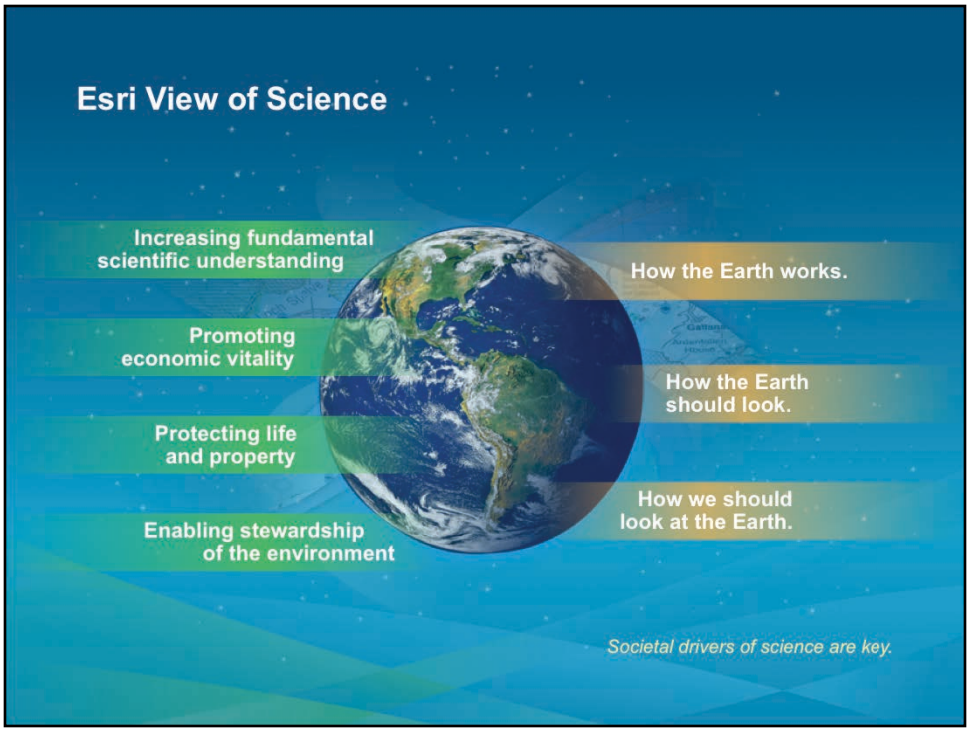

Emerging
Citizen Science Initiatives
at Esri
Dawn Wright, Ph.D.
Esri Chief Scientist
esri
Citizen Science 2015, San Jose, CA, February 12, 2015



At Esri we are concerned not only with supporting basic and applied science, but recognize that there are many major themes of compelling interest to society that will drive scientific research for the next two decades.
Four of these are [on the slide]. And thus we view science as helping us to understand much more than soley "how the Earth works" but …

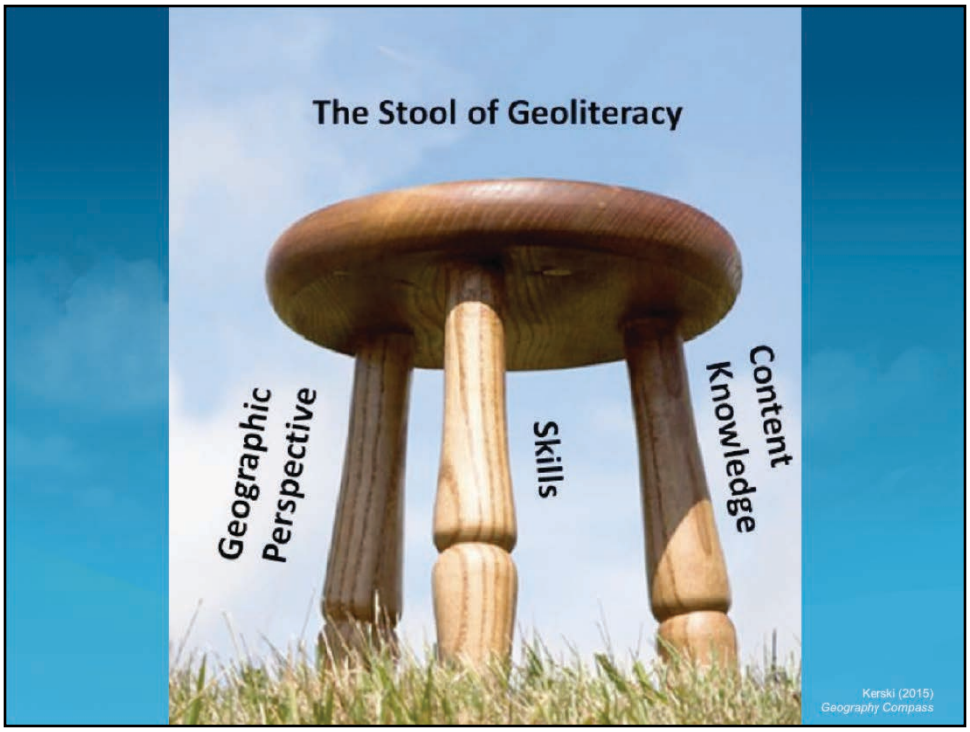
How the Earth works… (process)

How the Earth should look… (design)

How we should look AT the Earth… (data)

"Teaching geography in the 21st Century includes working with mobile and online mapping tools, in addition to traditional focuses such as physical and cultural geography, fieldwork, and understanding landscapes"

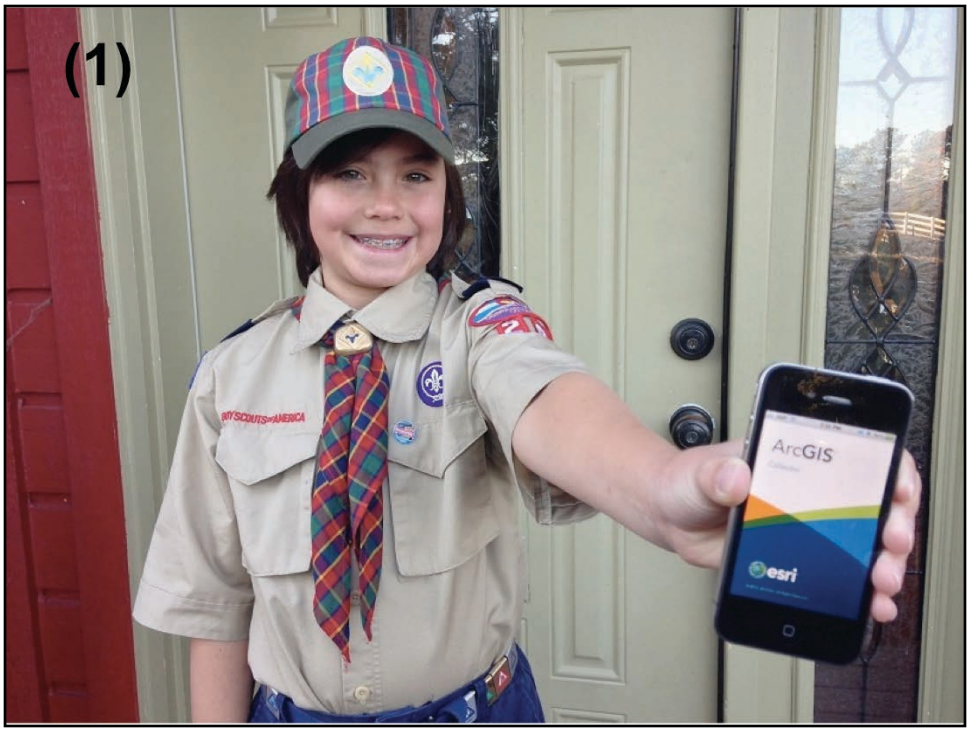
Five converging global trends that present geography with new global opportunities.



For Citizen science → **Illustration of why phenomena can be understood more completely WHEN it is mapped.**
Geoliteracy can be conceptualized as being supported by content knowledge, skills, and the geographic perspective (or spatial thinking)

Now to review several citizen science data collection methods supported by Esri technology

Method 1 – Collector for ArcGIS



Utility and ease of use of the app spans, all the way from projects for local children in US neighborhoods

(1)

GIS Helps Farmers See the Big Picture

Landscape-level analysis for climate-smart agriculture

By Asa Strong

www.esri.com/esri-news/arcuser/fall-2014

Vincent Makiyi (right), a local GIS specialist, collects GPS data on a tablet with the chief of a rural community near Ulongwe, Malawi.

A nonprofit organization in Malawi uses GIS to apply sustainable farming practices that can improve crop yields for smallholder farms in this southeast African country.

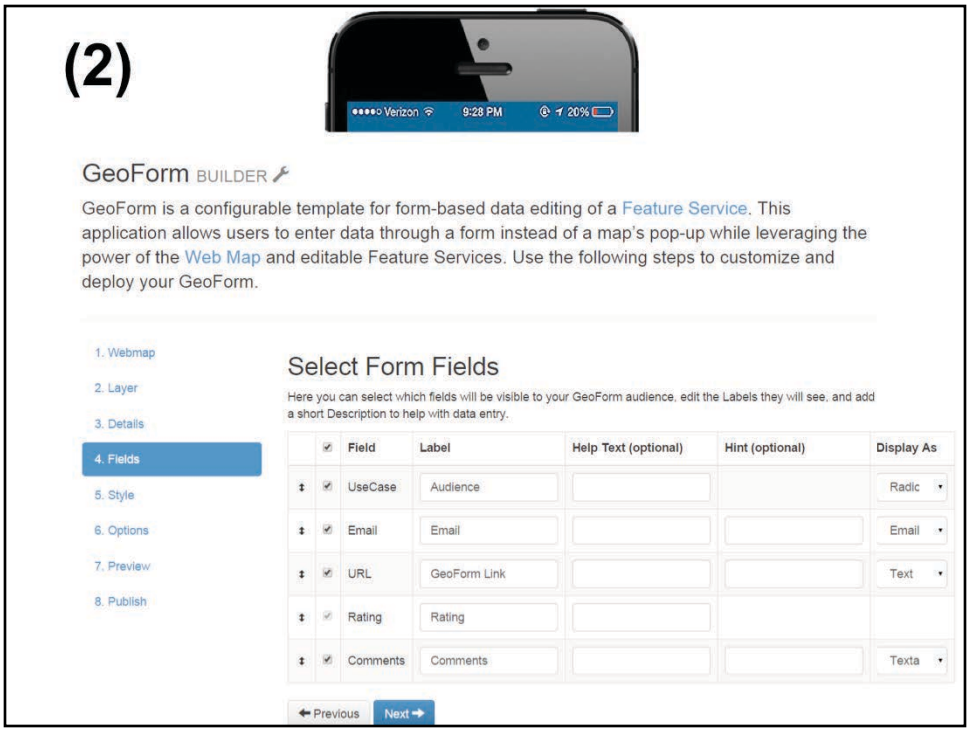
The inland nation of Malawi is a small country but is densely populated. Nearly 80 percent of its people are smallholder farmers. On average, farms in sub-Saharan Africa are already the smallest in the world. Malawi's farms averaging fewer than two hectares, are primarily planted with maize, and are dependent on rainfall. Given these limited resources, farmers are generally able to produce only enough to adequately feed their families.

Farmers' limited capacity for taking on risk, coupled with limited access to sustainable technologies and financial services, further reinforces low agricultural productivity. These limitations produce a yield gap—the difference between potential and realized yields in the same geographic area. Depletion of soil nutrients, loss of trees, and other environmental impacts on agriculture can exacerbate risks to future food production. However, there is potential to reverse these trends and improve economic and environmental conditions in the country.

Agricultural production is directly linked to the well-being of people and the environment in smallholder farming communities in Malawi. Rising rural populations in areas with a fixed amount of cultivatable land are placing unprecedented pressure on environmental resources and ecosystem services and making it more difficult for farmers to derive their livelihoods from the land. To produce the greatest economic and social benefit, efforts to improve this situation must simultaneously address environmental impacts and agricultural productivity.

Nonprofit organizations are heavily involved in the mission to increase food

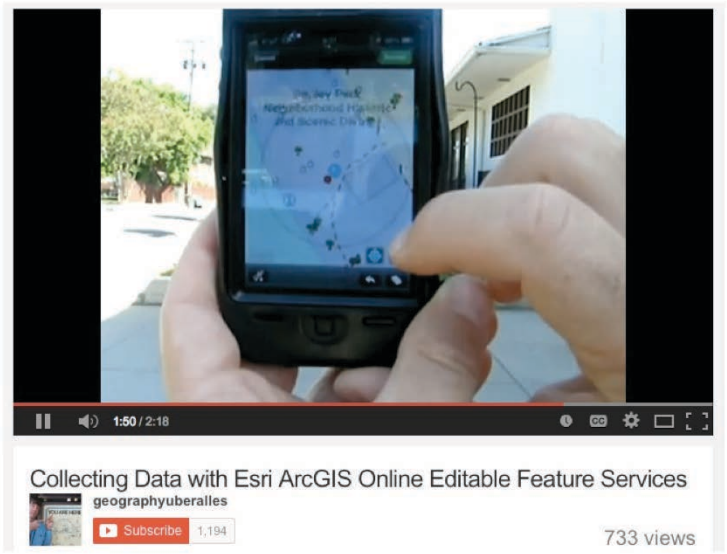
To local community projects in developing countries



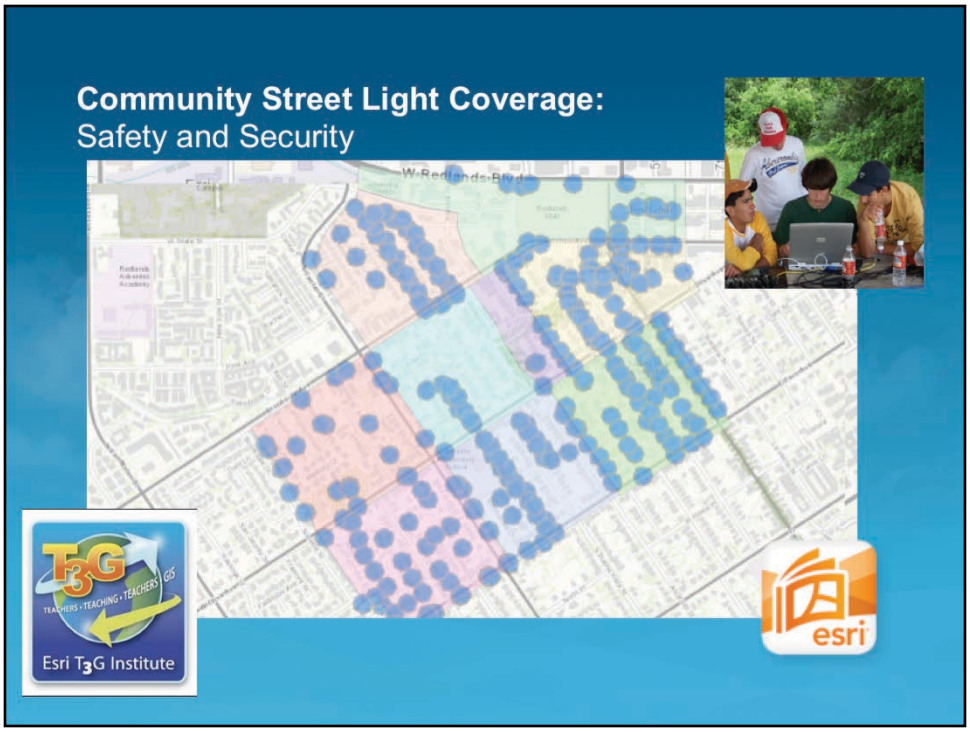
Citizen science data collection methods

Method 2 – Geoform template – easier form-based data editing of a Feature Service in an AGOL web map

(2) http://youtube.com/watch?v=C6dNfeQkTGo



Citizen science data collection methods
Method 2 – Joseph Kerski video



Could spend lots of time showing many maps resulting from data collection efforts. This is just one, collected by students – simple analysis via buffering of points to show light cast by a single street light and hence what areas of a neighborhood are the darkest and potentially most dangerous

83 T3G educators collected 2,000 points in 90 minutes using the Collector app

"People are moved by emotion. The best way to emotionally connect other people to our agenda begins with "Once upon a time…"
Science backs up the long-held belief that story is the most powerful means of communicating a message. Over the last several decades psychology has begun a serious study of how story affects the human mind. Results repeatedly show that our attitudes, fears, hopes, and values are strongly influenced by story. In fact, fiction seems to be more effective at changing beliefs than writing that is specifically designed to persuade through argument and evidence."

http://www.fastcocreate.com/1680581/why-storytelling-is-the-ultimate-weapon

Scientists are often encouraged not to publish their work until it constitutes a complete story.

Why not combine BOTH, especially to take advantage of the power of maps and geography to educate, inform, and inspire people to action as well?
Story maps is about using maps in new and innovative ways to get people excited and involved in the world.
Thanks to continuing changes in **the Internet, cloud computing, mobile and tablet platform**s, and to constant improvements in the software itself, we can now put the power of GIS into the hands of managers, CEOs, reporters, school kids—*even policy makers.*


Story Maps
APPS GALLERY COLLECTIONS SUPPORT BLOG
storymaps.arcgis.com
English
Use Story Maps to Inform and Inspire Your Audience
Story maps combine interactive maps and multimedia content into elegant user experiences. They make it easy for you to harness the power of maps to tell your stories.
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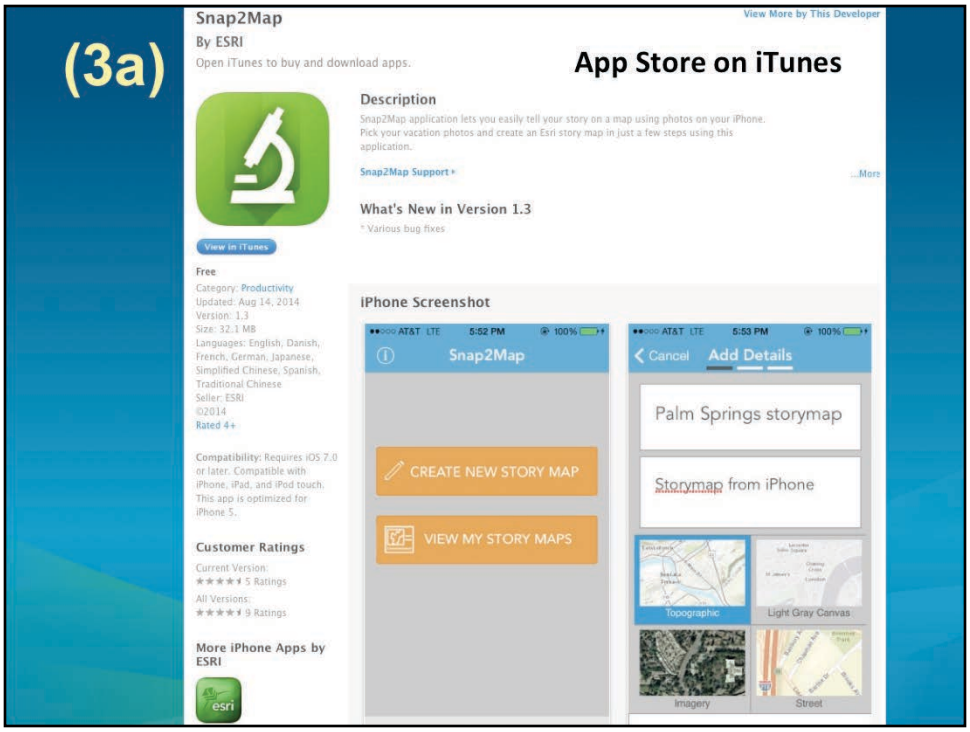
Get ideas for your own story maps from these examples created by a growing community of authors. View more story maps in our Gallery.
Flying Over Fifteen Gothic Cathedrals
The Changing Face of Africa
The Nature Conservancy: Salmon Conservation
A Tour of World Ecosystems
APP
Map Journal 20150107
The World Almanac of Wealth
Forbes: The World Almanac of Wealth
The World of Supertall Buildings
THE CITIES REPORT

Example of a compelling story map made by professional cartographers…

But anyone can put together a great story map. This one by a user: “Collective catalog of indigenous art in the Caura River Basin of Venezuela”

Great variety of map styles and apps with which to make them


(3a)
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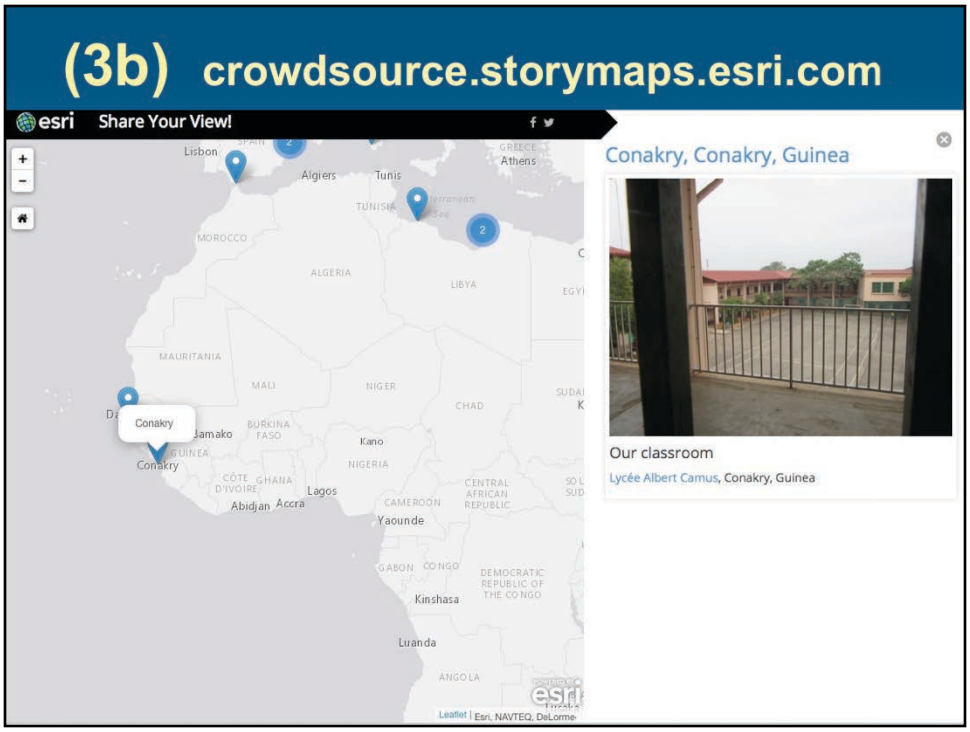
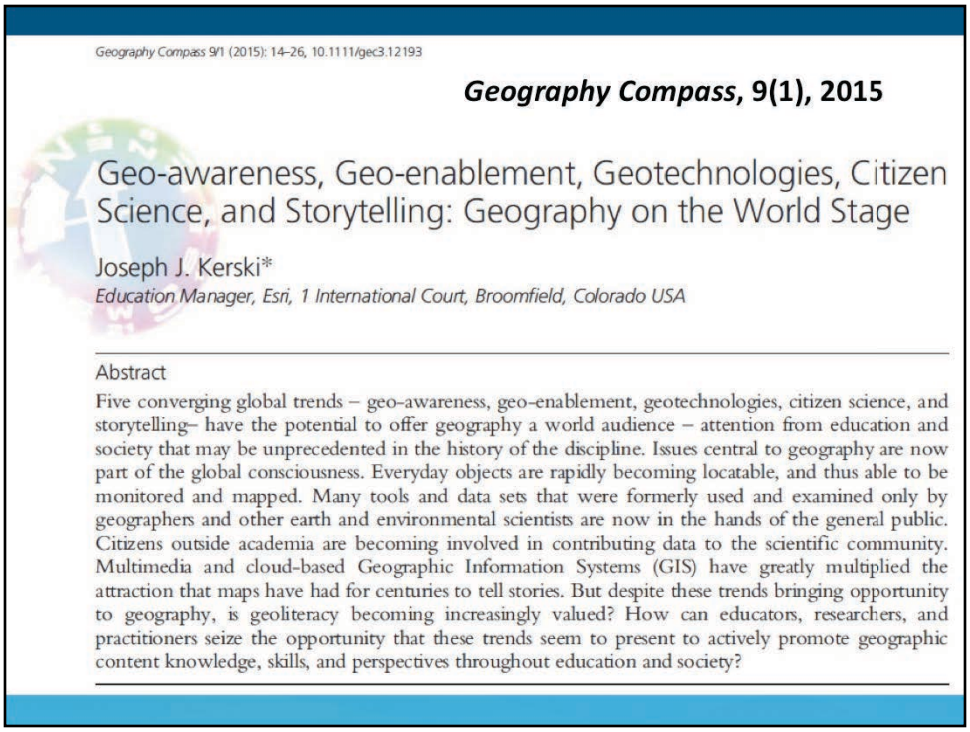
Description
Snap2Map application lets you easily tell your story on a map using photos on your iPhone. Pick your vacation photos and create an Esri story map in just a few steps using this application.
Snap2Map Support
...More
What's New in Version 1.3
• Various bug fixes
View in iTunes
Free
Category: Productivity
Updated: Aug 14, 2014
Version: 1.3
Size: 32.1 MB
Languages: English, Danish, French, German, Japanese, Simplified Chinese, Spanish, Traditional Chinese
Seller: ESRI
©2014
Rated 4+
Compatibility: Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch. This app is optimized for iPhone 5.
Customer Ratings
Current Version:
5 Ratings
All Versions:
9 Ratings
More iPhone Apps by ESRI
iPhone Screenshot
Snap2Map
CREATE NEW STORY MAP
VIEW MY STORY MAPS
Cancel
Add Details
Palm Springs storymap
Storymap from iPhone
Topographic
Light Gray Canvas
Imagery
Street

Made by high school students from photos taken in the field. They could have used Snap2Map



A new story map app in development focusing only on photos



Geography Compass 9/1 (2015): 14–26, 10.1111/gec3.12193

***Geography Compass*, 9(1), 2015**

Geo-awareness, Geo-enablement, Geotechnologies, Citizen Science, and Storytelling: Geography on the World Stage

Joseph J. Kerski*
Education Manager, Esri, 1 International Court, Broomfield, Colorado USA

Abstract

Five converging global trends – geo-awareness, geo-enablement, geotechnologies, citizen science, and storytelling– have the potential to offer geography a world audience – attention from education and society that may be unprecedented in the history of the discipline. Issues central to geography are now part of the global consciousness. Everyday objects are rapidly becoming locatable, and thus able to be monitored and mapped. Many tools and data sets that were formerly used and examined only by geographers and other earth and environmental scientists are now in the hands of the general public. Citizens outside academia are becoming involved in contributing data to the scientific community. Multimedia and cloud-based Geographic Information Systems (GIS) have greatly multiplied the attraction that maps have had for centuries to tell stories. But despite these trends bringing opportunity to geography, is geoliteracy becoming increasingly valued? How can educators, researchers, and practitioners seize the opportunity that these trends seem to present to actively promote geographic content knowledge, skills, and perspectives throughout education and society?

Now I would like to share some recent papers that have just come out, which hopefully can inform our discussion of citizen science and indigenous knowledge


Esri Insider
Esri visions, strategic initiatives, and trending topics
RSS 2.0
Atom 1.0
http://shar.es/1okg41
Geoenabling Citizen Science
by Joseph Kerski on June 4, 2014
Share 86
Tweet 187
Share 551
Every issue from pollution to habitat to biodiversity and beyond has a geographic component, and thus can be studied in the field. Because the world is rapidly changing, and because large organizations have cut back on many of their field staffs, much of the critically needed field data can and should come from citizen scientists.
What is "citizen science"?
"Citizen science is scientific research conducted, in whole or in part, by amateur or nonprofessional scientists, often by crowdsourcing and crowdfunding."
–Wikipedia
Consider the major environmental issues of our 21st Century world: Coastal erosion, air, soil, and water pollution, urbanization, desertification, habitat loss, invasive species, and deforestation, just to name a few. Each of these issues occurs somewhere, and often in multiple locations and at multiple scales. For example, climate change is a global phenomenon that also impacts local weather and crop yields. Each phenomenon exhibits a spatial pattern in its source and in its diffusion. Each affects multiple facets of the human and physical environment. Therefore, the geographic perspective is key to understanding those issues, and citizen science initiatives provide data that can be used within a GIS environment. In such an environment, multiple variables can be displayed and analyzed as map and image layers, at multiple scales, in two dimensions and in three dimensions.
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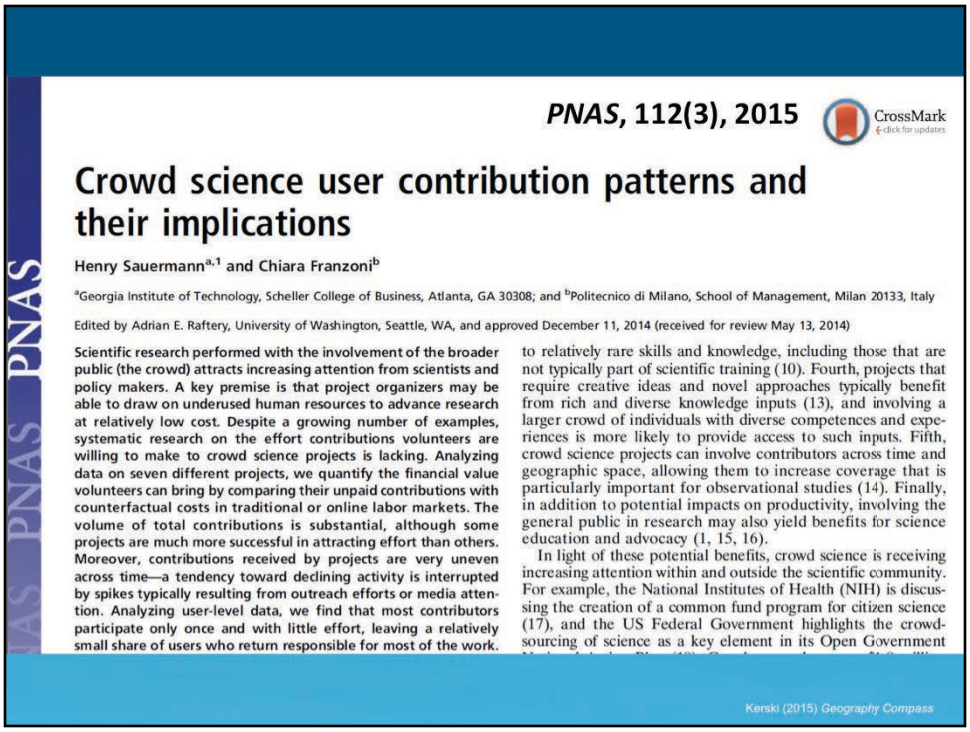
What do you want to discuss next?



PNAS, 112(3), 2015

Crowd science user contribution patterns and their implications

Henry Sauermann[a,1] and Chiara Franzoni[b]

[a]Georgia Institute of Technology, Scheller College of Business, Atlanta, GA 30308; and [b]Politecnico di Milano, School of Management, Milan 20133, Italy

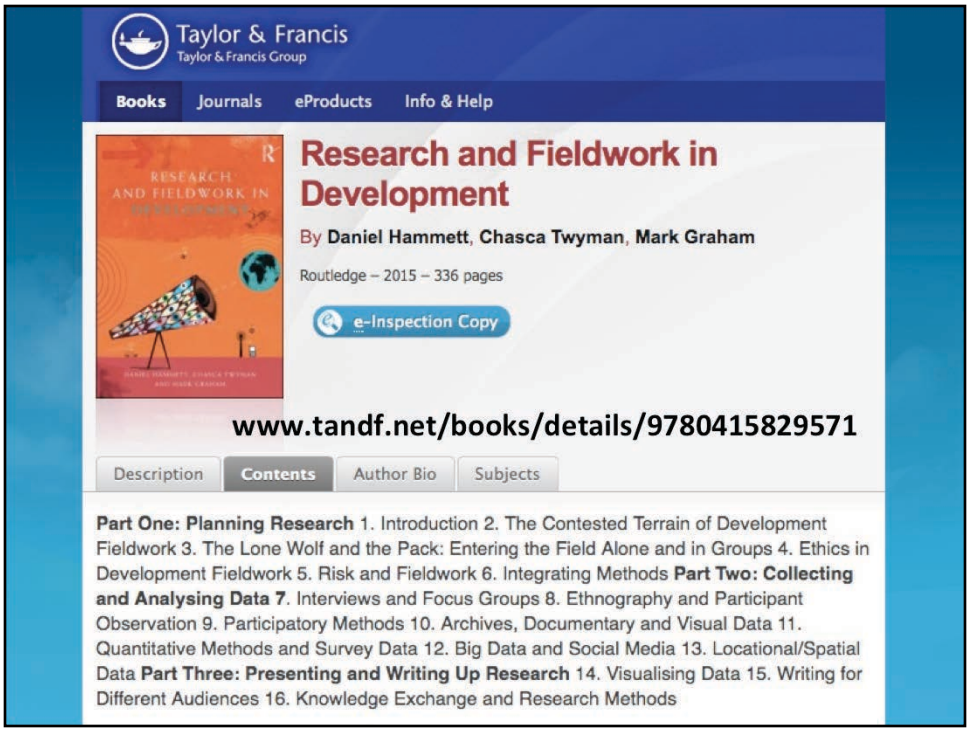
Edited by Adrian E. Raftery, University of Washington, Seattle, WA, and approved December 11, 2014 (received for review May 13, 2014)

Scientific research performed with the involvement of the broader public (the crowd) attracts increasing attention from scientists and policy makers. A key premise is that project organizers may be able to draw on underused human resources to advance research at relatively low cost. Despite a growing number of examples, systematic research on the effort contributions volunteers are willing to make to crowd science projects is lacking. Analyzing data on seven different projects, we quantify the financial value volunteers can bring by comparing their unpaid contributions with counterfactual costs in traditional or online labor markets. The volume of total contributions is substantial, although some projects are much more successful in attracting effort than others. Moreover, contributions received by projects are very uneven across time—a tendency toward declining activity is interrupted by spikes typically resulting from outreach efforts or media attention. Analyzing user-level data, we find that most contributors participate only once and with little effort, leaving a relatively small share of users who return responsible for most of the work.

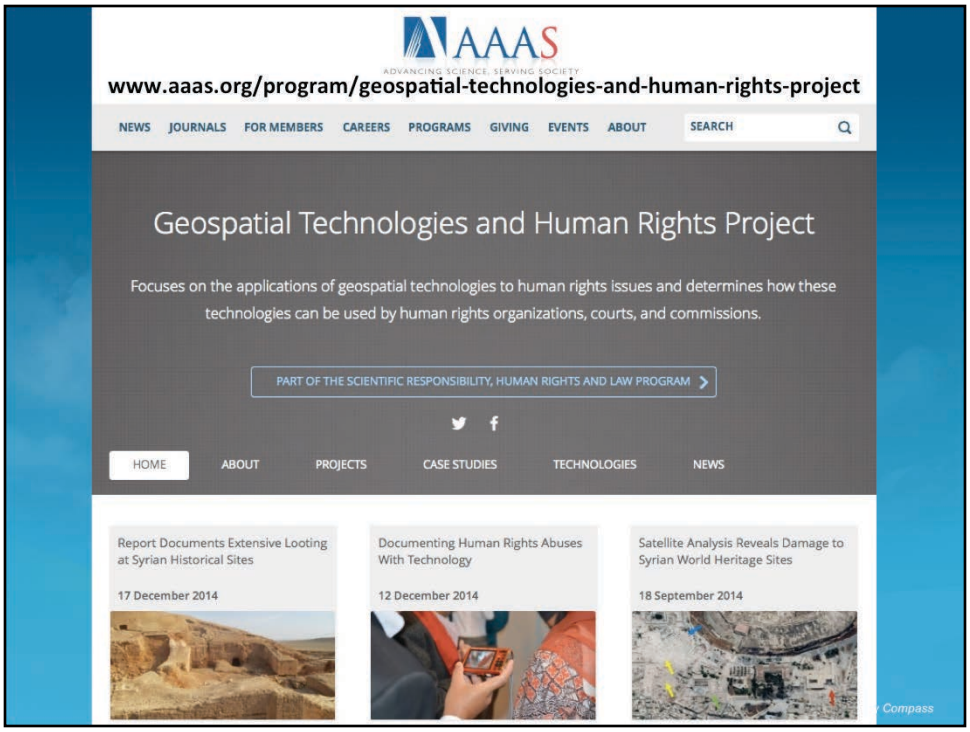
to relatively rare skills and knowledge, including those that are not typically part of scientific training (10). Fourth, projects that require creative ideas and novel approaches typically benefit from rich and diverse knowledge inputs (13), and involving a larger crowd of individuals with diverse competences and experiences is more likely to provide access to such inputs. Fifth, crowd science projects can involve contributors across time and geographic space, allowing them to increase coverage that is particularly important for observational studies (14). Finally, in addition to potential impacts on productivity, involving the general public in research may also yield benefits for science education and advocacy (1, 15, 16).

In light of these potential benefits, crowd science is receiving increasing attention within and outside the scientific community. For example, the National Institutes of Health (NIH) is discussing the creation of a common fund program for citizen science (17), and the US Federal Government highlights the crowdsourcing of science as a key element in its Open Government

Kerski (2015) *Geography Compass*



An Esri colleague on our Nonprofit and Global Organizations team, Charles Brigham, wrote a citizen-science focused chapter in this book on the use of crowdsourced data and big data in INTERNATIONAL development research, including ethnography and political geography, particularly in subSaharan Afirca



Esri's Charles Brigham is also involved in this AAAS program that we all might want to connect with and track, if not doing so already.


Thank You
edcommunity.esri.com
esriurl.com/scicomm
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Twitter: @deepseadawn

Extra Slide


Other Strategic Initiatives
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Open Source
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- acquired geoIQ, new Development Center
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