



Volunteered Geographic Information (VGI) and other cartographic (r)evolutions

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Will there be a “raison d’être” for national mapping
agencies in a few decades from now?

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International Workshop on Spatial Data and Map Quality
Valetta, Malta – 20th January 2014



Cartography



Cartography and Science



Ptolemy (90-168)



Gerardus Mercator
(1512-1594)

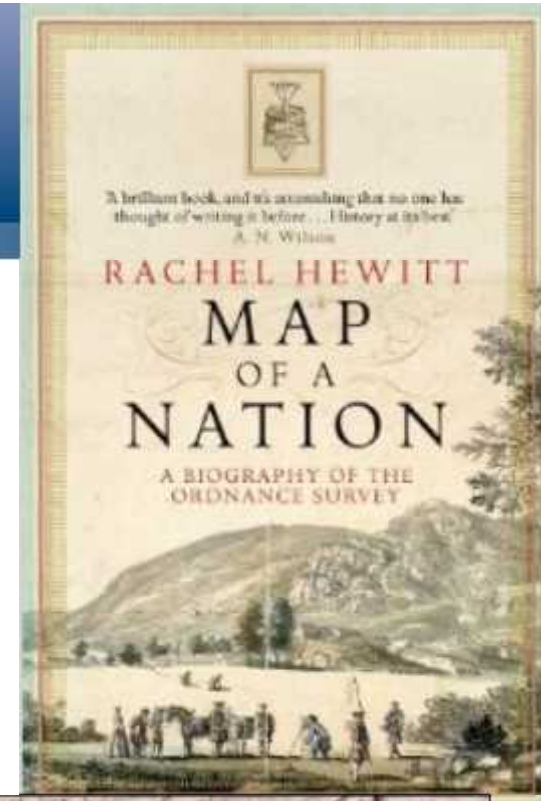


Shen Kuo (1031-1095)

Cartography and Engineering



Ordnance Survey
UK
1791



Cartography and Engineering

IGN France
1940 (1887)



Cartography and Engineering



OpenStreetMap



Big change in the Cartography landscape



Dealing with big changes...

What Psychology tells us when we face big changes in our life...?

THE 5 STAGES OF GRIEF



Denial



Anger



Bargaining



Depression

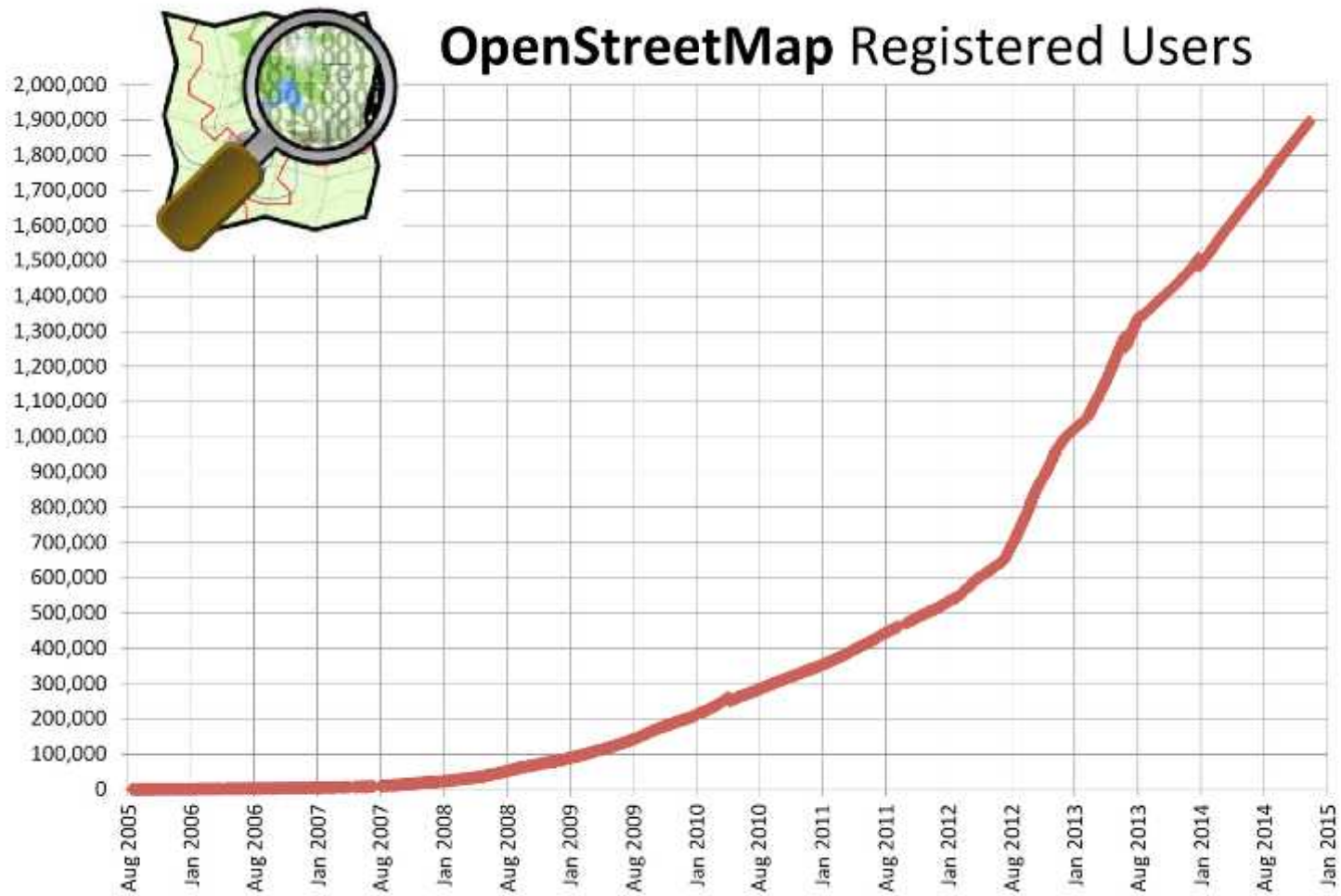


Acceptance

Reaction from most NMAs

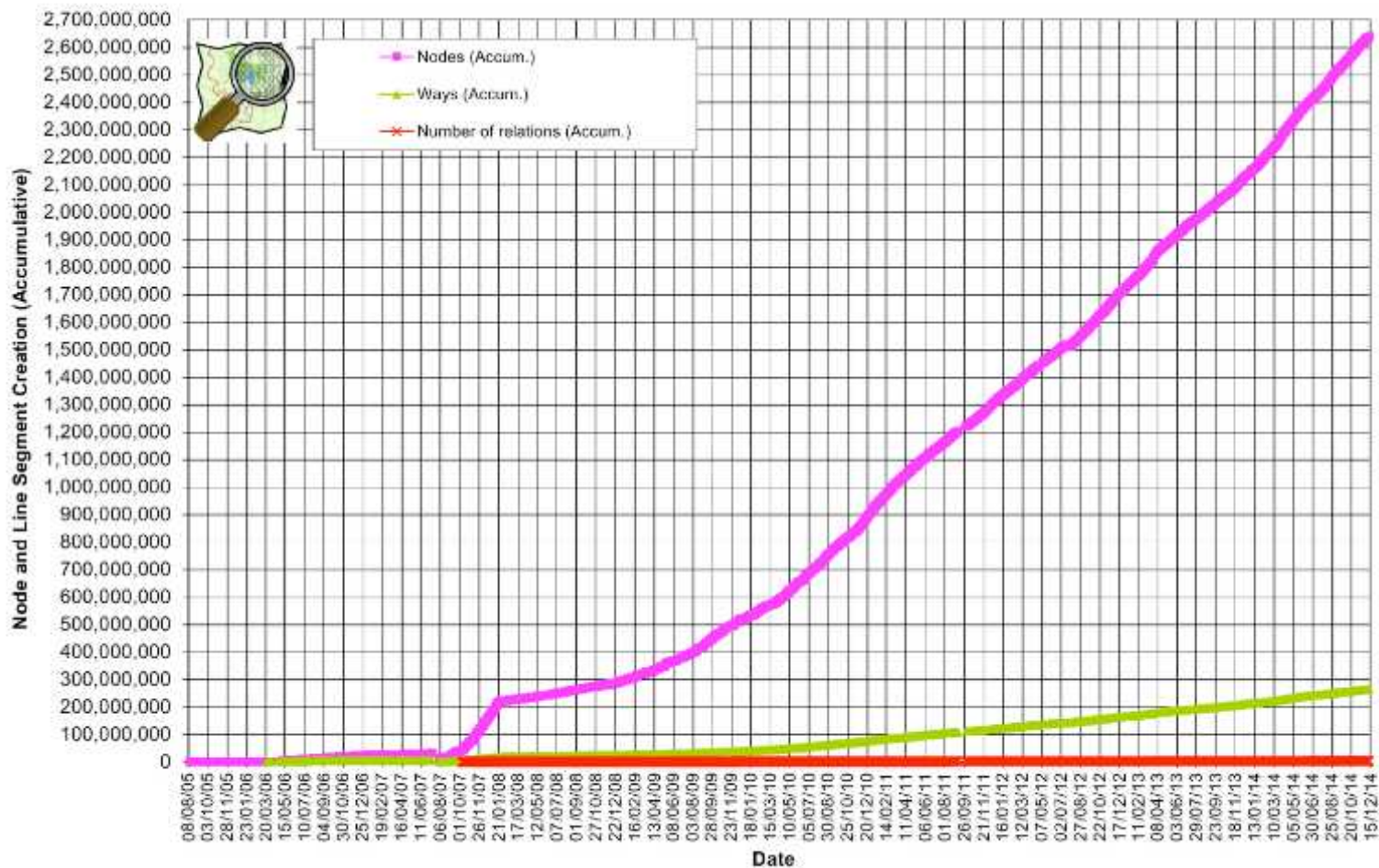
- 5 stages of grief of NMAs' exclusivity with maps:
 - Denial and isolation
 - They are not professional, it can't be serious
 - Anger
 - Why is this getting popular? This is not real mapping! People will see the difference with what we do
 - Bargaining
 - They still do good things, let's use some of their data to improve mine
 - Depression
 - Their data are good and people use them... Will people still need us?
 - Acceptance
 - Crowdsourcing is a new reality, how can we best benefit from it?

OpenStreetMap Statistics



OpenStreetMap Statistics

OpenStreetMap Database Statistics
Node, Way and Relation Creation



OpenStreetMap Statistics

OpenStreetMap Database Statistics
Users Uploading or Editing Nodes (Rolling Month)



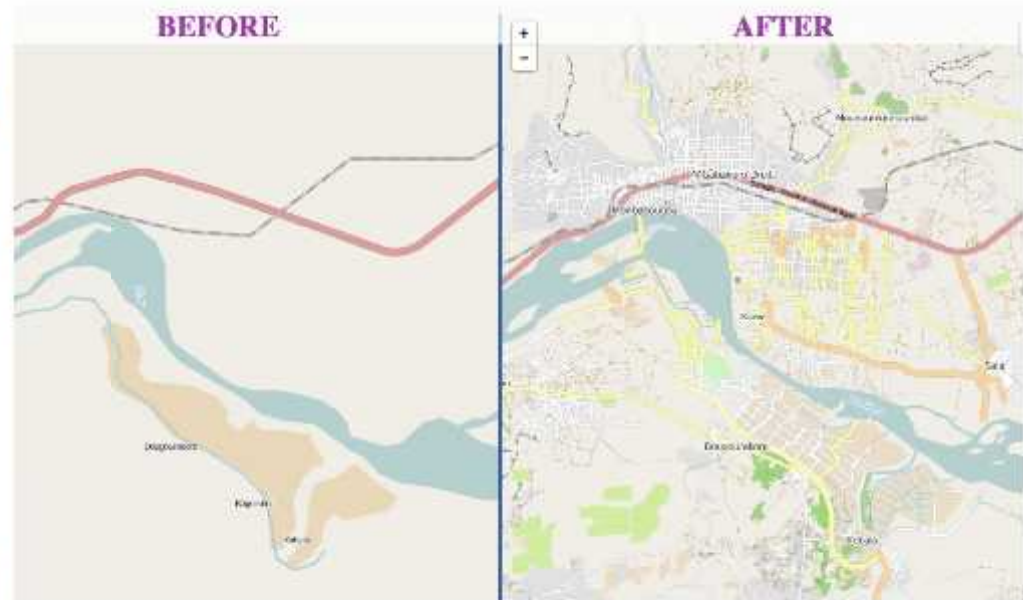
OpenStreetMap South Burlington High School Mapathon - December

On Monday, December 1st, 2014, the Spatial Analysis Lab organized another OpenStreetMap (OSM) event. It was held at the South Burlington High School where three of Kristine Harootunian's (a math teacher at SBHS) classes digitized geographic features in Mali in response to the Ebola outbreak. There had been a small outbreak in Mali, which resulted in 9 clinical cases (7 confirmed, 1 probable and 1 suspected) ([Ebola Outbreak, Mali](#)). In this outbreak, the number of cases did not climb exponentially due to the preparedness and diligence of various organizations on the ground such as Doctors Without Borders and the World Health Organization.

When an Ebola outbreak occurs, the only course of action is to contain it as quickly as possible. However, due to the incubation period of the virus, (up to 21 days) people can be infected, yet asymptomatic. This makes it incredibly difficult to know who to quarantine as widespread testing is not an option. [Contact tracing](#) is one of the most potent tools in our arsenal to prevent the spread of Ebola. This entails health workers on the ground maintaining detailed records of who has contracted Ebola and those people who have had direct contact with that person so that they can be monitored. Having access to detailed maps of the area of interest is a key component to accelerating this process. Contact tracing was a major effort in Mali and resulted in hundreds of people being quarantined.



Students at South Burlington High School working with OpenStreetMap



[Outside of Bamako, Mali, before and after OSM's recent activation](#)

Other VGI projects

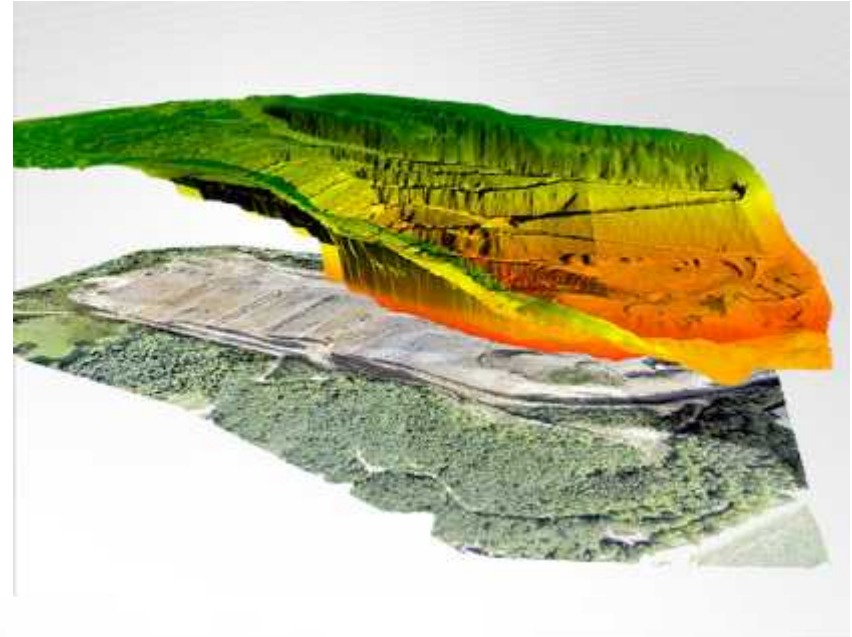
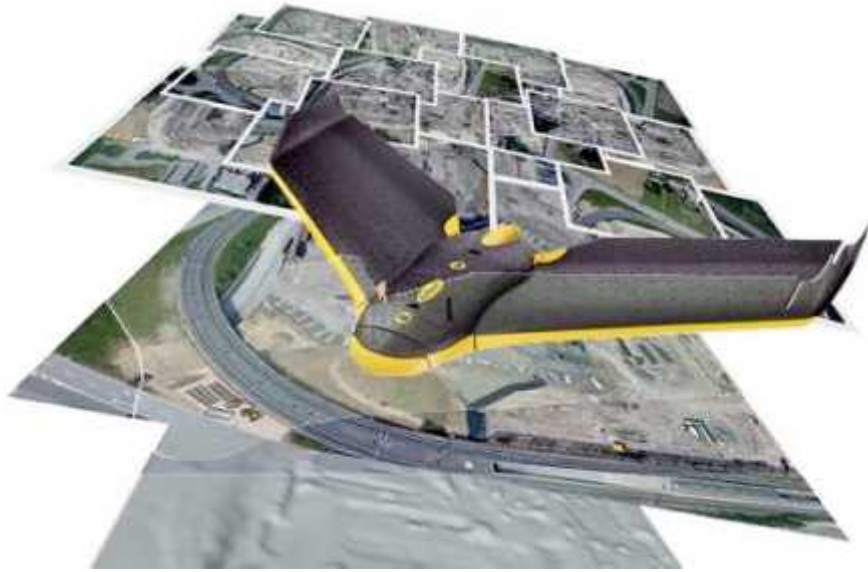
Table 1. Comparison of volunteered geographic information (VGI) projects. ODbL, Open Database License; API, application programming interface; N/A, not available; CC BY-SA, Creative Commons Attribution-Share Alike.

Attribute	Map maker (Google)	Here map creator (Nokia)	Map share (TomTom)	Waze	Wiki mapia	OpenStreet Map
Initiated in	2008	2012	2007	2008	2006	2004
Number of Users or registered Members (in million)	N/A	N/A	60 ¹	45 ²	1.9 ³	1.3 ⁴
Active Contributors per month in 2013	40,000 ⁵	N/A	N/A	12–13 million ⁹	N/A	20,000 ⁴
Coverage (number of countries) in 2013	>220	>120	>90 ⁶	World	World	World
License	Property of Google	Property of Nokia	Property of TomTom	Property of Waze	CC BY-SA	ODbL
Data downloadable	No	No	No	No	Yes ⁷	Yes

Notes: ¹ the number of enabled devices; ² [45]; ³ [39]; ⁴ [46]; ⁵ [47]; ⁶ the number of countries for which map data is available; ⁷ only via a web-API.

(Neis and Zielstra, 2014)

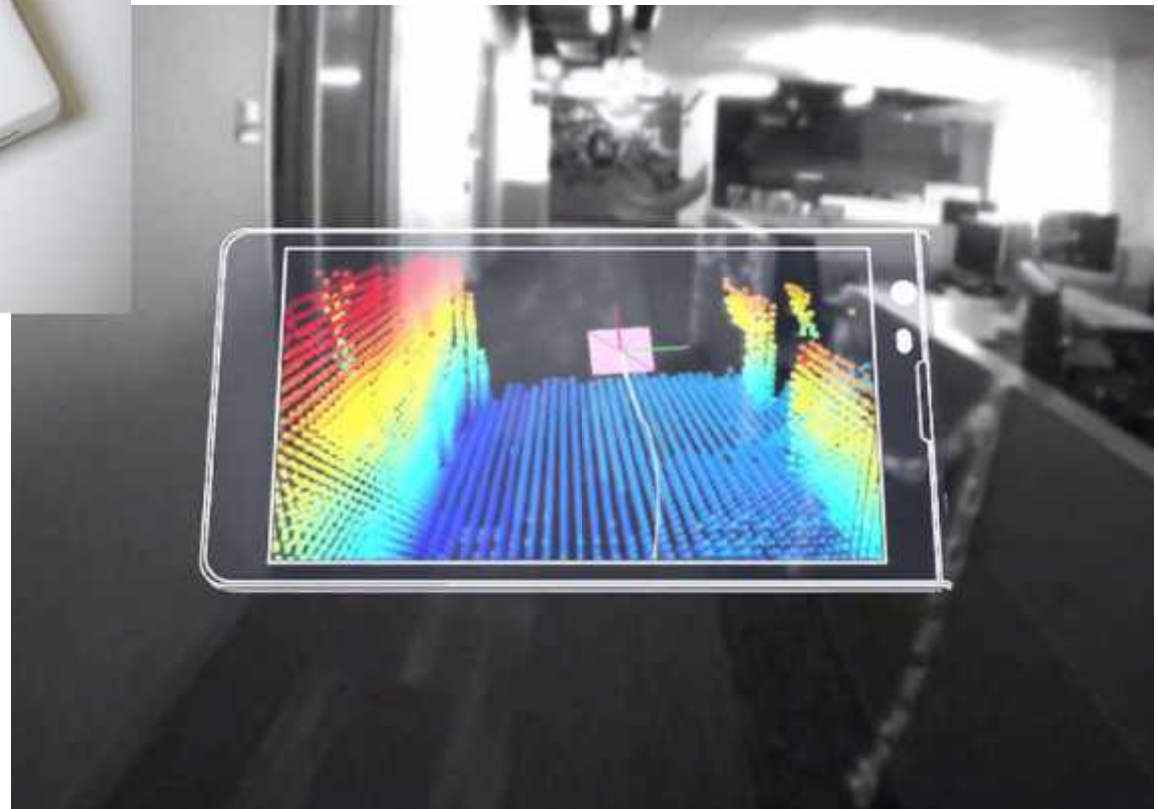
Mapping with drones



And this is only the beginning



Example: Google Project Tango



NMAs always go through changes

National Mapping Agencies – A new model for the 21st Century

Prof. Peter DALE, Scotland

Key words: National Mapping Agencies (NMAs), Local Land Information Managers (LLIMs), International Mapping Agency (IMA).

ABSTRACT

Many countries cannot afford to run a modern capital intensive national mapping agency (NMA). This paper proposes a new model for NMAs as Centres for Geographic Information, supported where appropriate, by International Mapping Agencies (IMAs). Traditionally, NMAs have been responsible for topographic mapping (based on 19th Century military requirements) and cadastral mapping (concentrating on property boundary beacons). Much of the mapping is out of date or covers only parts of a country. The data, though necessary, is insufficient for the needs of a modern society.

(Dale, 2002, FIG XXII)

Changing the role of NMAs



- “Governments are likely to continue to play a major role in securing and guaranteeing the **quality** of the fundamental geospatial information base” (*UN-GGIM, 2013*)

But changes are now more rapid...

[Archive](#) > [April 2013, Volume 27, Number 4](#) > [Cadastral Agencies Need to Rethink Role](#)

Cadastral Agencies Need to Rethink Role 12/04/2013

GIM International Interviews Jacqueline McGlade

Mapping and cadastral agencies will need to reconsider their changing roles in the near future. One of the most important challenges will be their ability to manage near real-time data and information. After ten years as director of the European Environment Agency in Copenhagen, professor Jacqueline McGlade will be leaving the position in May 2013. At the High Level Forum of the United Nations Global Geospatial Information Management Initiative (UN-GGIM) which took place recently in Doha, Qatar, she spoke to GIM International and explained in more detail her call for mapping agencies and cadastral agencies to reflect on how they will need to change in order to respond to future economic and societal trends.

Durk Haarsma, publishing director, GIM International

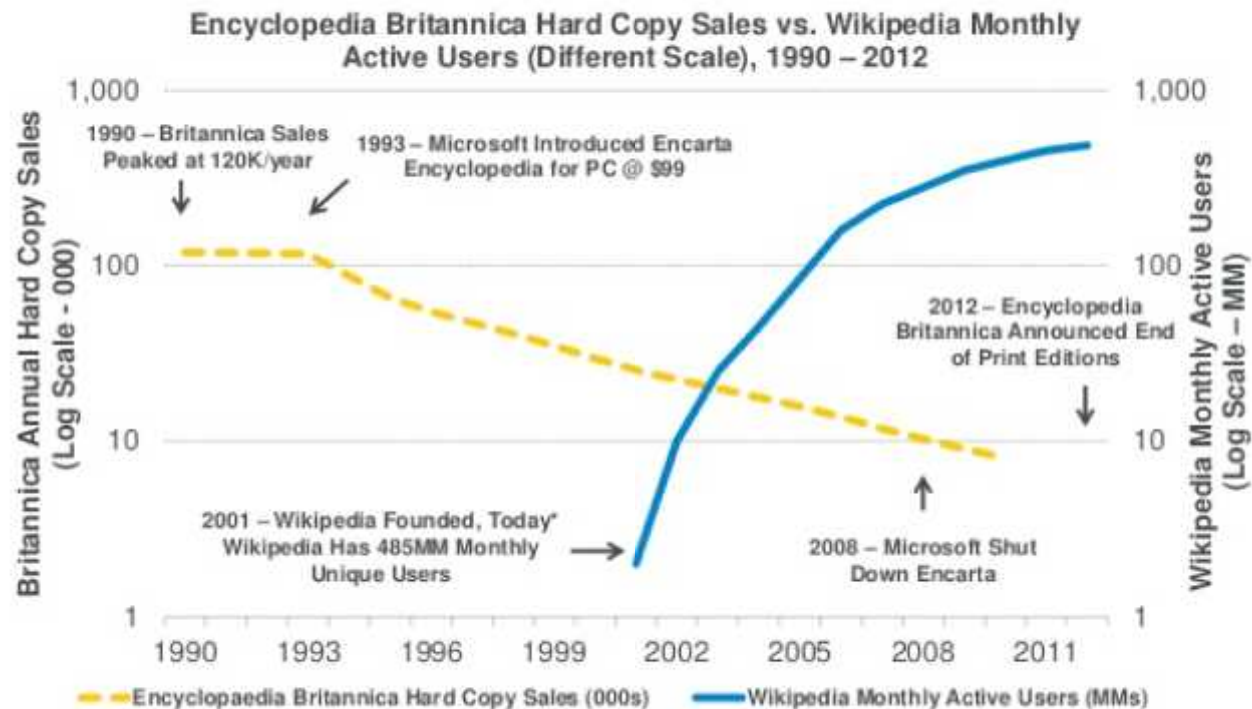


First of all, what do you think of the United Nations adopting geospatial as a major point of focus through the UN-GGIM Initiative?

It's long overdue, and therefore a very good initiative. The spread of geospatial thinking is a powerful unifier to make progress on delivering sustainable development around the world. Whilst everyone's location can be found on a map, the map itself could be a good or an inaccurate map, depending on how a country has invested in such activities as mapping, cartography and geodesy. However, with the growth in satellite programmes and the science and knowledge that is now available, the emancipation of

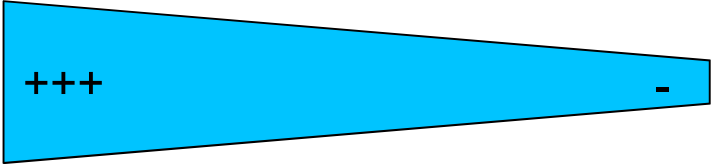
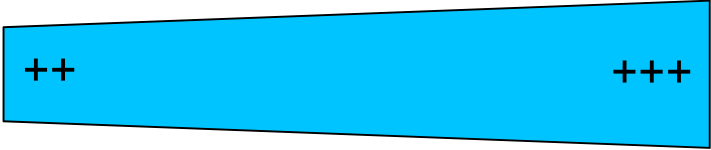
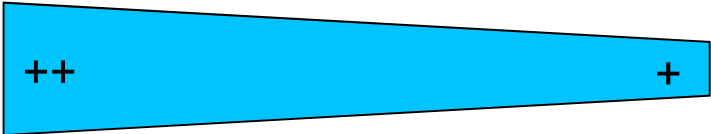
An impact of crowd-sourcing

244 Years In, Encyclopedia Britannica Went Out of Print in 2012



What NMAs do

Very simplified view:

	Past → Future
<ul style="list-style-type: none">• Acquisition<ul style="list-style-type: none">• Land surveys• Aerial surveys	
<ul style="list-style-type: none">• Management<ul style="list-style-type: none">• Data Processing• Spatial database storage• Quality Control/Assurance	
<ul style="list-style-type: none">• Dissemination<ul style="list-style-type: none">• Production of maps• Distribution of maps (Web, etc.)	

New role of NMAs

- What National Mapping Agencies will/could do:
 - Producing authoritative data (liability?)
 - Defining standards and policy
 - Establishing national spatial reference networks
 - Shift from being a producer a catalyst of geospatial data integration
 - Etc.

What about data quality?

	Authoritative	VGI
• Internal quality		
• Positional Accuracy	++	+++ / +
• Thematic /Attribute Accuracy	++	+++ / -
• Completeness	+++	++ / -
• Logical consistency	+++	++ / -
• External quality		
• Cost	- / +++	+++
• Up-to-dateness	-	+++
• Homogeneity	++	- -

NMAs and data quality

- NMAs should take a more active role in crowd-sourcing by sharing expertise (not only data).
- NMAs should:
 - Invest resources (time and funding) to link with the crowdsourcing communities and support them
 - Help reduce heterogeneity in crowd-sourced data
 - Focus their efforts to limit unnecessary redundancy

Conclusions

- The mapping landscape is changing very rapidly but NMAs don't change at the same pace
- Failure to adapt could lead to a lack of relevance of a lot of NMAs activities
- NMAs still have an important role to play in the future but have to better rethink their roles in light of the other players
- NMAs have a invaluable expertise that could benefit mapping initiatives more generally and should be more engaged in crowdsourcing activities to improve the quality of the data in their countries

9th International Symposium on Spatial Data Quality (ISSDQ' 15)

Part of “*ISPRS Geospatial Week*”

www.isprs-geospatialweek2015.org

Sept 28th - Oct 3rd

Montpellier, France



Special sessions proposal: January 15th

Short paper submission: March 15th

Questions?

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