Standards for Biodiversity Data (Sharing Information Online)

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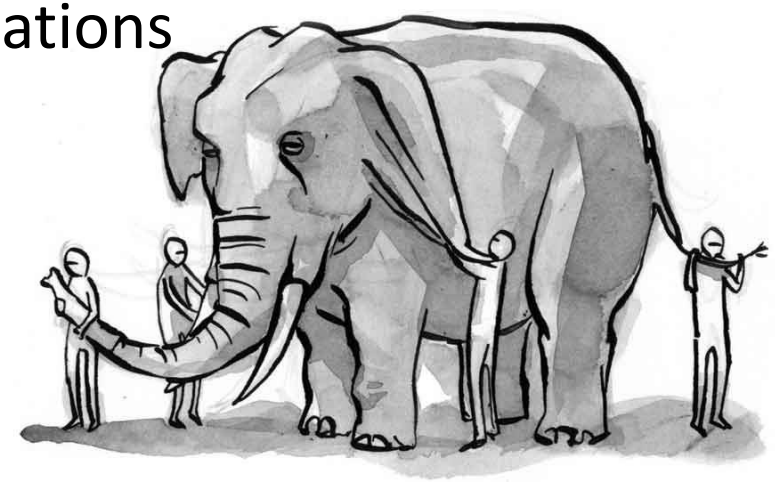
Topics in this presentation

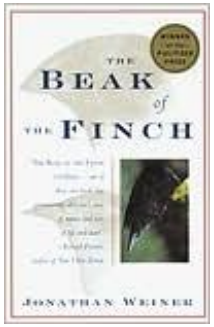
- Example of private data
- Preparing private data for export
- Identifiers for objects and properties
- Standard vocabularies for properties
- Representing relationship among objects
- Adding more detail with annotations



iDigBio
Integrated Digitized Biocollections

Imagining data from *The Beak of the Finch*

- Database information about individual birds



tag	sex	species	mother	father	birthdate
1154	M	large			
1158	F	large			
1160	F	cactus			
1188	F	medium			
1207	M	large	1158	1154	1/1/1975
1008	M	medium	1188		2/12/1976
1330	F	medium	1188	1207	3/15/1978

- Database information about measurements

tag	date	beak1	beak2	wt	notes
1158	12/15/1974	25	12	30.5	
1158	1/15/1975	25	12	28.3	
1158	5/21/1978	25	12	32.1	
1207	1/1/1975			2.3	newborn
1207	2/5/1975	5	3	6	

Information for a single bird

- Example bird as triples

Finch 1207		
id	**property**	**value**
1207	sex	M
1207	species	large
1207	mother	1158
1207	father	1154
1207	birthdate	1/1/1975

- Example measurements of the bird

Measurement		
id	**property**	**value**
	bird id	1207
	date	2/5/1975
	beak1	5
	beak2	3
	wt	6

  - No obvious identifier for the measurement!

Exporting information

- Step 1: Improve properties and values
  - Standardize values
    - “large” is short for “large ground finch”
    - Replace with “Geospiza magnirostris”
  - Add missing information
    - Lat/long for the island
  - Find standard properties to use
    - *sex* replaced with *dwc:sex*
    - *latitude* with *dwc:decimalLatitude*
    - *mother* replaced with ?
  - Define new properties as needed
    - E.g. *beak1* and *beak2* are specific to this measurement
    - Create definitions and register with some repository

Exporting information

- Step 2: improve identifiers and add fields

Finches								
Id	**tag**	**sex**	**species**	**mother**	**father**	**birthdate**	**latitude**	**longitude**
http://beaks.org/finch/1154	1154	M	Geospiza magnirostris				30.2564	-88.1253
http://beaks.org/finch/1158	1158	F	Geospiza magnirostris				30.2564	-88.1253
http://beaks.org/finch/1160	1160	F	Geospiza scandens				30.2564	-88.1253
http://beaks.org/finch/1188	1188	F	Geospiza				30.2564	-88.1253
http://beaks.org/finch/1207	1207	M	Geospiza	http://beaks	http://beak	1/1/1975	30.2564	-88.1253
http://beaks.org/finch/1008	1008	M	Geospiza	http://beaks	http://beak	2/12/1976	30.2564	-88.1253
http://beaks.org/finch/1330	1330	F	Geospiza	http://beaks	http://beak	3/15/1978	30.2564	-88.1253

id	subject	date	beak1	beak2	wt	notes
http://beaks.org/measurement/113	http://beaks.org/finch/1158	12/15/1974	25	12	30.5	
http://beaks.org/measurement/114	http://beaks.org/finch/1158	1/15/1975	25	12	28.3	
http://beaks.org/measurement/115	http://beaks.org/finch/1158	5/21/1978	25	12	32.1	
http://beaks.org/measurement/116	http://beaks.org/finch/1207	1/1/1975			2.3	newborn
http://beaks.org/measurement/123	http://beaks.org/finch/1207	2/5/1975	5	3	6	

Representing relationships

- Measurement relationship to specimen
  - Property: subject of measurement
  - Measurement: http://beaks.org/measurement/113
  - Subject: http://beaks.org/finch/1158
- Father relationship
  - Property: father
  - Child: http://beaks.org/finch/1207
  - Father: http://beaks.org/finch/1154

What kinds of identifiers do you use?

- Specimen identifiers
- Image identifiers
- Taxon identifiers

Identifier types

- Content-rich identifiers contain information
  - Simple identifier, often attached to specimen
    - Number stamped on band: 1154
    - Catalog number: ASU11234
  - Compound identifier: globally unique in context
    - Darwin core triple (institution, collection, catalog number)
      - (BOTF, finch, 1154)
  - URI (uniform resource identifier): internet friendly
    - http://beaks.org/finch/1154
- Content-free identifiers
  - Cannot be parsed, remembered or typed
  - 40c842c9-c04c-489a-b20e-d84bfc16dedd6

Better Identifiers

- UUID identifiers – no embedded content

Finches								
Id	tag	sex	species	mother	father	birthdate	latitude	longitude
40c842c9-c04c-489a-b20e-d84bfc16dedd6	1154	M	Geospiza				-0.4197	-90.37
143ce8bc-ba5d-432b-be31-a5d40b691a63	1158	F	Geospiza				-0.4197	-90.37
dc0ea8ef-9f87-457e-9989-4232e37fb0fd	1160	F	Geospiza				-0.4197	-90.37
38554297-2144-413d-81db-7ea3e89790a2	1188	F	Geospiza				-0.4197	-90.37
cb521b8d-dc14-4691-a9d4-80e4b7899d95	1207	M	Geospiza		urn:uuid	1/1/1975	-0.4197	-90.37
e0868656-c398-4dbf-907b-e1fbf0b0a1ee	1008	M	Geospiza		urn:uuid	2/12/1976	-0.4197	-90.37
c3dd7903-2665-4749-a649-54dadb6a4999	1330	F	Geospiza		urn:uuid	3/15/1978	-0.4197	-90.37

Measurements						
id	isAbout	date	beak1	beak2	wt	notes
025a42e4-4dd7-4b98-9ddc-0b13d664c205	143ce8bc-ba5d-432b-be31-a5d40b691a63	12/15/1974	25	12	30.5	
3b7a6f1b-b0e3-4d3b-a68c-a380fea3f0ca	143ce8bc-ba5d-432b-be31-a5d40b691a63	1/15/1975	25	12	28.3	
a3ca802a-93ed-459a-91ef-4593a4e43455	143ce8bc-ba5d-432b-be31-a5d40b691a63	5/21/1978	25	12	32.1	
432c0a0e-7013-4ee2-ab5a-6ef711f13708	cb521b8d-dc14-4691-a9d4-80e4b7899d95	1/1/1975			2.3	newborn
ff1deac1-23c8-4e14-a163-efd06f88c50e	cb521b8d-dc14-4691-a9d4-80e4b7899d95	2/5/1975	5	3	6	

Moving to standard vocabularies

- Formal processes for defining properties
  - A property is an identified thing
    - http://rs.tdwg.org/dwc/terms/sex
    - dwc:sex is abbreviation
    - Property object has a definition
  - Resource-valued property is a type of relationship
  - Suppose *beak1* is a measurement of beak height
    - Properties defined include
      - Units of measure
      - Morphological feature measured
- Social processes for agreeing on properties and values

Media Vocabulary: Audubon Core

- Properties of a media object
  - http://terms.tdwg.org/wiki/Audubon_Core_Term_List
- Examples
  - dcterms:identifier
    - Unique code of the media object
  - dc:type
    - Recommended terms are Collection, StillImage, Sound, MovingImage, InteractiveResource, Text
  - xmpRights:UsageTerms
    - The license statement defining how resources may be used
  - ac:associatedSpecimenReference
    - A reference to a specimen associated with this resource.

Relationships as annotations

- A relationship that needs its own properties
  - When, who, why, what evidence
- An annotation (*id1*) is an assertion of properties for objects
  - **On** 4 October 2013, Joe **claims** that specimen *id2* is of species *id3* **because** he disagrees with the determination on the label, and for **evidence**, he offers a set of image annotations *id4* showing morphological features that can be seen in the photograph *id5*.
  - Many relationships are expressed in this annotation
- QA updates can be represented as annotations

Identifiers in the Community

- Lots of uncertainty (disagreement!) in community
  - What form of identifiers, what services to provided, etc.
- We need to
  - Emphasize identification of specimens and other objects
  - Help providers to see value of specimen identifiers
  - Remove obstacles to adoption
    - E.g. validate and advocate standard practice in collections managers
  - Move forward in spite of problems
- Current suggestion
  - UUID as basis of identifier
    - f47ac10b-58cc-4372-a567-0e02b2c3d47
  - URI with embedded UUID
    - ark:/87286/B2/f47ac10b-58cc-4372-a567-0e02b2c3d479

Conclusions

- Must have identifiers for objects
  - Especially occurrences
- Must have agreement on properties and values
- Must have strategy for representing relationships
  - In provider databases
  - In repositories
  - In transit

Acknowledgements

- iDigBio team
- GBIF Working Group on GUIDs
- GBIF Working Group on Media Information
- Morphbank project team

More notes on Data Quality for Digitization

- If time permits

Feedback on Quality Issues

- How to get updates into collection database?
  - Receive update from a reliable source
  - Accept it into the database
  - Symbiota supports update from CSV
- What if updates require review?
  - Evaluate values, are they reasonable?
    - Evaluate basis of update?
    - Too time consuming for mass updates
- Update as annotation
  - Includes information about the update
  - Who, when, why
- Software support for quality annotations
  - Kurator, Filtered Push

Quality data from public transcription

- Notes from Nature
  - http://www.notesfromnature.org/
  - Transcribing herbarium labels for SERNEC
- Results sent back to collection manager
- What does the collection manager do next?

Managing Public Participation Digitization

- Biospex is designed to manage process **and** data