options that reduce time to market and promote creative design. ArcGIS Platform offers an affordable and flexible location-focused PaaS for software developers, businesses, and organizations.

Esri APIs and SDKs

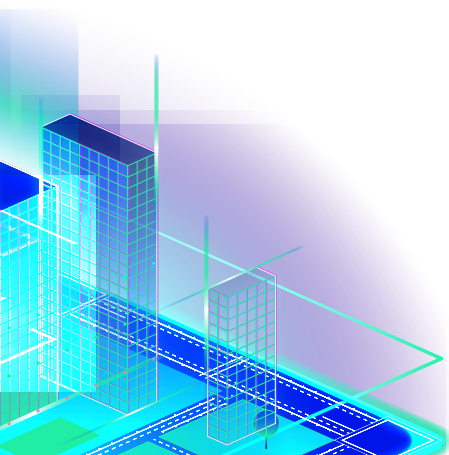
As developers, you can use our advanced mapping services in your own mapping applications or flex the ArcGIS system to meet your organization's particular needs. Solution partners, integrators, and Esri's own developers use ArcGIS application programming interfaces (APIs) and software development kits (SDKs) to develop location-enabled products, solutions, applications, and extensions. You can leverage the same suite of tools to develop for just about any modern system.



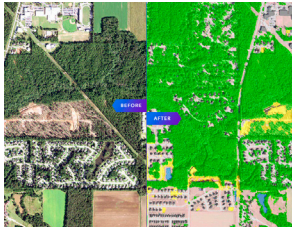
ArcGIS Knowledge is enterprise knowledge graph software that enables users to explore and analyze spatial, nonspatial, unstructured, and structured data to accelerate decision-making. Developed to seamlessly connect analysts to the data sources they need and the analytical tools they trust, ArcGIS Knowledge supports collaborative, all-source investigations and sharing of information across the enterprise. Analysts can visualize information through multiple perspectives, like maps, link charts, histograms, and entity cards, to solve spatial and nonspatial problems. ArcGIS Knowledge offers a cost-effective and flexible way to add enterprise knowledge graph analytics to your existing ArcGIS investment.

ArcGIS Maps SDKs for Game Engines

The convergence of real-world GIS and game engine real-time visualization will enable us to create detailed 3D representations of our data. Gain empowerment, through analysis and visuals, over complex projects like digital twins, architectural visualization, and simulation. Create interactive 3D worlds to bring geographic accuracy into games by accessing real-world terrain, imagery, and 3D structures and features. Bring these new projects to desktop and mobile platforms, as well as popular extended reality (XR) hardware like Oculus Quest and Microsoft HoloLens.

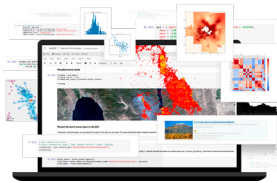


Artificial Intelligence and Machine Learning

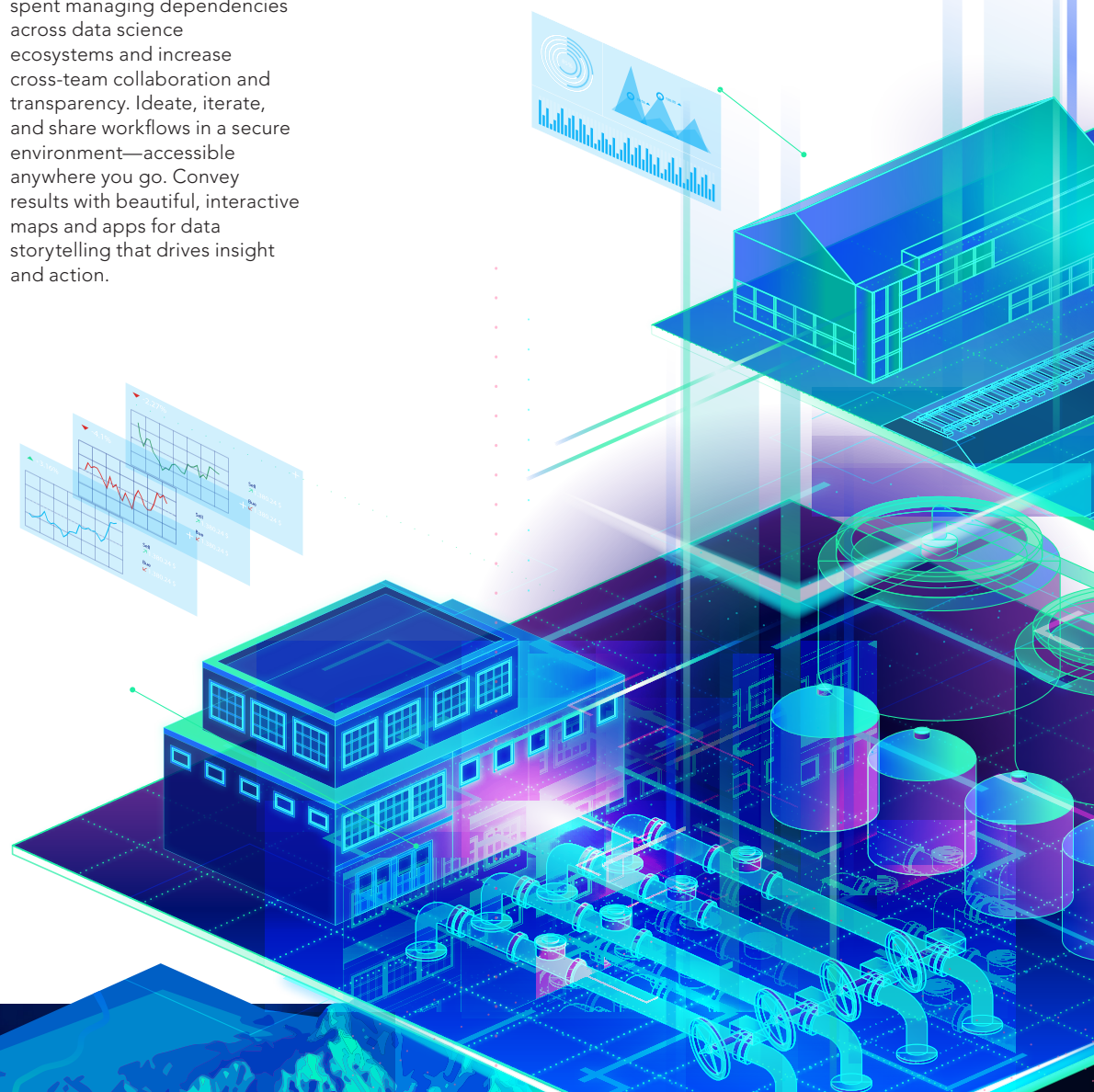


Use machine learning (ML) and artificial intelligence designed to solve the complex spatial problems you face. Use location data as the connective thread to reveal hidden patterns, improve predictive modeling, and create a competitive edge. Combine powerful built-in tools with machine learning and deep learning (DL) frameworks.

Solve complex problems by combining powerful built-in tools with any machine learning package or framework you use, including scikit-learn, TensorFlow, R, IBM Watson, and Microsoft AI.



ArcGIS Notebooks provides a Jupyter Notebook experience optimized for spatial analysis. Combine industry-leading spatial analysis algorithms with open-source Python libraries to build precise spatial data science models. Reduce time spent managing dependencies across data science ecosystems and increase cross-team collaboration and transparency. Ideate, iterate, and share workflows in a secure environment—accessible anywhere you go. Convey results with beautiful, interactive maps and apps for data storytelling that drives insight and action.



Digital Twin Additional Resources

Europe's Largest Port Prepares for Autonomous Ships (article)

With GIS technology, IBM's Watson IoT, and Cisco's Kinetic, Port of Rotterdam's digital twin will help the port receive autonomous ships.

The Digital Twin of Port of Rotterdam (video)

Hear Erwin Rademaker, program manager with the Port of Rotterdam Authority, detail the role location technology is playing in the digital transformation of Europe's largest port.

Digital Twin Helps Airport Optimize Operations (article)

The world's 11th-busiest airport, the second-largest in terms of hub connectivity, and the main international airport of the Netherlands, Amsterdam Airport Schiphol facilitates the movement of passengers and cargo throughout the Netherlands and the rest of Europe.

Real-World Solutions Using Geospatial Models: Transportation (ebook)

This ebook contains various case studies showing how geospatial technology enables transportation problem solvers to use reality as their greatest asset.

Commercial/Business

A Digital Twin Fuels Record Expansion at Vail Resort (article)

Determined to deliver early season openings to thousands of skiers, management at Vail Ski Resort initiated an expansion of its snowmaking capabilities that relied on a digital twin of the mountain's infrastructure.

5D: The New Frontier for Digital Twins (article)

Imagine watching a 3D animation of a construction project as it progresses through each phase. Now add a timeline so designers see which structures will be built by week, and include an estimator that calculates cost every step of the way.

A Digital Twin for the Supply Chain (article)

Read how a digital twin is changing the landscape of supply chain operators.

Digital Transformation: A Walk-Through Guide (blog)

This article discusses how companies and executives are strategizing a game plan to begin their digital transformation.

Five Steps toward Building a Digital Twin for the Supply Network (blog)

Manufacturers Committed, but Slow to Digitally Transform the Supply Chain (blog)

Architecture, Engineering, and Construction

Digital Twin of the Globe Helps Companies Get Ahead of Climate Risk (article)

Business executives crave predictability, and a new simulation-based system uses GIS technology to predict where supply chain vulnerabilities could emerge months and years in the future.

ArcGIS: A Foundation for Digital Twins (blog)

Digital twins are virtual representations of the real world that incorporate physical objects, processes, relationships, and behaviors.

Building Smart Infrastructure in a Digital Age: Global Innovators (ebook)

This ebook contains various case studies highlighting how global innovators are driving change in a digital age.

How NASA Mapped and Modeled Langley's Digital Twin (blog)

The National Aeronautics and Space Administration's (NASA) Langley Research Center uses a digital twin as a backdrop to nearly 300 lightweight and purpose-driven facility management apps.

A Network Digital Twin Helps Brazil Utility Expand Renewable Energy (blog)

Water

Gwinnett County Explores Benefits of Digital Twins at Pump Station (case study)

Esri's ArcGIS technology-based digital twin enables Gwinnett County's operations managers and staff to locate and monitor assets within a rich 3D, spatially accurate environment.

Combining Spatially Contextualized Assets and Real-World Building Spaces Enables a Vertical Asset Management Program (case study)

See how Raleigh Water saved time and money by enabling staff to quickly locate assets throughout the organization's facilities by leveraging indoor maps.

Smarter Solutions for the Real World, Using GIS—Water (ebook)

This ebook contains various case studies highlighting smarter solutions using GIS for water.

A Foundation for Digital Twins in Water (storytelling app)

This story will introduce the elements and information models that comprise a digital twin and provide a better understanding of problems that all water organizations face.



Electric

Florida Utility Creates Digital Twin of Electric Assets with Highly Accurate Field Operations (case study)

Field crews create the first highly accurate digital twin of the utility's transmission and distribution assets in 50 years.

Creating a GIS-centric Community of Action (article)

Today, utilities and local governments face another turning point in technology development: the digital twin.

Telecom

Enabling Digital Twins for Next Generation Network Management (storytelling app)

Vodafone Creates Country-Scale Digital Twins to Engineer Better Networks (blog)

Smart Cities

Meet Boston's Digital Twins (blog)

See how the Boston Planning & Development Agency carved a 3D wooden model of Boston's downtown to help planners and developers design the city's future.

Uppsala Creates a Detailed Digital Twin to Enhance Sustainability (blog)

The Uppsala Climate Protocol guides key decisions that planners used to design green development.

NextTech: A Digital Twin Aids Planning in the New Workplace (article)

Learn how a health-care system saved \$4,000 a day in a 395-bed facility by eliminating time wasted by staff searching for assets.

Artificial Intelligence

Replacing 50,000 Work Hours with AI (blog)

See how drones and AI have saved one utility 50,000 work hours a year by using deep neural network modeling.

Automating Railway Asset Detection Using Lidar and Deep Learning (article)

Learn how deep learning was used in 2D and 3D domains for asset inventory management for railways.

Digital Twins: Accelerating Business Innovation (podcast)

Jay Theodore, Esri's chief technology officer for enterprise and AI technologies, explains how digital twins powered by location intelligence technology can help businesses and other organizations gain insights into real-world operations and assets.

Planning and Design

Honolulu Planners Visualize Housing Patterns with an Eye on Affordability (blog)

The Honolulu City Council, in Hawaii, faced housing affordability concerns. Three-dimensional maps showed housing supply and demand, which guided zoning changes and transit planning on all levels.

Gothenburg Is (T)Winning (blog)

Gothenburg created a digital twin of its city to analyze historical or real-time data and study simulations of potential future scenarios.

Hardeeville and ArcGIS Urban: Small City Facing Tremendous Growth (blog)

See how a small city planning department uses the 3D visualization tools in ArcGIS Urban to see the changes and impacts of population growth on the city.





Esri, the global market leader in geographic information system (GIS) software, location intelligence, and mapping, helps customers unlock the full potential of data to improve operational and business results.

Founded in 1969 in Redlands, California, USA, Esri software is deployed in more than 350,000 organizations globally and in over 200,000 institutions in the Americas, Asia and the Pacific, Europe, Africa, and the Middle East. Esri has partners and local distributors in over 100 countries on six continents, including Fortune 500 companies, government agencies, nonprofits, and universities. With its pioneering commitment to geospatial information technology, Esri engineers the most innovative solutions for digital transformation, the Internet of Things (IoT), and advanced analytics.

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