

Integrating New York City Information Systems

Improving situational awareness for everyone

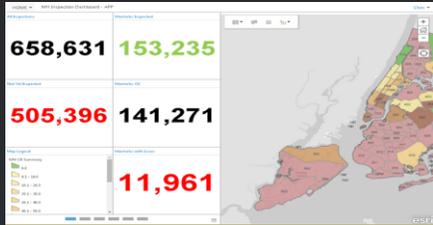


esri®

THE
SCIENCE
OF
WHERE™

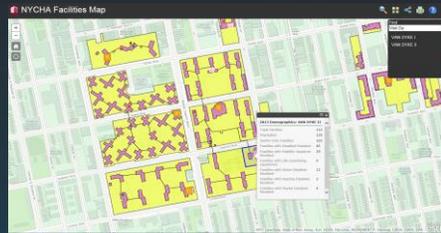
GIS is Delivering Value Across the City...

Asset Mgt and Inspections
Water Security, Green
Infrastructure



DEP

Facilities Management



NYCHA

Emergency Management



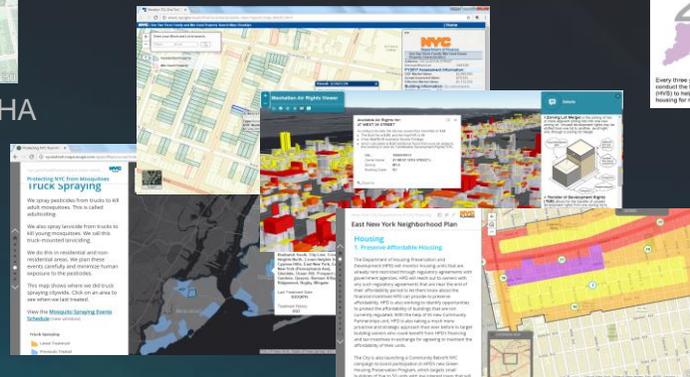
NYC EM

BladeRunner Fleet Mgt
Route Analysis



DSNY

Citizen Engagement



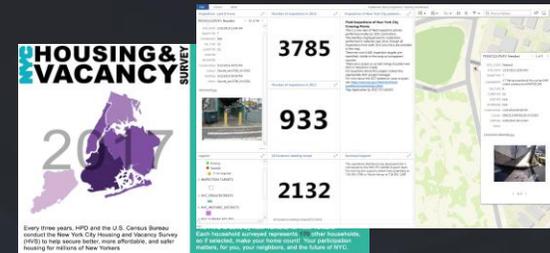
Finance, Health, Planning

Forestry Resource Mgt
Storm Mobile



Parks

Field Inspections



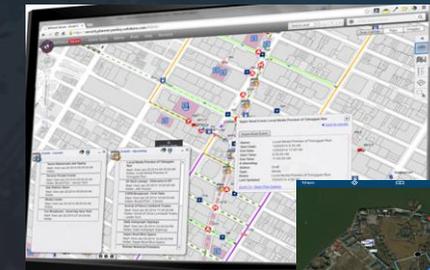
DOT, HPD

Crime Analysis



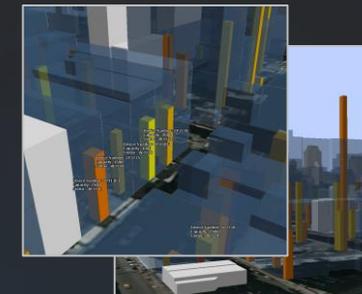
NYPD

Situational Awareness, IMT



FDNY

Elevator Work Orders



DOB

... Hundreds of Applications, Systems and Departments

Location Enablement



Discover, use, make, and share maps at work — anywhere, anytime

Constituent Engagement



Facilitate and manage communication with stakeholders

Decision Support



Inform execs and management with maps and location intelligence

Field Mobility



Get authoritative information into and out of the field

Analytics



Describe, predict, and improve business performance

Location Data Management



Collect and organize location data about your assets and resources

System of Engagement
(Demand)

System of Record
(Supply)

Location Enablement



Discover, use, make, and share maps at work -- anywhere, anytime

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**System of Engagement
(Demand)**

**System of Record
(Supply)**

**System of Insight
(Evolved, Sustainable Capability)**

GIS Integrates Everything

Connecting People, Processes, Things and Data About Them

Improving Efficiency,
Collaboration and
Communication

*System of
Engagement*

Helping Organizations
Understand . . .

*System of
Record*

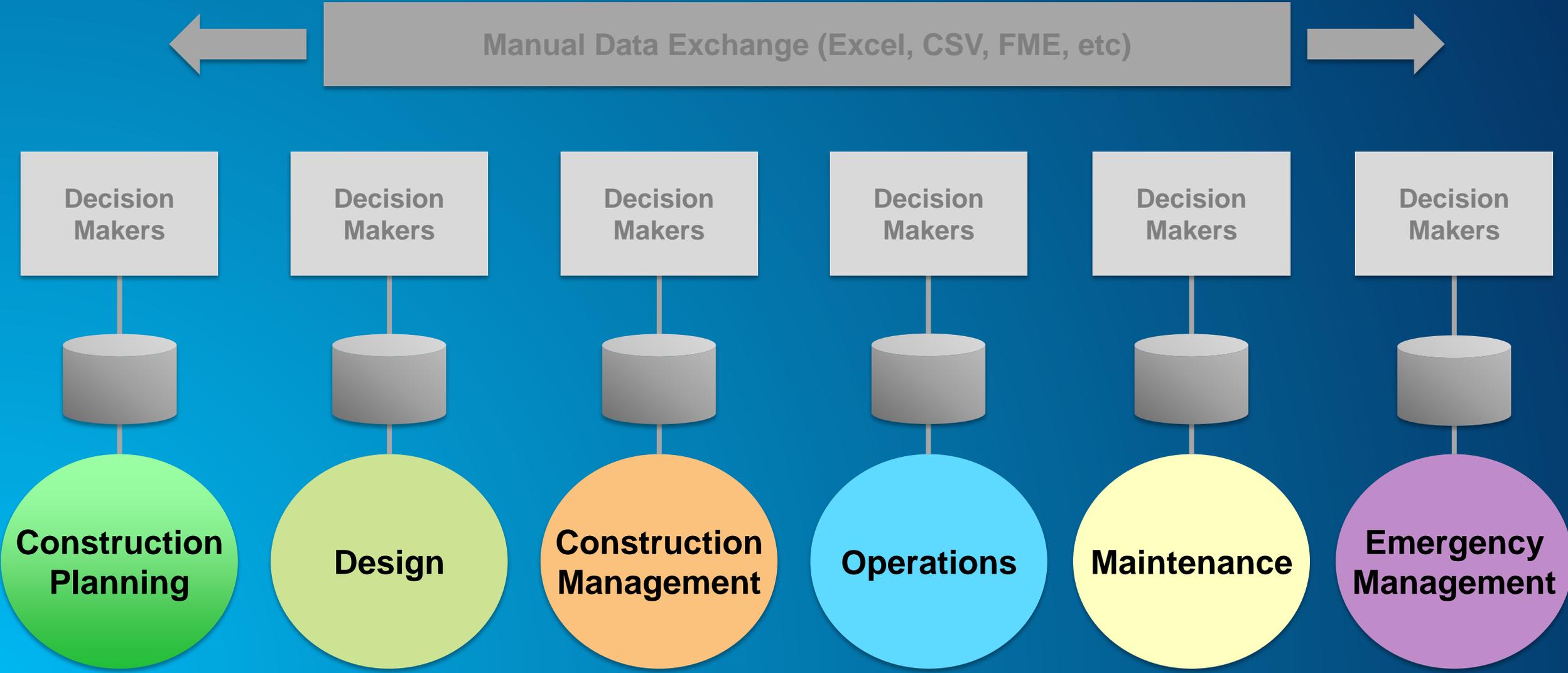
*System of
Insight*

Supports Multiple
Types of Systems

. . . And Be Aware, Alert,
and Responsive

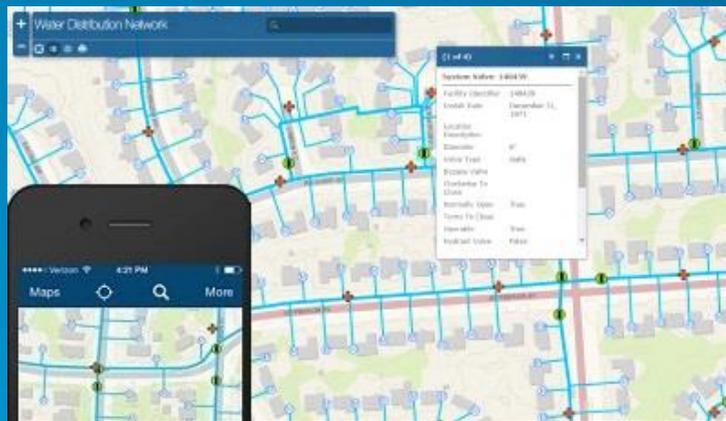


Infrastructure Data Life Stages Today

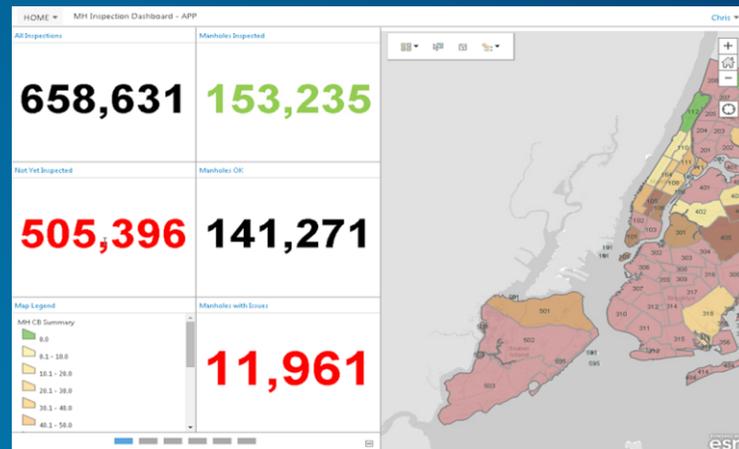


GIS “Smart” Networks

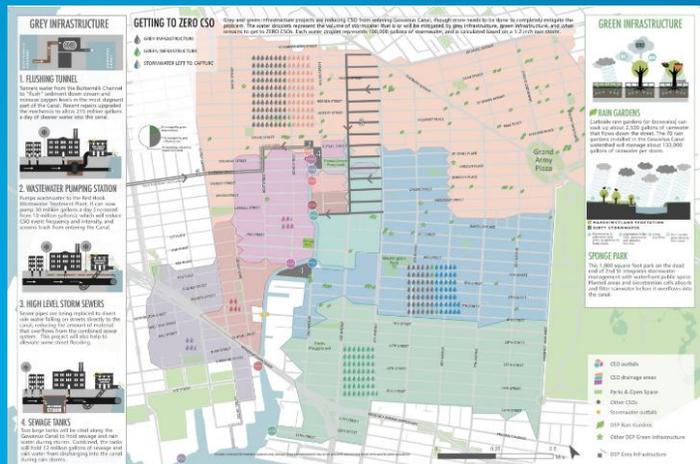
City of New York Department of Environmental Protection



Water Distribution and Sewer Flow Intelligent Network Models



Inspections and Work Order Management



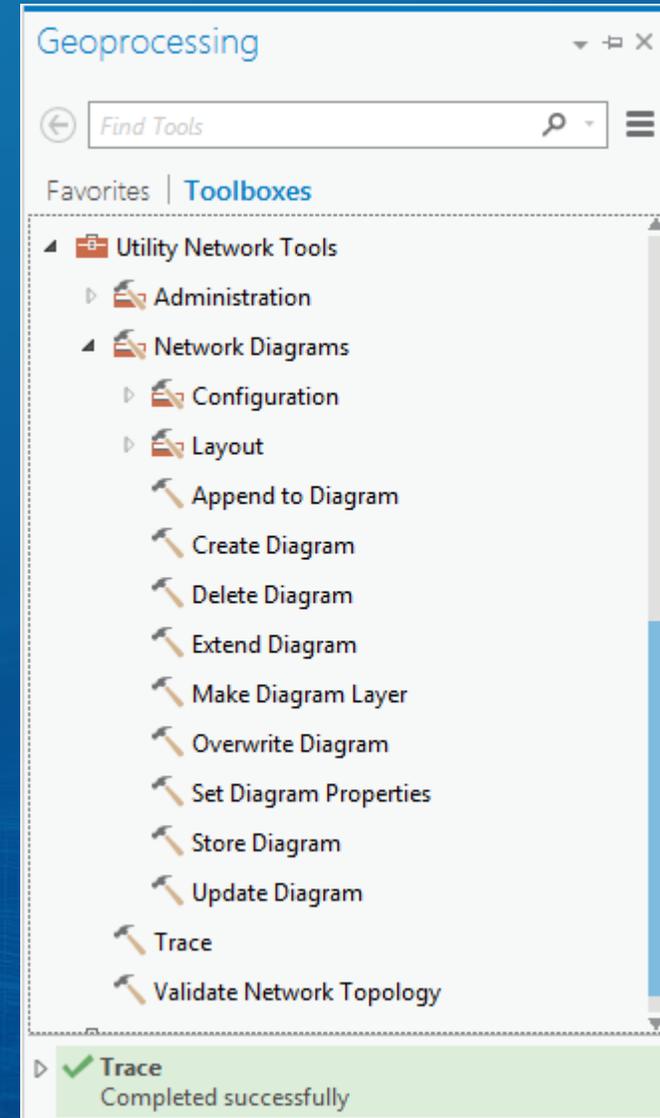
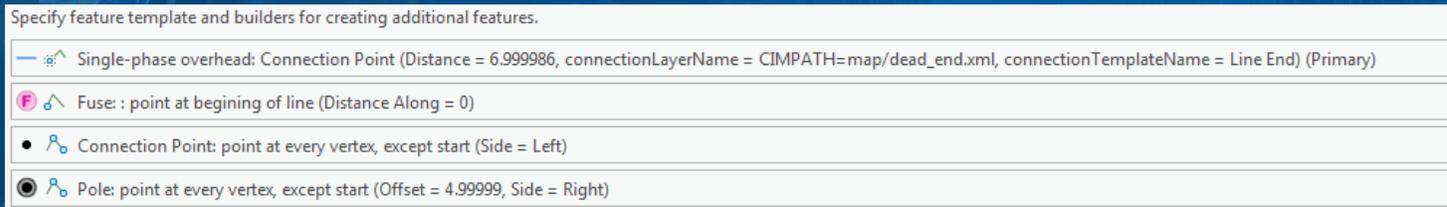
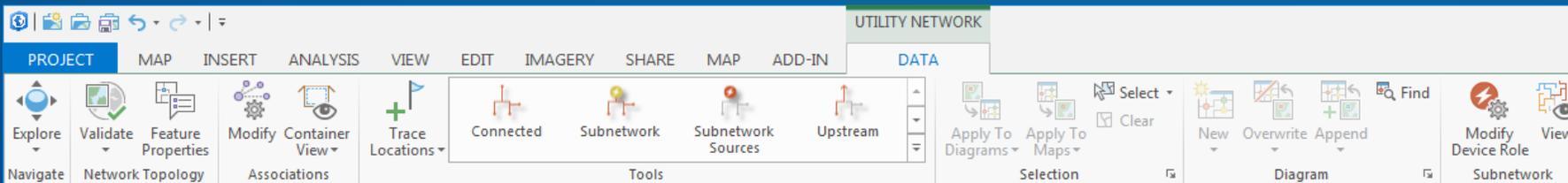
MS4's, CSO's, Sewersheds



Green Infrastructure Project Life Cycles

GIS Network Management

- New **Utility Network** for the next 10-15 years
 - Electric, gas, water, storm water, sewer, telco, etc.

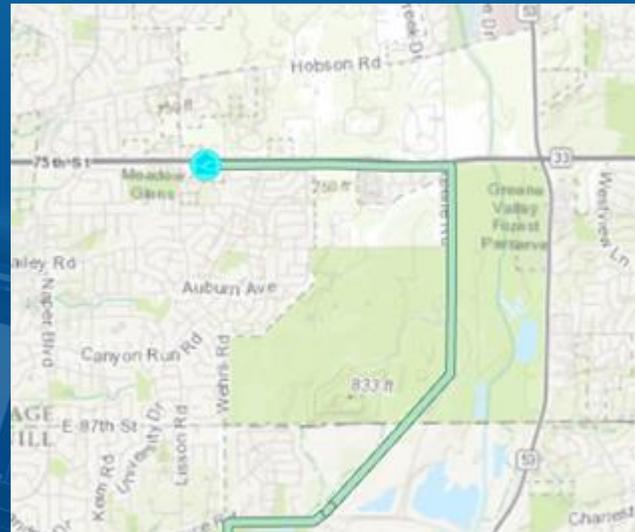


GIS Network Management

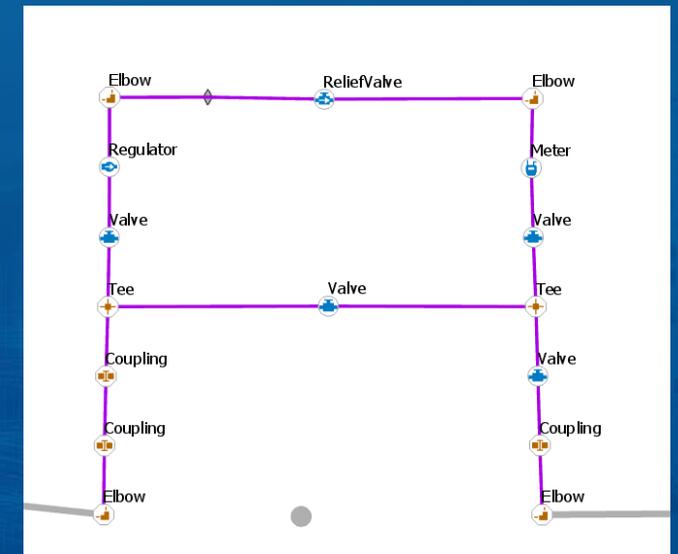
- Real world representation of what is on the ground
 - Accurately representing assets for enhancing analysis and modeling and for simplifying data export for other systems
 - Device Assembly – A container for multiple devices...



Multiple Devices



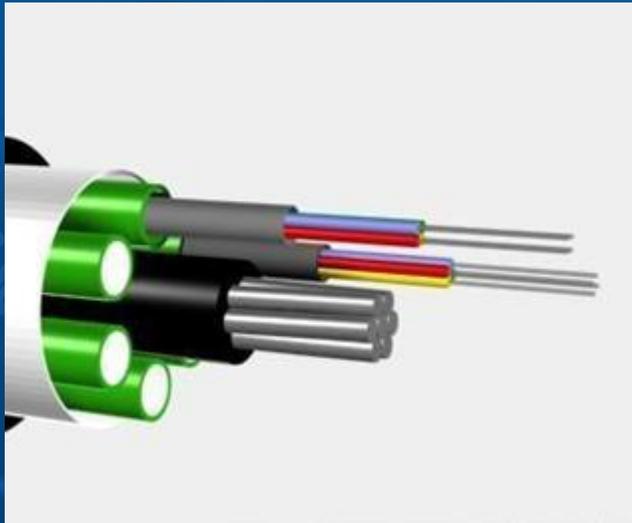
Single Device Assembly on the map



Device Assembly containing devices

GIS Network Management

- Real world representation of what is on the ground
 - Accurately representing assets for enhancing analysis and modeling and for simplifying data export for other systems
 - Linear containment – Trenches/Ducts contain wires...



Linear features containing lines



Structure Line on the map



Property	Value
OBJECTID	2
Enabled	True
Creation User	<Null>
Date Created	<Null>
Date Modified	<Null>
Last User	<Null>
Work Order ID	<Null>
Project Number	<Null>
Project Name	<Null>
Common Language Locat...	<Null>
MANUFACTURER	<Null>
Part Number	<Null>
Calculated Length	<Null>
Measured Length	<Null>
Account Code	<Null>
Installation Date	<Null>
Item of Plant ID	{F44CA1CF-FB4B-48CA-B81E-8B89...
Material Cost	<Null>
DIAMETER	<Null>
COMMENTS	<Null>
Material	<Null>
Subtype Code	Trench
GLOBALID	{SD474684-7CD4-43A8-B30A-9D59...
SHAPE_Length	688.064

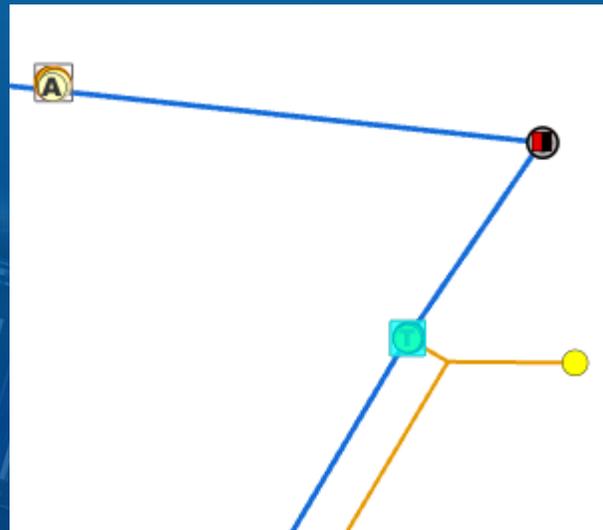
Structure Line containing Lines

GIS Network Management

- Real world representation of what is on the ground
 - Accurately representing assets for enhancing analysis and modeling and for simplifying data export for other systems
 - Terminals – modeling real world connections...



Device with terminals



Single Device on the map



Feature Properties

Features in gray are not in network topology.

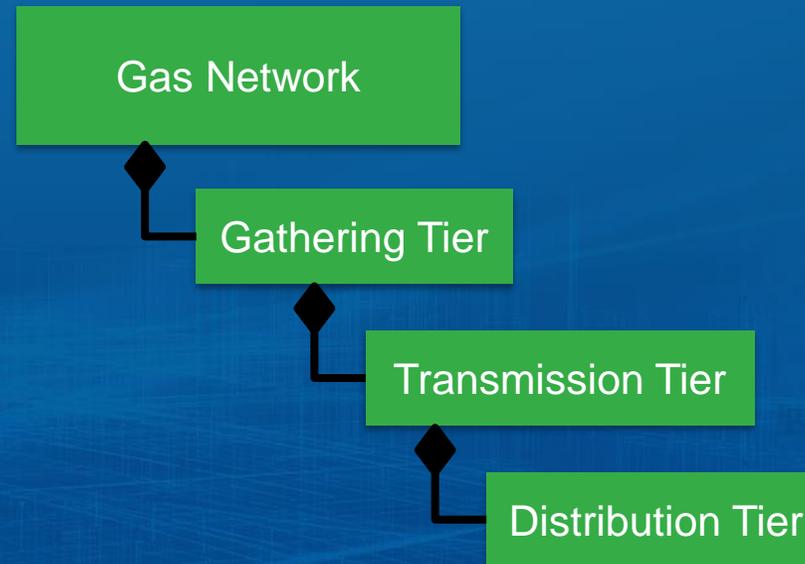
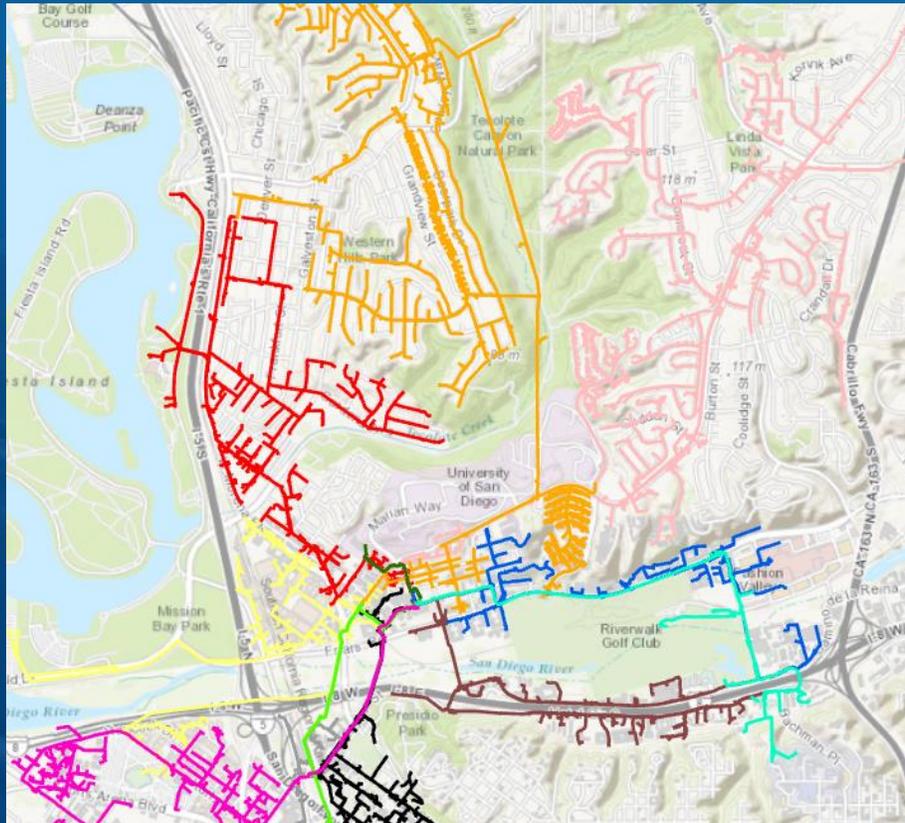
- ▲ Junctions
 - ElectricDistributionDevice.Transformer.High {CDAC3190-3403-492D-BA5F-BFF77379D27A}
 - ElectricDistributionDevice.Transformer.Low {CDAC3190-3403-492D-BA5F-BFF77379D27A}
- ▲ Edges
 - ElectricDistributionDevice.Transformer.Terminal edge {CDAC3190-3403-492D-BA5F-BFF77379D27A}
- ▲ Adjacent Junctions
 - ElectricDistributionDevice.Transformer.Low {CDAC3190-3403-492D-BA5F-BFF77379D27A}
 - ElectricDistributionDevice.Fuse {50AA0CDD-8A81-4F39-BAA3-B779B63CD9D8}

Single Device with multiple terminals

GIS Network Management

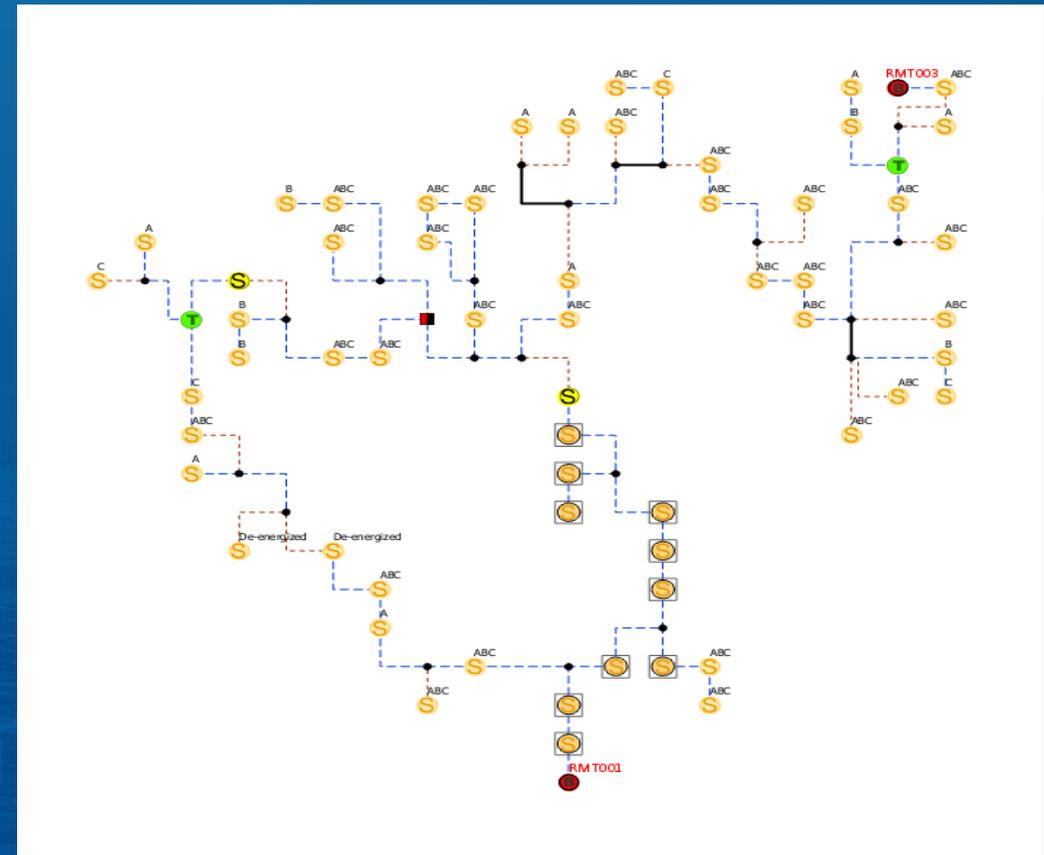
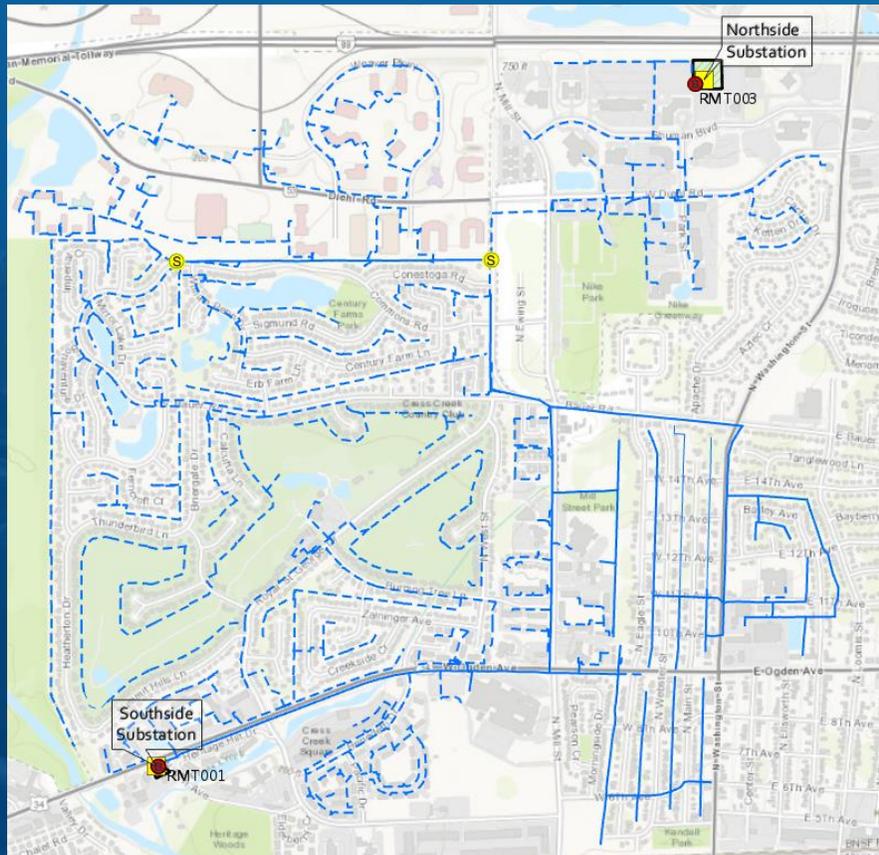
- **Subnetwork Management**

- Representing a portion of the network, a “Pressure Zone” or “Circuit”



GIS Network Management

- Diagram capabilities integrated directly with the *Utility Network*



GIS Network Management

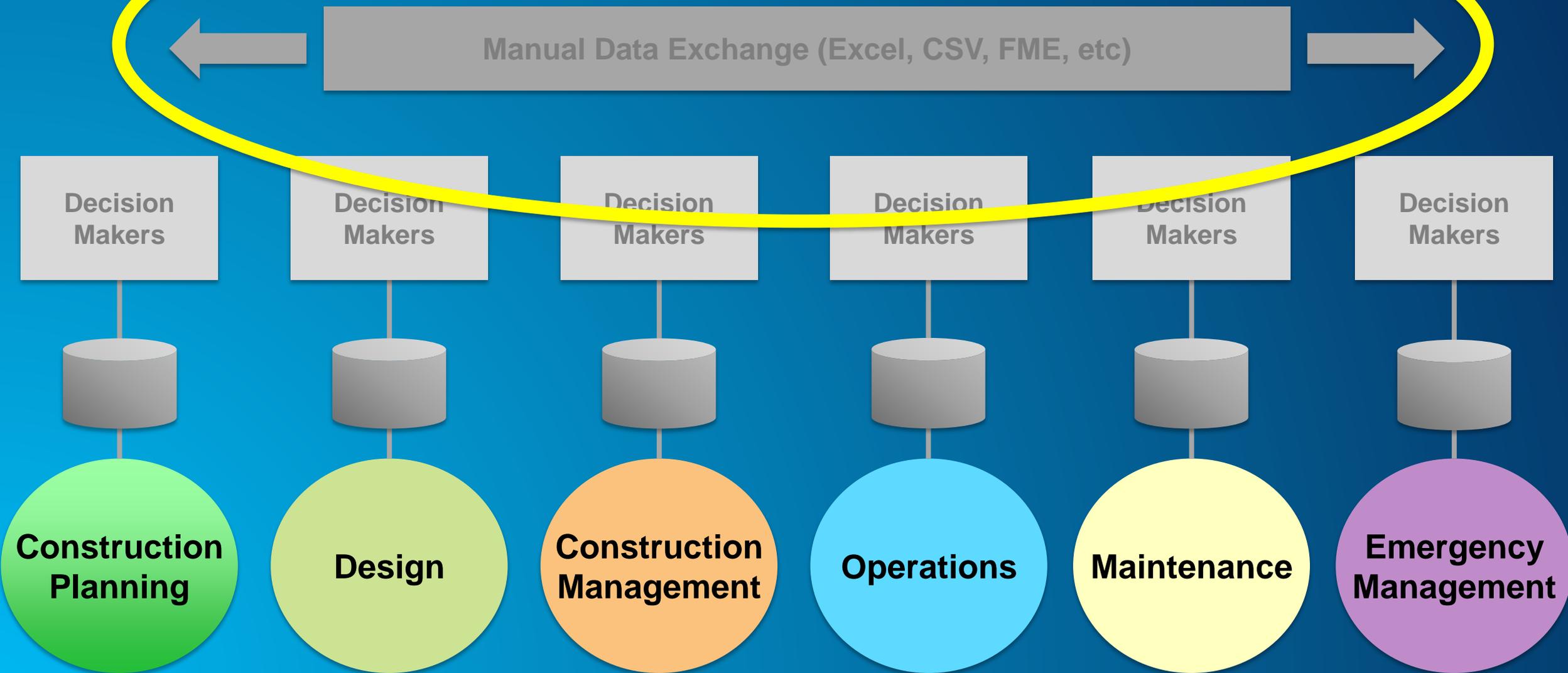
- **Provide utility customers with the ability to model, edit, and analyze complex networks of facility infrastructure using role-based apps**
- **Enable key modeling concepts to better support a true representation of what is on the ground, while fostering an easy exchange of network information with other mission-critical systems**
- **Support highly responsive editing and analysis capabilities**
- **Provide the capabilities of the network and the asset management solution wherever users want to work**
- **Whether users view and query data, execute analysis, or edit the network, the capabilities to perform these actions will work across the platform**
- **The technology is based on a services architecture**

GIS Network Management

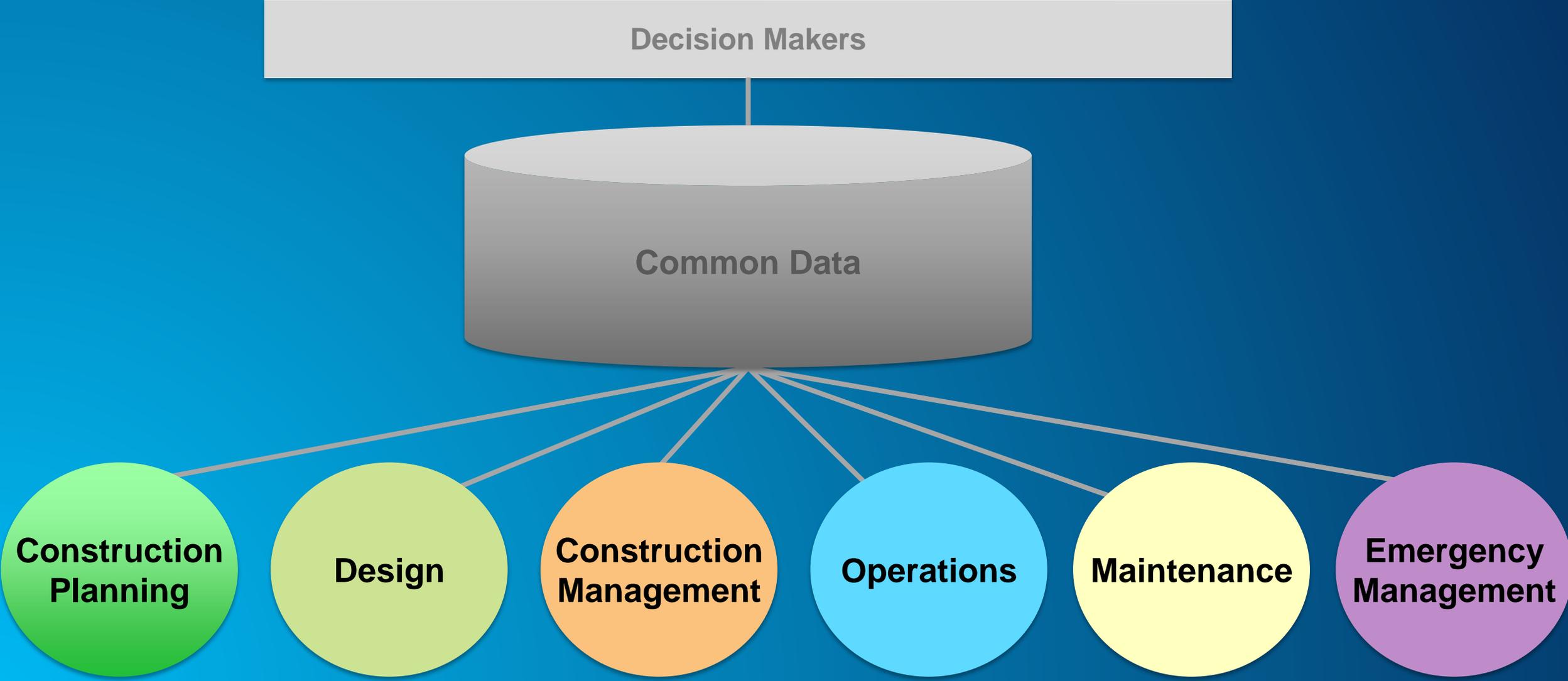
- ***Increasing ROI***

- Ensuring data quality and correctness
- Real world representation of what is underground
- Sophisticated analysis
- Subnetwork management
- Improved mapping and visualization techniques
- Expanded data exchange capabilities
- Increased performance
- Services based architecture for enabling the platform
- A strong foundation for our *customers and partners*

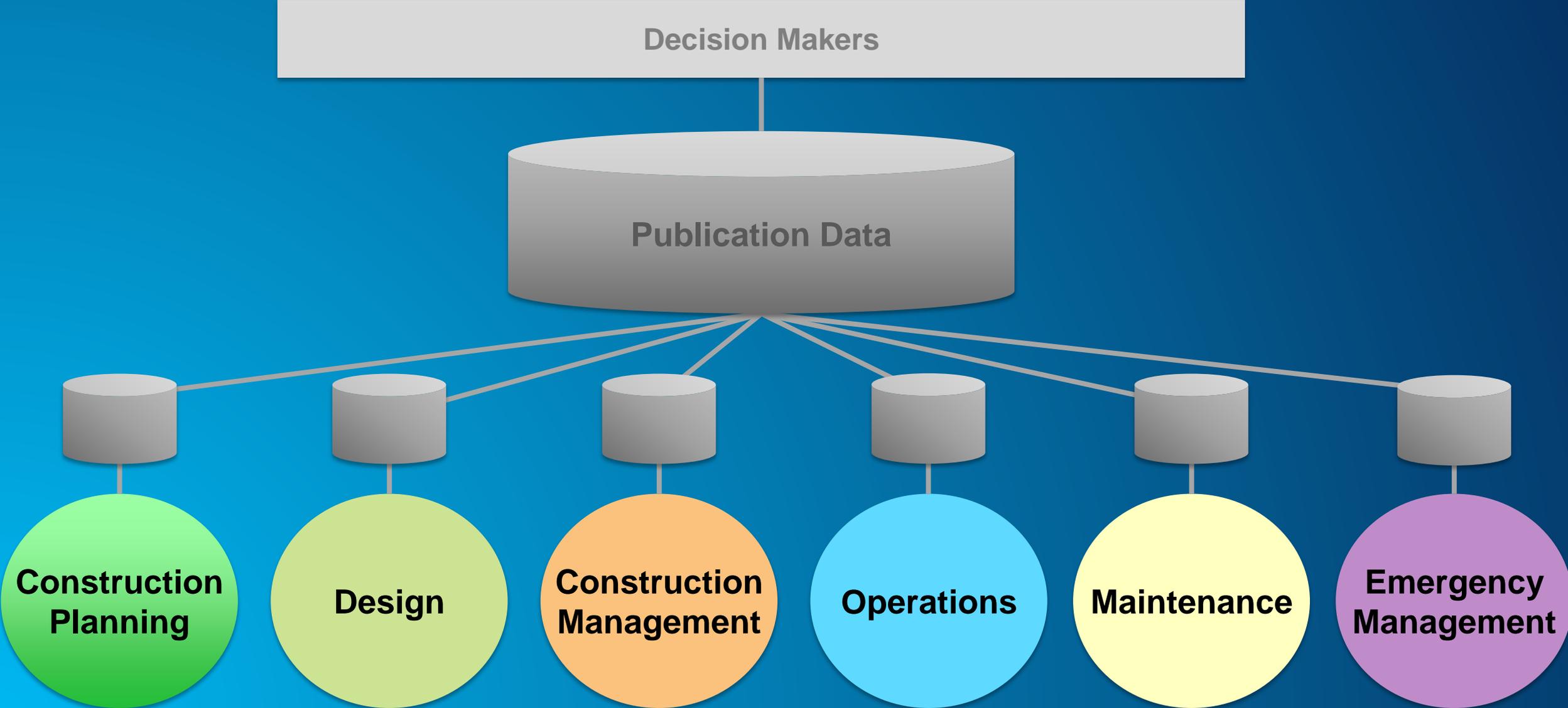
Infrastructure Data Life Stages Today



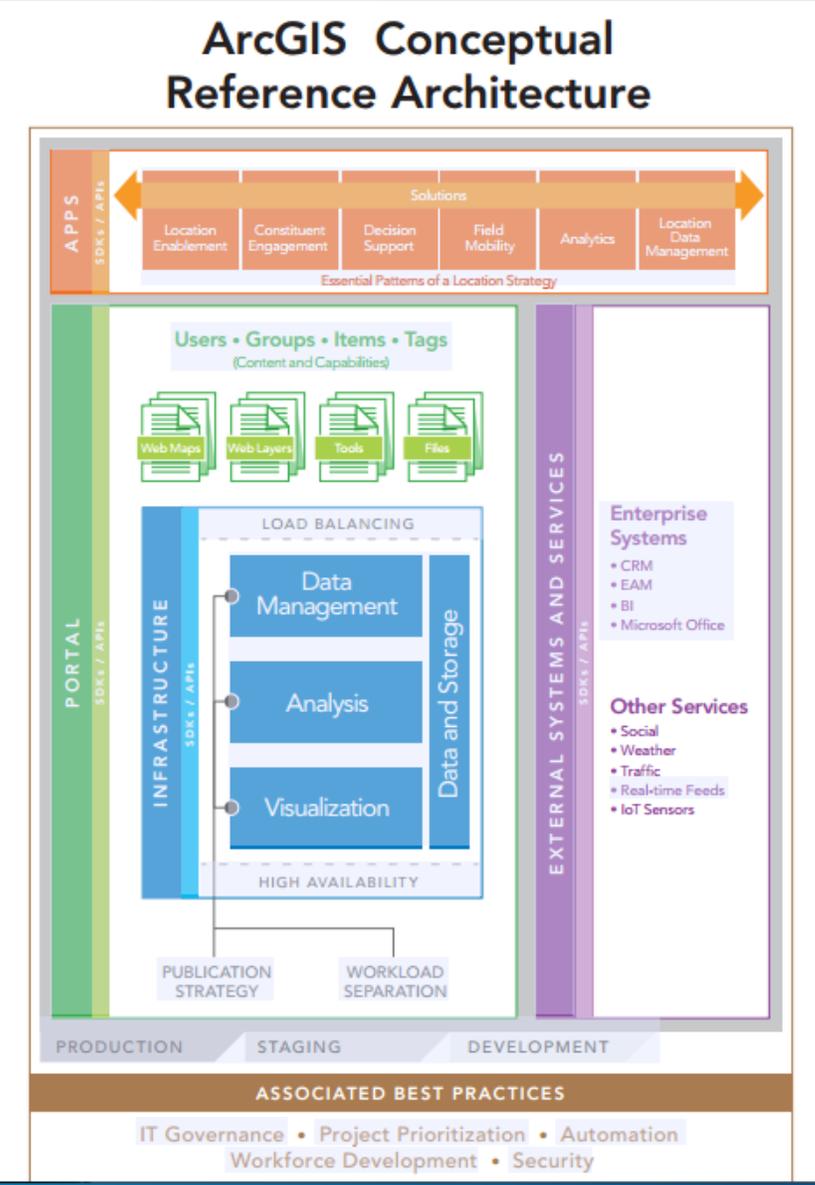
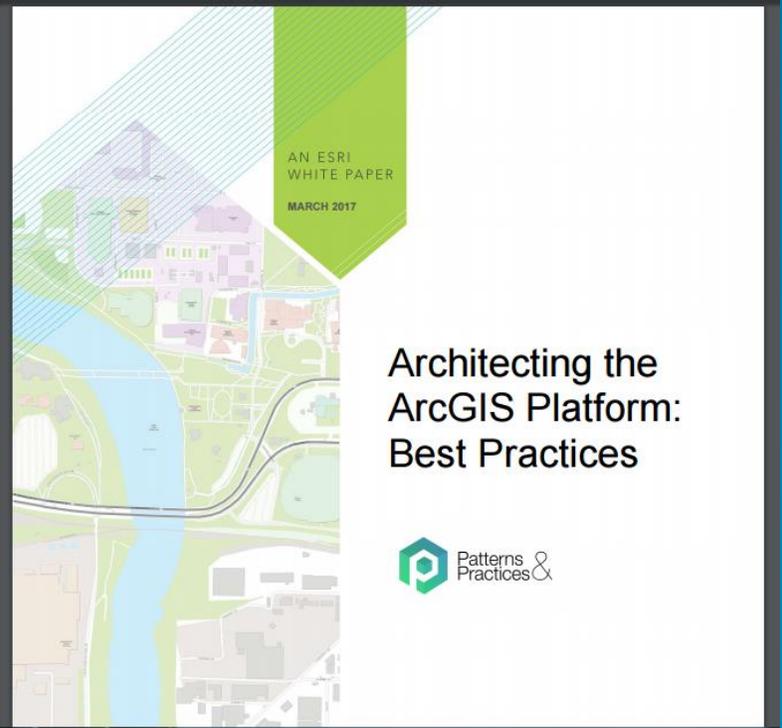
Infrastructure Data Life Stages Future 1



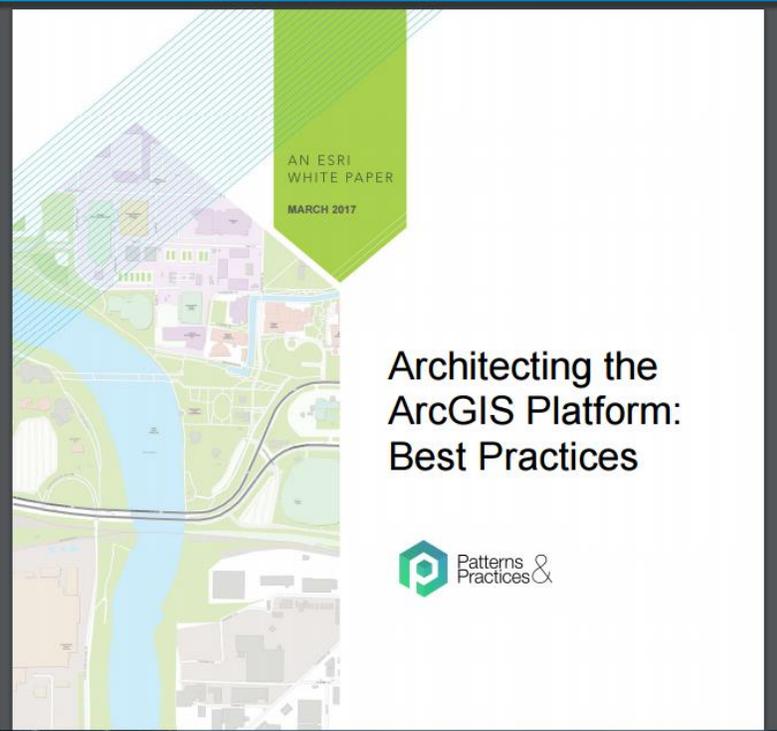
Infrastructure Data Life Stages Future 2



Publication Databases Are a GIS Best Practice



Publication Databases Are a GIS Best Practice



Architecting the ArcGIS Platform: Best Practices Publication Strategy: Geospatial Content Delivery March 2017

Publication is the act of delivering content (data, services, and applications) to appropriate consumers in an appropriate manner. A geospatial content publication strategy is necessary for delivering content to consumers in a well performing, reliable, and secure manner.

Introduction
An effective geospatial content delivery strategy must address performance, reliability, and security. By addressing these three areas, organizations can make certain that content will be available and delivered in a manner that is suitable for consumers to use. This strategy should balance user expectations for performance and availability against security and load on the infrastructure. The intent is to mitigate risk while meeting audience needs and expectations.

Recommendations
One common publication need involves sharing internal information with people outside of the organization—for example, a city sharing land ownership information with the public. A typical strategy would involve creating a publication geodatabase (as a hosted service) deployed to a cloud environment, which is separated from internal systems. This strategy addresses the elements of performance, reliability, and security.

Performance is addressed by separating information consumers from operational or transactional systems. In the example of the city sharing land ownership information, the public consumes information from ArcGIS Online, which reserves the city's internal resources for transactional editing of the property boundaries. Separating consumers from transactional editing reduces resource contention, increasing the available resources for editors. Leveraging a cloud-hosted, software-as-a-service (SaaS) environment also provides a scalable, more elastic venue for consumers, so the available resources can grow in response to demand (for example, to support a suddenly popular map). In the city's example, performance is appropriately addressed for information curators and consumers.

Reliability is an important aspect of an information system. Reliability can be expressed as a service level agreement (SLA) or as an expectation of when the system will be available (for example, during work hours, or during a crisis). Organizations can address reliability by following many of the other best practices, such as high availability, load balancing, workload separation, and security. It can also be addressed by leveraging cloud capabilities. In the city's example, reliability is addressed for the public, because ArcGIS Online has a 99.9% SLA. There is a less strict SLA for editors, which does not warrant high availability. Organizations (in this case, the city) should implement appropriate infrastructure to support those less strict SLA requirements for their editors.

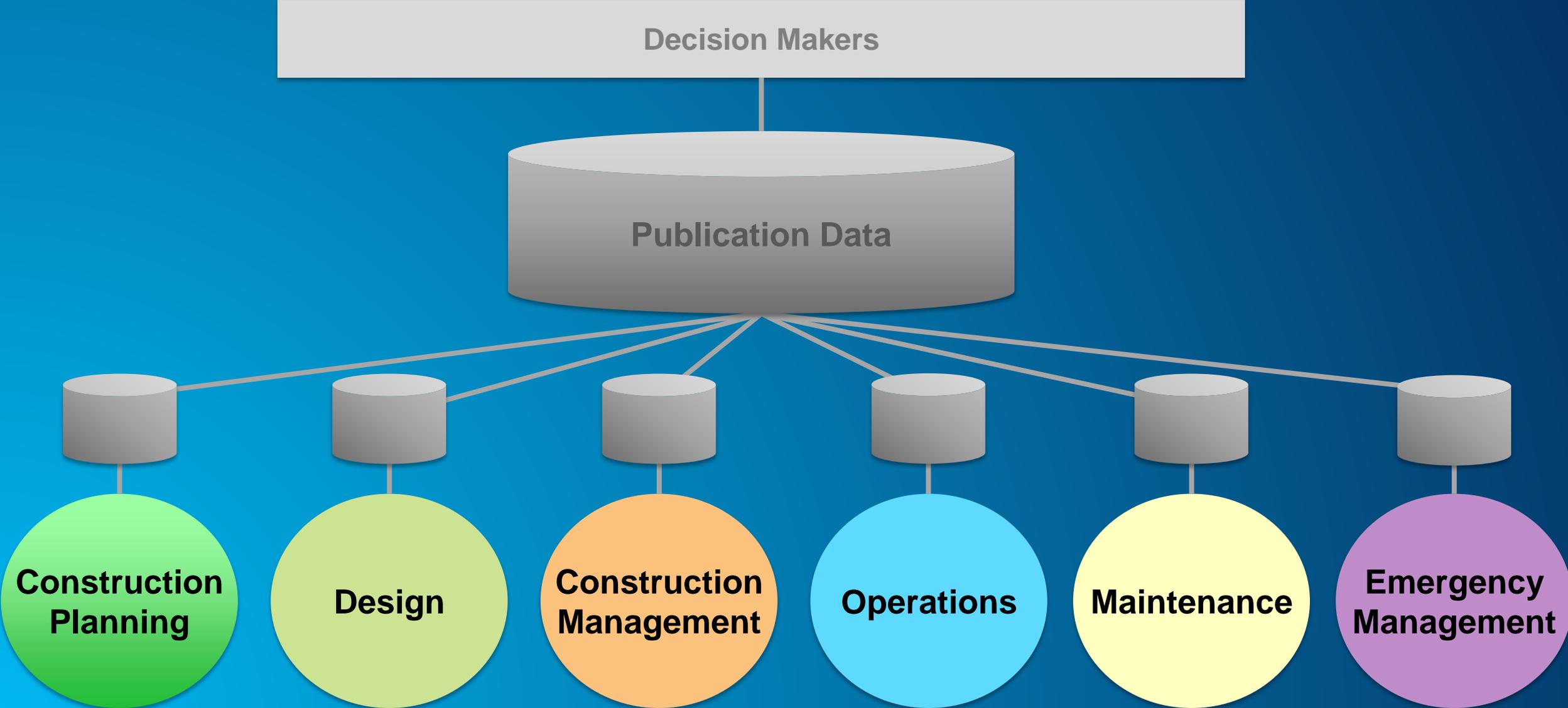
Security means exposing the right content to the right consumers, while still protecting the enterprise. In the city's example, consumers are allowed to view the published land ownership information, but they have no access to update the property boundaries. For reasons such as legality and cost, property boundaries should only be edited by authorized experts and maintained in a secure system of record. The example appropriately addresses geospatial content security on the consumer side, but internally, the land records department maintains lots of sensitive information, so a separate internal publication environment is appropriate for other departmental access. In this case, the city might also consider a separate internal publication environment for decision support, as shown in figure 1.



Figure 1: Publish content to the environment appropriate for the audience.

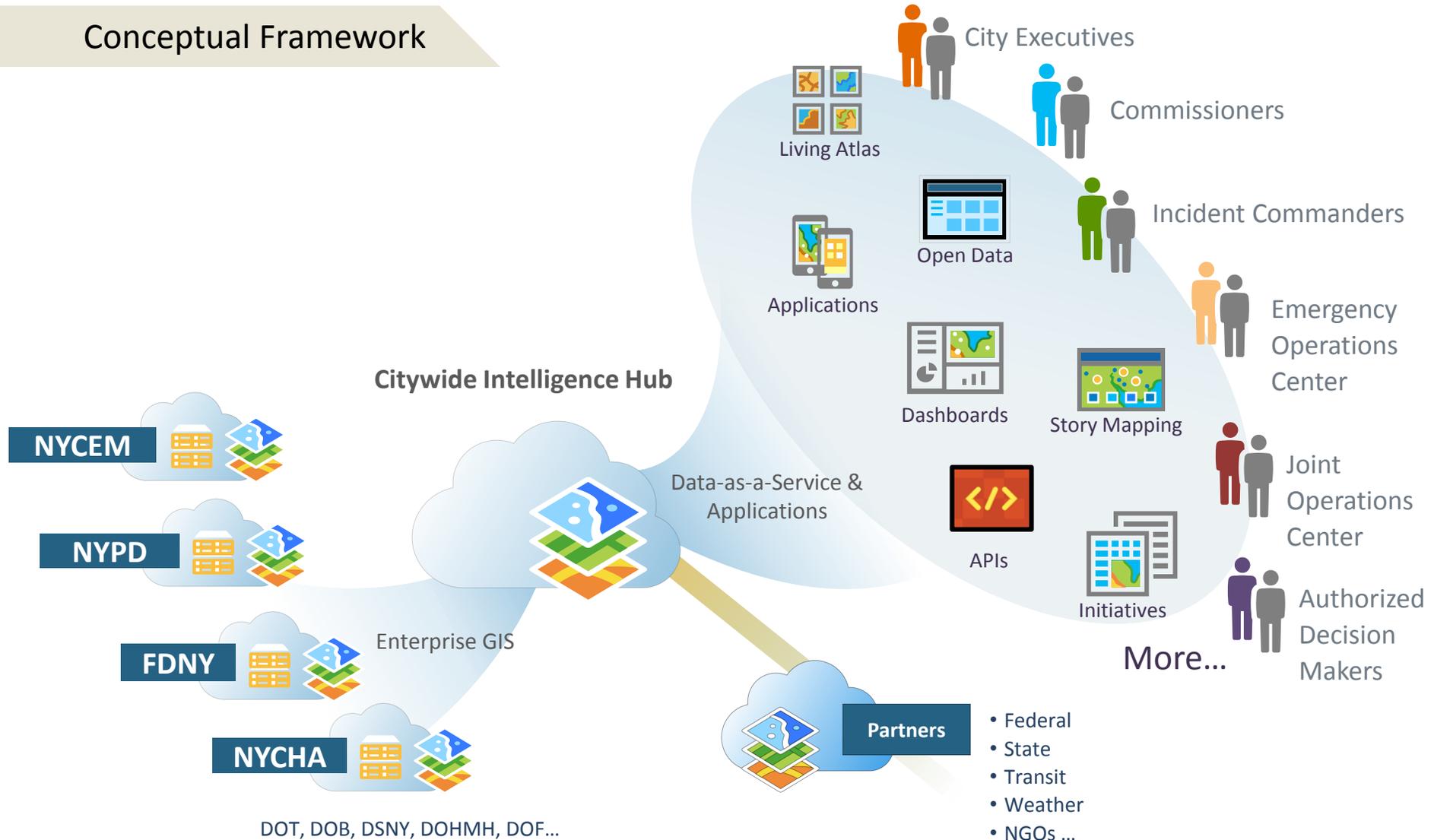
An effective geospatial content publication strategy will address performance, reliability, and security. The strategy should strive to deliver content that meets the needs and expectations of consumers, while protecting internal systems and data. Effective geospatial content delivery exposes appropriate information to the broader audience while minimizing the impact on operations.

Infrastructure Data Life Stages Future 2



Citywide Intelligence Hub

Conceptual Framework



Building Intelligence Toolkit

NYC
BUILDING INTELLIGENCE TOOLKIT

Find address or place

117 BROAD STREET

BUILDING INFO | LIFESTYLE INFO

DOMINANT LIFESTYLE: Metro Renters

POPULATION (BLK GRP): 1055

HOUSEHOLD: Singles; Shared

MEDIAN AGE: 32.1

INCOME: Middle

INSPECTED: Mon Aug 29 2016
DAMAGED

DAMAGED

14 BUILDINGS

12 OCCUPIED

FAIR

23 BUILDINGS

22 OCCUPIED

GOOD

16 BUILDINGS

15 OCCUPIED

NYC Buildings | NYC Department of Buildings | Property Profile Overview

117 BROAD STREET | MANHATTAN 10004 | BINS - 1000006

AMERICAN EXPRESS PLAZA	2 - 2	Health Area	7700	Tax Block	5
BROAD STREET	117 - 125	Census Tract	9	Tax Lot	7501
SOUTH STREET	15 - 16	Community Board	101	Condo	YES
SOUTH STREET	22 - 22	Buildings on Lot	1	Vacant	NO
NEW YORK PLAZA	2 - 2				

[View Zoning Documents](#) | [View Challenge Results](#) | [Pre - BIS PA](#) | [View Certificates of Occupancy](#)

Cross Streets(s): WATER STREET, SOUTH STREET

DOB Special Place Name:

DOB Building Remarks:

Landmark Status:

Local Law	NO	Special Status	N/A
SRO Restricted	NO	Loft Law	NO
UB Restricted	NO	TA Restricted	NO
Environmental Restrictions	N/A	Grandfathered Sign	NO
Legal Adult Use	NO	City Owned	NO
Additional BINS for Building	NONE		
Additional Designation(s)	POPS - PRIVATELY OWNED PUBLIC SPACES		

Special District: LM - LOWER MANHATTAN

This property is located in an area that may be affected by the following:

Tidal Wetlands Map Check:	No	
Freshwater Wetlands Map Check:	No	Click here for more information
Coastal Erosion Hazard Area Map Check:	No	
Special Flood Hazard Area Check:	Yes	

Department of Finance Building Classification: RG-CONDOMINIUMS

Please Note: The Department of Finance's building classification information shows a building's tax status, which may not be the same as the legal use of the structure. To determine the legal use of a structure, research the records of the Department of Buildings.

	Total	Open	Elevator Records
Complaints	14	2	Electrical Applications
Violations-DOB	255	1	Permits In-Process / Issued
Violations-ECB (DOB)	43	0	Illuminated Signs Annual Permits
Jobs/Fillings	603		Plumbing Inspections
ADA / LAA Jobs	9		Open Plumbing Jobs / Work Types
Total Jobs	611		Facades
Actions	320		Marquee Annual Permits
			Boiler Records
			DEP Boiler Information
			Crane Information
			After Hours Variance Permits

Operationalizing Information Systems

GIS Delivering Information Products to Decision Makers

Manhattan Air Rights Viewer

Available Air Rights for: 515 7 AVENUE

According to the data, this site has unused Floor Area Ratio of 4.79

- The Built FAR is 5.21, and the HighFAR is 10
- It has 94,602.50 available Square Footage,
- which calculates to 0.92 additional floors that could be added to this building or sold as Transferable Development Rights(TDR)

BBL: 1008130064
Owner Name: EDHILL CAPITAL, LLC
Zoning: M1-6/IC
Building Class: K9

@ Zoom to

Details

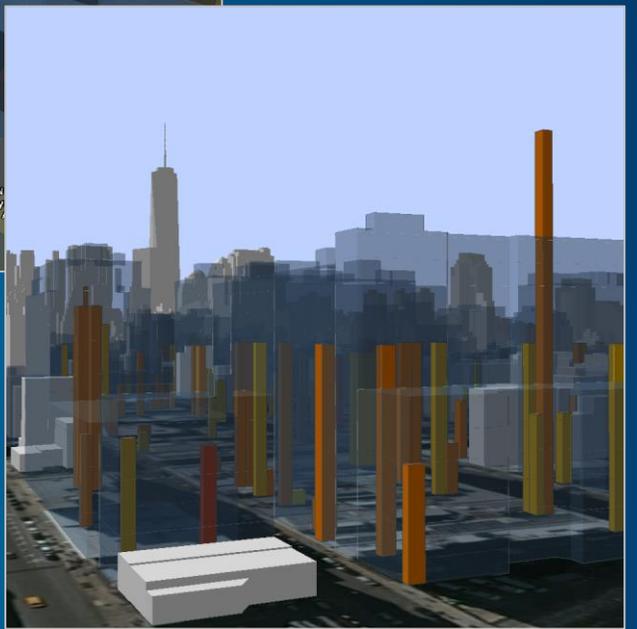
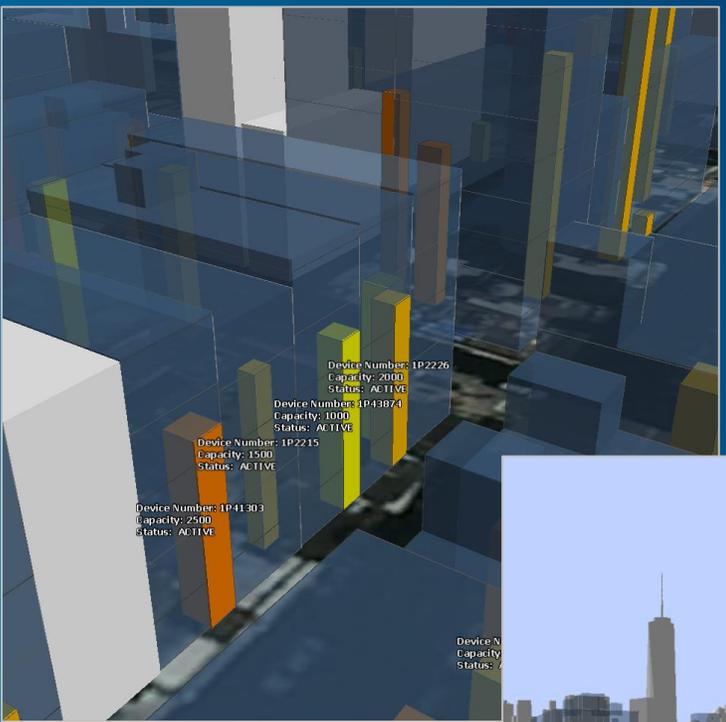
A **Zoning Lot Merger** is the joining of two or more adjacent zoning lots into one new zoning lot. Unused development rights may be shifted from one lot to another, as-of-right, only through a zoning lot merger.

Unused development rights
Additional floor area from lot A
Permitted floor area on zoning lot B
Zoning lot B
Zoning lot A
Merged zoning lot

A **Transfer of Development Rights (TDR)** allows for the transfer of unused development rights from one zoning lot to another in limited circumstances, usually to promote the preservation of historic buildings.

Source: USGS, NGA, NASA, CGIAR, GEBCO, Robinson, NCEAS, NLS, OS, NMA, Geodatasystreisen and the GIS User Community ...

esri



Citywide Intelligence Hub

Location as a Service

Business Operations

HUB Platform

Decision Makers

- Mayor's Office
- Commissioners
- Incident Commanders
- Emergency/Joint Operations Centers
- Citywide Analytics



NYC
Mayor's Office of Operations



NYC
Information Technology & Telecommunications





cyclomedia

Ground Level Imagery: CycloMedia

360°parallax-free and geometrically correct panoramic images taken at scale with superior position accuracy



Positioning Quality

- Excellent geo-reference (10cm on average)
- Ground control points through (optional) CycloPositioner 1.5T
- **Allows for optimal position accuracy**

Image Quality

- Natural, clear and bright colors
- 100 Mpx at 62dB
- **Excellent definition as a result of high resolution**

Metric Quality

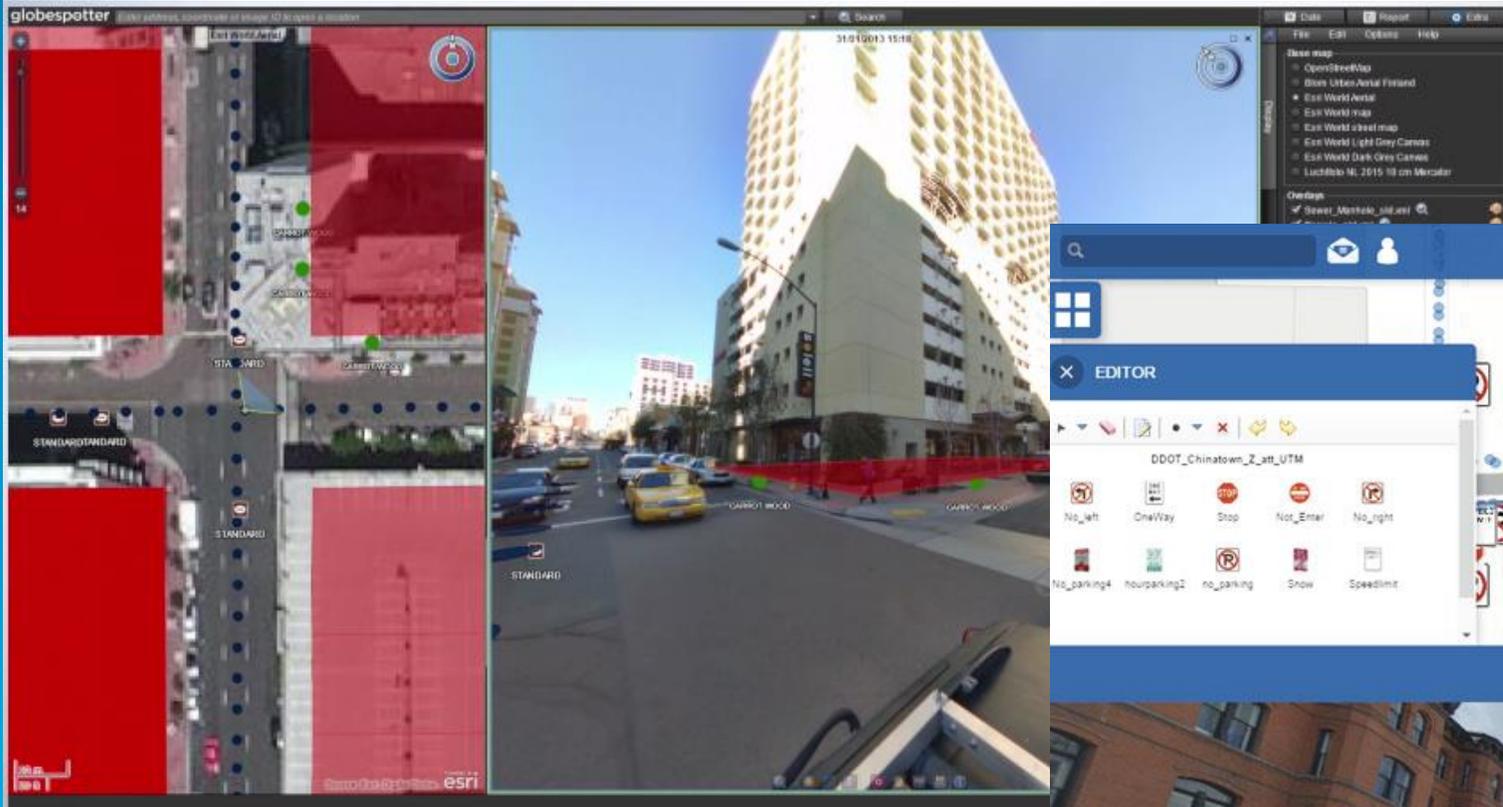
- Geometrically accurate per pixel
- Relative Measurement Accuracy – 2cm
- Full spherical 360° view - 180° vertically
- No visible seams or image gaps
- **Enables users to take precise measurements**

Meta Data

- X, Y, Z + orientation in required coordinate systems
- Includes ImageID
- **Allows users to evaluate data and determine 3D coordinates**

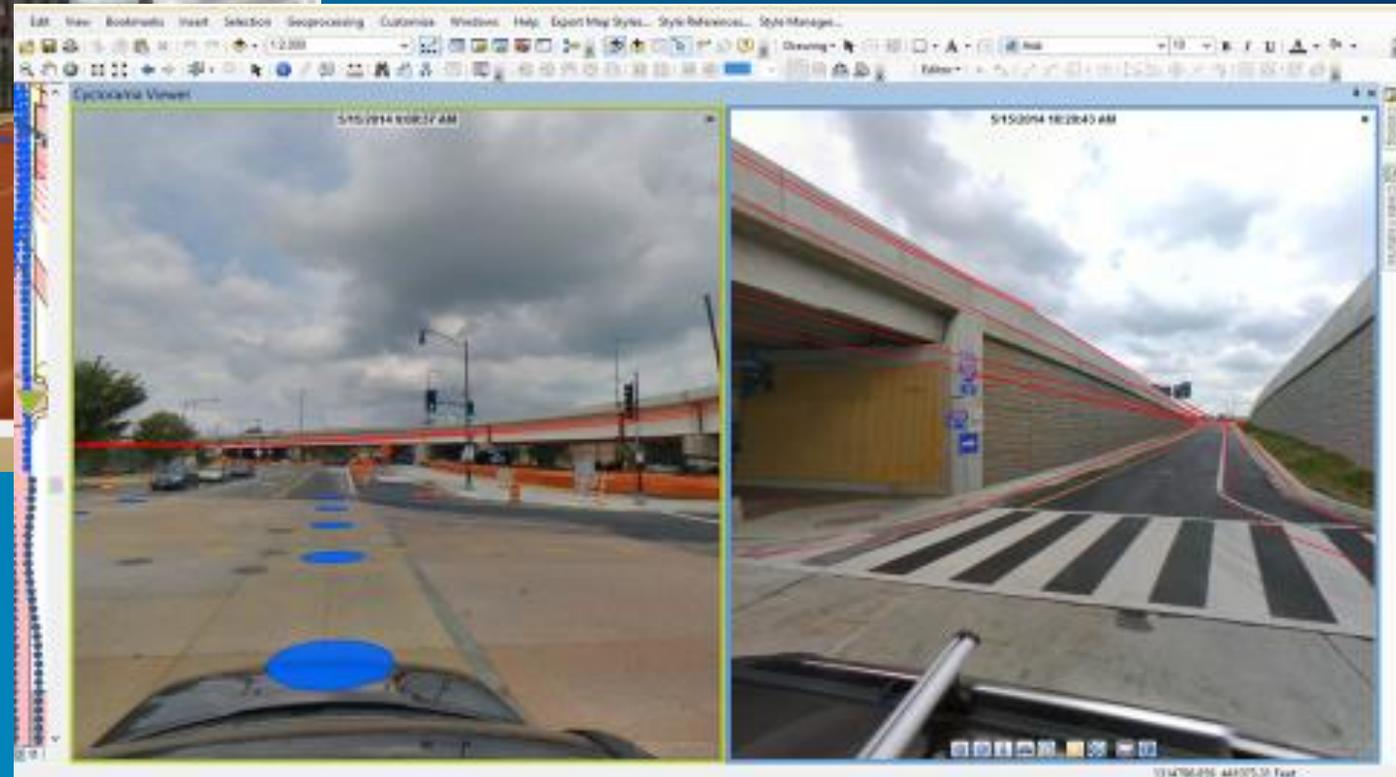
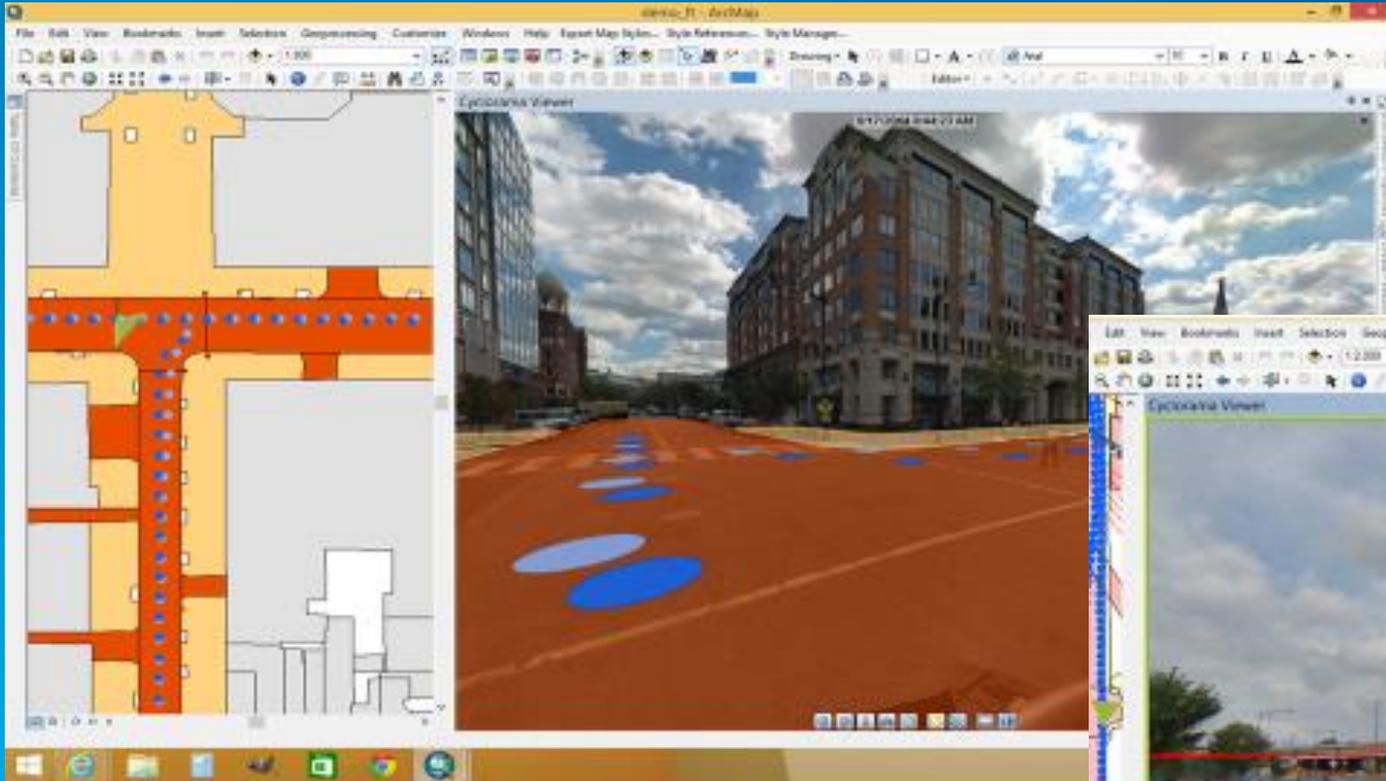
Unique Features

CycloMedia - GeoCycloramas



Imagery Updating As-Builts

- GIS Overlays X,Y & Z
- Mobile LiDAR Capture & Utilization
- Integration of existing data/historical images – “Content Collaboration”
- Feature/Asset Extraction
- Catastrophic event imagery delivery





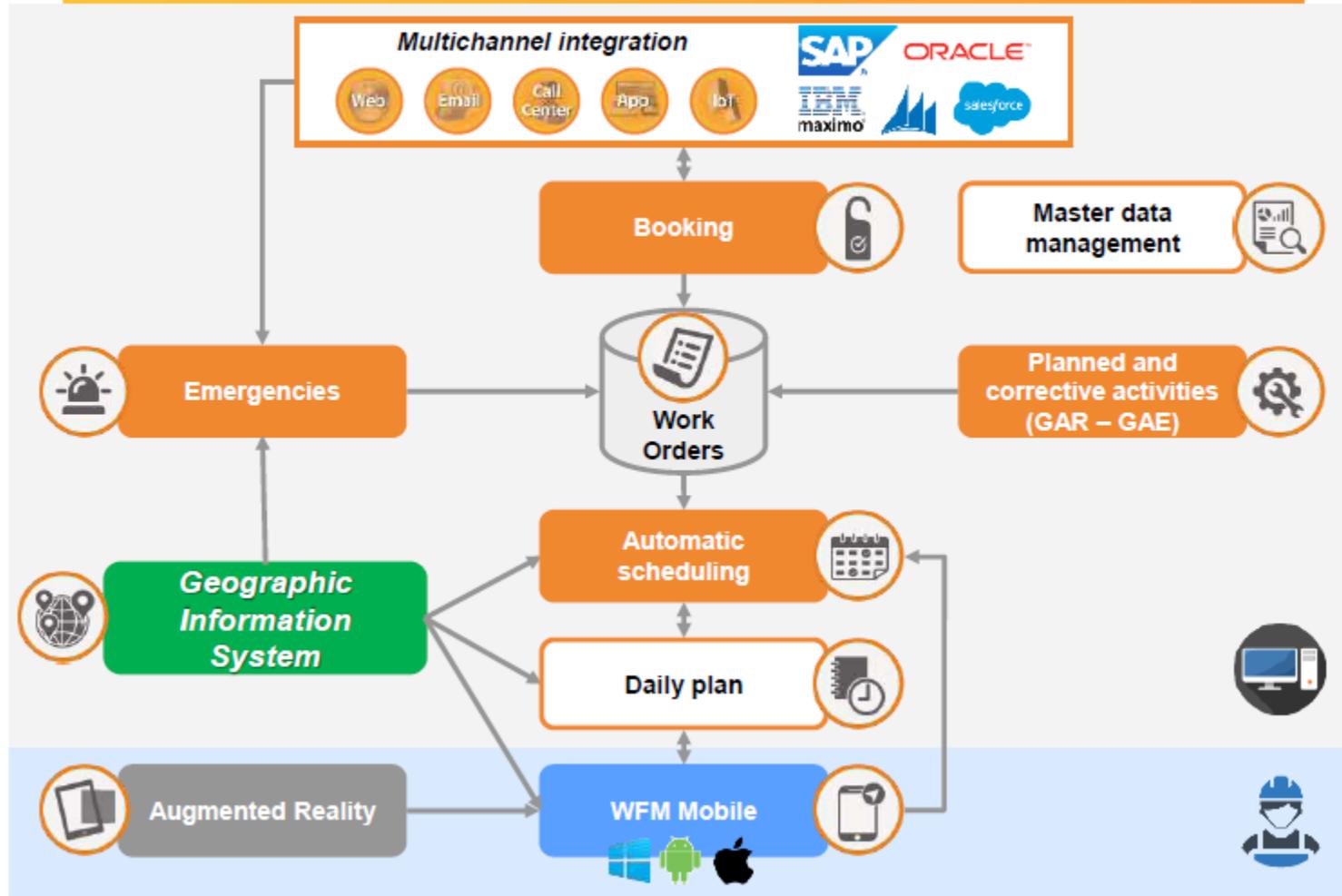
GIS and Augmented Reality in Pipeline Field activities

Salvatore Amaduzzi

November 2nd 2016



Field Service Management application flow



Augmented Reality Module

Use of Augmented Reality in support of the operational processes performed on field by maintenance teams



- App integrated with Mobile WFM and enterprise GIS services
- Combined use of GPS, compass and accelerometer to overlay virtual objects onto the real world
- Representation and consultation of information on the assets (attributes, location, technical sheets, installation diagrams, etc.)
- Dynamic and parametric regulation of the displayable contents
- Tracking and orientation for reaching the plants located in arduous areas
- Support to pipeline control (check on the presence of interferences in the pipeline)

Augmented Reality for Field Service Management

Cross Platform support



Multi Device Integration



Esri services compliant



Augmented Reality for Field Service Management

Combination of reality and virtual reality

Interactive real time execution of the user's inputs

Alignment of real and virtual objects

Automatic identification of plants/technical objects



Security equipments verification



Indoor orientation (emergency procedures)



Localization of underground networks



Isolated plants reachability (3D orientation)



Guided interactive maintenance procedures



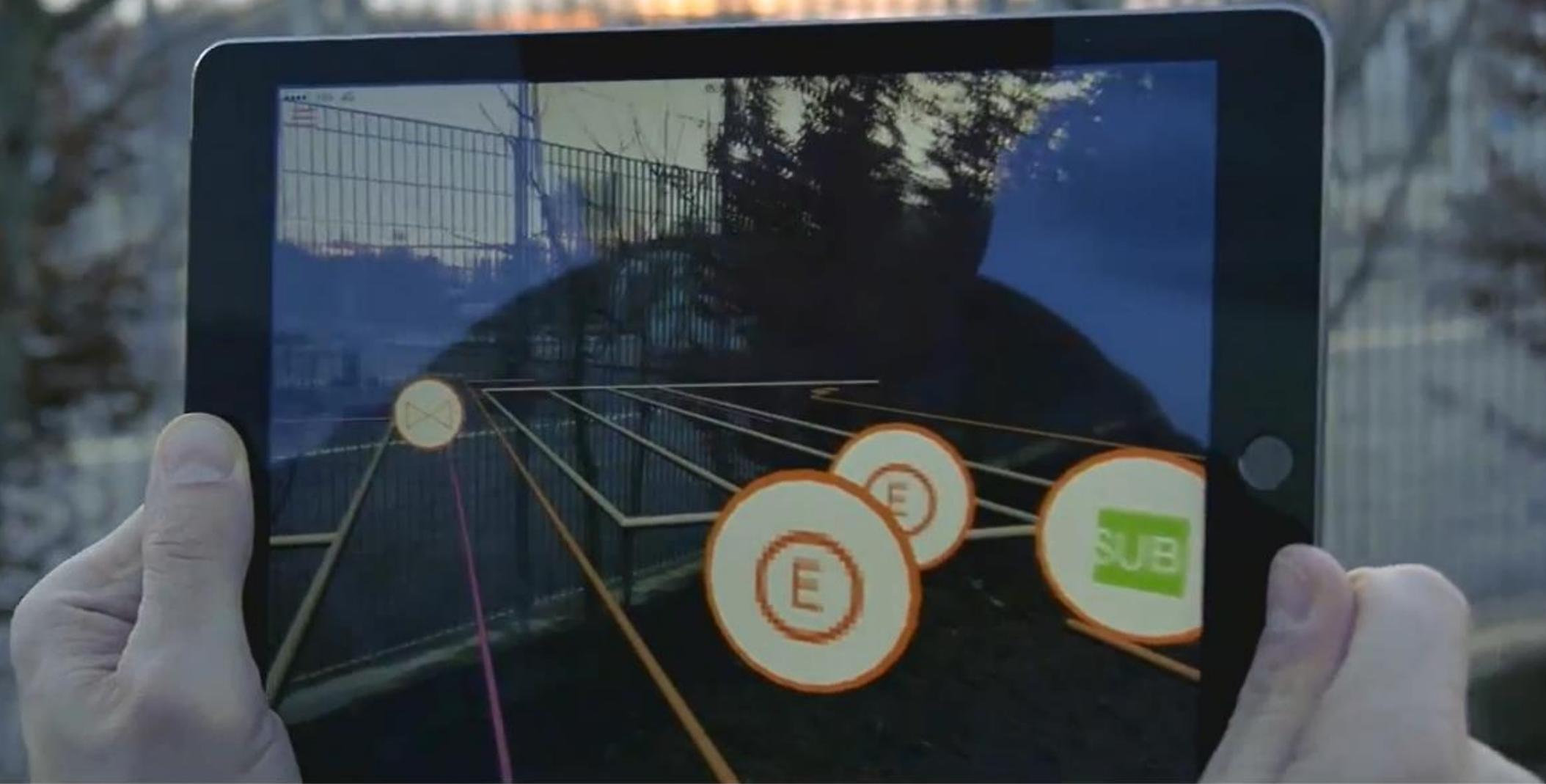
Increase in the perception of the working environment and reduction in the complexity of the activities being carried out

Augmented Reality on smartglasses





The user can visualize all informative layers about underground networks and technical objects mapped



For each technical object identified,
quick access to its datasheet with the related master data

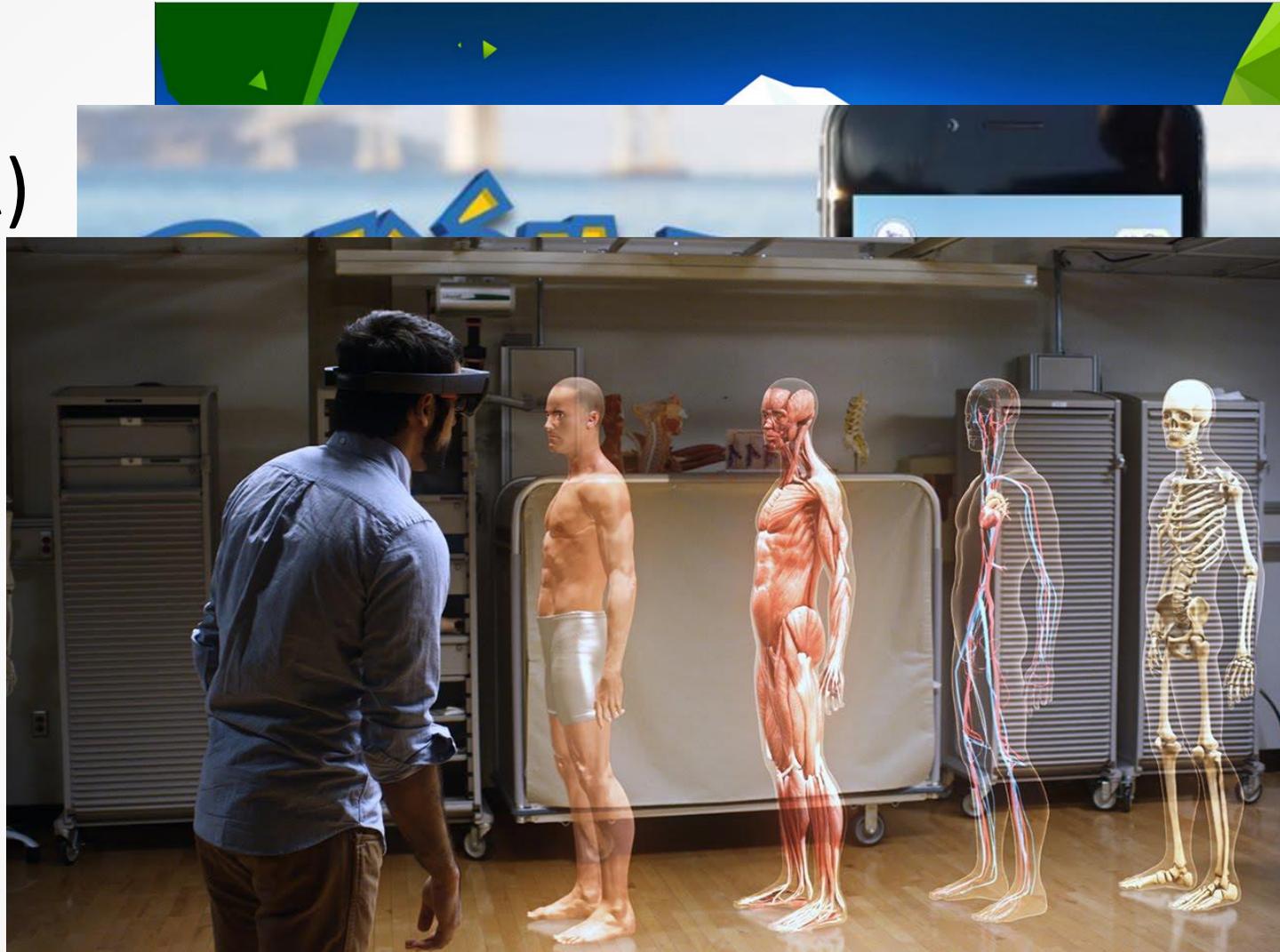
Meemim

Visual GIS



Virtual, Augmented and Mixed Realities

- Virtual (VR)
- Augmented (AR)
- Mixed (MR)







Municipal/Utilities Technology

- HoloLens - unique opportunity
- Leverage existing investments
- Bring disparate data elements together
- Benefit from bi-directional integration with ESRI GIS



5 - Collaboration

- Combination of visualization plus live video feed





6 – As-Built Capture

- Hands-free capture of as-built vs. as-documented
- ESRI GIS update via bi-directional integration





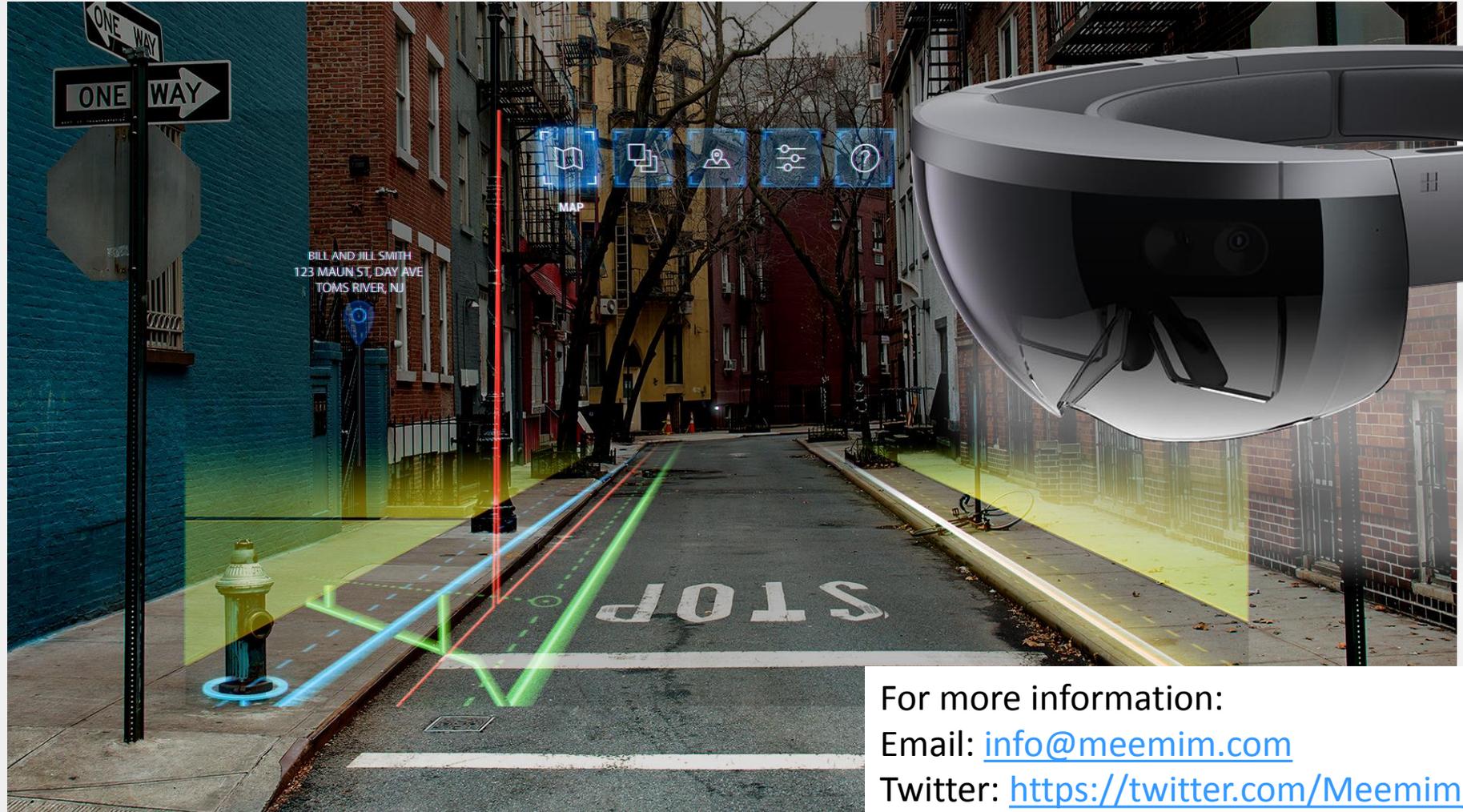
Solution Summary

- Infrastructure visualization
 - With data labels and visual aids
- Knowledge management integration
- Bird's eye view
- 2-way video communication
- Field-office collaboration
- Hand-free as-built capture and GIS updates





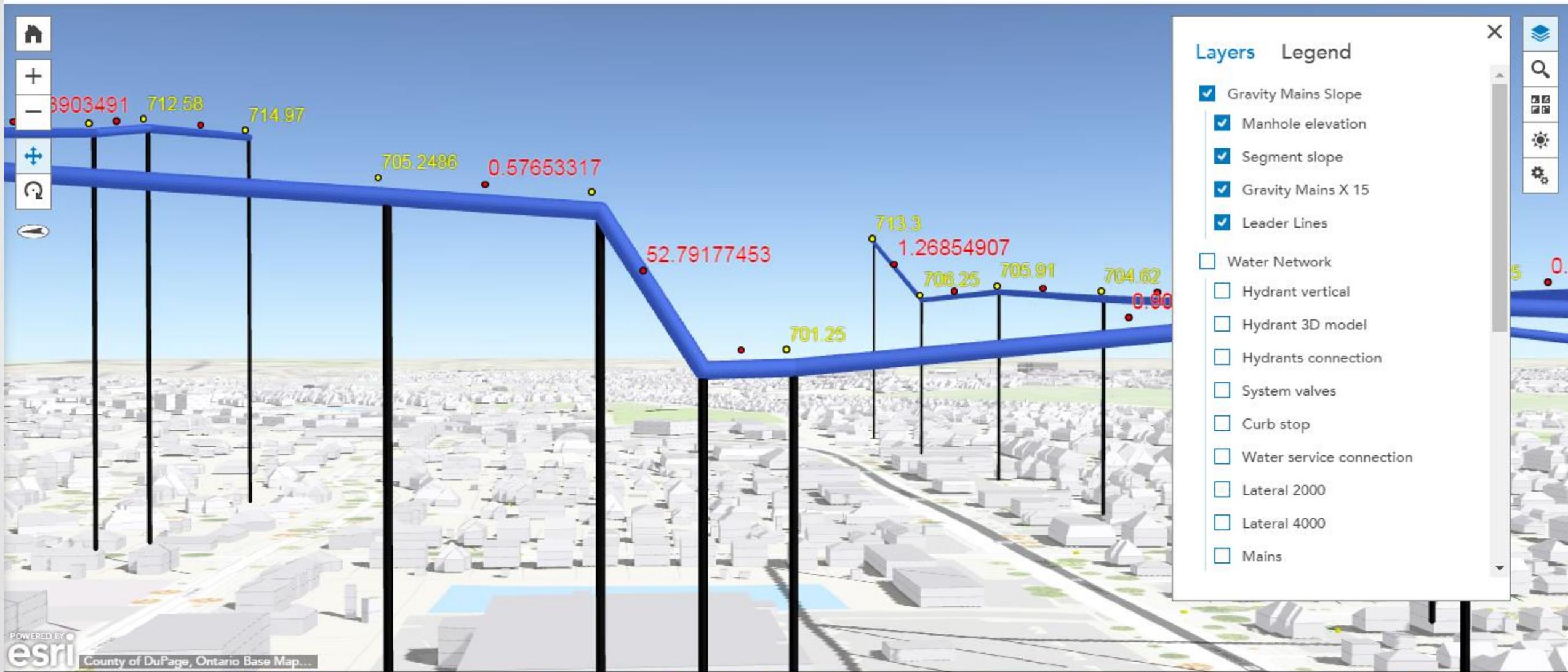
Meemim vGIS - The Future is Visual



For more information:
Email: info@meemim.com
Twitter: https://twitter.com/Meemim_Inc
LinkedIn: <https://www.linkedin.com/company/meemim>
Web: www.Meemim.com



Home, Zoom (+/-), Pan, Rotate, North Arrow



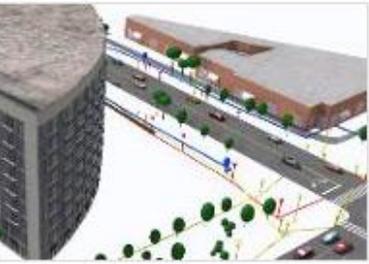
Layers Legend

- Gravity Mains Slope
 - Manhole elevation
 - Segment slope
 - Gravity Mains X 15
 - Leader Lines
- Water Network
 - Hydrant vertical
 - Hydrant 3D model
 - Hydrants connection
 - System valves
 - Curb stop
 - Water service connection
 - Lateral 2000
 - Lateral 4000
 - Mains



3D Utilities

Overview



A CityEngine Webscene showing subsurface utilities in 3D.

[View Application](#)

by CityEngine

Last Modified: April 12, 2017

CityEngine Web Scene

Description

A CityEngine Webscene showing subsurface utilities and telecom networks.

Access and Use Constraints

No special restrictions or limitations on using the item.

Comments (0)



[Sign in](#) to add a comment.

3D Utility Network

www.arcgis.com/home/item.html?id=7da792266ced428288e13130ee2ee3d2

3D Utility Network

Overview

3D Underground Utility Network

by CityEngine

Last Modified: March 30, 2017

360 VR Experience

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Created: March 1, 2017

Size: 34 MB

Description

An ArcGIS 360 VR Experience of a 3D Utility data set. Show water, gas, electrical, and telecom networks. Earth's surface and streets can be remove to be able to look under ground. Streets, Buildings, Vegetation procedurally generated with CityEngine.

Integrating New York City Information Systems

Improving situational awareness for everyone

**Thank you
Enjoy the Workshop!**

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