Citizen science infrastructures: Technology appropriation for data management & sharing

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8 August, 2017

Infrastructures

- The most basic level of organizational structure in a complex system

- Often large-scale public systems, services, & facilities necessary to the publics they serve

  - Notorious for being visible only when broken!

Citizen Science Infrastructures

- Foundations for the core activities of doing citizen science

  - Data collection & entry

  - Annotation & transcription

  - Analysis & visualization

- *Protocols* & *platforms*

  - Lots of tools & methods for distributed activity

  - Good support for groups is important

Convenient Examples

- iNaturalist
  - Biodiversity data sharing platform & community
  - Machine vision + human refinement of species IDs; "Projects" support group-specific activities & roles
- Zooniverse
  - Annotation & transcription platform & community
  - Use project builder to configure a new project
- CitSci.org
  - Comprehensive citizen science project management platform for monitoring & ecology
- They are all free & have apps.

There are literally dozens of biodiversity platforms!

Name	URL	Geographic distribution	Language(s)	Taxonomic Focus	Shares with GBIF?	Website? Y/N	Mobile app? Y/N	# Users	# Records	Comments	Date Added/Updated	See other user's data?	Crowdsourcing ID?	Do... dat...
Biodiversity Snapshots	http://www.biodiver	?	?	?	?	?	?	?	?	Wasn't loading on July 8, 2016	July 8, 2016			
WildObs	http://wildobs.com/		English	?	?	Y	?	?	?	Overrun with spam :-(	July 9, 2016			
Audubon Nature Share	http://natureshare.	?	English	Birds	?	Y	?	?	?	Seems to only allow bird sightings but previously I thought it was more inclusive.	July 8, 2016			
Angler Action	http://www.anglera	?	English	Fish	?	Y	Y	?	?	Emphasis on reporting zero catch data.	July 9, 2016			
Virtual Museum (Animal Demography Unit)	http://vmus.adu.org	Africa		Subprojects (e.g. MammalMAP) covering conspicuous taxa	?	Y	?	?	?	Based at University of Cape Town	July 8, 2016			
BowerBird	http://www.bowerbi	Australia	English		Yes, via ALA	Y	?		50,000	Ken, its founder, writes a monthly newsletter called the Bower Bird Bugle full of great stories of the power of this kind of platform. I (Carrie) love reading it.	July 8, 2016			
FungiMap	http://fungimap.org	Australia	English	Fungi	?	Y	?	?	?	Unsure if other people's observations are accessible for public view. Lots of identification resources.	July 8, 2016			
RedMap	http://www.redmap	Australia	English	Rare marine species	?	Y	N	?	1280	Redmap = Range Extension Database & Mapping project	July 8, 2016			
iNaturalist Canada	http://www.inaturali	Canada	English, French	All	Yes	Y	using iNatural	2,475	71,200	iNaturalist network partner	July 8, 2016		yes	
hinature	http://hinature.cn/	China			?	Y	Y	549	520	Has 45,695 species pages and 2675 protected areas.	April 25, 2017			
NaturaLista	http://naturalista.bi	Colombia	Spanish		Yes	Y	using iNatural	421	6,913	iNaturalist network partner	July 8, 2016		yes	
NatureGate	http://www.luontop	Europe?	Several	Plants, birds, butterflies, Fish	?	Y	?	?	?	Maybe not very social, more about learning and recording.	July 8, 2016			
IGFAcatchlog	http://www.igfacatc	Everglades NP (I	English	Fish	?	Y	Y	?	?	Has actual rewards for different levels of engagement.	July 9, 2016			
naturgucker	http://naturgucker.c	Germany	German, English	All?	?	Y	?	?	?	Unsure about geographic use.	July 8, 2016			
iNaturalist	www.inaturalist.org	Global	Several	All	Y	Y	Y	...642	3,097,000	Includes counts from iNaturalist network partners.	July 8, 2016	yes	yes	yes
Anymals +Plants	https://www.anyma	Global	English			Y	Y		16,650	Funded mostly by German organizations.	July 8, 2016			
Project Noah	http://www.projectn	Global	English			Y	Y		771,591	Has huge Facebook following. Generally attracts great photographers.	July 8, 2016			
iSpot	http://www.ispotnat	Global	English, Spanish	All	country nodes	Y	N	?	500,000+	Nodes in UK & Ireland, Chile, Hong Kong, and Southern Africa	July 8, 2016		yes	
Discover Life	http://www.discove	Global	English	All		Y	N	?	>2 million?	Big emphasis on moths but covers thousands of taxa.	July 8, 2016			
Map of Life	http://www.mol.org	Global				Y	Y			Useful for finding species around you and recording your own observations. Not really social (yet?) because you can't interact with other people's observations. Really nice mobile app.	July 8, 2016			
eBird	http://ebird.org/con	Global	Several	Birds		Y	Y	...185	...3,333	Several regional portals.	July 8, 2016		no	
Web sakana zukan	http://zukan.com/fi	Global		Fish	maybe	Y	yes	...652	45,845	3268 species	July 10, 2016			
Jellywatch	http://jellywatch.org	Global	English, Japanese	Marine life (especially jellies)	?	Y	Y	?	5,250	Easy to export data as csv	July 8, 2016			
Mushroom Observer	http://mushroomob	Global	English	Mushrooms	?	Y	?	?	261,000		July 9, 2016		yes	
HerpMapper	https://www.herpm	Global	English	Reptiles & Amphibians		Y	Y		148,738	Obscures all data to county level.	July 8, 2016			
Umiushi zukan	http://www.umiush	Global	Japanese		no	Y	N	...34	26,537	1059 species	July 10, 2016			
eshark	http://eoceans.org/	Global	English	Sharks, rays, chimeras		Y	?		33,000+	Also have sub-projects for Fiji, Thailand, and Indonesia	July 11, 2016			
Shark Base	http://www.shark-b	Global	English	Sharks, rays, chimeras	via ALA?	Y	N	100	2,154	Based in Australia?	July 11, 2016			
Record Wildlife	http://recordwildlife	Global?	English	Any	No	N	Y	?	?	Not really social. More for personal recording.	July 8, 2016			
the Wildlab	http://thewildlab.or	Global?	English	Birds, Marine life	?	Y	Y	?	?	Aimed at educators!	July 8, 2016			
MycoMap	http://mycomap.co	Global?	English	Fungi	?	Y	?	?	?	Cool seasonality maps! Supports genetics. Integrates data from iNaturalist.	July 9, 2016			
India Biodiversity Portal	http://indiabiodivers	India	English	All	?	Y	Y	?	82,948	Also pulls data from GBIF. Well developed mapping functionality. Has many subgroups (regional & taxonomic).	July 8, 2016			
Cnature	http://www.cnature.	Israel	Hebrew, English	Most taxa	Not directly	N	Y	?	?	Trait-based ID tools in the app.	July 8, 2016			
Minna de tsukuru Kobe ikimono map	http://commons.my	Kobe	Japanese	All	no (maybe)	Y	N	?	6,423	run by local government	July 10, 2016			
Naturing	https://www.naturin	Korea	Korean	All?	No	Y	Y	?	?	Was used by Bioblitz Korea in 2015 (I think).	February 18, 201			
NatureSpot	http://www.natures	Leicestershire and	English	All?	Via NBN?	Y	N	?	?	Lots of ID resources	July 8, 2016			
Maryland Biodiversity Project	http://www.marylan	Maryland (USA)	English	All	?	Y	N	?	259,323		July 9, 2016			
NaturaLista	http://naturalista.co	Mexico	Spanish	All	Yes	Y	using iNatural	5,929	248,000	iNaturalist network partner	July 8, 2016		yes	
Observation (Observado)	http://observation.c	Global	Several	All	Varies by country	Y	Y	8,646	19,088,968	Lots of stats here: https://observation.org/statistiek.php and good overview here: https://thetestgarden.com/for-the-birds/tech-birds/observation/	July 8, 2016	yes	Validation teams	see
NatureWatchNZ	http://naturewatch.	New Zealand	English	All	Yes	Y	using iNatural	4,710	261,000	iNaturalist network partner	July 8, 2016		yes	
Journey North	http://learner.org/jn	North America	English	Birds, some insects	No	Y	Y	?	?	Popular in the classroom.	July 8, 2016			
ebutterfly	http://www.e-butter	North America	English	Butterflies	Y	Y	N	?	?	Most data features behind login.	July 8, 2016			
HERP	http://www.naherp.	North America	English	Reptiles & Amphibians	No	Y	No	3,099	235,792	Bigger than Herpmapper? Wow.	July 9, 2016			
Natusfera	http://natusfera.gbi	Spain	Spanish	All	Yes	Y	?	595	1,596	Uses iNaturalist open source platform but doesn't share the database and community (i.e. independent)	July 8, 2016			
artportalen	http://www.artporta	Sweden	Swedish	All?	?	Y	?	?	?	Anyone who knows Swedish want to fill in?	July 8, 2016			

(Some) Missing Links

- Strong data management support
  - Review processes, task routing, etc.
  - Documentation & metadata
- Functionality to support training
  - Variety of practices & media used
- Comprehensive communication toolkits
  - Public-facing & internal, multichannel, multimedia
- Guidance on community management

Technology Appropriation

CS infrastructures are **system assemblages**…

> **collections of functional technical components and social components (Prestopnik & Crowston, 2012)**

…whose key components are usually borrowed or bought through **appropriation**.

> **a process where "users re-invent the technology while they try out its features, tweak devices and applications so they better answer their needs, come up with different ways to use services, and develop new social, economic and political practices" (Bar, Pisani, & Webster, 2007)**

Appropriation? What? Why?

- Most projects rely on a complex network of technical components

  - E.g., external data standards, social media platforms, map baselayers, custom systems

- It's usually better to borrow or buy than build

  - For that to work, projects need technologies that support appropriation
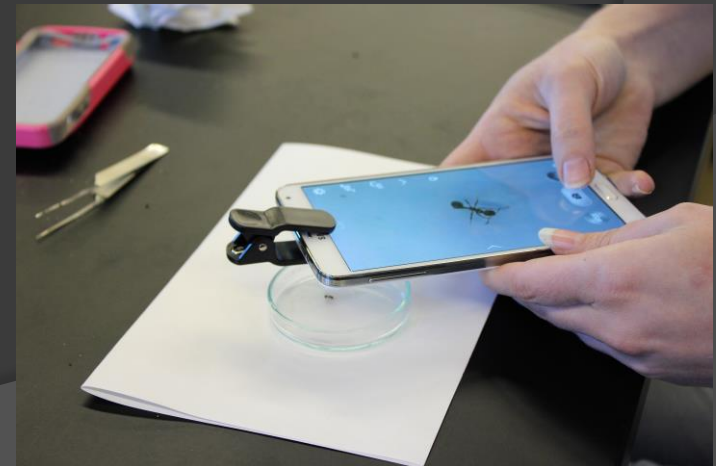
  - And work for science. And communities.

Photo: Yurong He

Designed for Appropriation

- Allows flexibility in assigning meanings

- Makes data flows visible, open code base

- Makes their own intentions & goals clear

- Actively supports tool & process reuse

- Supports flexibility through configurability

- Learns from appropriation to improve tools

- Encourages sharing by documenting uses

Dix, A. (2007). Designing for appropriation. In *Proceedings of the 21st British HCI Group Annual Conference on People and Computers*. British Computer Society.

Can "It" Be Appropriated?

- Can you make needed adaptations so it will work for your protocol & people?

- Can you trace data flows, view code, & see how it's been used by others?

- Are you cool with:

  - Who runs things?

  - The direction & sustainability of it?

  - Degree of support for custom configuration?

  - Track record for adapting to better serve users?

Thanks!

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Photo: Trish Mace