

TDWG



Biodiversity Information Standards (TDWG) gratefully acknowledges the financial or in-kind support of TDWG 2020 by the following organizations.



**GBIF**

**JRS** Biodiversity  
Foundation



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**TDWG**



**2020**

## **SYMPOSIUM SYM 07**

# **NEW STANDARDS DEVELOPMENT TO SUPPORT THE TRANSFORMATION OF COLLECTION DATA INTO DIGITAL SPECIMENS**

20<sup>TH</sup> OCTOBER 2020, UTC 17:00 – 18:30

INTRODUCTORY REMARKS



# FIRST PRESENTATION

## ‘OPENDS’ – PROGRESS ON THE NEW STANDARD FOR DIGITAL SPECIMENS

WOUTER ADDINK, ALEX HARDISTY

Addink W, Hardisty AR (2020) ‘openDS’ – Progress on the New Standard for Digital Specimens. Biodiversity Information Science and Standards 4: e59338. <https://doi.org/10.3897/biss.4.59338>.

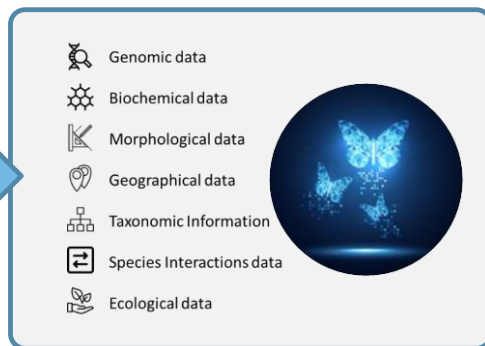


# DIGITAL SPECIMENS<sup>#</sup> (DS) PROVIDE AN ANCHORING FUNCTION FOR ALL KINDS OF DATA FROM PHYSICAL SPECIMENS

Physical Object



Digital Object



An actionable  
**knowledge unit**  
on the Internet

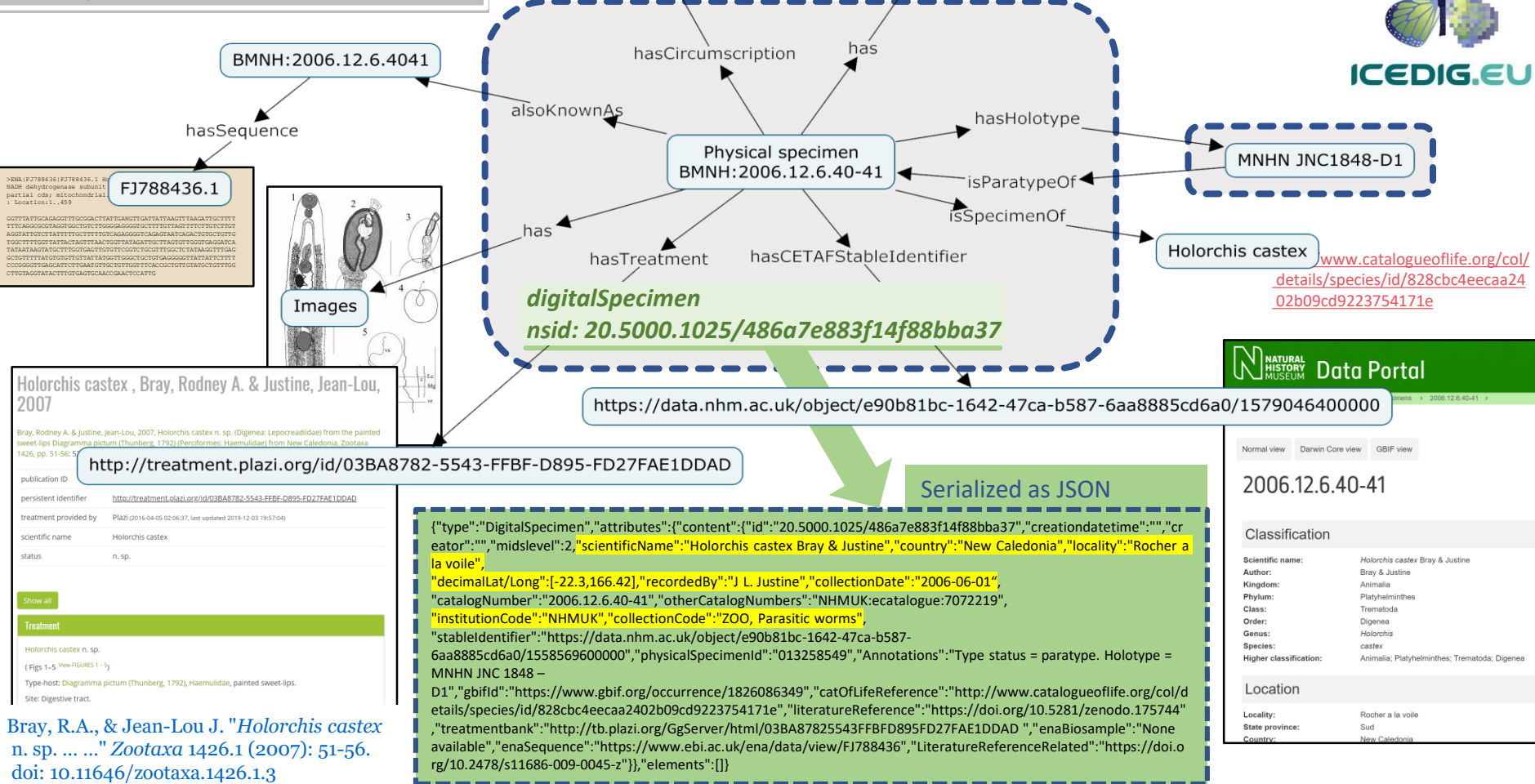
Data locked up in physical specimens is released through digitization, analytical, and computational methods.

Digital Specimens (DS) are more than just digital representations. They act as processable twins on the Internet for physical specimens in collections. They can be manipulated remotely across a network by machines and humans. This aspect of manipulation by machines is often understated because traditionally humans work with specimens.

<sup>#</sup> What is a Digital Specimen? <https://bit.ly/DigitalSpecimen>.  
Also, Lannom et al., 2020 [https://doi.org/10.1162/dint\\_a\\_00034](https://doi.org/10.1162/dint_a_00034).

# A simple Digital Specimen

February 2020



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# AS TWINS OF PHYSICAL SPECIMENS, DIGITAL SPECIMENS CAN ENABLE TRANSFORMATIONS OF WORKING PRACTICES

- Wider access for research and learning through packaging of images and links to 3<sup>rd</sup>-party data, and working with data where access to the physical specimen itself is not needed.
- Attaching annotations / interpretations, arranging loans / visits, attributing work done (specimens used, persons credited), curation by the community, tracing provenance, etc.
- Inserting relations between multiple specimens and between specimens and other data, growing a 'PID graph' that can be used for analysis and inference.
- Organising / indexing virtual groupings of related specimens e.g., by gathering, exiscattae, thematic criteria of your choice, etc.
- Machine processing/learning/analysis, data mining on very large scale.
  - taxonomy, phenology, biogeography, stratigraphy, mineralogy, ... ..

# MAKING THIS REALITY REQUIRES A SPECIFICATION FOR OPEN DIGITAL SPECIMENS – 'openDS'

- Digital Specimens are standardized:
  - For exchange/transfer between computer systems and interoperability between software programs
  - To allow operations to act on DS remotely and to allow machines to process DS, as well as humans.
- openDS specifies:
  - What a Digital Specimen is (in information terms so it has meaning and context)
  - How to include the specimen data itself as well as all data derived from a specimen i.e., the scientific content part and its structure
  - How machines and humans can act on a Digital Specimen and gain attribution for their work
  - How the data can be serialized and packaged for transfer.
- openDS is an enriched specimen information model to link derived or related data back to specimens. Answers to frequently asked questions: <http://bit.ly/opensfaq>

IN THE 12  
MONTHS SINCE



BIO  
DIVERSITY  
NEXT



ICEDIG.EU



Completed its work  
on DS Architecture  
design and  
recommendations,  
and the DiSSCo  
Data Management  
Plan.



*Mobilising Data, Policies and Experts in  
Scientific Collections*

openDS workshop, Warsaw,  
February 2020:

*"... a wide measure of interest  
and acceptance of the idea, even  
if not all the details are yet  
understood and agreed."*



Has begun the technical work and  
established dialogues with



The Extended Specimen  
Network: A Strategy to Enhance  
US Biodiversity Collections,  
Promote Research and Education



BoF 01,  
22<sup>nd</sup> Sept.

Next slide



Biodiversity Data  
Integration IG,  
Thursday 12<sup>th</sup>  
November



## REALISING THE VISION ON A GLOBAL LEVEL

- openDS should become a new TDWG standard and visions for Digital Specimens and Extended Specimens must align.

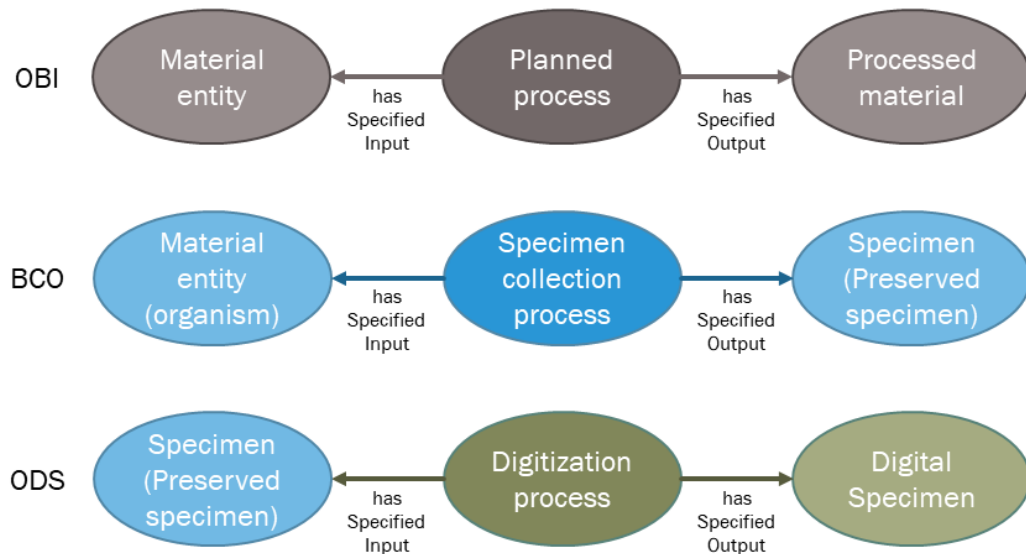


Birds of a Feather noted the similarities between the DS and ES concepts.

Agreed on need for a global collaborative process towards a standard on the converged DS/ES concept. Open to all with interest in specimens / samples. Letter of intent: <http://bit.ly/LolSpModel>. 16 organisations, 17 individuals given support so far.

# TECHNICAL FOUNDATIONS

- Concepts from ABCD 3.0, EFG extension for geo-sciences, and Darwin Core;
- Extending from:
  - bco:Specimen in the Biological Collection Ontology (BCO) (which is linked to Darwin Core)
  - obi:Planned\_process in the Ontology for Biomedical investigations (OBI)
  - iao:InformationContentEntity in the Information Artifact Ontology (IAO).
- Leading to new classes in an Open Digital Specimen (ODS) ontology.



The result or output of ods:Digitization\_process, which takes a bco:Specimen as its input is a new class, ods:Digital\_Specimen, which is an instance of an 'entity' in the RDA/TDWG attribution metadata recommendation, where ods:Digitization\_process is an instance of an 'activity' performed by some 'agent' to produce that DS entity. Hence, digitization and subsequent work can be attributed to someone.

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# THANK YOU

- To follow the work: <https://github.com/DiSSCo/openDS>
- To become involved, email: [hardistyar@cardiff.ac.uk](mailto:hardistyar@cardiff.ac.uk)
  
- Questions?