Preserving 3D data:

Best Practices from a UK perspective

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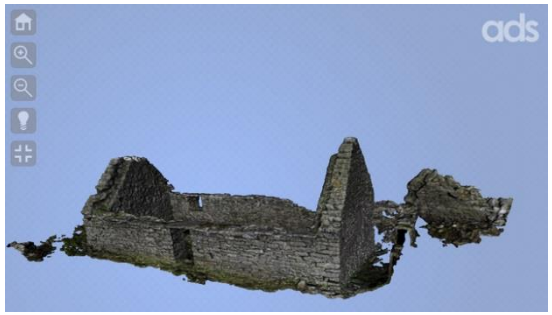
Overview

1. An Overview of the ADS and the UK heritage and preservation landscape

2. Guides to Good Practice and other guidance

3. 3D data: what is it and how do we preserve it?



An overview of the ADS

The Archaeology Data Service

- Set up in 1996 at the University of York
- Core aim: the long-term digital preservation and dissemination of data
- **Research data** archives
- **Development-led** (commercial) fieldwork archives
- Primarily UK focussed
- Advice to Research Councils and National Heritage Agencies

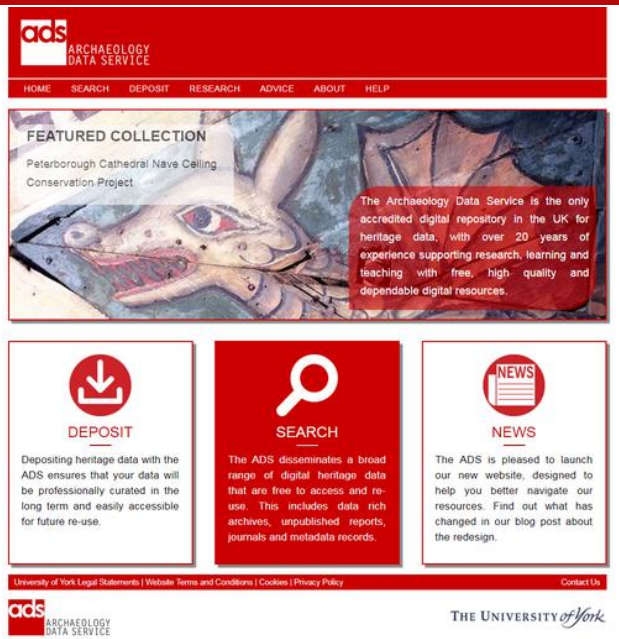
Other UK bodies and groups

- National bodies: Historic England, Historic Environment Scotland, RCAHMW.
- Bedern Group
- Forum on Information Standards in Heritage (FISH)
- Digital Preservation Coalition

Cooperation and involvement within and beyond your sector is key.

What do we archive?

ADS collections:



- around 2.5 million files
- around 17TB of data
- c.1000 ‘rich archives’
- largely image data (TIFF, JPG)
- …and then PDF files (e.g. reports, journals) and DOC files
- databases, spreadsheets, geophysical survey data, GIS, CAD, video

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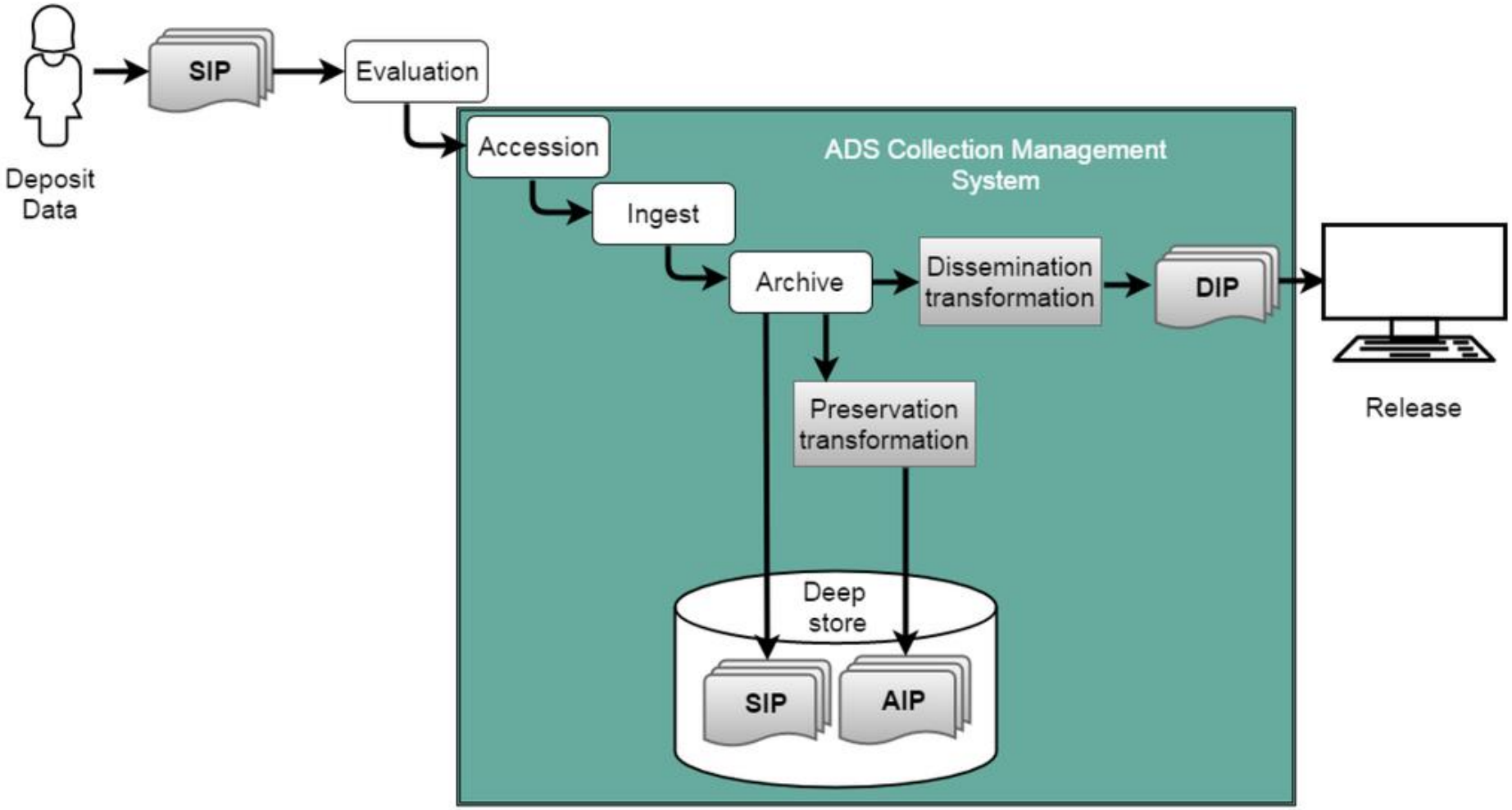
How do we archive it?



Overall Aim

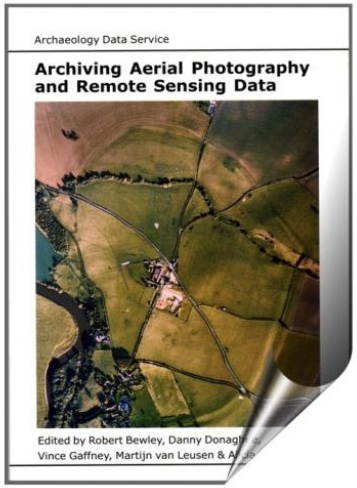
- Ensure that digital data is successfully archived, managed, and accessible in a digital format
- Preserve data, through normalisation and migration, in standardised formats to ensure long-term accessibility
- Ensure data is properly documented and understandable
- Documented in our Preservation Policy and Repository Operations documents:
  - http://archaeologydataservice.ac.uk/advice/PreservationPolicyRev.xhtml
  - http://archaeologydataservice.ac.uk/advice/RepositoryOperations.xhtml

Guides

Guides to Good Practice:
Initial stage of development (hard copy guides):

1998 GIS: A Guide to Good Practice
1998 Archiving Aerial Photography and Remote Sensing Data
1999 Digital Archives from Excavation and Fieldwork (+ Rev. 2nd Ed.)
2001 Geophysical Survey Data in Archaeology
2002 CAD
2002 Creating and Using Virtual Reality:
a Guide for the Arts and Humanities

Hard copy and online, covered similar core elements.



Role of the Guides

- **File formats**
  - how they are used
  - which are best suited to long-term preservation and access
  - preference for non-proprietary formats and open standards, uncompressed formats, formats which use plain text and are human readable
- **Metadata and documentation**

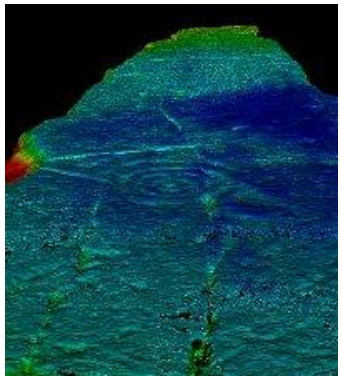
A Brief History of the G2GPs

Phase of Project-based development:

2005-6 The Big Data project:

- Wessex Archaeology *Wrecks on the Seabed* (mag., sub-bottom, sidescan, multibeam)
- Durham University *Breaking Through Rock Art* (laser scan)
- English Heritage *Where Rivers Meet* (lidar)
- Project produced a final report and a set of recommendations for future research – all available online:

http://archaeologydataservice.ac.uk/research/bigData.xhtml

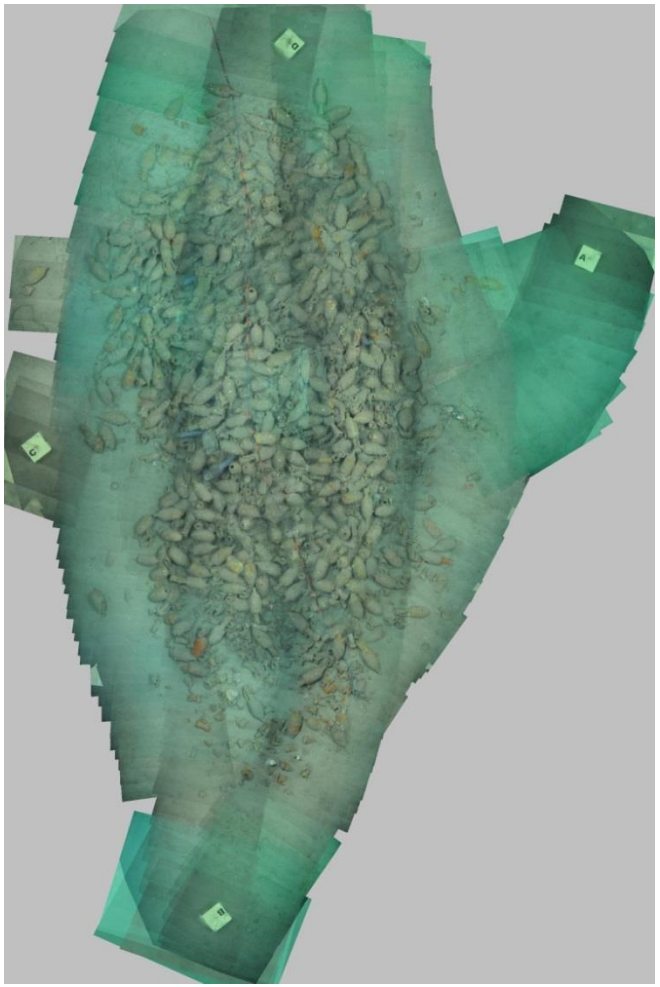


A Brief History of the G2GPs

More project-based development…:

2006-9 Virtual ExploratioN of Underwater Sites (VENUS) (with INRAP):

- Aimed to develop methodologies and technological tools for the virtual exploration of underwater sites (using UAVs).
- ADS deliverables (again, online):
  - Exemplar archive (images, multibeam & sidescan, vrml)
  - A **VENUS Guide** for data preservation and documentation



http://archaeologydataservice.ac.uk/research/venus.xhtml

A Brief History of the G2GPs

Digital Antiquity project to revise and expand the Guides

2009-11

Aerial Survey
Geophysics
GIS
CAD

Revised and Updated Old Guides

Excavation & Fieldwork

Retired / 'recycled'

Marine Remote Sensing
Laser Scanning
Photogrammetry

New Guides

A Brief History of the G2GPs

Digital Antiquity project to revise and expand the Guides

2009-11

- Archival strategies
- Selection and Retention
- Preservation Intervention Points
- 'Big Data'
- Creating Datasets
- Copyright

Create Integrated Archive & Project Level Sections

- Documents and Texts
- Databases and Spreadsheets
- Raster and Vector Images
- Digital Video and Digital Audio

New 'Common Components'

A Brief History of the G2GPs

Most recent development: 2013-17: **ARIADNE project**

- Initial phase allowed assessment of 14 European partner's guidelines and procedures
- Assessment phase developed a plan for new guides and case studies
  - Dendrochronology (DANS) - TRiDaS
  - Thermoluminescence (ATHENA)
  - **3D Models**

Other Guidance

- **Historic England**
  - Range of practical guides covering heritage projects

- **Digital Preservation Coalition**
  - Technology Watch Reports
  - Digital Preservation Handbook

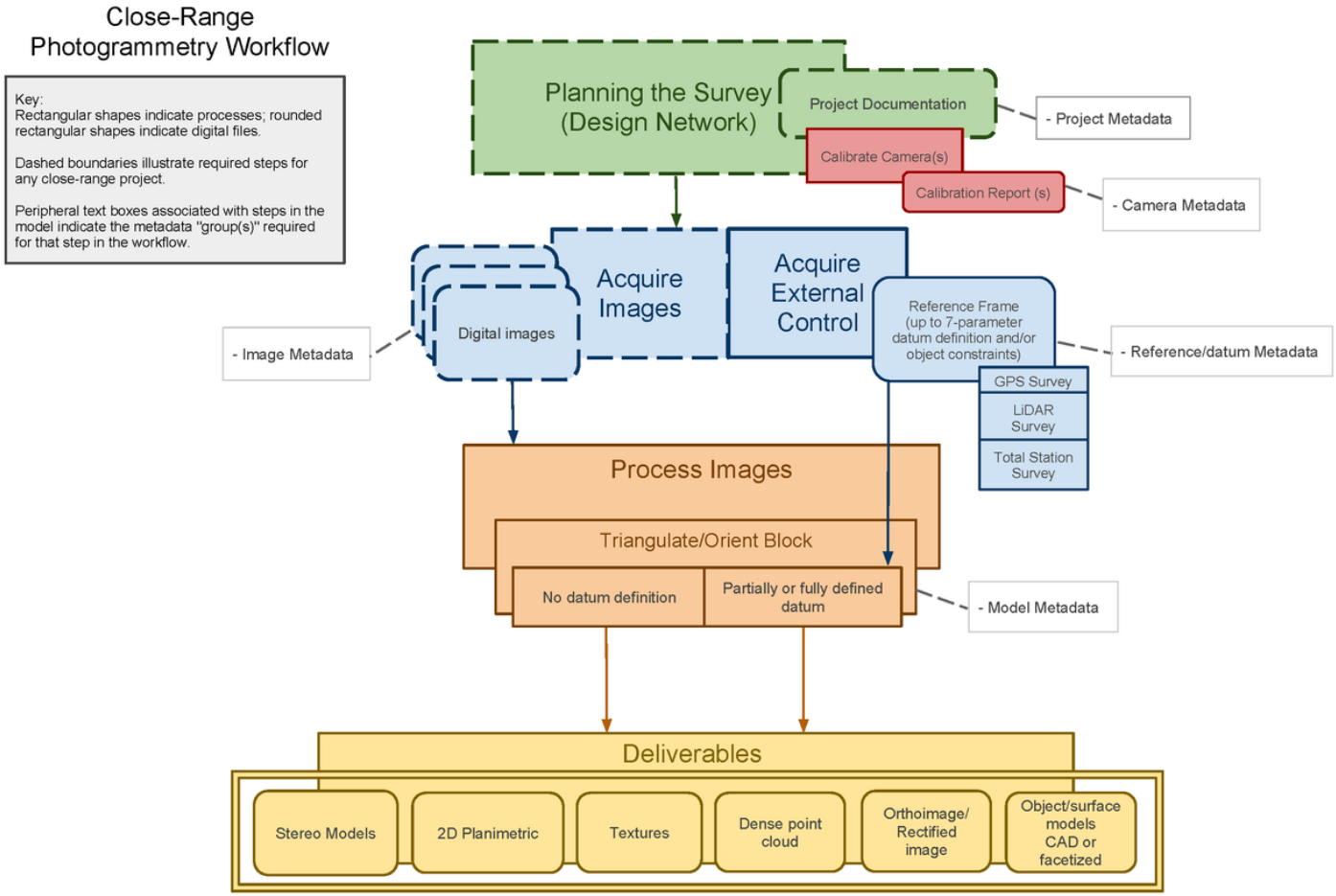
DigitalPreservationCoalition

What is 3D data?

Just models?

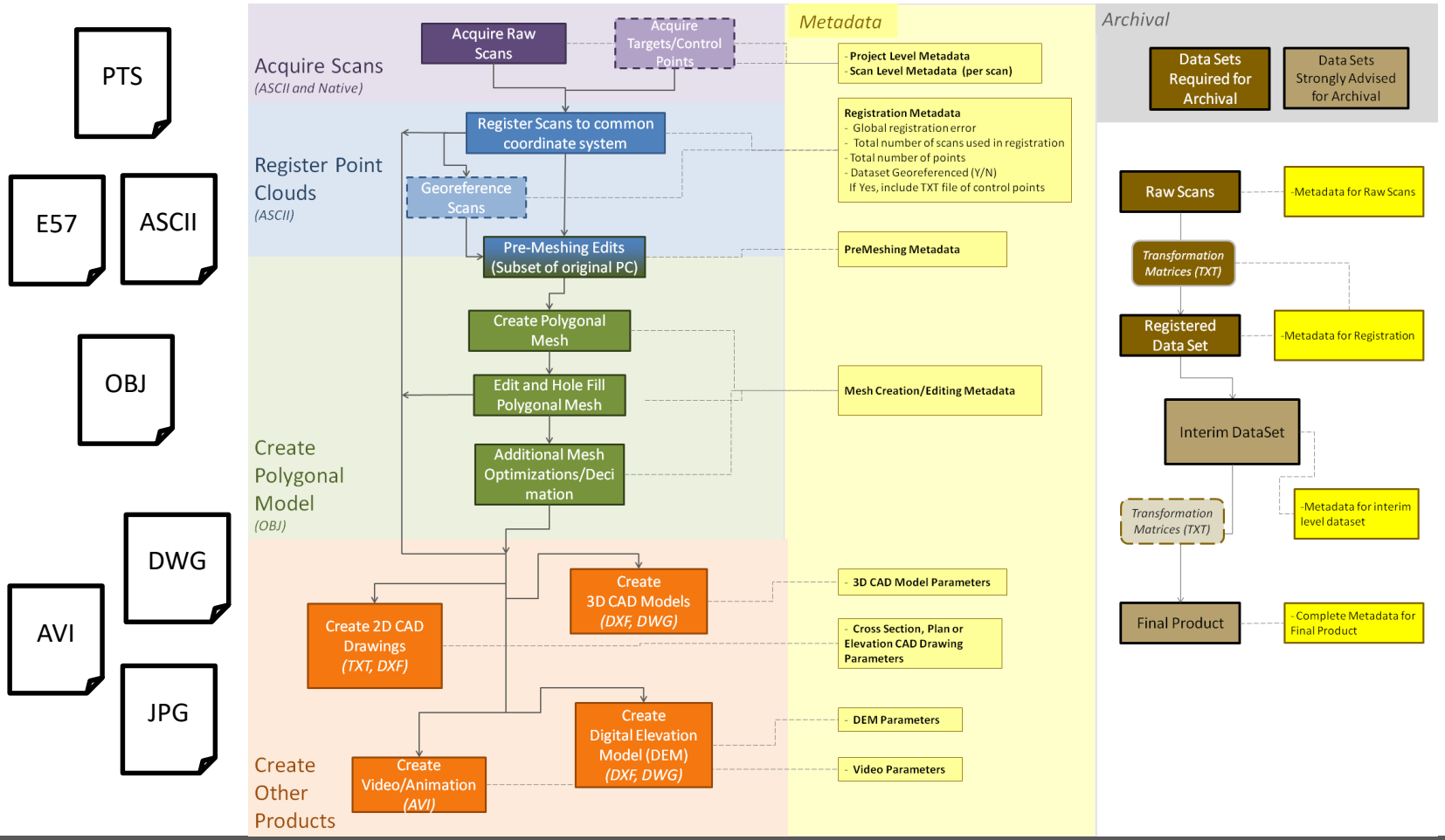
What is 3D data?

Result of different workflows and methodologies:



What is 3D data?

Result of different workflows and methodologies:



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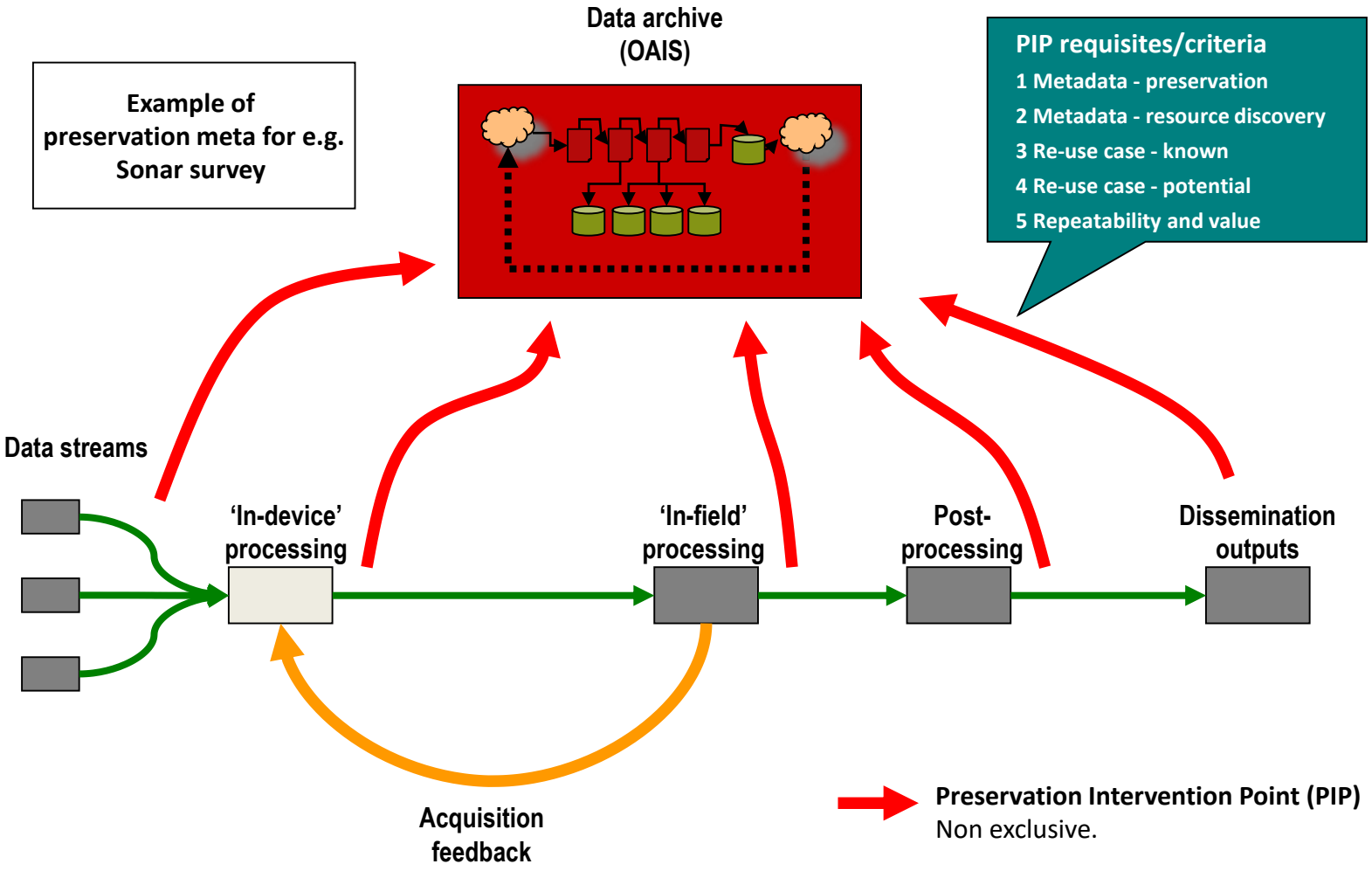
Preservation Intervention Point Schema



What to Preserve?

Assessing the workflow to:

- Identify the **raw data** for preservation
- Identify final products and deliverables - e.g. images, video, models for 3d printing
- Identify stages where data could be recreated through documentation
- Identify where data quality reduction happens e.g.:
  - e.g. RAW to TIFF to JPG
  - Images editing and masking
  - data is decimated

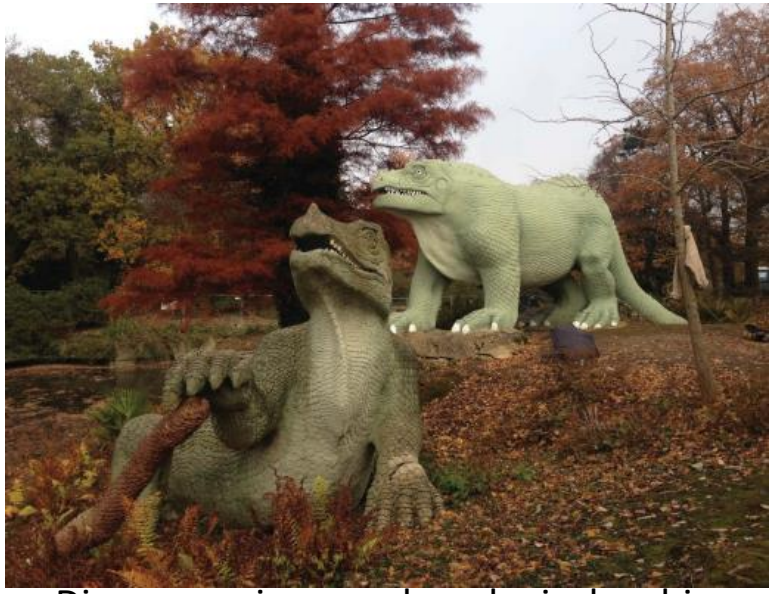
File Formats

Assessing the workflow files, at the specific points chosen:

- Are they suitable for ingest into an archive?
- Proprietary? Open? Documented? Formats
- Are they stable formats suitable for preservation?
- Are they suitable for dissemination?

Questions and Issues: Files

Some things worth considering:



Dinosaurs…in an archaeological archive

- Raw data (Pointclouds or images) can be fairly easy to preserve but can be **large**:
  - e.g. one LS collection = 3.1TB, 164k+ files
  - Crystal Palace Iguanodon survey = 15000+ images
  - Cost to the depositor – sheer numbers of files required
  - Storage is a relatively small issue but access can be problematic

Metadata

General approach:

- Metadata requirements and collection should complement the file selection process to build up a full picture of the workflow
- Record information about:
  - Data collection techniques/methodology (hardware)
  - Specific sets of files
  - Processing applied to these (in hardware and software)
- Relationships between these (CARARE2 and CRMDig)
- Technical specifications (hardware and file formats)
- Embedded metadata (EXIF, E57, etc.)

Questions and Issues: Metadata

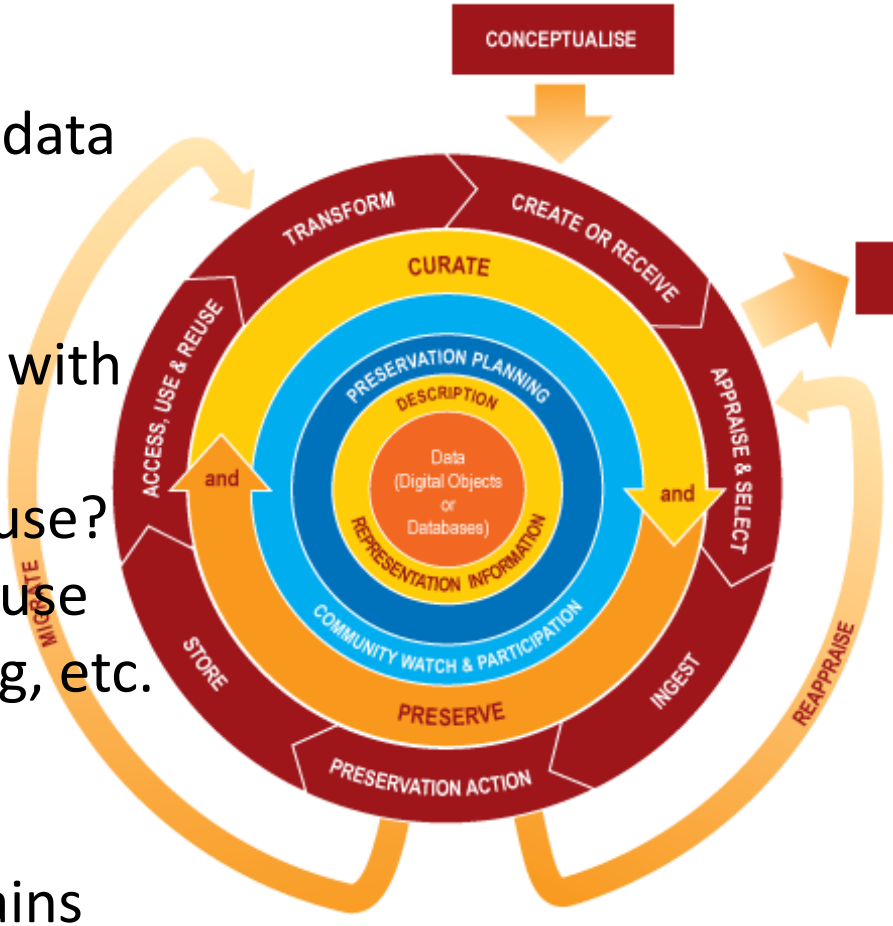
Some things worth considering:

- Workflows can be complex = metadata can be complex and lengthy
- Early engagement with creators is important:
  - Make sure the right things are recorded by those who understand them
  - Ensure that creators understand the full scope of what might be required
- Automation and extraction of embedded metadata would be ideal…
- …but we still need to define these elements and schema.

Reuse

Data reuse is key

- Reuse should, to a degree, inform data selection and documentation
- Who is reusing 3D data?
- Data creators: are already familiar with their data
- Are certain formats a barrier to reuse?
- How is it being reused? Identify reuse cases: monitoring, BIM, 3D printing, etc.
- Inappropriate reuse:
  - Survey data and security
  - Ethical issues and human remains



Preservation policy should not be a barrier to data deposition or reuse