



Reimagining GIS: Geographic Information **Society**

Clint Brown

Linda Beale

Mark Harrower

Esri

8 billion

= Number of basemap requests per month on AGOL

14,000

= Unique requests per second

12,000

= New Items created per day

100,000,000

= Unique people who have accessed ArcGIS

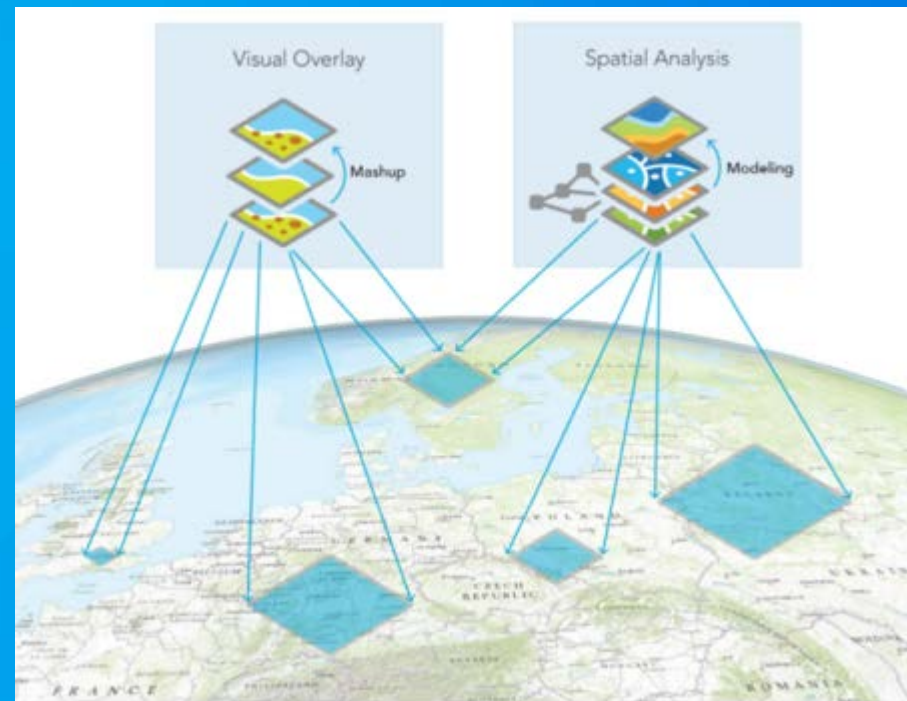
Modern GIS is participatory

Every GIS user needs data provided by other users

- **All of us depend on other users for some of the information that we use in our GIS work.**
- **We've all worked for years on data sharing among GIS users and communities**

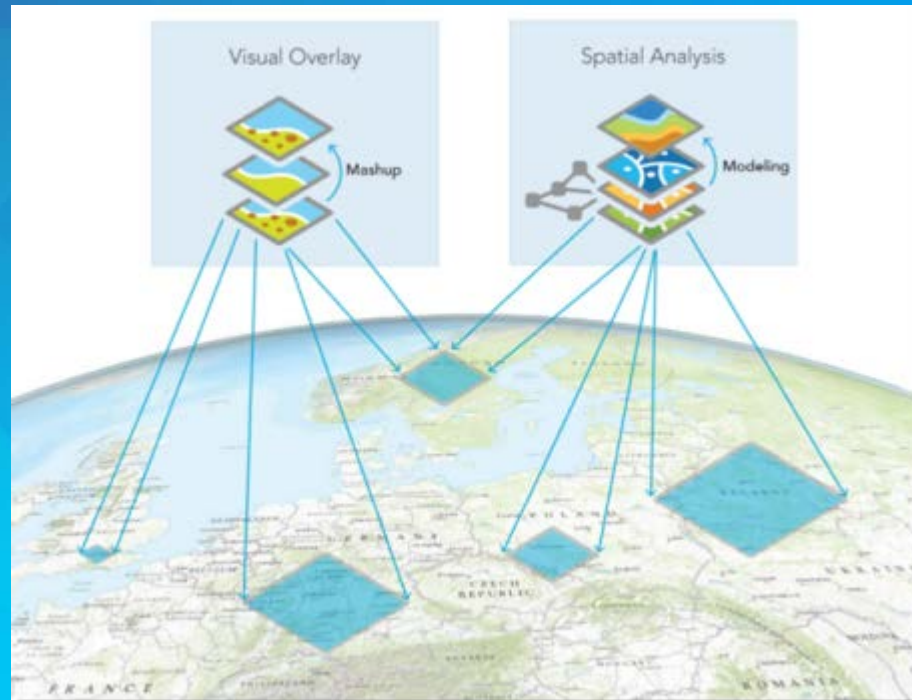
Millions of users around the world are building their data layers

- For their areas of interest
- And themes
- And at all levels of geography
 - Neighborhoods
 - Communities
 - Regions
 - States and Provinces
 - Nations
 - The Oceans
 - Entire World



These data are georeferenced

All GIS layers fit onto the earth's surface

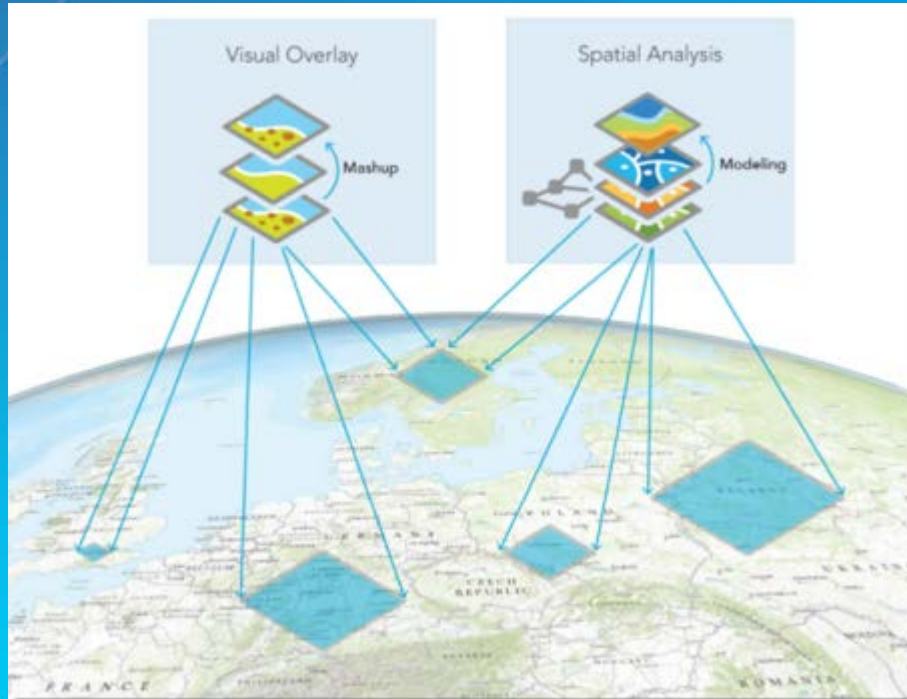


- And can be combined with anyone else's shared information layers

It's easy to integrate GIS Layers

By building your own GIS

Authoritative crowd sourcing



- Your data layers
- For your jurisdictions

You are contributing to the GIS of the World

Collectively filling in GIS layers globally

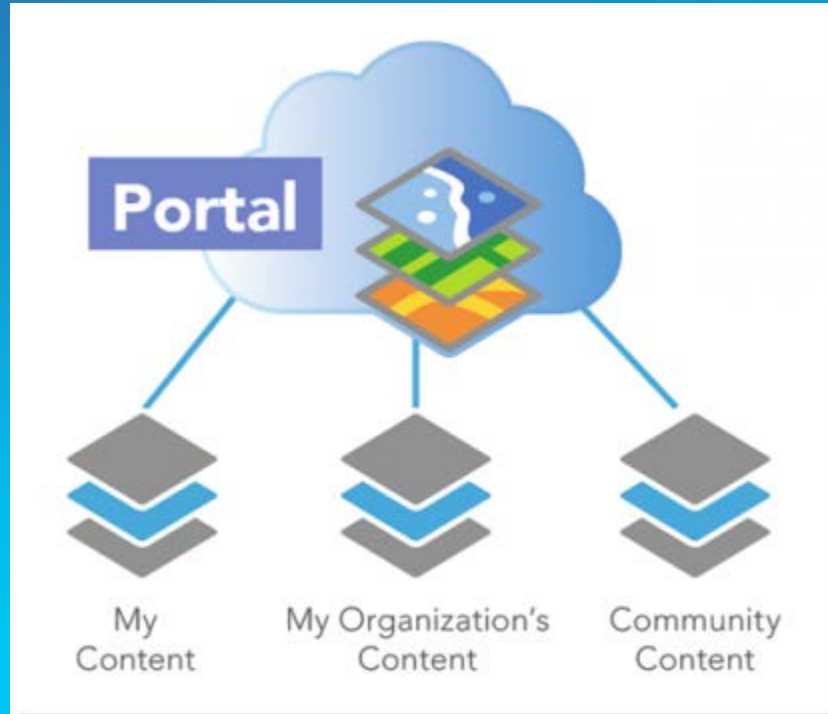
Meanwhile GIS is moving to the cloud

Continuously expanding network of computers

- Every layer has a URL – its web address
- Making layers easy to access online
- Building and sharing our own data -- combining all of our layers ...
- Growing and expanding every day ... across hundreds of thousands of GIS organizations worldwide
- Not just GIS users, but all kinds of public and crowd-sourced maps

GIS provides the integration engine

Web GIS enables sharing and use



Portals organize information in catalogs -- the content that you are interested in

Helps you organize your view for access to information items

- Your personal work
- Your Workgroup, Department, and Enterprise
- Your Community

Enables combining your information with others

A Living Atlas of Useful Geographic Information Items

App trends

- The explosion of smart phones and devices launched the app revolution
- Highly focused consumer apps on our devices
- Mapping apps are among the most popular
- Anyone with a smart phone knows how to use maps
- Many want maps that do more – GIS maps
- And **maps** provide the most common GIS experience

It All Begins with a Map



- Online Maps have an interface
- Called an “App”
- Targeted and purpose-built

Sharing Your Work

Information Item Sharing is growing rapidly ... in addition to data sharing

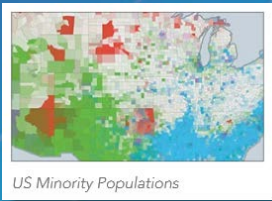
ArcGIS Open Data

The screenshot displays the ArcGIS Open Data website interface. At the top, it features a navigation bar with 'Open Data', 'About', and 'Help' links, and a 'My Account' dropdown menu. The main header area has a cityscape background with the text 'Explore 27,406 Open Datasets from 2,176 Organizations Worldwide'. Below this is a search bar with the placeholder text 'Search for data about' and a location selector set to 'anywhere'. The 'Featured Organizations Sharing Data' section includes logos for Maryland, the City of Chicago, Halifax, DC.gov, and LI DOT. The 'Noteworthy Data' section highlights two datasets: 'City of Chesapeake Open GIS Data' (Building Outlines) and 'Halifax Open Data' (Trails). The 'Newest Data' section shows three recent datasets: 'Open Code PHL/Lehigh' (UNI Permits), 'Open Code PHL/Lehigh' (DOR Parcel), and 'SLOSH OpenData' (SLOSH Category 3). The footer contains the Esri logo and copyright information: '© 2015 Esri. All rights reserved. Privacy Terms of Use'.

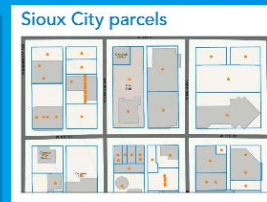
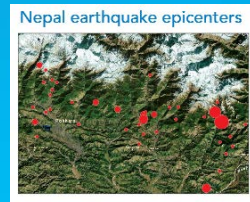
GIS Data Sharing is Changing

From “simple” dataset sharing to sharing useful information items

Maps and Scenes



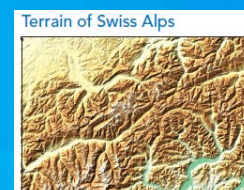
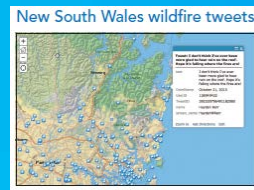
GIS Layers of Many Types



Sensors

3D Multipatches

Points, Lines, & Polygons



Tweets

Rasters

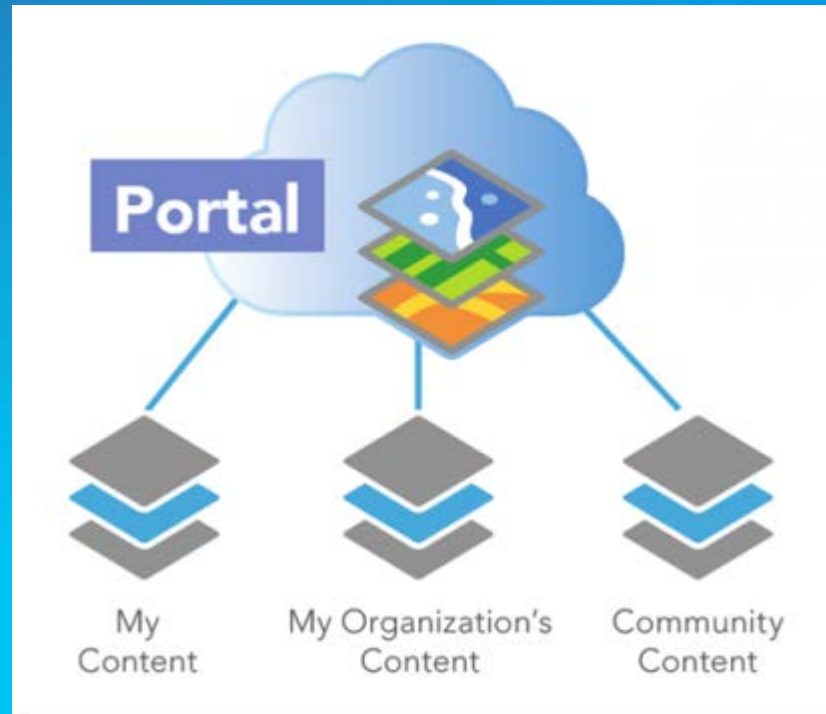
Apps



Analytics can also be shared

GIS data sharing enables access to better information

From Data Copies on Disk



- **Dynamic**
- **Up-to-date**
- **Best Available**
- **A Click Away**

To Ready To Use Information Items Available Anywhere

GIS is Participatory

- **GIS is for Organizations**

Purpose-driven maps for executives, managers, decision makers, operations staff, field crews, constituents

- **GIS is for Communities**

Share a common location (geography) or work in the same field

- **GIS is for Public Engagement**

Engage with the public. Tell Stories. Gather feedback. Share your work.

Linda Beale

The implications in practice

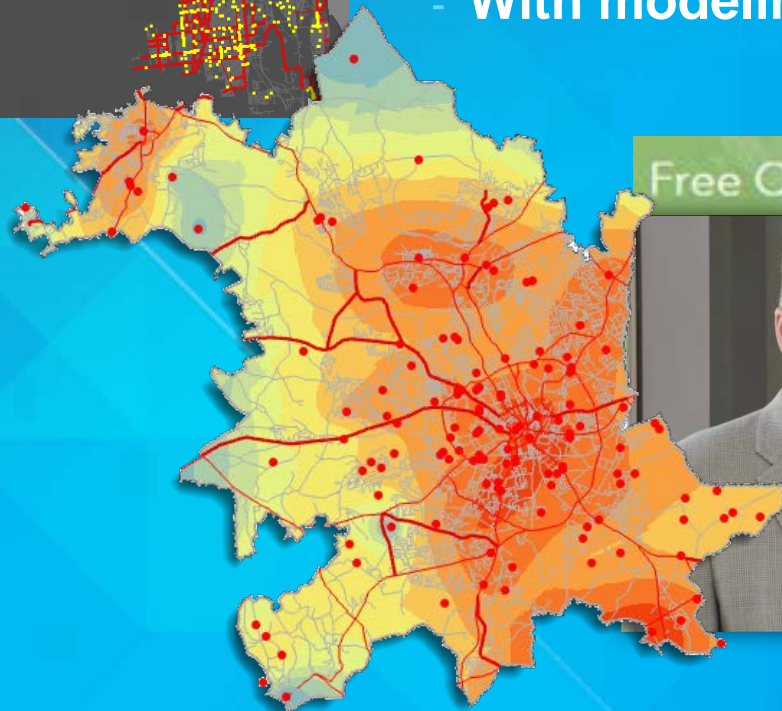
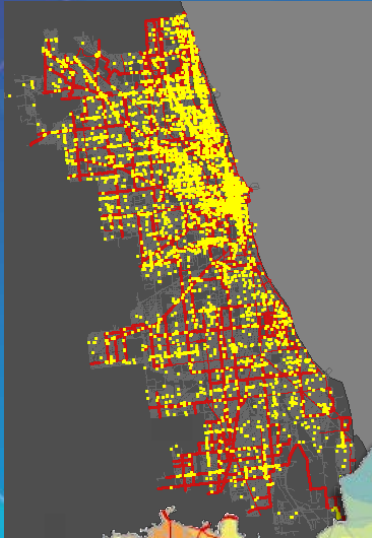


How does it impact your work?

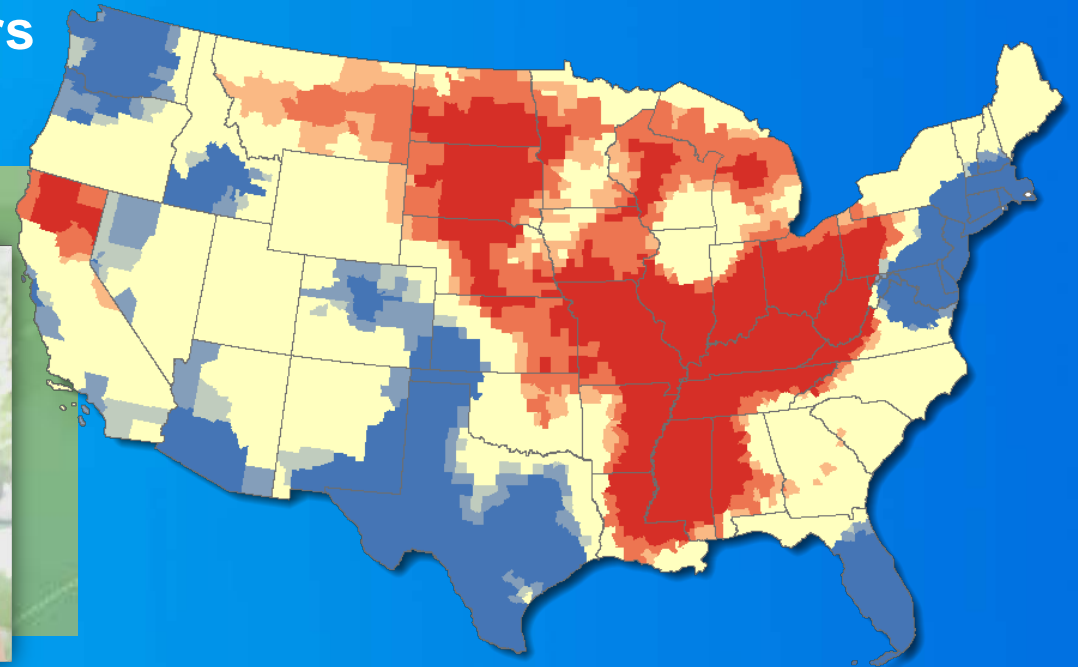
Public Records Databases API

Application Programming Interfaces (API) allow programmatic access to some of the information

- Examples:
 - Communities provide background and meaning to your work
 - Your results are only as accurate as your data
 - Great available data...arghhh through an API?!
 - With modeling, context matters

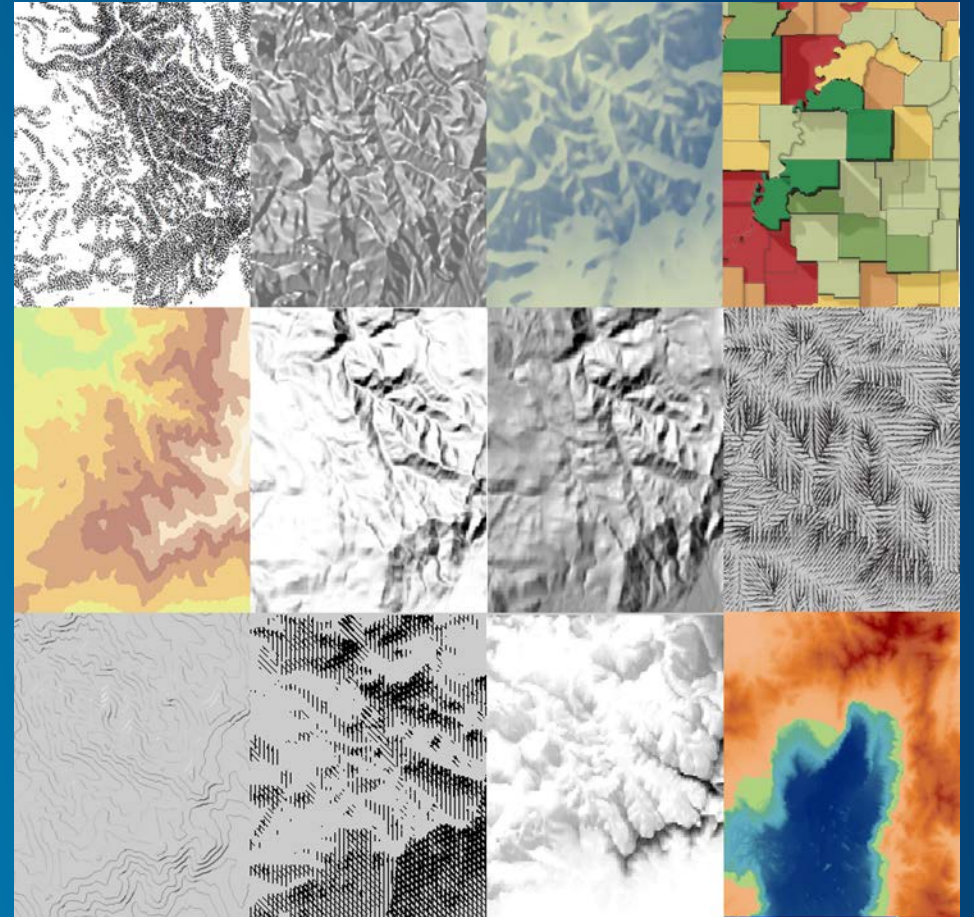


Free Online Course –



Terrain Models (free download from ArcGIS Online)

- Multi-Directional Oblique Weighted (MDOW) hillshade
- Swiss Hillshade
- Cluster Hillshades
- Sky Models
- Historic Dots
- Filled Contours
- Illuminated Contours
- Hachures
- Shadow lines
- Chromastereoscopic tinting
- 3D Choropleth



GIS: for understanding and communicating

1985 document by The Royal Society on the Public Understanding of Science



Science pervades our society. Understanding of science does not.

“Scientists must learn to communicate with the public, be willing to do so, and indeed consider it their duty to do so.”

GI Scientists are learning to communicate with the public, should be willing to do so, and consider it their duty.

Mark Harrower

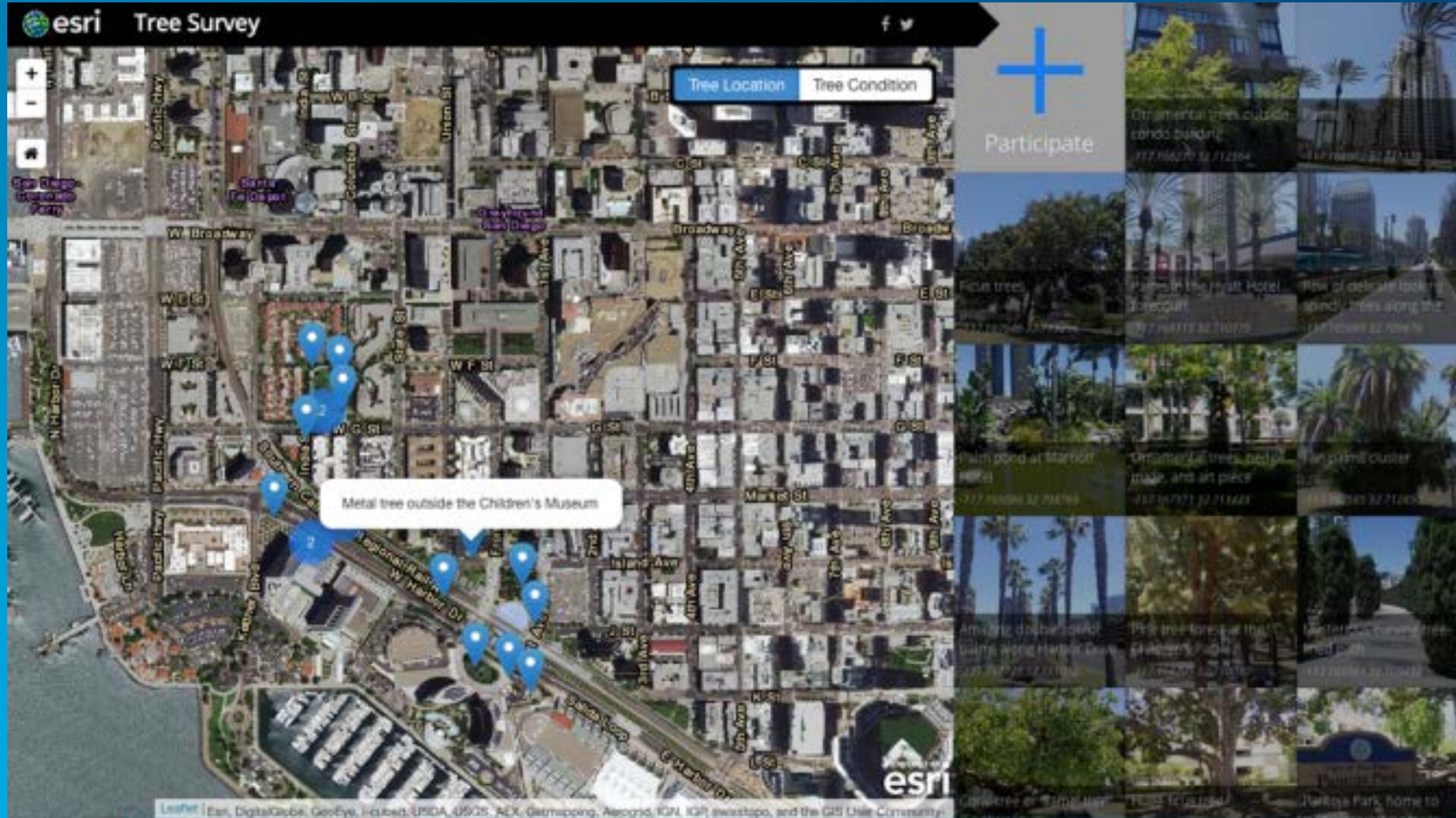
Making Social GIS Work



Flow of Content is now multidirectional

- Crowdsourcing, wikis, OSM, citizen science, open data: we collect things no one would ever collect, vet and improve content, gain realtime awareness, do it faster and cheaper, find novel uses.
- The move to mobile and persistent connectivity has accelerated this
- What makes something “authoritative” is becoming more complicated

Crowdsourcing Content + Mobile



Citizen Science + GIS

Collaborating with the public to do everything from data collection to developing technology, models, methods, vetting, and disseminating knowledge.

No GIS user is an island: Adding and Re-sharing is a force multiplier

Social GIS allows us to tackle more ambitious projects

Citizen Science – White House Science Fair

esri White House Science Fair

Washington (among others)

Washington, D. C., District of Columbia

Via Twitter

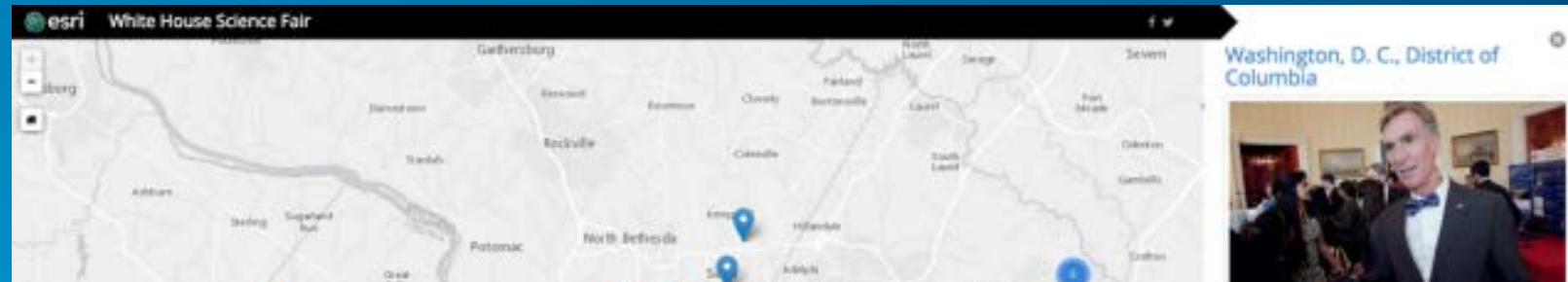
Why was @BillNye at the @WhiteHouse yesterday? The #WHScienceFair of course! [Let's Move! Liza@BillNyeDC](#) [Liza@BillNyeDC](#)

Other entries from Washington, D. C., District of Columbia

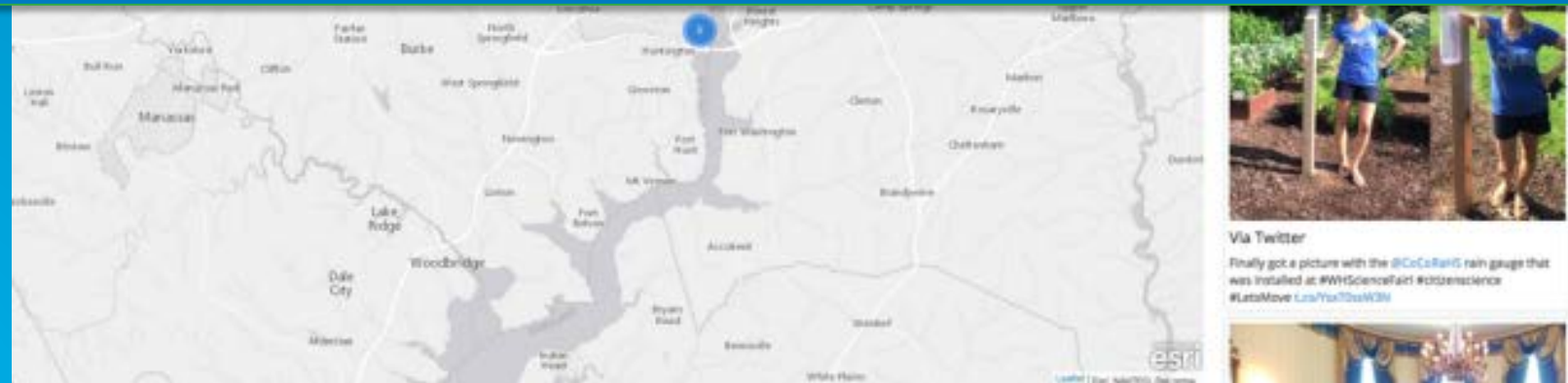
Via Twitter

Finally got a picture with the @CoCoRainG rain gauge that was installed at #WHScienceFair! #citizenscience #LetsMove [Liza@YvonneW3N](#)

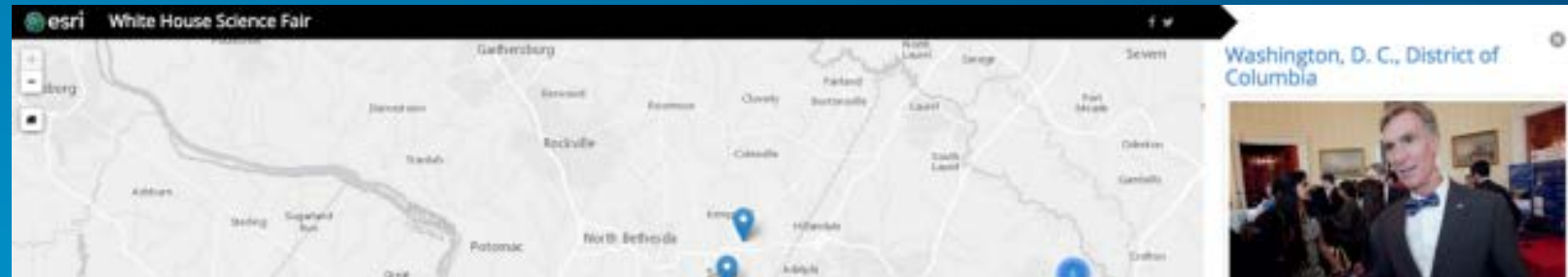
Citizen Science – White House Science Fair



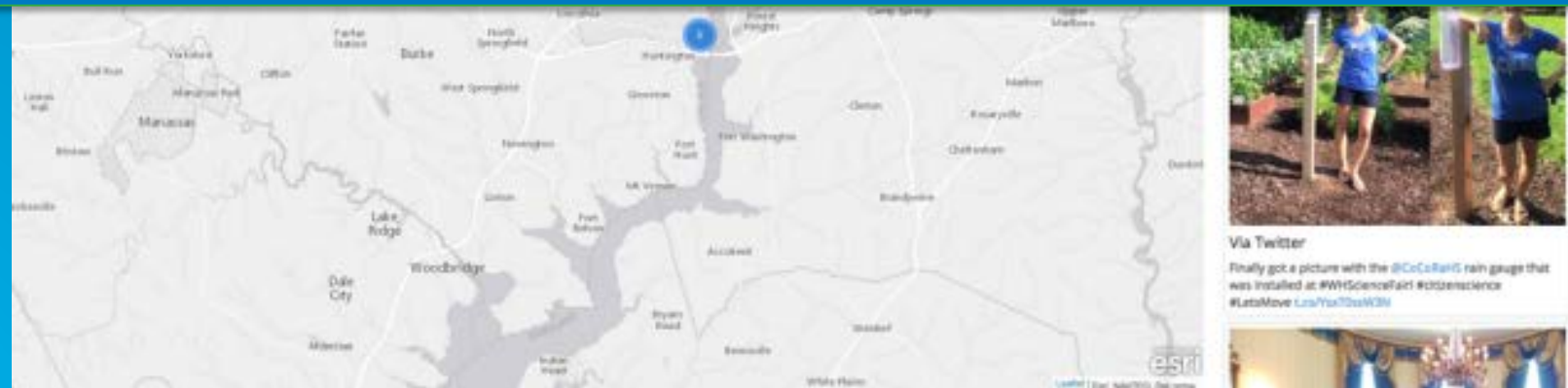
Barrier to entry is low – e.g. Twitter hashtag



Citizen Science – White House Science Fair



Social GIS can build on existing social networks



Agency + Citizen Engagement / Reporting



A story map Facebook Twitter LinkedIn esri

BioBlitz: Citizen Science in the National Parks

The Hawai'i Volcanoes National Park BioBlitz, held on May 15 and 16, 2015, was the latest in a series of citizen science events. It brought together more than 170 leading scientists and traditional Hawaiian cultural practitioners, more than 850 students and thousands from the general public.

Left: National Geographic photo by Chris Johns

 NATIONAL GEOGRAPHIC



Approaching a Decade of Citizen Science

Citizen Science

[Home](#)[Get Started](#)

Overview

Citizen Science is a configuration of the Crowdsourcing Reporter application template that allows members of the public to report sightings of wild plants and animals. The application has been optimized for smartphones but is responsively designed to be used on smartphones, tablets, and desktop computers.

The Citizen Science application presents one or more maps that can be used to report an observation. Users can anonymously submit new reports, review existing reports, and comment and vote on reports or observations submitted by other users. They also can authenticate with their social media or ArcGIS Online credentials and track the status of problems or observations they have reported.



You may be interested in

ArcGIS for State Government includes several related maps and apps that also can be configured in your organization:

- [Crowdsourcing Manager](#)
- [Wildlife Management Area Locator](#)

[REQUIREMENTS](#)[WHAT YOU GET](#)[WHAT'S NEW](#)[DOWNLOAD](#)[TRY IT NOW](#)

Social GIS > Data

It is *also* sharing know-how, methods, techniques, and models (re: Open Science)

Analysis and results shared too

An Audience ≠ Community

- An audience is one-way, non-interactive, not social
- A great online community offers something you can't get anywhere else — e.g., authoritative content, knowledge, models, peer reviews, etc.

How to Foster Community

- Amy Jo Kim “Online communities must grow organically, not be rigid, overly-planned.” Let the community figure-out who it is, what it exists for, it’ll be more successful.
- Let people decide how much (and how) they’ll interact with the community – tailor their own experiences – not one-size-fits all.
- Facilitate reputation building (many methods) – it is the “trust” economy, not just formal credentials.
- Takes much more than just technology!!

Tenets of Open Data

- (1) open to everyone
- (2) lineage
- (3) persistence (doesn't disappear)
- (4) real people behind this / accountability / authoritative
- (5) open formats
- (6) open discussions
- (7) updatable

Successful Communities

- Great content, consistently delivered
- Designed to share – works best in a “give/get” relationship
- Allow one-to-one connections, many-to-one, and one-to-many relationships. E.g., citizens reporting potholes
- Responsive & accountable
- Allow good work to get promoted (likes, views)

People are *ready* for GIS

A profound change in GIS

- Web GIS is about deploying all of our collective content across the new **cloud** computing infrastructure
- And making GIS apps for use by virtually **anyone**
- Can be used **anywhere**

The human dimension of GIS

The role of GIS professionals will be critically important

- We need people with geographic literacy
 - With the skills, passion, and commitment to continue to build, assemble, and share the world's geography.
 - Professionals who can build important analytics enabling us to combine our shared information layers
 - People with skills in GeoDesign and Planning
 - People with skills in Spatial Analysis and the ability to plan for, analyze, and evaluate alternatives

Engage Socially and Think Open

- Learn how to share and leverage intelligent information items. Share your work, not just your data.
 - Maps, Scenes, Layers of all kinds, Analytics, Apps
- Access the best available information
 - “Authoritative” is typically, but not always, better
- Leverage information from the entire community. Just because it wasn’t built with ArcGIS, it shouldn’t be ignored.
 - ArcGIS
 - Other systems
 - Google
 - Open Street Map
 - Open source
 - Etc.
- Share your work and serve others

Thanks Very Much

Linda, Mark, and Clint