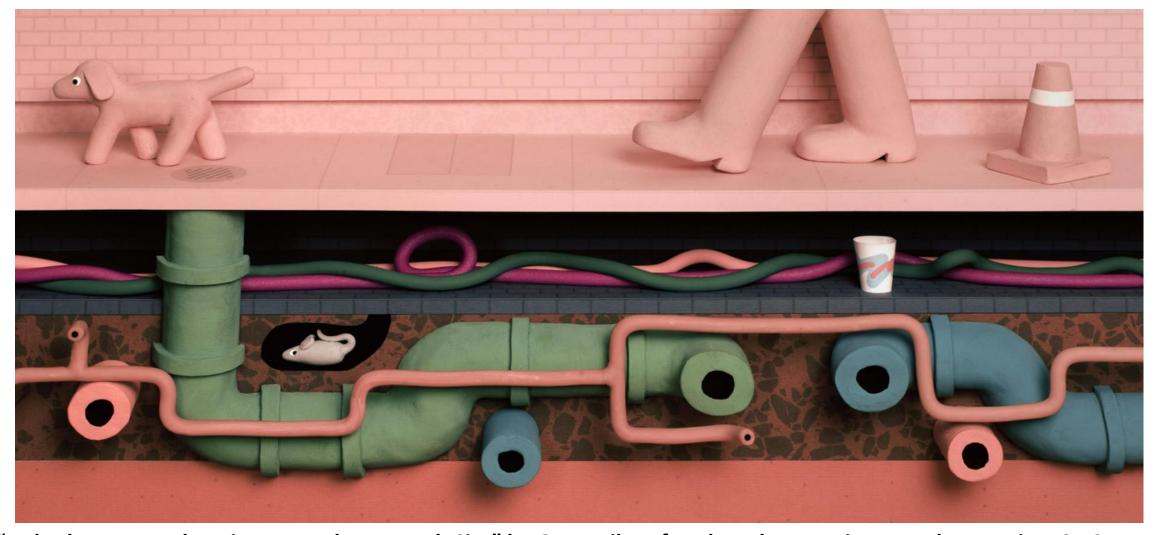
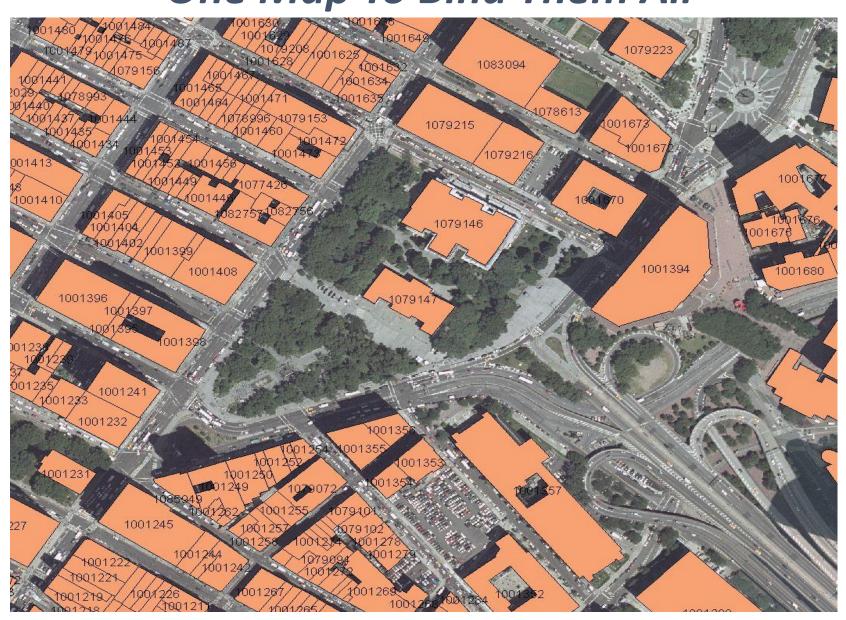
Infrastructure and Environment The Foundation of NYC Communities



"Nobody Knows What Lies Beneath New York City" by Greg Milner for Bloomberg Businessweek Magazine, 8.10.17

NYC Accurate Digital Basemap Created: 1995 - 2000 "One Map To Bind Them All"

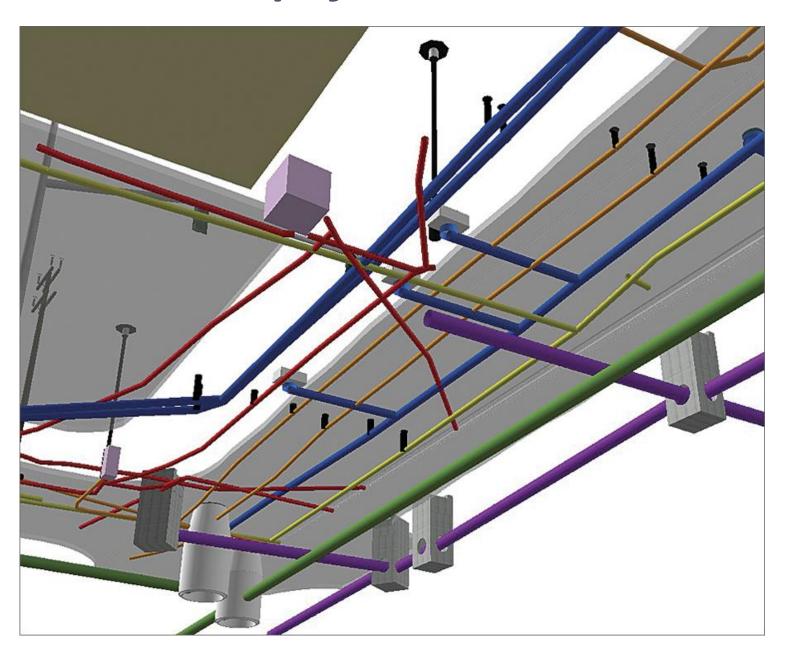


The Geospatial Response To 9/11 and Sandy Massive Infrastructure Destruction

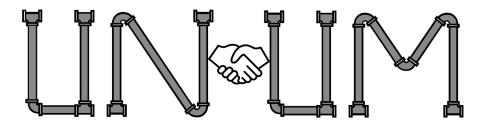




Concept for 3D Data Pilot



Source: Esri



Unification for Underground Resilience Measures

National Science Foundation Award # 2133356 (\$1 million grant)

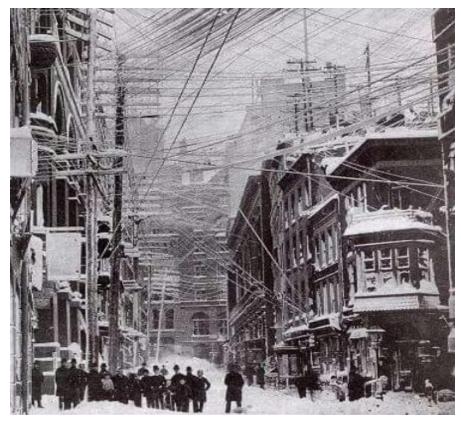
UNUM: NYU's Approach to Underground Infrastructure Interoperability in NYC

Professors Debra Laefer and Rae Zimmerman (NYU Wagner); Alan Leidner and Wendy Dorf (NYC GISMO)

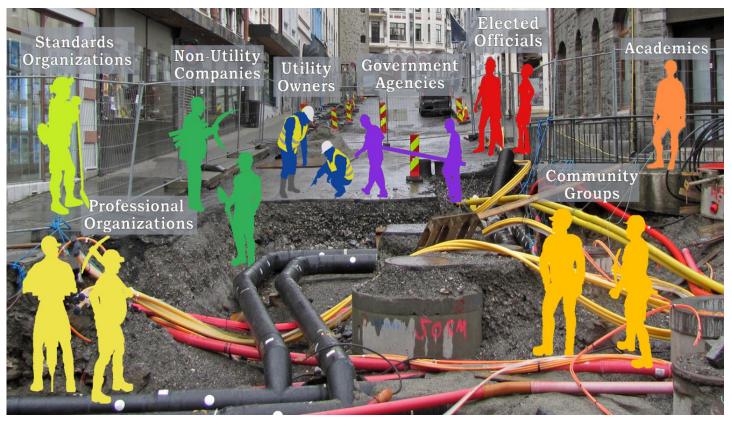


NYC GISMO Application Fair, June 8th, 2022

Yesterday



Today



NYTimes archives 1888 Source: Peter Gmelch

Participating organizations



































































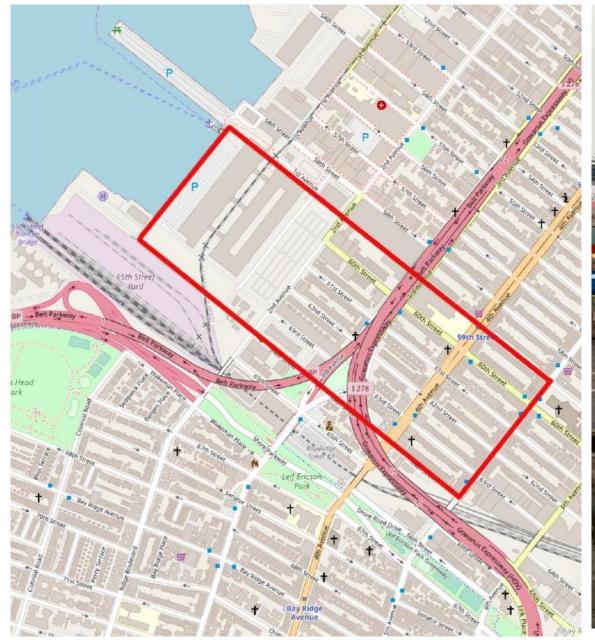






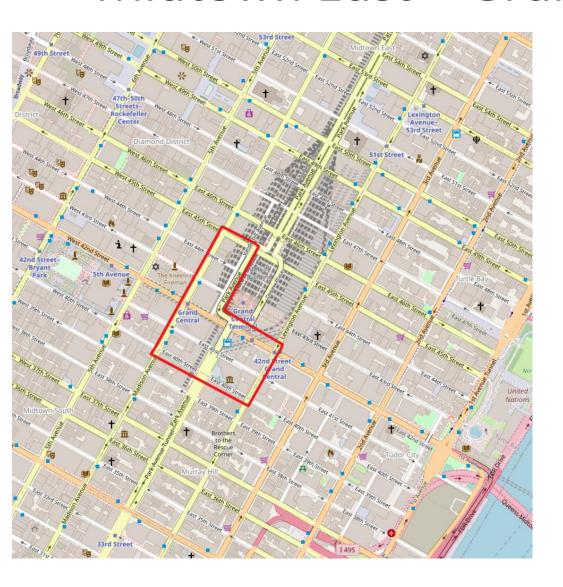


Sunset Park, Brooklyn, Pilot Area



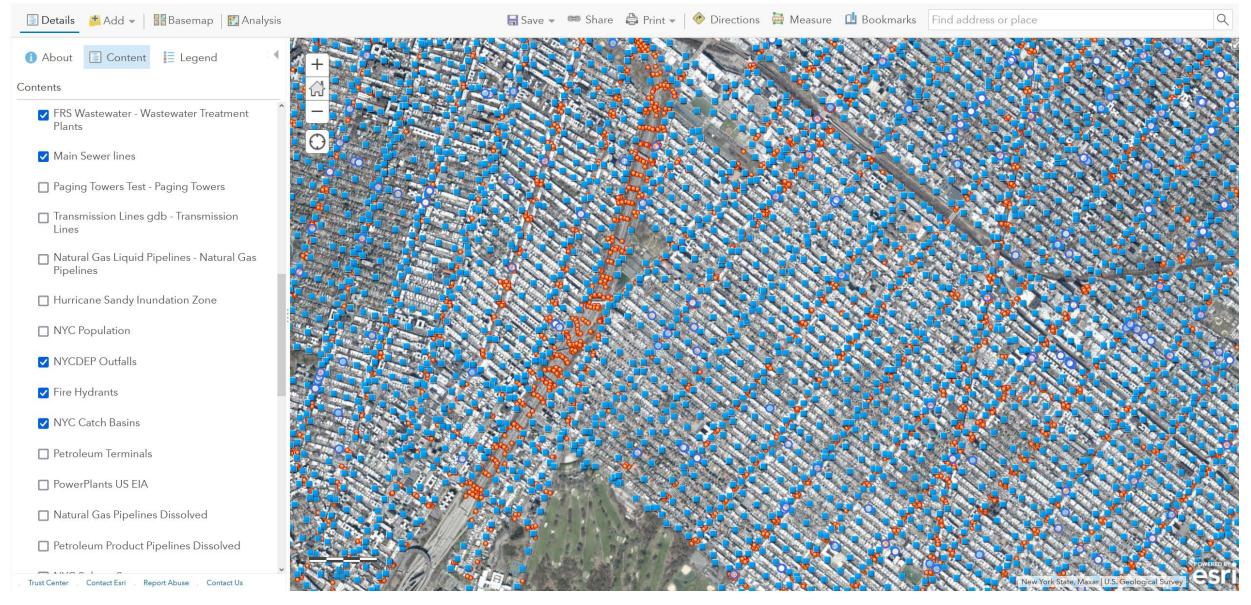


Midtown East - Grand Central Pilot Area





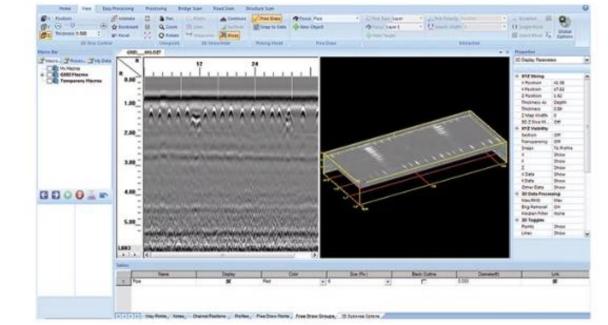
Open Infrastructure Data Compilation

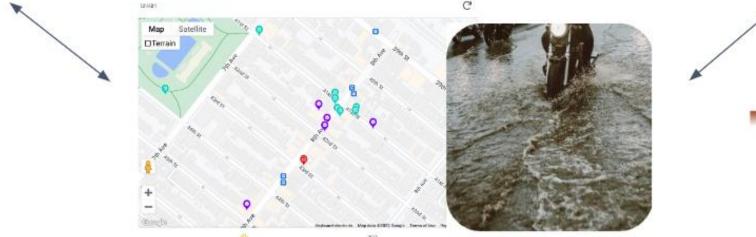


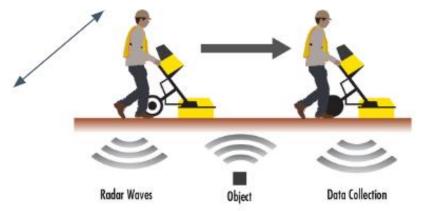
Co-create community digital twin

 Link point clouds and GPR scans with community data collection tools









In Progress







MUDDI Data Standard

- Organization of technical committee
- -Pre-interview questionaire distributed to asset holders
- -Develop legal agreements

Scaling for NYC

- -Solicit signatures on legal agreements
- -MUDDI data standard work
- -Decision maker workshops

Grant stage 1
(Jan. - May 2021)



Beginning of stage 2 (Oct. 2021)



Community facing (Jan - May 2022)



Data aggregation (Jan 2022-present)



Next steps (Present-Spring 2023)

Planning phase

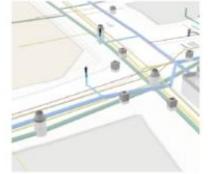
- -Received stage 1 planning grant funding
- -Continue to build stakeholder group
- -40+ letters of support

Stage 2 funding received

 -Initial kick off meetings with community stakeholder groups and asset holder teams

Community workshops and participatory arts

- -3 community workshops in Sunet Park
- -Planning for public arts exhibit at Brooklyn Army Terminal





Completed Tasks

Model for Underground Data Definition and Integration (MUDDI)

Open Geospatial Consortium (OGC)

Areas of Interest

Catchment Areas Service Districts Utility Sub-Networks Preservation Districts



Utility Networks

Water, Sewer, Electric, Transit, Gas, Telecom, Steam Network



Network Features

Pipe, Cable, Valve, Meter, Sensor, Pump



Environment?

Soil, Bedrock, Water, Remnants, Basements, Foundations, Chemicals

Accessory Features



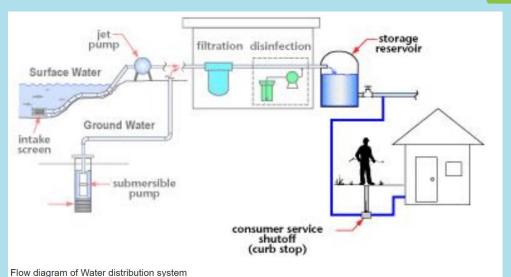
Attributes

Age, Material, 3D Location, Dimensions, Data Quality, Threat Level, Pressure, Temp, Capacity



Access, Support,

Container, Identity



Source: Alan Leidner

MUDDI: Environmental Features and Data

MUDDI Model

- Utility Networks
- Framework Layers
- Standards: DIGGS, GeoSciML

Data Creators and Holders

- City Agencies: DDC, DEP, DOB, DOT
- Authorities: MTA, PANYNJ
- Private Engineering and Construction Companies
- Federal USGS, ACE
- State DEC, DOT, GIS/IT, PW
- Institutions: Libraries, Colleges, Historical

Categories of Underground Environmental Data

- Abandoned remnants: Trolley tracks, fuel storage tanks, basements
- **Hazard Zones**: Flood, Surge, Earthquake, Drought, Radiation
- Flows & Fluxes: Underground streams and other movement
- Geology: Soils, Bedrock, Water Table, Chemical composition
- Non-Utility Built Features:
 Basements, Foundations, Vaults
- Ground Coverage: Roadways,
 Sidewalks, Vegetation, Water Bodies

Data Analysis Tools

- Al, Machine Learning
- Digital Twin, Models
- Chemical Analysis
- Climate Science
- Interactions with Utilities
- Increased Intelligence

Use Cases

- Lengthen life of underground assets
- Reduce contamination
- Reduce and mitigate underground emergencies
- Better manage disaster events
- Mitigate effects of climate change
- Reduce construction and maintenance costs
- Support green infrastructure



- Borings, Cores, Probes
- Aerial Sensors: Drones, Manned, Satellites, SAR
- Surface Sensors: GPS, EM, LiDAR, etc.
- Old Records, Maps, Studies: E.g. Viele Map

U.K. Commits to National Underground Asset Register Based on OGC MUDDI Model Now Under Serious Consideration by NYC!

National Underground Asset Register (NUAR)

£3.9 million is being invested by the Geospatial Commission in two pilot projects to help understand the feasibility and value of a National Underground Asset Register (NUAR) by designing, developing and configuring a data exchange platform which will support the evaluation of defined use cases.

1.5 million kilometres

combined network of water, sewer, gas and electricity services in the UK [34]









£1.2 billion

estimated economic cost of accidental strikes on underground pipes and cables per year (Geospatial Commission)



£4.3 billion

is the estimated spend on Street Works each year (Dept of Transport), with around 4 million holes dug each year by utility companies



