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5 WAYS TO TRANSFORM
URBAN PLANNING

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"Today's advanced GIS software can now model cities in 3D and integrate the full planning workflow, thereby dramatically enhancing efficiency and effectiveness."

Scott T. Edmondson,
Senior Planner-Economist
San Francisco Planning Department.

MODERN CHALLENGES MEET LOCATION INTELLIGENCE

As city planners strive to modernize, they face complexities in population change, traffic flows, housing availability, and economic development. Many are using location intelligence—smart maps, 3D models, and data analysis—to untangle these issues and find sustainable solutions.

Over the years, cities around the world have used location intelligence to manage, share, and visualize data. Thousands of local governments rely on modern mapping systems to improve operational performance in every department—from public safety to community health. Planning departments can now use mapping and spatial analysis to study urban trends and patterns with the added advantage of 3D and scenario tools that render design visualizations.

Working together in a virtual location intelligence platform, planning teams use data-driven maps to model the city. Specific plans guide neighborhood planning interventions, while comprehensive plans support long-range goals across the entire city. The same technology tools planners use to build and iterate scenarios can be used to measure key performance indicators (KPIs). Throughout the process, staff and stakeholders collaborate on proposals and plans.

By taking advantage of location intelligence technology, innovative planning and design professionals are keeping pace with city goals and citizen needs.

ENCOURAGE CITIZEN ENGAGEMENT

City planners succeed when their work is backed by local knowledge and input. Most departments create strategies to engage their communities in conversation that results in honest feedback about city projects, proposed budgets, and plans.

California's City of Pasadena, for instance, launched Our Pasadena—an initiative to accommodate community growth while protecting the city's historic character. The project is backed by ArcGIS® Urban, a web-based 3D experience for urban planning and development from location intelligence leader Esri.

Pasadena's planning department uses the technology to collaborate and test scenarios for plans across the city. Residents can view these 3D scenarios to understand how changes to zoning codes will affect the community. They can easily see how, for example, increasing a building's setbacks will change the current streetscape. Where once planners and residents viewed changes on a 2D plan, they can now walk down a virtual street and experience alternative futures.

Workshops and other public meetings are difficult for many in the community to attend, so more cities are opting to engage and share information online. City planning departments can post maps and surveys on their website. Site visitors can take a virtual tour and answer survey questions to share their reactions. Responses are captured and immediately reported to the planning department so planners can make decisions and refine plans.

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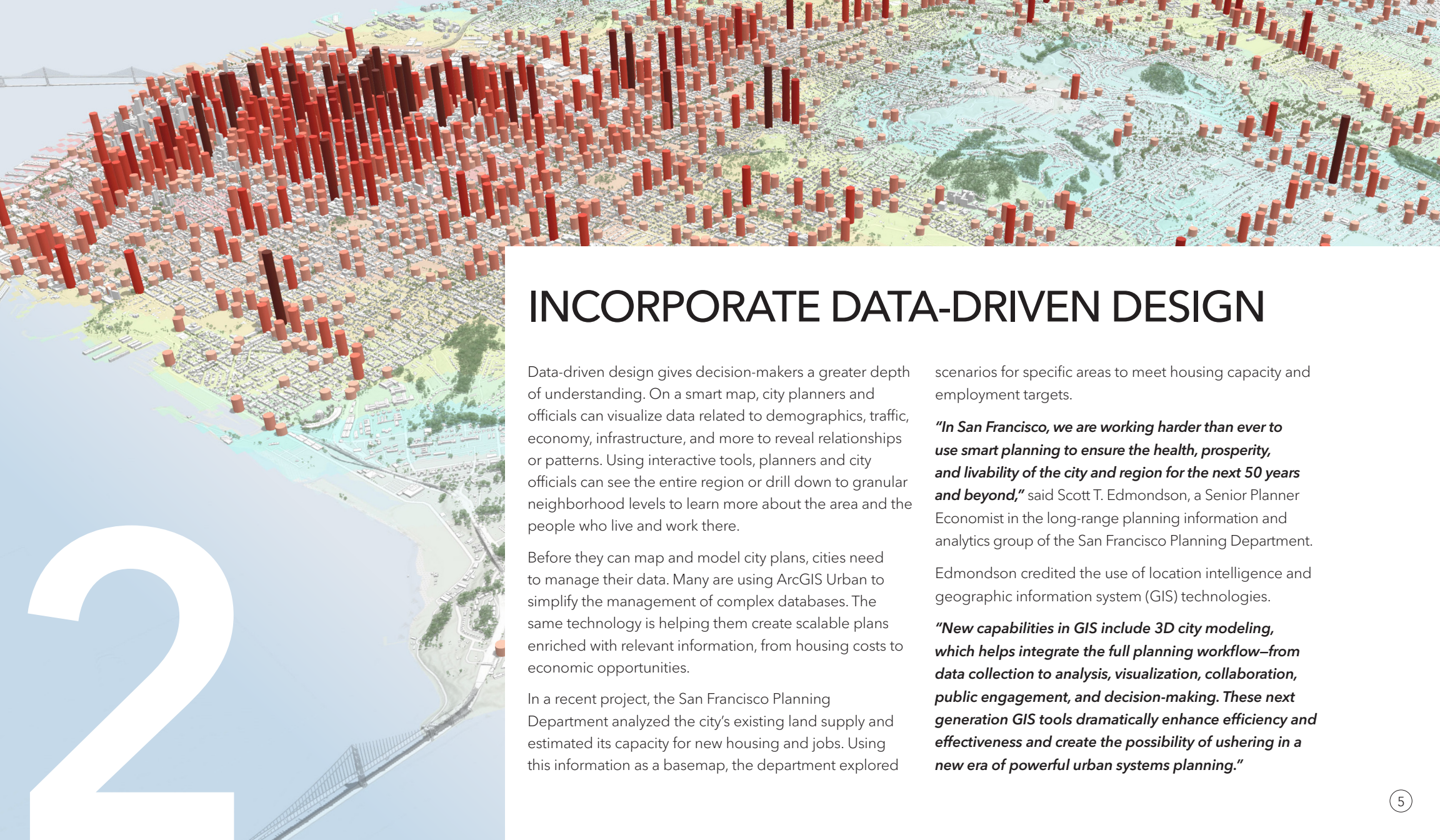
INCORPORATE DATA-DRIVEN DESIGN

Data-driven design gives decision-makers a greater depth of understanding. On a smart map, city planners and officials can visualize data related to demographics, traffic, economy, infrastructure, and more to reveal relationships or patterns. Using interactive tools, planners and city officials can see the entire region or drill down to granular neighborhood levels to learn more about the area and the people who live and work there.

Before they can map and model city plans, cities need to manage their data. Many are using ArcGIS Urban to simplify the management of complex databases. The same technology is helping them create scalable plans enriched with relevant information, from housing costs to economic opportunities.

In a recent project, the San Francisco Planning Department analyzed the city's existing land supply and estimated its capacity for new housing and jobs. Using this information as a basemap, the department explored scenarios for specific areas to meet housing capacity and employment targets.

"In San Francisco, we are working harder than ever to use smart planning to ensure the health, prosperity, and livability of the city and region for the next 50 years and beyond," said Scott T. Edmondson, a Senior Planner Economist in the long-range planning information and analytics group of the San Francisco Planning Department.

Edmondson credited the use of location intelligence and geographic information system (GIS) technologies.

"New capabilities in GIS include 3D city modeling, which helps integrate the full planning workflow—from data collection to analysis, visualization, collaboration, public engagement, and decision-making. These next generation GIS tools dramatically enhance efficiency and effectiveness and create the possibility of ushering in a new era of powerful urban systems planning."

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REDUCE RISK WITH DIGITAL TWINS

By replicating the real world in a digital environment, planners gain a safe place to test project scenarios. These digital twins model a neighborhood's buildings, vegetation, street rights-of-way, and other infrastructure. The more details planners add to models, the more realistic neighborhood scenes become and the more useful they are for analyzing real-world effects.

The Boston Planning & Development Agency (BPDA), for example, uses a digital twin to explore how development constraints will affect city plans. With ArcGIS Urban, the team authors iterative scenarios to create and test regulatory policy. BPDA staff created a web-based 3D model of the city to streamline review of proposed development projects, thereby reducing the need for resubmissions.

"We are trying to spatially understand environmental impacts," said Corey Zehngebot, Senior Architect and Urban Designer at BPDA. *"By using cutting-edge technology with data-driven workflows, we have metrics and standardized processes and procedures to evaluate projects and move them forward."*

Traditional 2D site plans do not offer enough information for reviewers to understand the spatial impact of a proposed project. However, 3D models help people visualize and assess a project in the context of its proposed location. Staff can adjust designs and measure how any change will influence outcomes.

In Boston, developers proposed a 775-foot project that ignited debate about the impact of its height and shadow on the Boston Common. BPDA planners requested a 3D model of the project and used shadow impact tools to model each hour of the day. By adjusting the building's height, they could see how the change affected shadow cast. The modeling work revealed that the project needed to be lowered 80 feet.

"Having a digital 3D model allows us to capture the entire city and determine real-world impacts to make timely decisions," concluded Zehngebot.

EVALUATE IMPACT

Over time, demographics and markets shift. Public concerns about climate trends, conservation, and resource use evolve. As urban environments change faster than predicted, city regulations must keep pace. In turn, planners need tools to uncover growth patterns and evaluate areas where current trends no longer fit existing building regulations.

One example is the city of Hardeeville. Situated in the coastal low country of South Carolina, the town has doubled its population to nearly 6,000 within the last decade. Service employees from nearby resorts are attracted by the low cost of living, and a new interstate exit provides greater commercial opportunity for the city. Consequently, Hardeeville city officials annexed large undeveloped land parcels that call to investors and developers.

To accommodate this growth, Hardeeville needed to delineate planned development districts and decide how these areas would be developed from completely residential to almost completely commercial. Planners needed to rethink areas where previously prescribed zoning codes were out of sync with the current community's broader vision for land use.

With the help of ArcGIS Urban, Hardeeville planners aligned community needs and new zoning requirements. They input the city's standards for space use, then mapped possibilities. Planners used ArcGIS Urban to explore options for where best to extend and apply zoning changes. They tested different layouts and evaluated the construction potential of each undeveloped tract. The process led them to make informed decisions for each district.

By visualizing proposed scenarios throughout the planning process, planners get a clearer understanding of how development will look. The 3D models help decision-makers see connections and understand related problems. For example, they can evaluate a proposal's environmental impact on surrounding and previously existing natural resources. They can assess how well the plan protects wetlands and preserves rural character.

The ability to analyze current conditions, model plans, and rethink regulations goes a long way in helping Hardeeville and other cities evaluate impact for the future.

ACCELERATE POLICY MAKING

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To enforce sustainable development, communities need laws that preserve local identity but allow for visionary policy. Many cities are reexamining regulations that were designed for a different era in the city's evolution. Changing along with public opinion, some city planners are allowing development projects that could add diversity to the community and increase available housing.

For instance, affordable housing for locals is scarce in Honolulu, Hawaii. A statewide housing demand study predicted that Honolulu will need nearly 26,000 housing units by 2025. But the city's zoning regulations were in need of an update to permit new site development proposals. Honolulu launched the Transit-Oriented Development initiative that is transitioning neighborhoods to mixed-use zoning for residential and commercial. The initiative opens more housing opportunities and encourages walking and active areas. Citizens can live closer to jobs, for example. And apartments, which contribute 25 percent of the value for all new buildings in Honolulu, will be a key piece of the housing solution.

To visualize proposed changes and understand how they will impact residents, city analysts and planners used the location intelligence capabilities of ArcGIS Urban. They analyzed a zoning proposal that would raise apartment height limits from three to five stories. Staff entered various zoning code constraints and instantly saw the impact different height levels had on housing availability and jobs. Through spatial and quantitative analysis of the proposed design, city officials could see the plan's value.

ENSURE PLANNING CONTINUITY

ArcGIS Urban engages both casual and professional users with tools for analysis, and iteration. Web-based tools support community engagement and make it easy for nontechnical stakeholders to participate in the planning process. Interactive maps and web apps encourage meaningful two-way conversation, thereby giving citizens a greater voice and planners more clarity in planning the community. GIS-trained professionals perform deep analysis, build models, and employ desktop analytics to understand the complexities of a city's current state and create long-range plans that incorporate multiple factors.

Using existing data and maps, planners can map the as-built environment, a digital twin of the city including current regulations. By mashing up data sources and using analytical tools, they can identify patterns and trends. Planners can show stakeholders the location of community concerns such as housing availability and downtown mobility challenges that come with population growth. The planning department can use the digital twin as a test bed for scenarios and measure their impacts against existing and land-use values. Evaluation tools help planners ensure that development proposals meet the city's requirements, such as adhering to shadow ordinances.

From project inception to completion, planning departments use ArcGIS Urban. Built on ArcGIS Online, the Esri mapping service, it orchestrates the entire urban development life cycle. ArcGIS Urban also can be used as a component of the Esri Geospatial Cloud, including the community engagement platform ArcGIS Hub, wherein planners collaborate across divisions, departments, and other agencies as well as inform stakeholders and engage the public. In addition, the system ensures continuity in planning and accelerates review processes.

ArcGIS Urban supports every phase of the planning process.

Community Engagement and Goal Setting

Mapping Existing Conditions and Trends

Scenario Planning

Project Submission and Evaluation

Sharing and Reporting

THE POWER TO TRANSFORM URBAN PLANNING

Every person involved in planning workflows can now access and use information and tools that help them meet city goals.

How a city manages change is evident in quality of life, productivity, and physical infrastructure. By mapping what is, what was, and what could be, planners gain insight about what needs to be done next.

Many planners are using location intelligence technology—specifically, ArcGIS Urban from Esri—to design smarter, more sustainable communities. This comprehensive set of web and desktop GIS tools supports the entire development life cycle. Within this virtual environment, planners can design what-if scenarios, support design decisions, and collaborate for consensus.

Learn more about ArcGIS Urban: **go.esri.com/urban-ebook-aec**

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