

The Value of Digitizing Herpetology Collections



ILLINOIS NATURAL
HISTORY SURVEY
PRAIRIE RESEARCH INSTITUTE



Chris Phillips
Illinois Natural History Survey
Prairie Research Institute
University of Illinois

INHS--24,000 specimens

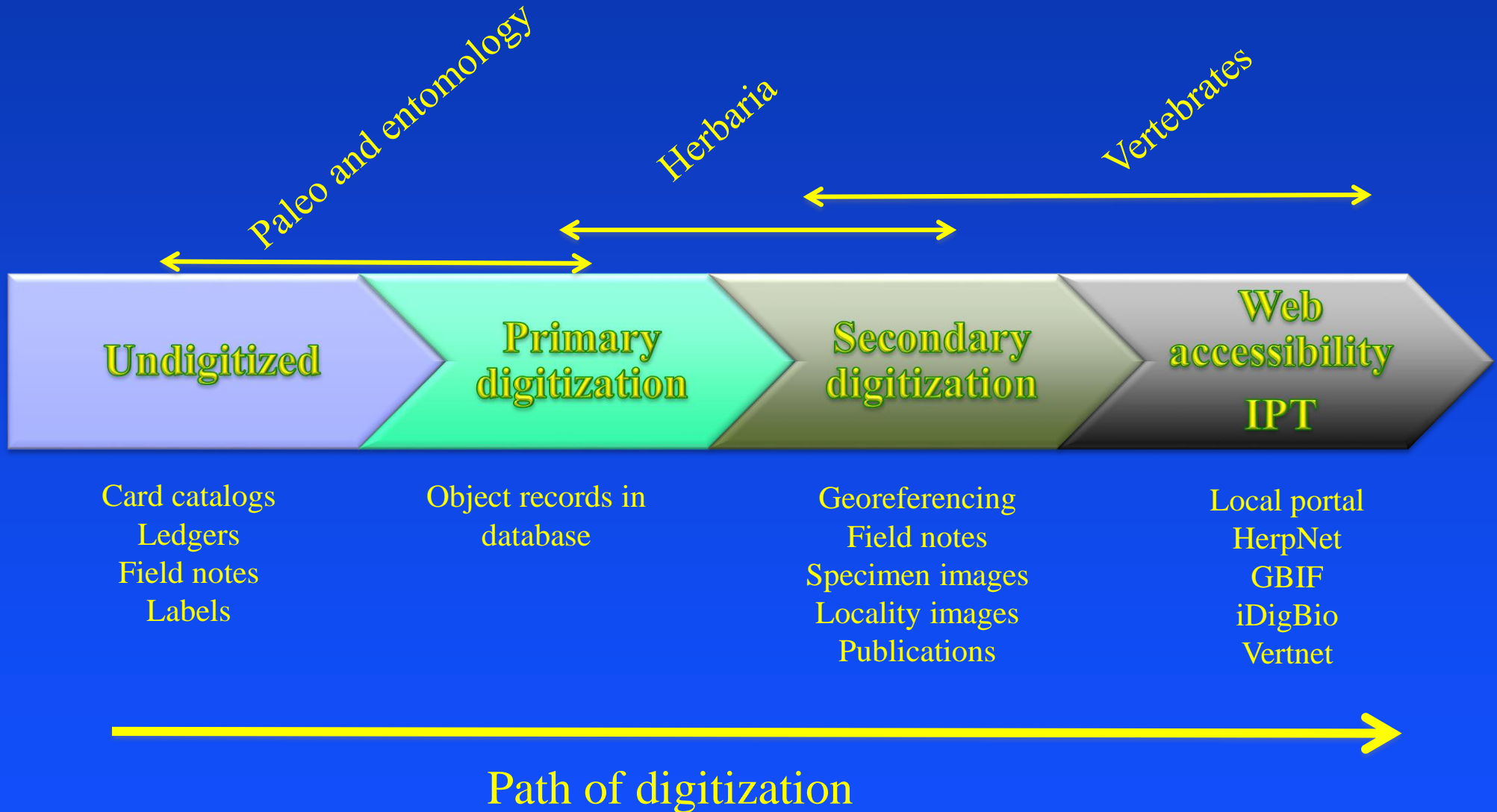
UIMNH--100,000 specimens

- Databased (FileMaker Pro)
- Web presence (GBIF, iDigBio, VetNet)
- Geo-referenced (99%)

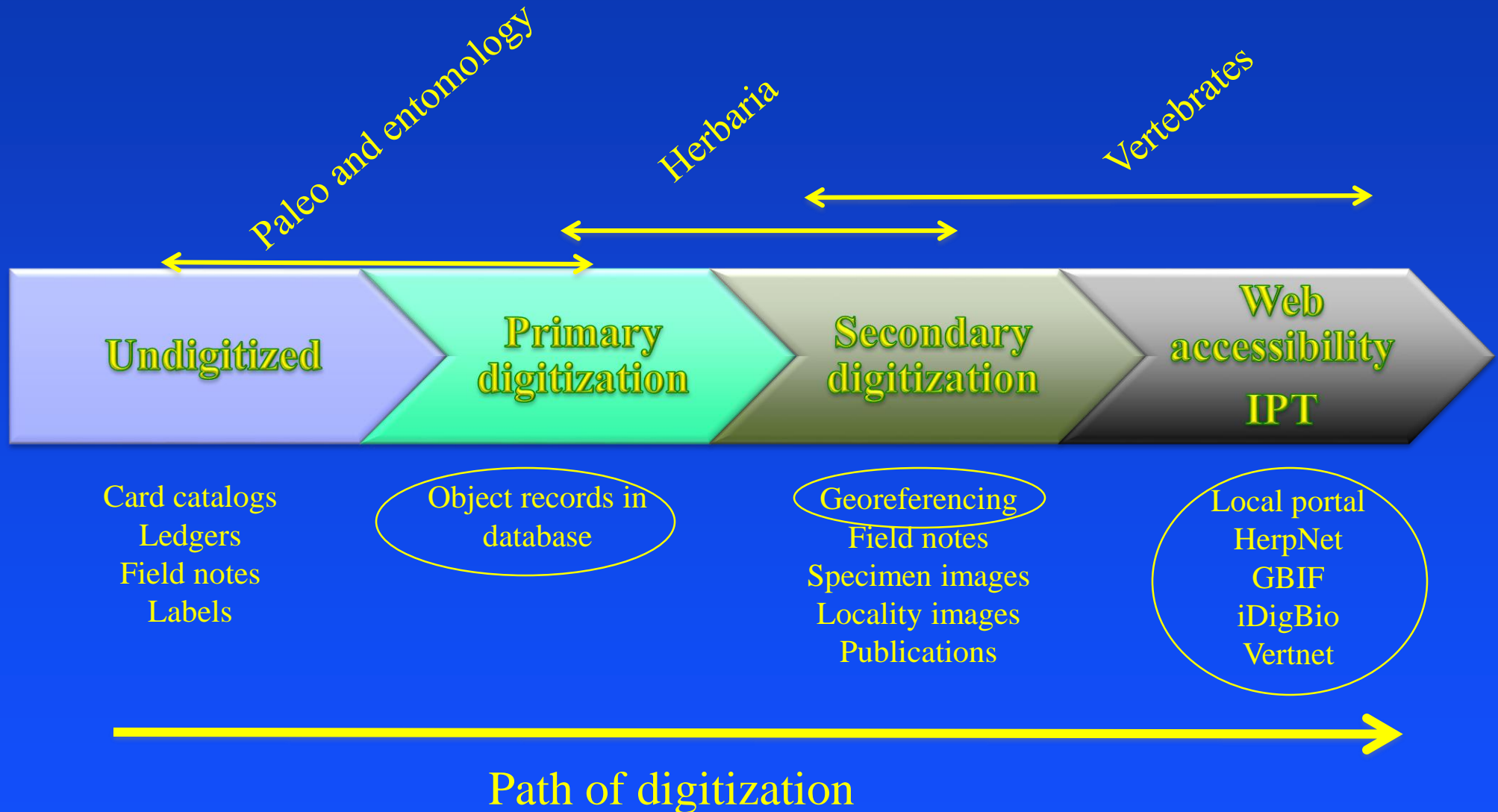


- Only a few images of specimens from special requests

Digitization progression



Where are we?

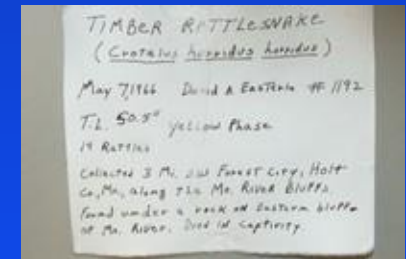
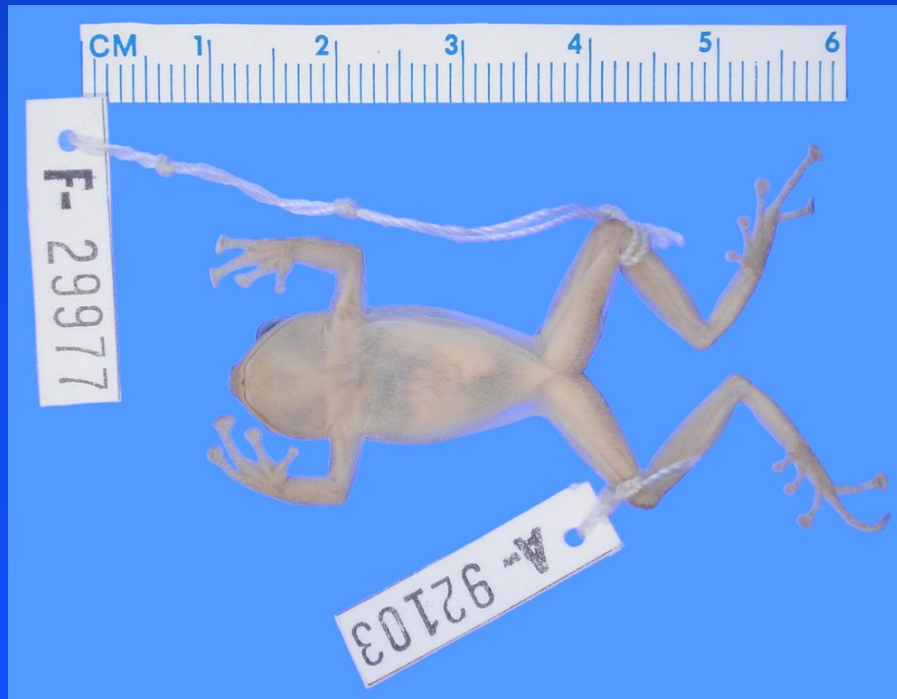


Where are we?

Kansas – 12,000 digital images

Michigan – 1,327 images of types

MCZ – 7,000+ specimens imaged



Digitized label from KU

MCZ A-92103

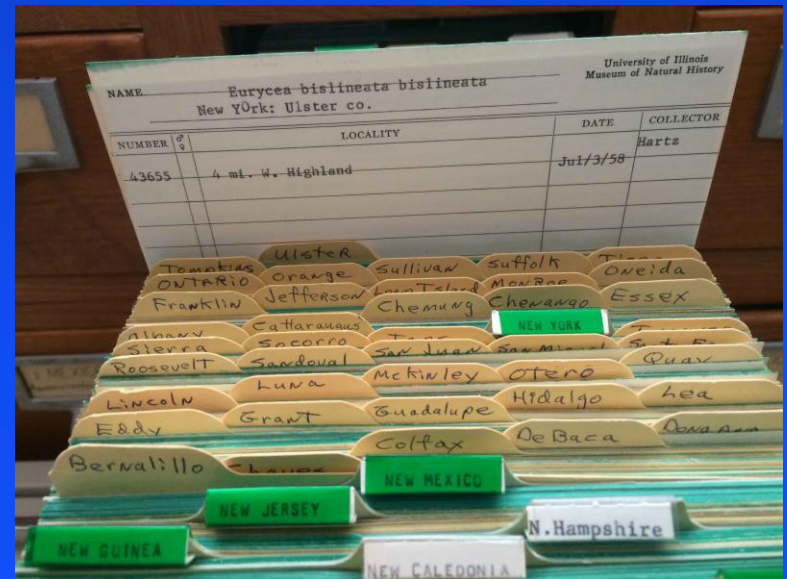
What is the value of digitizing?

- For primary digitization it's obviously access to data
- Geo-referencing also has obvious value
- When considering digitizing auxiliary material the value can be less obvious

What is the value of digitizing?

I. Auxiliary Material

Ledger, card catalog and labels are assumed to be the original source for record creation, so often ignored.



What is the value of digitizing?

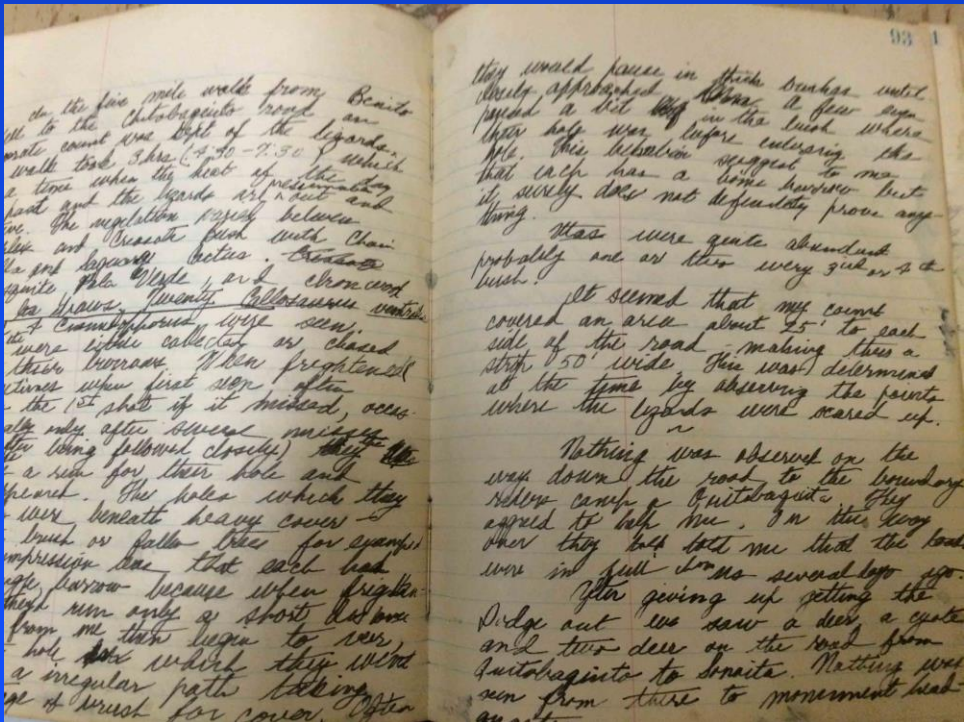
I. Auxiliary Material

We examined this issue using ten pages of one ledger (400 entries) and found data not in the digital record, e.g., location, date, other collectors.

What is the value of digitizing?

I. Auxiliary Material

Field Notes, video, audio, microscope slides



What is the value of digitizing?

I. Auxiliary Material

Locality images



These sources are more likely to contribute value to a record, but the extent of that value is largely unknown.

What is the value of digitizing?

I. Auxiliary Material

So there would be value to digitizing auxiliary material, both in terms of physical attachment of additional data to the record and making these extra data available to the public. But is enough “value added” to warrant the expense? What is the cost-benefit ratio?

What is the value of digitizing?

II. Specimen Images

- Obtain IDs for un identified specimens (we have over 2,000)
- Allow remote examination of types or other important specimens, including those for which tissues are curated
- Use in publications
- External user groups -- K-12, artists, publishers
- Increase visibility of your institution
- Research?

What is the value of digitizing?

- These different values/priorities require different levels of image resolution

2D images ➡ 2D images w/post-processing ➡ 3D images ➡ MRI

Types, unidentified specimens, and tissue vouchers would need the highest level of resolution, while auxiliary material and specimens used for outreach would not.

What is the value of digitizing?

- Before we look at imaging equipment, lets consider some issues related to imaging Herpetology specimens.
 - Types of specimen storage
 - ETOH
 - Cleared & stained
 - Skeletal
 - Wide range of specimen sizes



What is the value of digitizing?

- Other considerations

Should ETOH specimens be photographed in liquid? You get a better image and less damage to specimens.



Imaging Equipment

2D and 2D high resolution

- Flatbed scanner or copy stand
 - Good for documents (ledgers, field notes) and some specimens
 - Both can be post processed
 - Copy stand can be stacked
 - Issues: shadow, uneven lighting, glare (copy stand)



Imaging Equipment

2D and 2D high resolution

- Photo e-Box (MK Digital Direct)
 - Good for documents and specimens
 - Can be post processed, including stacking
 - Customizable
 - Issues: size limitations (32" x 20") and inside of box can get hot



Imaging Equipment

2D high resolution

- GigaPan Robot
 - Mainly for specimen imaging and label data
 - Works well for insect drawers (NC State Insect Museum)
 - Issues: distortion at edges of stitched images and viewing limitations (must be posted to GigaPan.org) & limited to a few angles (side shots)

Imaging Equipment

2D high resolution

- SatScan
 - Mainly for specimen imaging and label data
 - Works well for insect drawers (Nat. Hist. Museum, London)
 - Distortion issue resolved
 - Issues: limited to one angle (horizontal movement of camera)

Imaging Equipment

Moving towards true 3D

- Even in the best images from GigaPan and SatScan the viewer can't see all the details of the specimen because of the limited number of perspectives these systems capture.
- The two most important uses of digital specimens from herpetology collections, type material and unidentified specimens, require the viewer to see multiple perspectives.

Imaging Equipment

Moving towards true 3D

- Currently, the best way to ensure multiple perspectives is by taking multiple 2D images.
- This is time intensive, and in some cases, the standard views (dorsal body, ventral body, plus head shots) don't capture the diagnostic characters needed for positive ID.



UMMZ 129013

Imaging equipment

Towards true 3D

- A current iDigBio TCN here at INHS, InvertNet, is attempting to solve this issue by designing a system that combines the horizontal movement of SatScan with the multiple side angles of GigaPan.
- Technologies to combine such images into a 3D image that allows virtual tilting are being developed.

Conclusions

- The “value added” to current digital specimen records by attaching images of auxiliary material is quite clear and the technology to capture these images is available. However, the extent of this value is unclear.
- Specimen images also add value to a record, and there are several levels of resolution involved, depending on the values assigned or the stated goals.

Conclusions

- Providing high quality images of specimens without the expectation that positive identification can always be made is being accomplished with current technology.
- Emerging technology (3D) may allow us to provide images with the ability to make positive IDs without having to know the diagnostic characters for each species and without time intensive workflows.