

Southern Africa Esri User Conference, 28 – 31 October 2025

# Integrated Cities

COMPLETE UNDERSTANDING WITH LOCATION  
INTELLIGENCE AND ARTIFICIAL INTELLIGENCE

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# Cities Today


An aerial photograph of Cape Town, South Africa, showing the city's urban landscape, the Cape Town Stadium, and the iconic Table Mountain in the background. The image is used as a background for the text.

**Urbanisation is one of the megatrends driving global transformation**

**Today, cities are home to half the world's population and are hubs of economic, social and cultural activity**

**Cities attract talent, investment and creativity and account for more than 80% of the world's GDP**



A low-angle, upward-looking perspective of several tall, modern skyscrapers with glass facades, reaching towards a clear blue sky. The buildings are arranged in a way that creates a sense of height and scale, with their lines converging towards the top of the frame. The lighting suggests it might be late afternoon or early morning, as some windows are illuminated from within.

**But climate change, inequality, resource shortages and other challenges are jeopardising sustainable development**

**Cities are also under increasing pressure to deliver efficient and effective services to their growing populations, while optimising their spending and utilisation of resources**

**City leaders need to meet current demands while ensuring sustainability and resiliency for the future**



# Areas of Governance

## Community Development

- Planning and development
- Economic development
- Housing
- Redevelopment
- Permitting & safety

## Utilities

- Electric
- Water
- Gas
- Telecoms

## Public Safety

- Police
- Civil defense
- Emergency management

## Public Policy & Administration

- Elected officials
- CxOs
- Information technology & GIS

## Public Works

- Engineering
- Parks
- Facilities

## Culture & Arts

- Libraries
- Museums

## Environment & Natural Resources

- Agriculture
- Wildlife
- Conservation
- Natural resources

## Transportation

- Roads & highways
- Public transit
- Airports
- Ports

## Health

- Public health
- Human services
- Hospitals & health systems





# Factors Affecting Cities & Local Governments



## BUSINESS NEEDS

Rethink approach to delivery of government services

Digital service delivery

Government collaboration

Climate risk assessment and mitigation

Improve community and citizen engagement

Opportunity for innovation



## TECHNICAL NEEDS

Modern business systems

Integration with other systems of record

Adjust to AI and machine learning

Improve transparency and responsiveness

Take a systems approach to solving workflows and interagency approaches

Enhance and leverage nonprofit partnerships

Provide modern applications for government



## CHALLENGES

The need for more green space

Resilience to threats and unplanned events

Urbanisation pressures as populations grow

Sustainable development

Degradation of the natural environment

The need for more green space

Meeting increasing demand with limited resources

Ensuring equity

Managing the impacts of climate change



## Modern Systems Coupled with Data Can Help, but...



There are outdated technology and systems in place



Data is being generated everywhere and is overwhelming



There are constraints on the capacity of agencies and teams



Siloed approaches still exist in agencies and departments



There are limited resources to implement new AI-enabled approaches



There is a lack of mandate to maximise the value from data and analytics



# Digital Evolution of City Governance

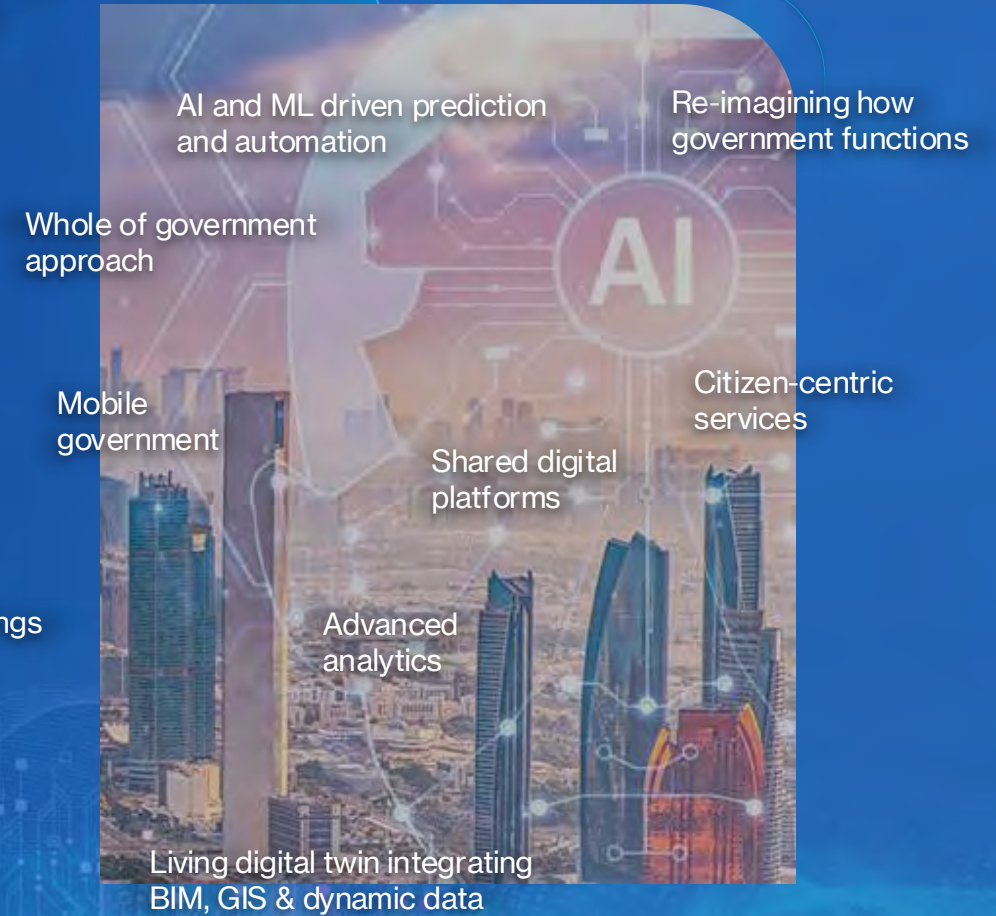
## E-Government



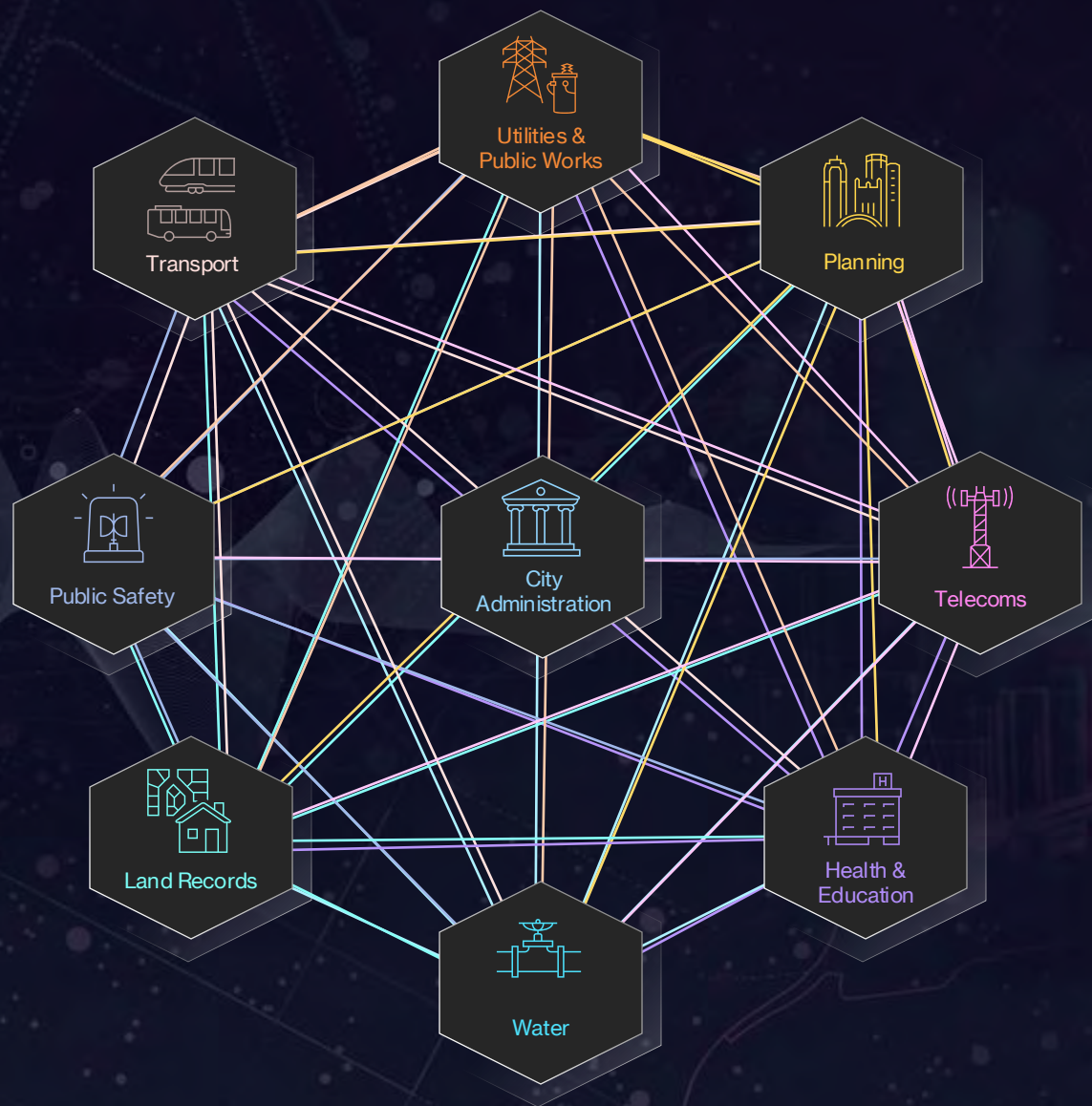
## Smart Cities



## Digital Transformation & AI-Driven Governance







**Challenges and opportunities in cities are rarely limited to a single agency or department**

Collaboration across the city and involving key stakeholders is more important than ever

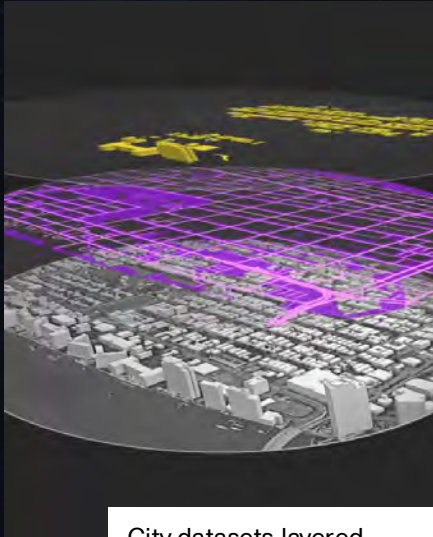


# Location Intelligence and Artificial Intelligence for Cities



## Location Intelligence

Location intelligence is the insight gained from visualising and analysing geospatial data



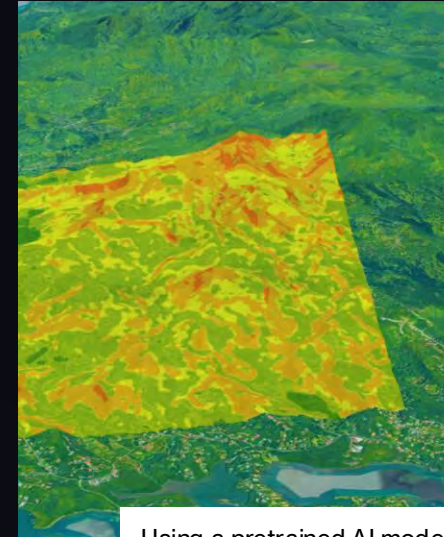
City datasets layered together to reveal insights

Layering demographics, traffic, environment, economics, weather and other data reveals patterns and **insights**, provides real-time **understanding**, and enables cities to approach challenges **holistically**



## Geospatial Artificial Intelligence

Geospatial technology enriched with AI helps boost productivity, decision-making and innovation



Using a pretrained AI model to find vulnerable buildings

Geospatial AI automates data **analysis**, can detect **patterns** and anomalies in vast datasets, and enables **modeling** and **monitoring** of operations in real-time to drive efficiencies



# ArcGIS

A Comprehensive Geospatial Platform

... For Creating Systems & Solutions

Pro  
Enterprise  
Online



Living Atlas

- Mapping
- 3D
- Imagery
- Analytics
- Data Management

Software, SaaS and PaaS



# Why GIS and AI are Powerful . . .

## Geospatial context + intelligence

- Insights from massive spatial data

## Advanced analytics and real-time insights

- Trends, patterns and predictions

## Automation, efficiency, accuracy

- Mapping, analysis and data management workflows

## Scalability & accessibility

- Scaling GIS impact, transform organizations and enable access by everyone





# GIS is Being Enhanced with AI

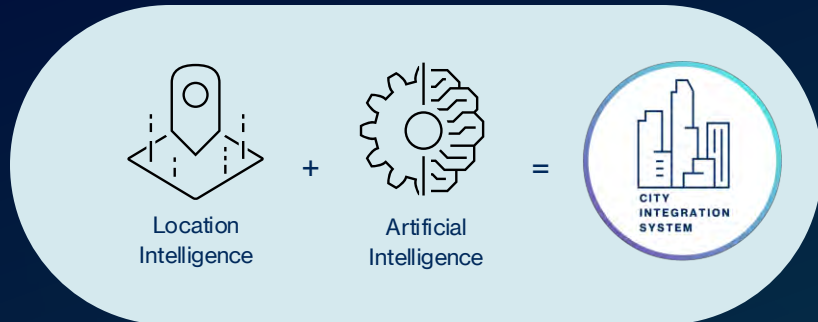
Delivering Transformational Value



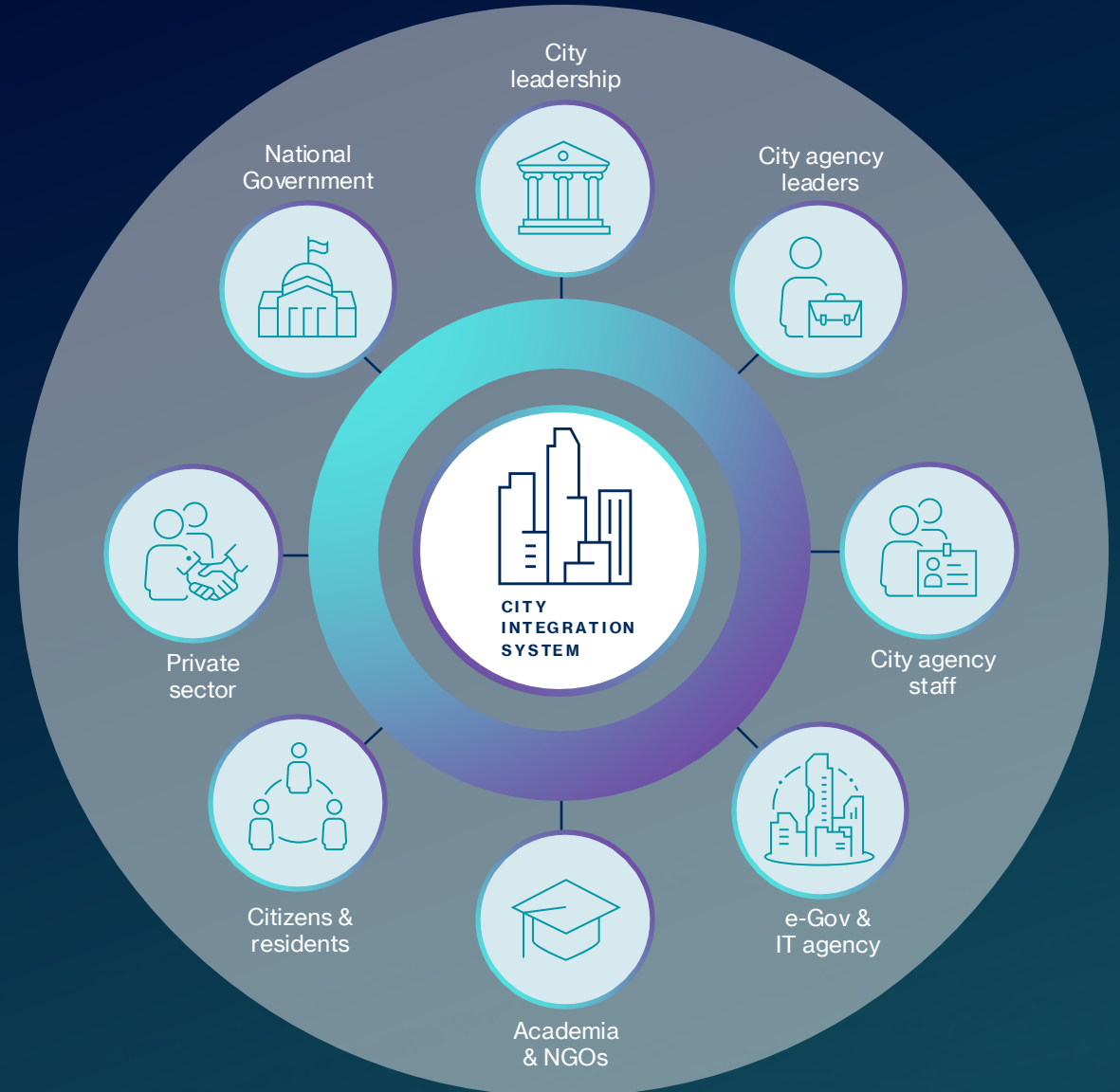


# A System for City Integration

By implementing a platform for government that is powered by location intelligence and artificial intelligence, all city stakeholders and their data can be integrated together to enable holistic city-wide collaboration



This approach can enable more effective governance, optimise decision making, ensure sustainability and resiliency, and improve the quality of life for those living, working and visiting the city



*Stakeholders and users of the system across the city and beyond*



# Where Location Intelligence and Artificial Intelligence Can Make an Impact



Citywide monitoring,  
analytics and response



Urban planning and  
land use



Critical city infrastructure  
and asset management



Transport management  
and optimisation



Public safety planning  
and management



Emergency response  
planning and management



Environmental monitoring  
and mitigation



Natural resource  
management



Policy, governance and  
service delivery



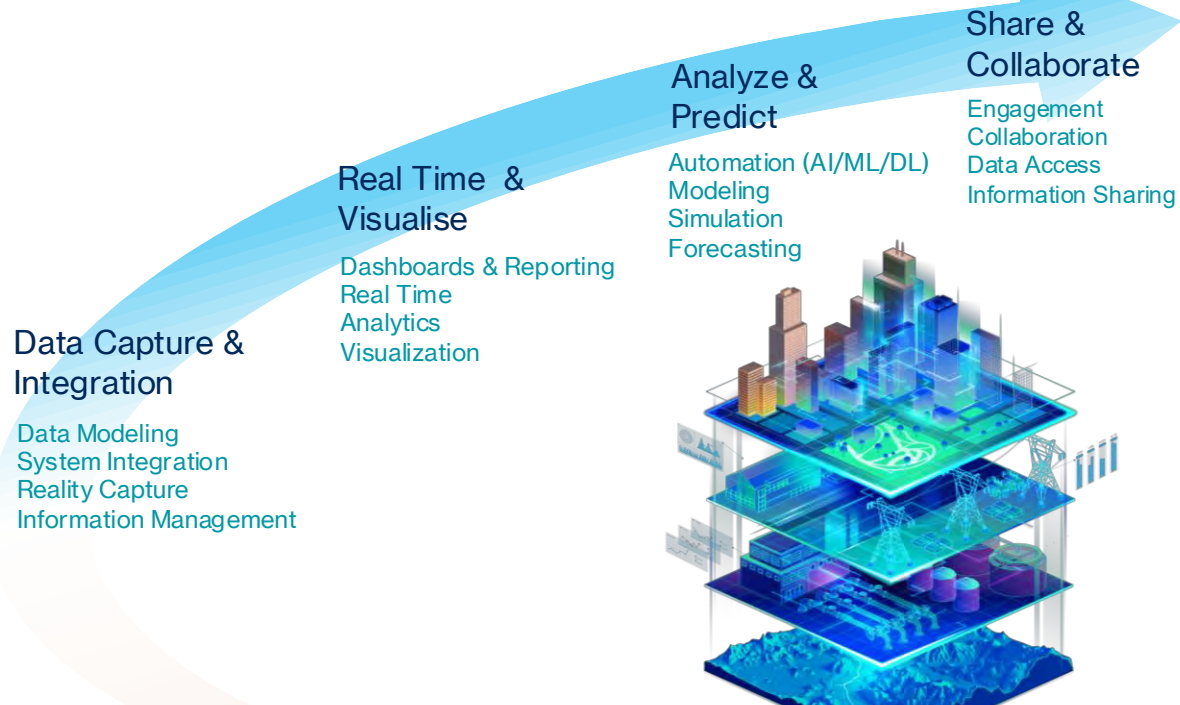
Citizen engagement and  
open data sharing



# AI-enabled city digital twin

The digital twin is a virtual representation of the city that includes physical assets, processes, relationships and behaviours

Geospatial technology interconnects and integrates data and workflows to enable digital twin creation, management and outcomes



A reality-based digital twin of Boston that integrates data from multiple sources



## Digital twins enable

- Creation of a historical record or baseline
- Visualisation of operational performance monitoring
- Testing and predicting future outcomes

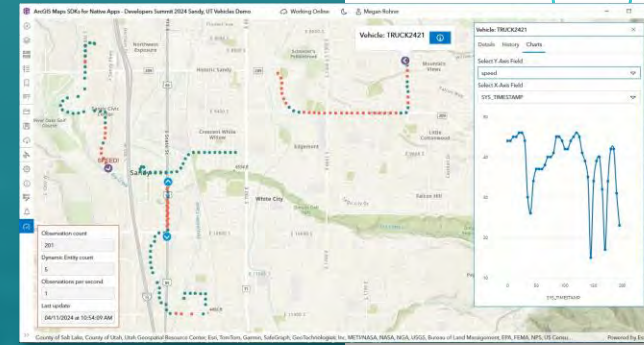
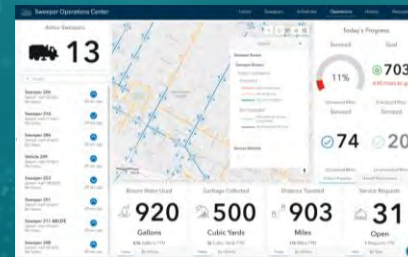
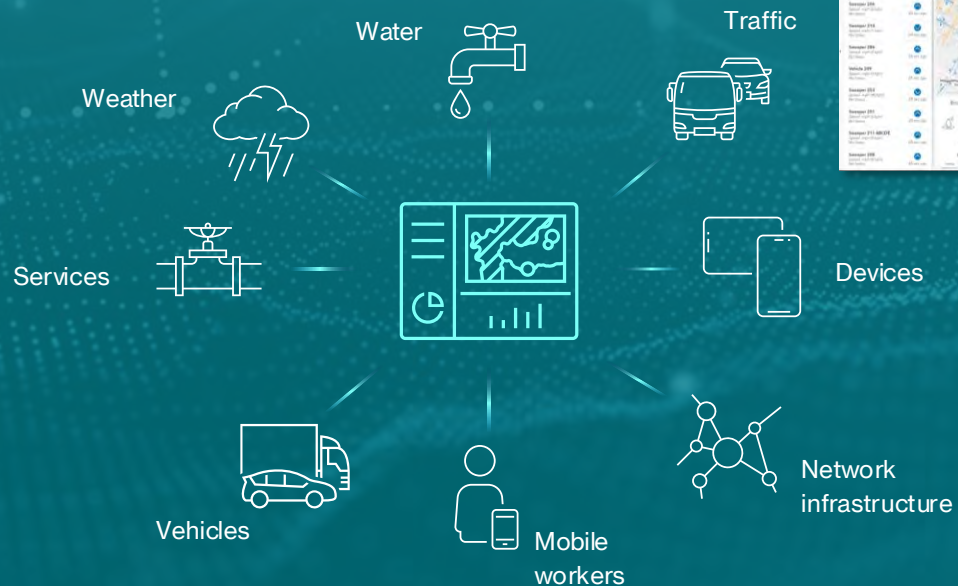




## Real-time city decision support system

A real-time view powered by dynamic data feeds coming from across the city can aid decision making, where to act and place resources, and respond quickly to unplanned events

AI powers predictive analytics on historical data to get ahead of issues before they arise



## Integration & Ingestion

## Visualisation

## Analysis

## Alerting & Actuation

## Data Management



### A 3D real-time operational dashboard for the city of Hong Kong

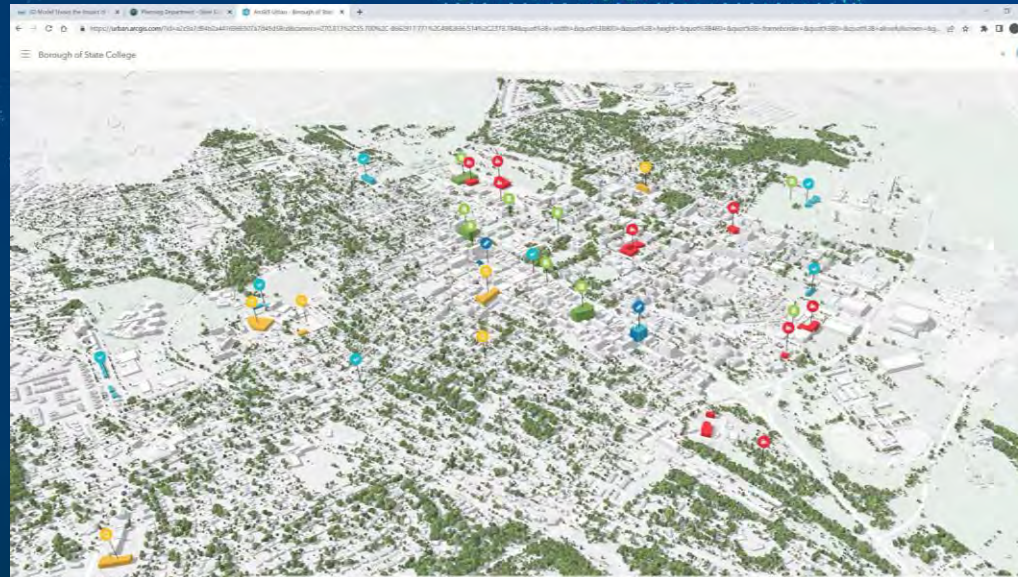


# Digital urban planning

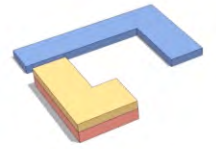
Urban planning in 3D that merges a digital twin of the built environment with web-based interactive zoning analysis and planning tools

- Design land use and zoning codes by comparing the current codes with proposed changes
- Illustrate new opportunities by building out planning scenarios for any parcel, district, or neighborhood
- Integrate developer plans and building proposals to view in 3D context
- Evaluate designs using KPIs and dashboards
- Share plans digitally and collaborate with stakeholders

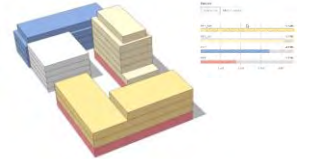
Interactive model that enabled Uppsala, Sweden to increase housing by 50%



Visualising comprehensive rezoning in Pennsylvania, US



Sketch scenarios



Evaluate designs



Test land-use changes



Model suitability



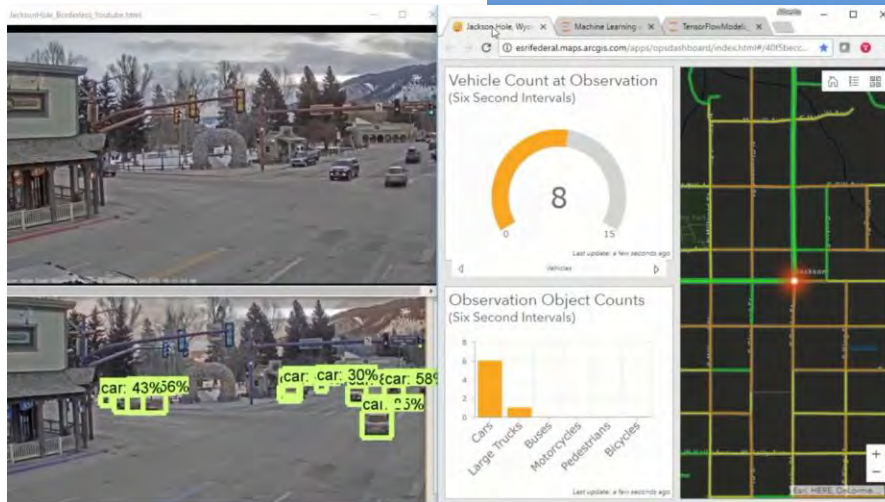
Perform spatial analysis



# Mobility monitoring and management

Monitor transportation systems in real-time to optimise operations and decision making

- Stream real-time traffic, bus services, arrivals and departures information and more
- Map, monitor and respond to incidents and events as they happen
- Use machine learning to analyse data dynamically to trigger alerts and events



Using AI to identify vehicles in real-time

Using machine learning to detect unusual road activity in Washington D.C.



US Department of Transport monitoring infrastructure and traffic accidents

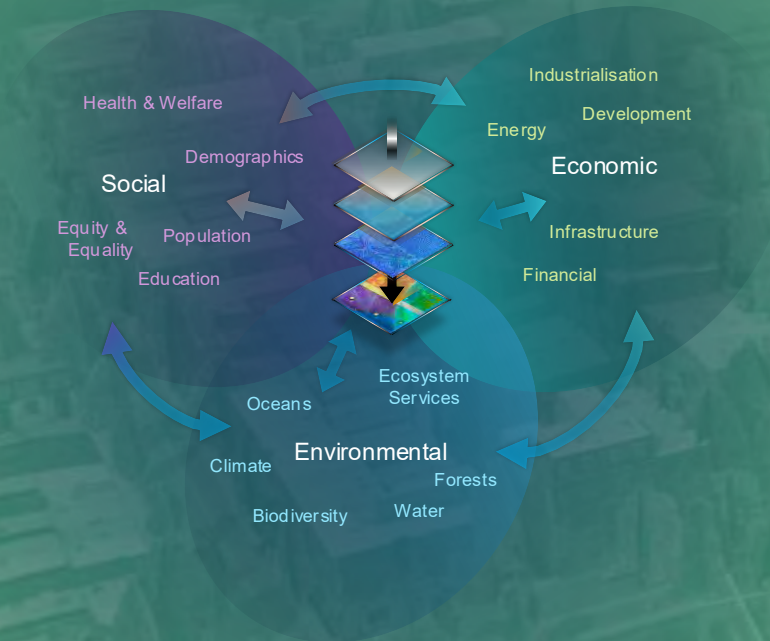


3D incident dashboard in Abu Dhabi



# Enabling sustainability

Gain a holistic view of challenges and opportunities to enable sustainable practices and outcomes for the city, and ensure balance between economic, environmental and social needs and aspects

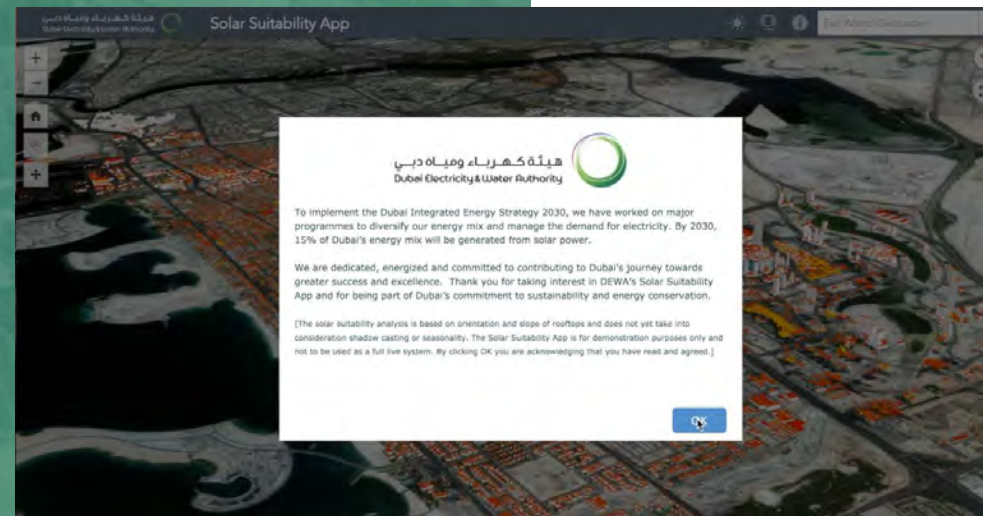
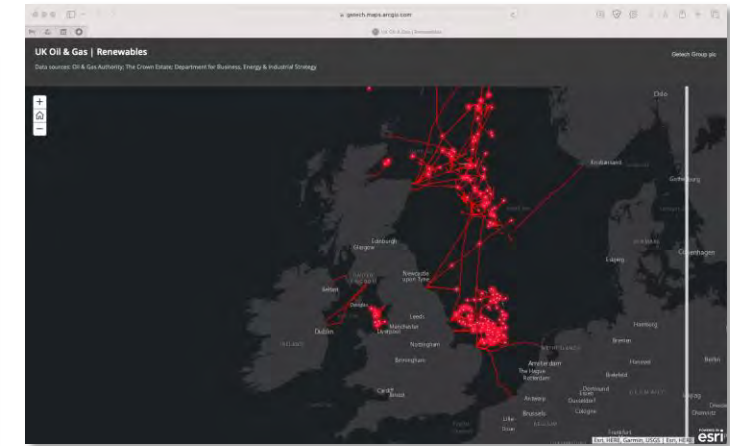


- 1 Understand the need
- 2 Map your work
- 3 Measure impact
- 4 Analyse performance
- 5 Engage stakeholders

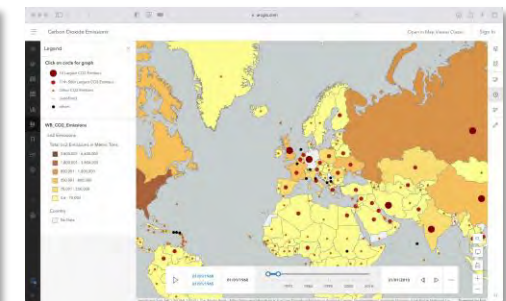
Analysing heat and planning green infrastructure in Prague



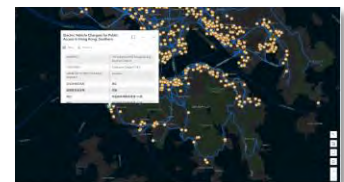
Mapping the reuse of existing infrastructure to support the energy transition



Modeling solar suitability in Dubai, UAE



Monitoring global carbon emissions



Planning the EV charger network in Hong Kong





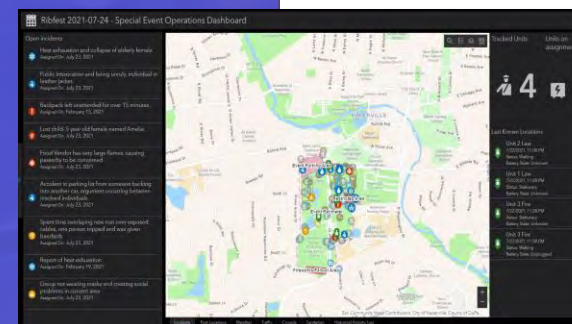
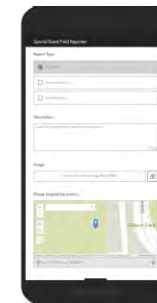
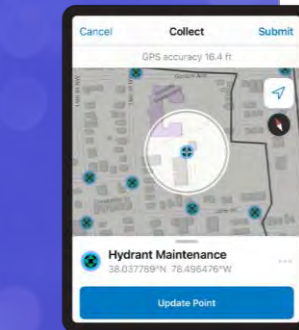


# Public safety

Get a deeper understanding of where to focus efforts to prevent, protect against, and mitigate complex threats and hazards. Use GIS to support all aspects of the emergency management lifecycle and leverage real-time data-driven insights to aid mission-critical decisions making

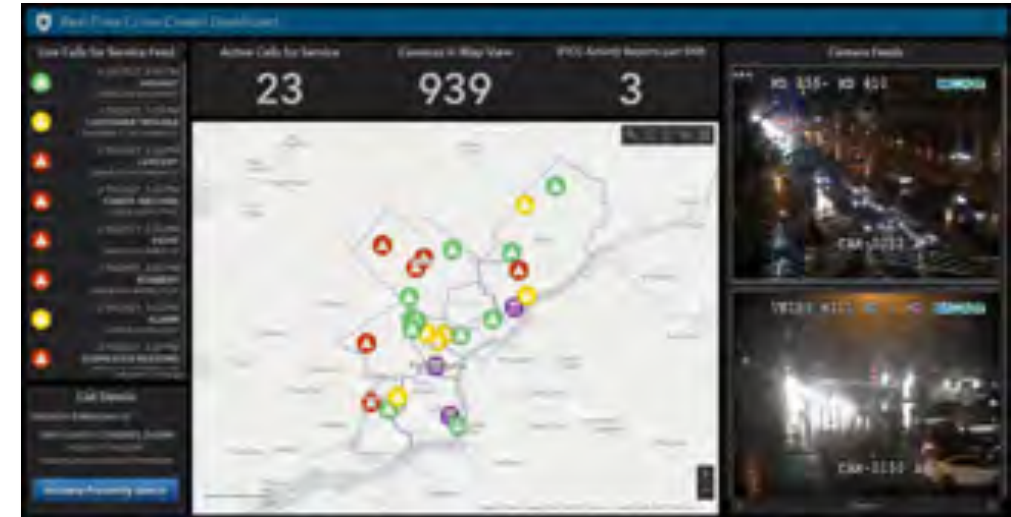


Get real-time alerts from trusted third party sources

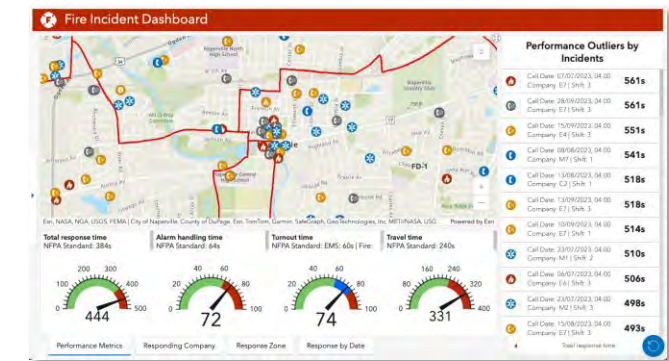


Manage events in the field

Gain a holistic overview of crime by integrating multiple data feeds



Collate and analyse statistics to identify crime trends



Monitor incident response



# Governance and public service delivery

Enhance public service delivery with a centralised approach to managing public assets, delivering effective services, and providing timely response across various government functions including public works, emergency response and transportation, ultimately leading to improved citizen satisfaction



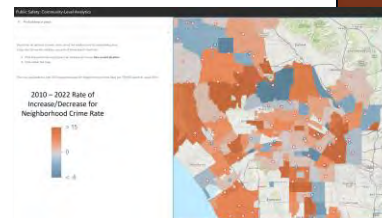
Capital improvement plan overview



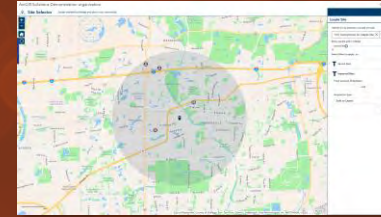
Transit rider reporter dashboard



Environmental monitoring



Crime statistics summary



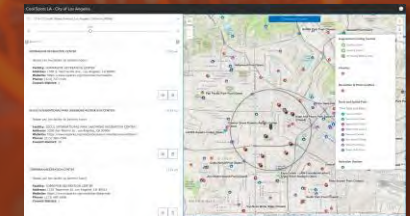
Community site selector



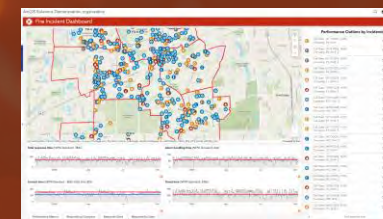
Tree inventory and management



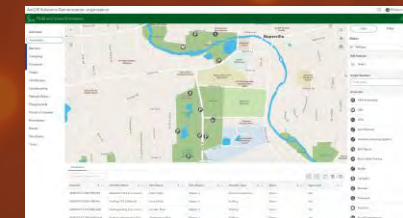
Public safety summary dashboard



Cool spots to beat the city heat



Fire incident dashboard



Public amenities locator



# Community engagement and open data

Drive engagement between the city and its community by sharing information on data-driven initiatives, plan and run community events and activities, and enable innovation by sharing open data



Smart Zwolle Hub

Maps & apps



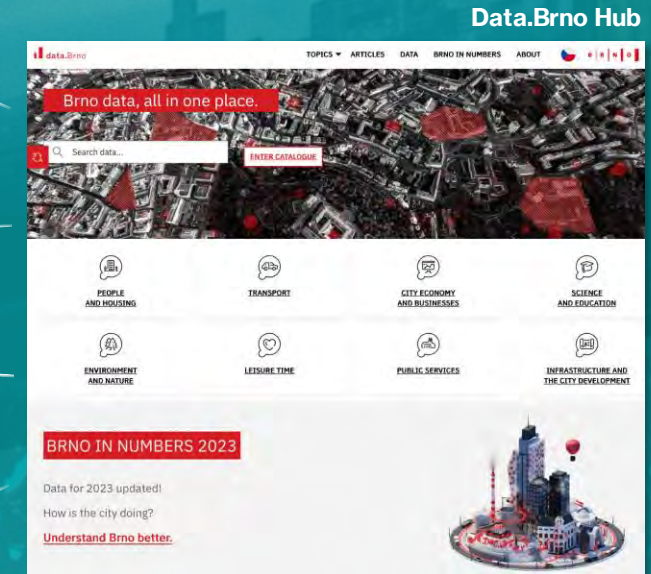
Collaboration



Tools for innovation



Open data

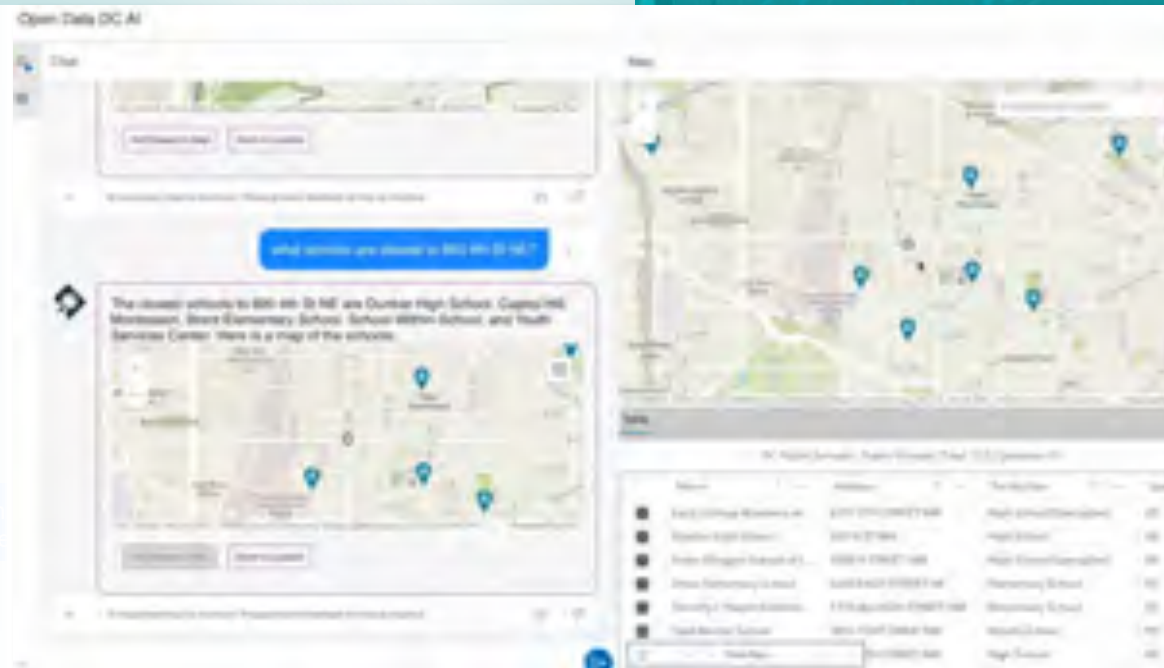


Data.Brno Hub

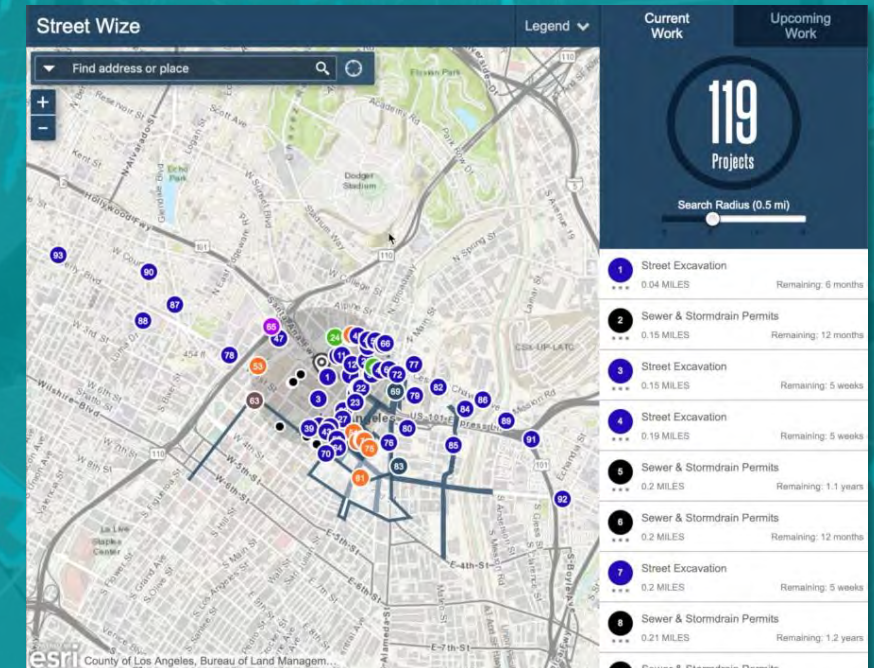
Where are the nearest cycle routes?

How many trees are there across the city?

What events are coming in the city this summer?



AI-enabled chat assistant helps community users find answers about the city



Sharing road closure data with the community



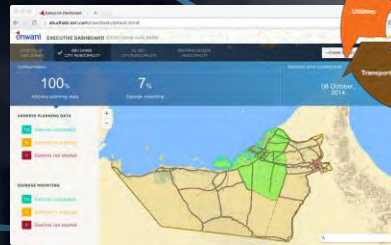
# Systems for Cities



AI-enabled digital twin  
Boston, USA



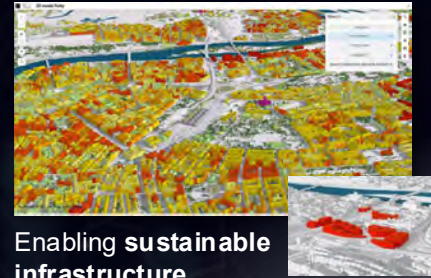
Ensuring resilience by preparing and responding to disruptive events  
Türkiye



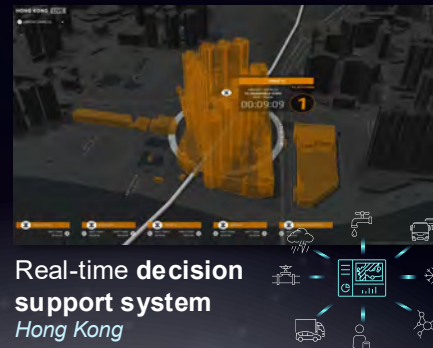
Citywide spatial data infrastructure  
Abu Dhabi, UAE



Mobility management powered with machine learning  
Washington DC, USA



Enabling sustainable infrastructure  
Prague, Czech Republic



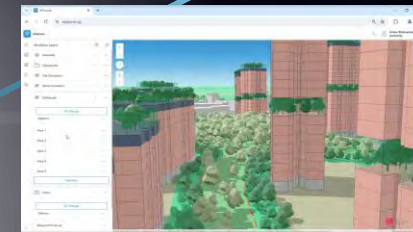
Real-time decision support system  
Hong Kong



Maintaining digital infrastructure with AI  
Kuwait



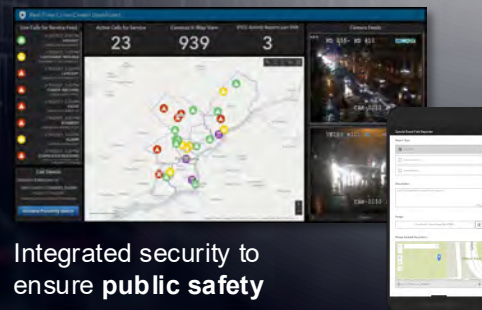
Low-altitude airspace planning integrated into building regulations  
Dubai, UAE



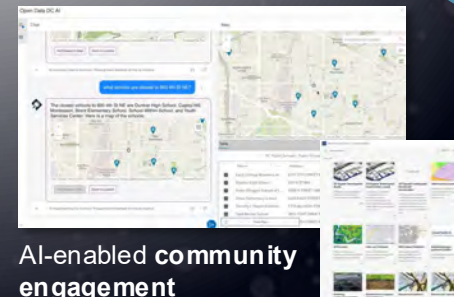
Greening urban spaces  
Singapore



Digital urban planning  
Uppsala, Sweden



Integrated security to ensure public safety



AI-enabled community engagement



AI-powered city monitoring using drone captured data  
Vilnius, Lithuania



# Outcomes



## EFFECTIVE GOVERNANCE

- Leadership and policy making guided by data and a holistic perspective
- Ability to respond to threats and opportunities quickly based on real-time data and advanced analytics



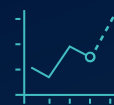
## OPTIMISED DECISIONS

- Government-wide common operating picture enables smarter data-driven decision making
- Ability to collaborate in real-time on activities and effectively communicate decisions and outcomes



## SUSTAINABILITY & RESILIENCY

- Data-enabled assessment of urban and natural planning and development decisions
- Ability to consider, prepare and communicate for multiple scenarios that might test resiliency



## INVESTMENT-READY ECONOMY

- Equip an ecosystem of government and private sector partners with technology and data that enables investment and growth
- Nurture and enable an active business startup community



## INNOVATION ECOSYSTEM

- Collaborate with non-governmental partners including academia and NGOs to foster skills and capacity in geospatial and AI
- Enable public access to open data and communicate on governmental initiatives



## IMPROVED QUALITY OF LIFE

- Create livable areas that thrive with innovation, provides quality public services and good governance
- Offer a high quality of life for those that choose to live, work and visit













Network Management Twin | Data courtesy of: OPEGIEKA





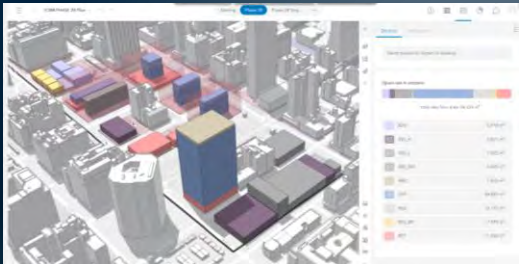








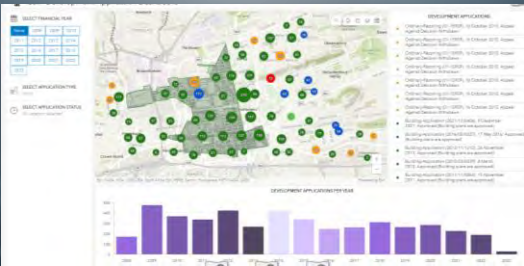
# Digital Twins Enabling Cities in Southern Africa



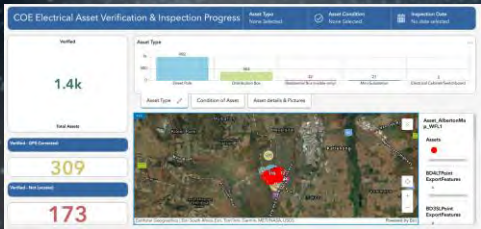
eThekweni Municipality



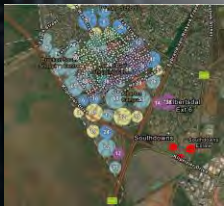
City of Cape Town



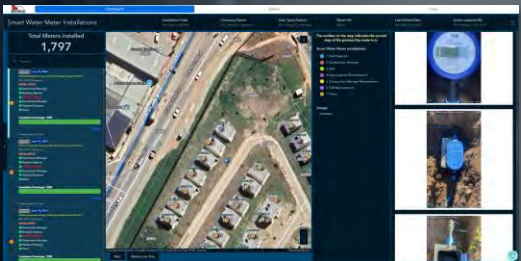
City of Johannesburg



City of Ekurhuleni



George Municipality



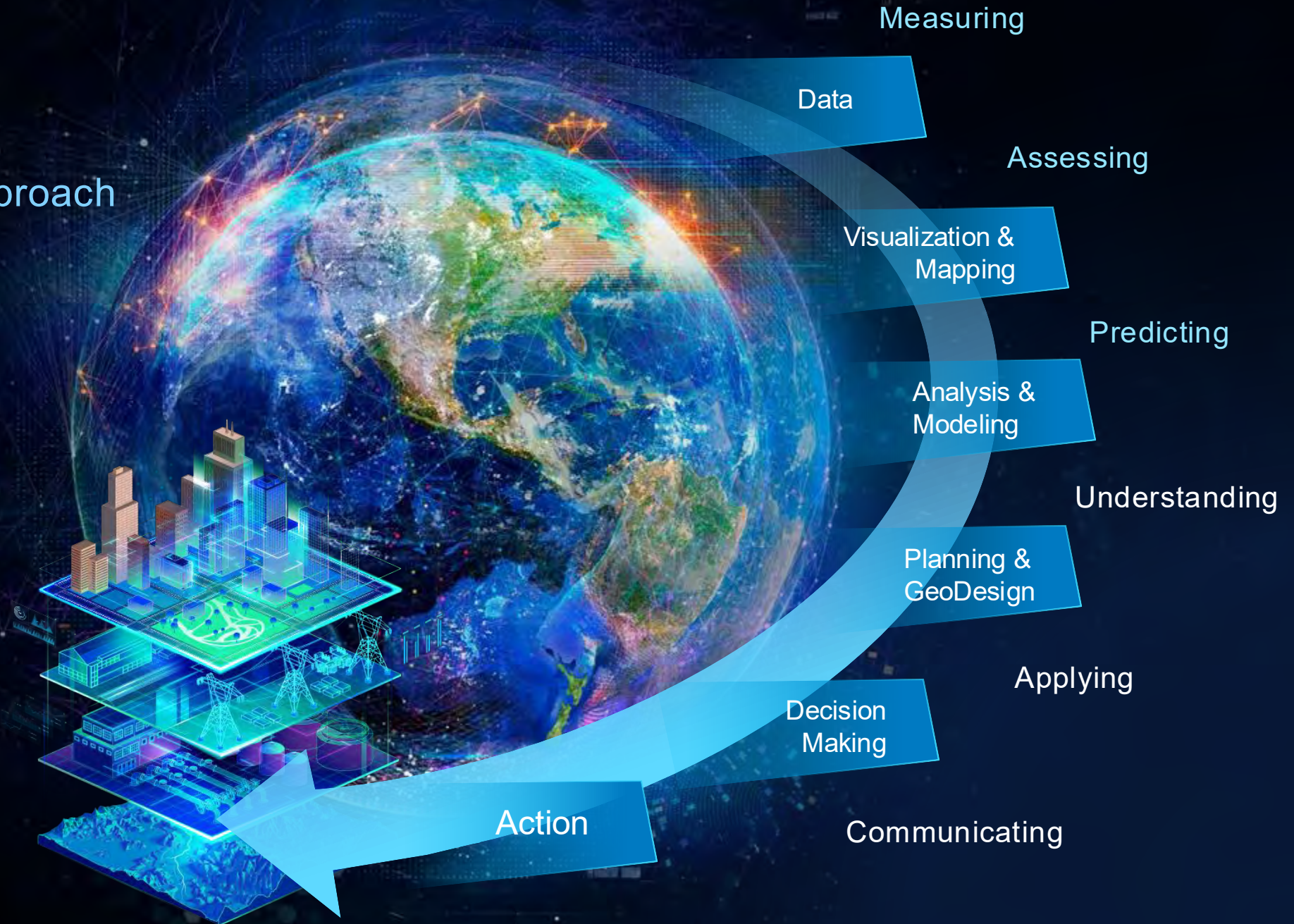


# GIS

Enables The  
Geographic Approach

Providing a Process  
and Framework . . .

. . . For Applying Geographic  
Knowledge Widely





# GIS Professionals

Have an Important Role to Play

Understanding the Situation We Are in . . .  
. . . and Explaining It to Others

Determining  
What's Needed and Wanted

Creating Holistic Solutions

## GEOGRAPHIC APPROACH

Making Sustainability a Priority

Leveraging the Latest Science  
and Technology

Maintaining  
Public Trust

. . . GIS, the Geographic Approach, and You





# Location Intelligence & Artificial Intelligence

Enabling Integration Across Cities & Municipalities

*Technology*

*Vision and leadership*

*Strategic thinking*

*People and learning*

*Sharing and collaborating*

Geospatial technology serves as a key platform to connect governments with private organisations and citizens to address challenges, optimize services and increase resiliency







# Thank you

**Richard Budden**

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