

Standards for Biodiversity Data (Sharing Information Online)

Greg Riccardi
Florida State University
iDigBio
griccardi@fsu.edu



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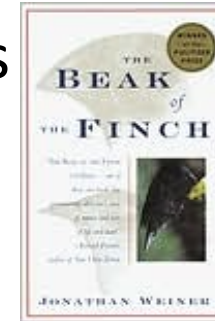
Topics in this presentation

- 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

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

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 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 1: 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>

Identifier types

- Content-rich identifiers contain information
 - Simple identifier, attached to specimen
 - Number stamped on band: 1154
 - Catalog number
 - Compound identifier: globally unique
 - 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
 - `urn:uuid:40c842c9-c04c-489a-b20e-d84bfc16dedd6`

Better Identifiers

- UUID identifiers – no embedded content

Finches								
id	tag	sex	species	mother	father	birthdate	latitude	longitude
urn:uuid:40c842c9-c04c-489a-b20e-d84bfc16dedd6	1154	M	Geospiza				-0.4197	-90.37
urn:uuid:143ce8bc-ba5d-432b-be31-a5d40b691a63	1158	F	Geospiza				-0.4197	-90.37
urn:uuid:dc0ea8ef-9f87-457e-9989-4232e37fb0fd	1160	F	Geospiza				-0.4197	-90.37
urn:uuid:38554297-2144-413d-81db-7ea3e89790a2	1188	F	Geospiza				-0.4197	-90.37
urn:uuid:cb521b8d-dc14-4691-a9d4-80e4b7899d95	1207	M	Geospiza	urn:uuid:	urn:uuid:	1/1/1975	-0.4197	-90.37
urn:uuid:e0868656-c398-4dbf-907b-e1fbf0b0a1ee	1008	M	Geospiza	urn:uuid:	urn:uuid:	2/12/1976	-0.4197	-90.37
urn:uuid:c3dd7903-2665-4749-a649-54dad6a4999	1330	F	Geospiza	urn:uuid:	urn:uuid:	3/15/1978	-0.4197	-90.37

Measurements						
id	isAbout	date	beak1	beak2	wt	notes
urn:uuid:025a42e4-4dd7-4b98-9ddc-0b13d664c205	urn:uuid:143ce8bc-ba5d-432b-be31-a5d40b691a63	12/15/1974	25	12	30.5	
urn:uuid:3b7a6f1b-b0e3-4d3b-a68c-a380fea3f0ca	urn:uuid:143ce8bc-ba5d-432b-be31-a5d40b691a63	1/15/1975	25	12	28.3	
urn:uuid:a3ca802a-93ed-459a-91ef-4593a4e43455	urn:uuid:143ce8bc-ba5d-432b-be31-a5d40b691a63	5/21/1978	25	12	32.1	
urn:uuid:432c0a0e-7013-4ee2-ab5a-6ef711f13708	urn:uuid:cb521b8d-dc14-4691-a9d4-80e4b7899d95	1/1/1975			2.3	newborn
urn:uuid:ff1deac1-23c8-4e14-a163-efd06f88c50e	urn:uuid: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 (*url1*) is an assertion of properties for objects
 - **On** 4 October 2013, Joe **claims** that specimen (*url2*) is of species *url3* **because** he disagrees with the determination on the label, and for **evidence**, he offers a set of image annotations (*url4*) showing morphological features that can be seen in the photograph (*url5*).
- Many relationships are expressed in the annotation

Identifiers

- Lots of uncertainty 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
 - URI with embedded UUID
 - urn:uuid:f47ac10b-58cc-4372-a567-0e02b2c3d47
 - 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

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