

Of the People, By the People, For the People:
Open Science in Government

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Open Science and Innovation

- Open Journals
- Open Data
- Open Source Software (e.g., iRods, Hydroshare)
- Shared Computing Infrastructure and Services
- Open Hardware
- **Open Collaboration (e.g., crowdsourcing, citizen science)**
- Human Centered-Design
- Science Communication

What is Citizen Science?

United States: The contributions of the public to the advancement of scientific and engineering research and monitoring in ways that may include:

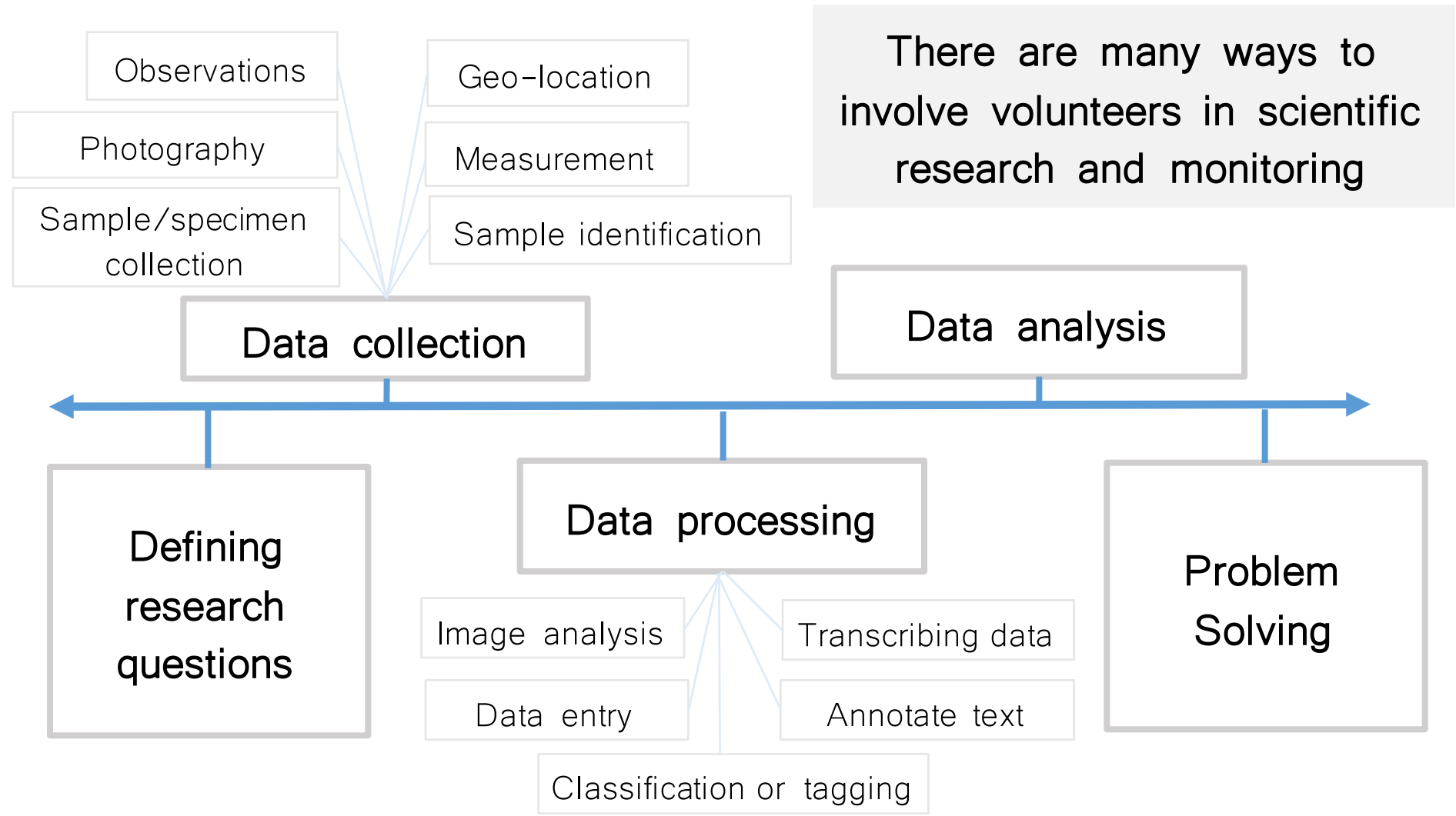
- Identifying research questions
- Designing/conducting investigations
- Collecting and analyzing data
- Developing data applications
- Developing technologies for science
- Solving complex problems



What is Citizen Science?

European Union: “Public involvement in projects or on-going programmes of scientific work by which individual volunteers or networks of volunteers, many of whom may have no specific scientific training, perform or manage research-related tasks such as observation, measurement or computation (EEA 2013).”

Citizen science may employ a range of methods, including volunteer monitoring, participatory sensing, volunteer geographic information, crowdsourcing, prizes and challenges, serious games, and making.



Why consider citizen science?

- Enhance scientific research and monitoring
 - Increase spatial or temporal frequency
 - Increase geographic extent or temporal scale (long-term)
 - Eye can be better than the algorithm
 - Reduce time and labor costs
- Provide hands-on STEM learning outside classroom
 - Facilitates education and scientific literacy
 - Increase public awareness of scientific developments and methods

Citizen science isn't right for solving EVERY scientific problem, but it can be valuable when applied to the right scientific or engineering problem and when designed properly.

Barriers and Risks

- Data quality
- Privacy
- Regulations (e.g. Paperwork Reduction Act, Procurement)
- Liability
- Staffing
- Funding

Overcoming Institutional Barriers

- **Serve as a Connector:** Hosted monthly live webcasts, roundtables, and workshops, connecting government staff with researchers, practitioners and industry.
- **Identify and Engage Champions.**
- **Highlight Case Studies:** New Visions in Citizen Science Report and workshop (July 2013)
- **Grow the Network:** Founded the Federal Community of Practice on Crowdsourcing and Citizen Science (January 2014).



Overcoming Institutional Barriers

- **Align with Priorities:** Included citizen science and crowdsourcing projects in the Administration's Open Government National Action Plan. Highlighted in White House Science Fair.
- **Provide Top Level Support and Guidance:** Written endorsement by Agency officials. Collaborated with White House to organize the Citizen Science Forum and shape the President's Strategy for American Innovation and a White House Memo on Citizen Science.



President's Strategy on American Innovation

A core component of the [Strategy for American Innovation](#) is increasing the ability of agencies to deliver better results at lower costs for the American people—through an Innovation Toolkit. These approaches can increase the effectiveness and agility of the government through improvements in its core processes and ability to solve problems. The Open Innovation Toolkit provides resources on two sets of approaches.

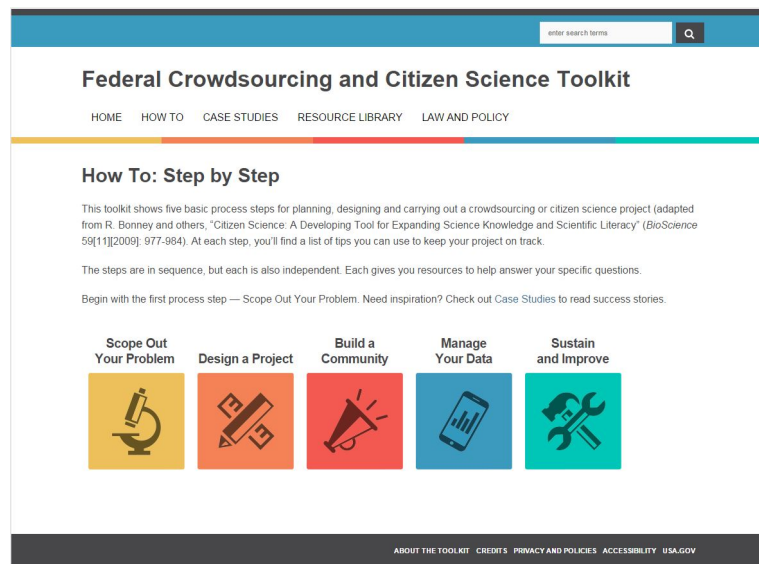
Innovation Toolkit: Prizes and Challenges; Citizen Science and Crowdsourcing; Open Data; Innovative Procurement; Innovation Fellows; etc.

Holdren Memorandum, Sept 30

- **Core Principals:** Data Quality/Fitness for Use, Openness, Meaningful Public Participation
- **Requirements**
 - Improve coordination of and support for citizen science and crowdsourcing within and between federal agencies, designate agency coordinators (60 days)
 - **Projects:** Contribute to a public database of Federal citizen science and crowdsourcing projects (180 days).
- **Guidance and Federal success stories**

https://www.whitehouse.gov/sites/default/files/microsites/ostp/holdren_citizen_science_memo_092915_0.pdf

How can we engage 2.8 million Federal staff?



- Diverse set of case studies
- “How to” information on program design, data issues, working with participants, etc.
- Information on resources, support and partner organizations
- Law and policy guidance

Developed by 125 members of the Federal Community of Practice on Crowdsourcing and Citizen Science, in collaboration with the White House:

<https://crowdsourcing-toolkit.sites.usa.gov>

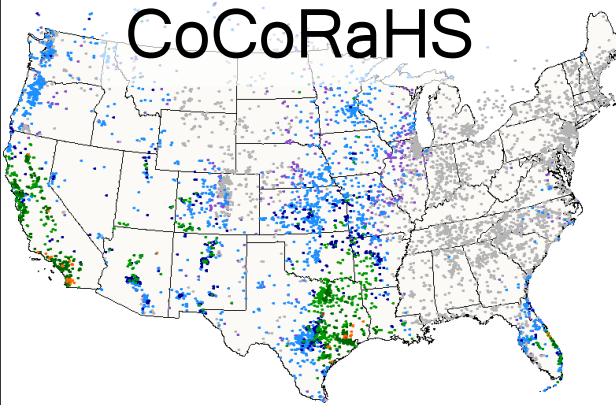
Overcoming Institutional Barriers

- **Understand and Address Legal Issues:** Commissioned legal analyses of privacy, IP, and liability implications. Wilson Center's legal interactive tool. Connecting the legal and innovation communities.
- **Inform Legislation:** Crowdsourcing and Citizen Science Act.
- **Increase Funding Opportunities:** NSF Core Priority Area, NASA, IARPA, NOAA, and NIH call for proposals. FY '17 White House Budget Memo for R&D.
- **Improve Discovery of Projects:** Catalogue of Federally Supported Citizen Science Projects in collaboration with the Wilson Center.

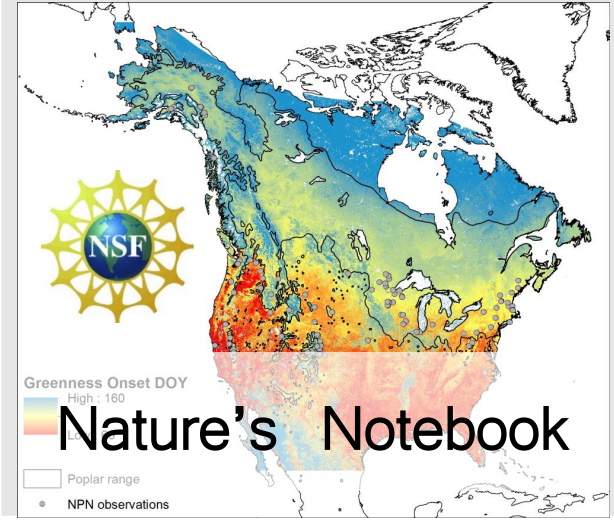
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CoCoRaHS

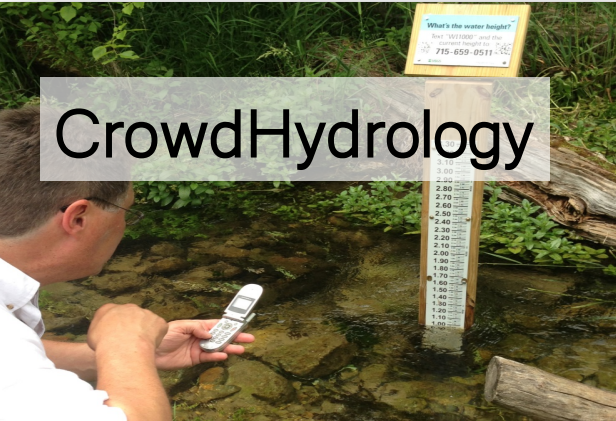


Old Weather



Nature's Notebook

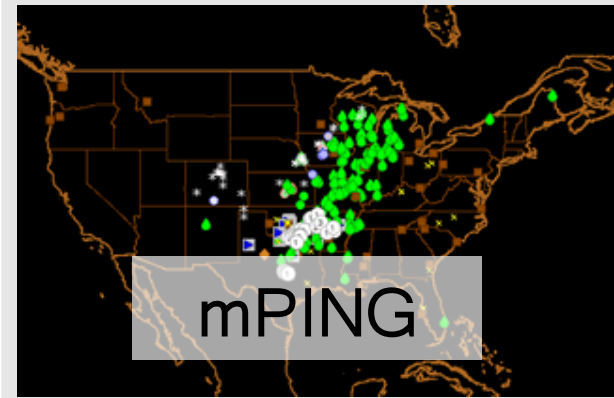
CrowdHydrology



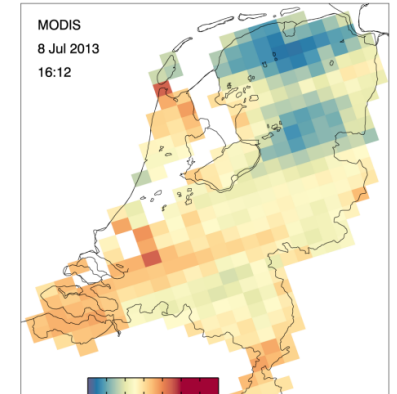
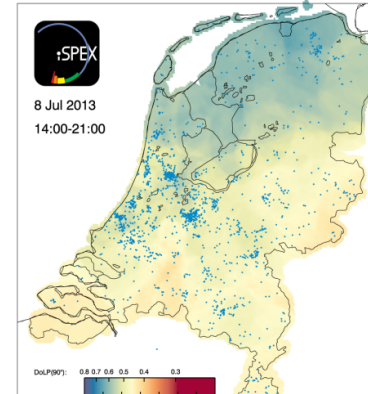
Soil Moisture



mPING



NOAA



Advances in technology are enabling and enhancing citizen science projects



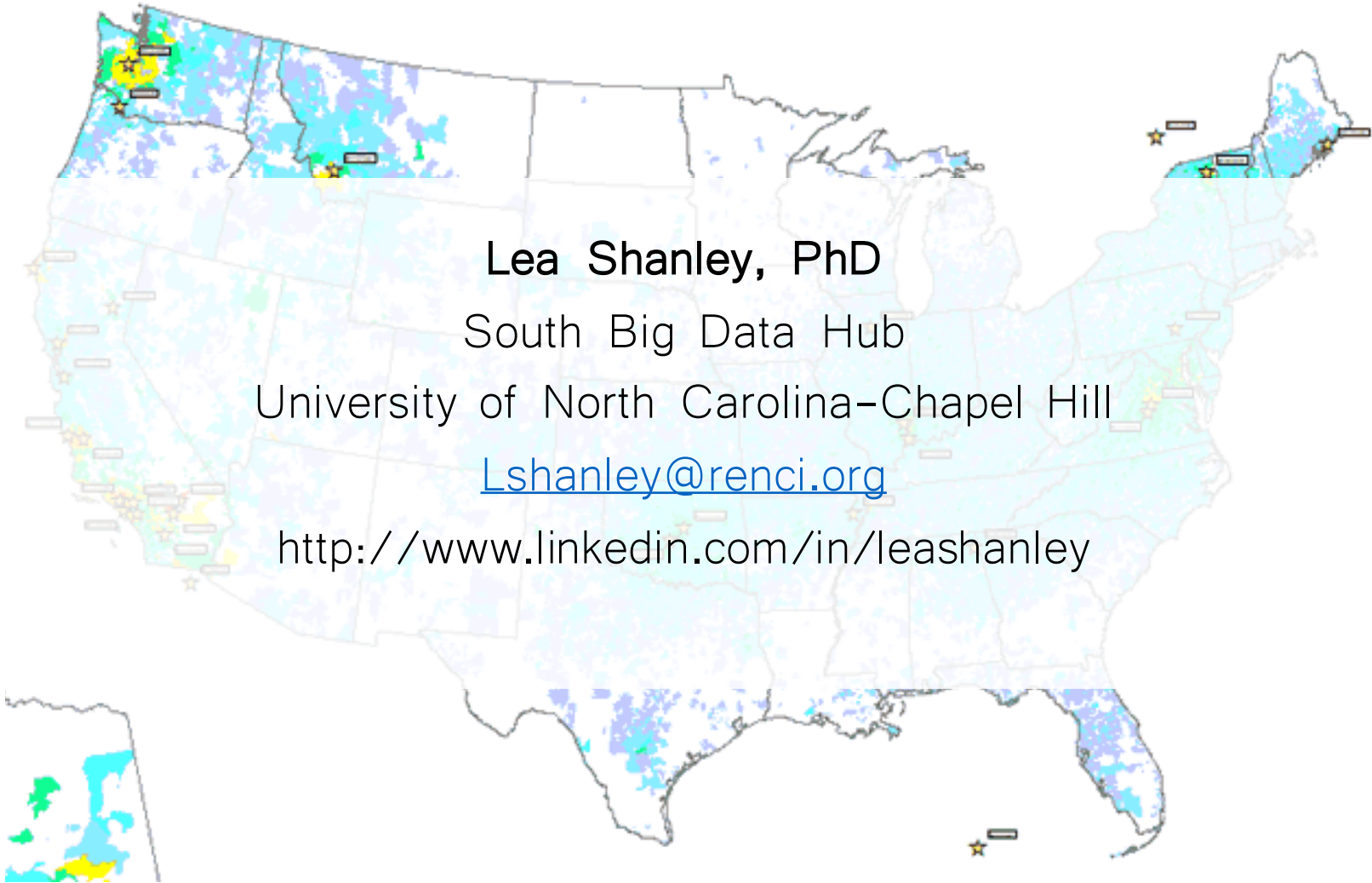


Air Sensor Toolbox for Citizen Scientists provides guidance on affordable, next-generation air quality sensors.



Impact on Policy

- **National Climate Assessment:** Collaborated with US Global Climate Change Program to identify ways in which citizen science is/could contribute to climate indicators.
- **National Civil Earth Observation Strategy and Plan:** Worked with US GEO and White House to identify where citizen science could augment and enhance earth observations.
- Commissioned Muki Hakley report on the impact of citizen science on policy in Europe.
- [See Cloud & Crowd video on Propeller Health]



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