

Do we still need photo metadata in 2019?

3D Photogrammetry and Metadata

By Simon Brown



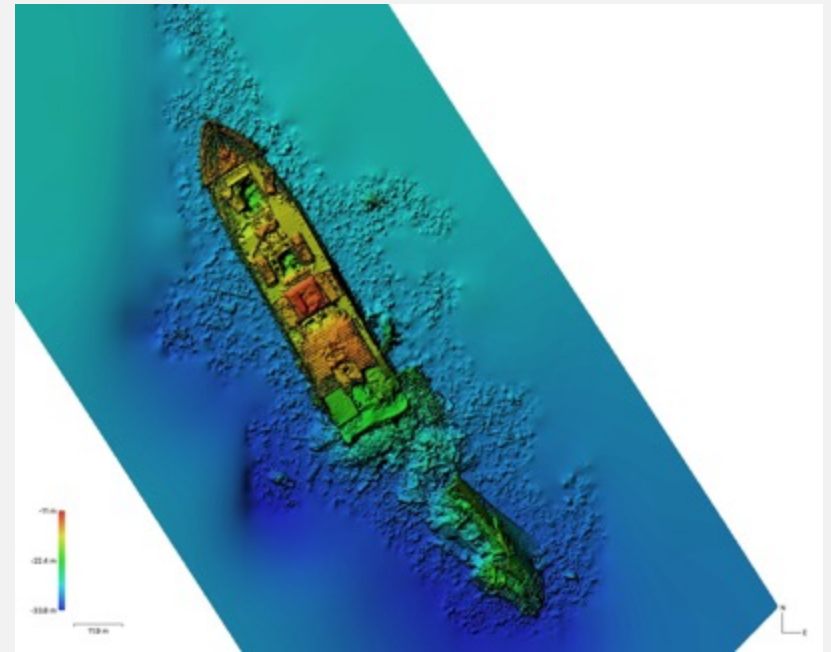
Agenda

- Introduction
- What is Photogrammetry?
- Uses of Photogrammetry
- Metadata and 3D Workflow
- Photogrammetry, Metadata and the Future
- Summary

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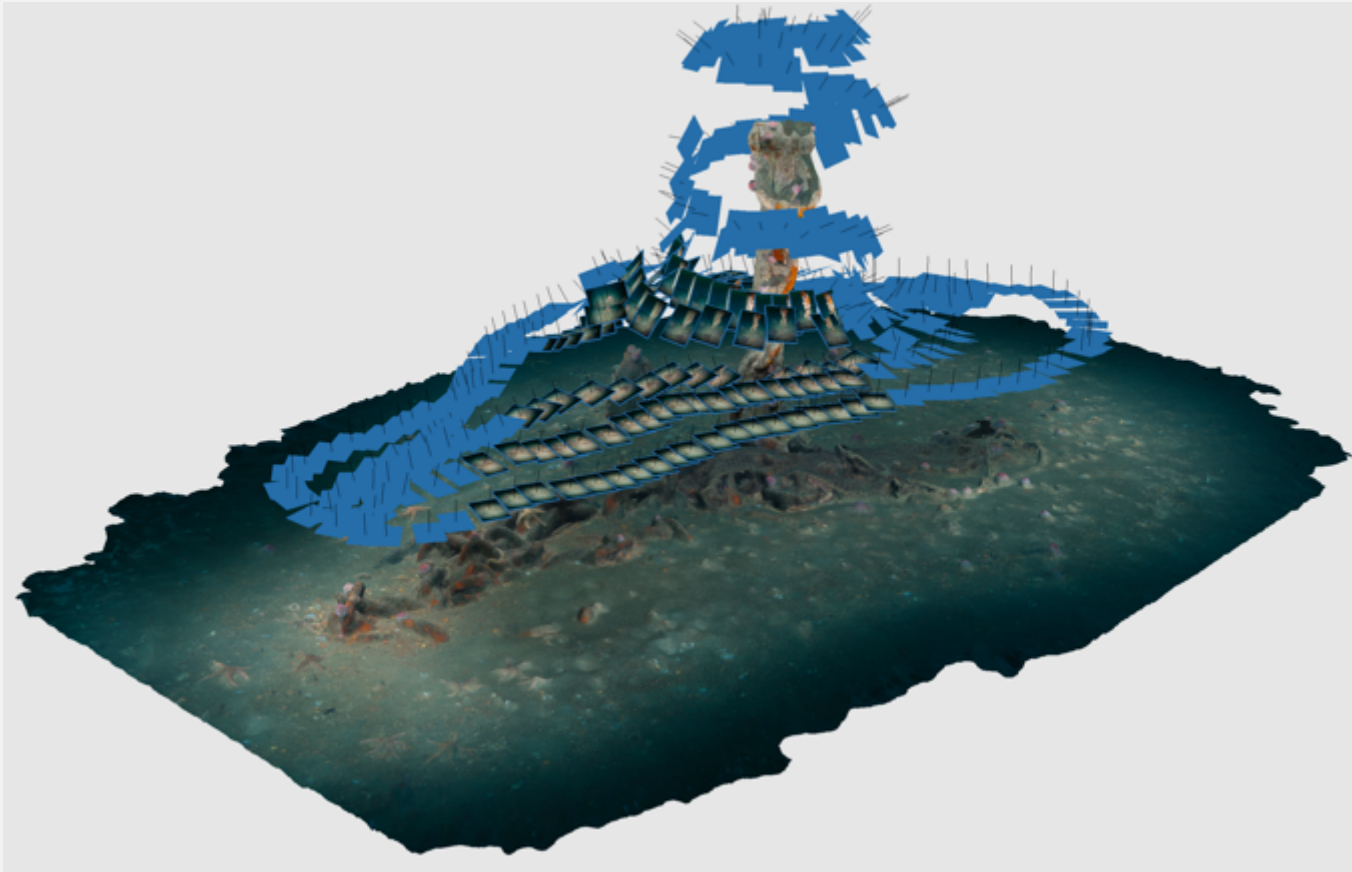
Introduction - Simon Brown

- Key skills:
 - Underwater photographer
 - Commercial diver
 - Data management consultant
 - 3D designer & engineer
 - Author and researcher



Digital Elevation Model of the SS Thistlegorm

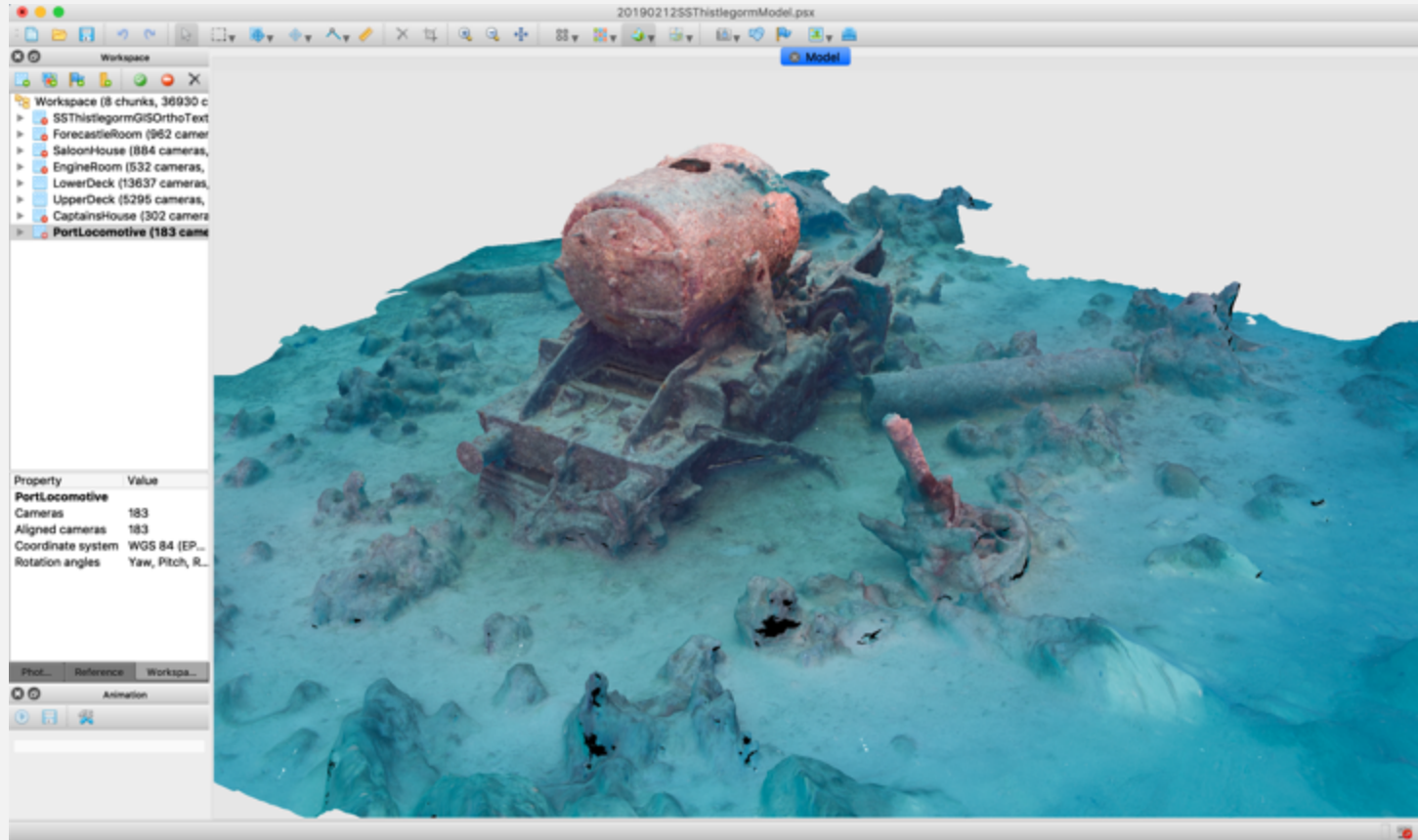
What is Photogrammetry?



What is Photogrammetry?

- The art and science of creating a 3D shape from 2D photographs.
- Requires hundreds or thousands of high quality overlapping photographs.
- Requires bespoke software to interpret each image and identify common points.
- Processing time – even with dedicated hardware - can be measured in days even with cloud computing.
- Subject must be static/immobile.
- Output includes 3D model, ortho photo and DEM.

What is Photogrammetry?



Live Demo

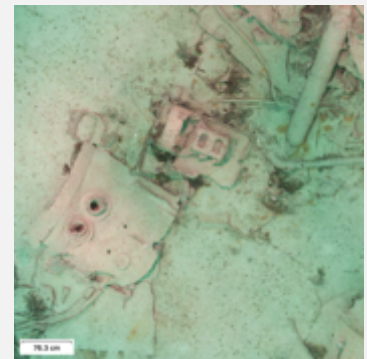
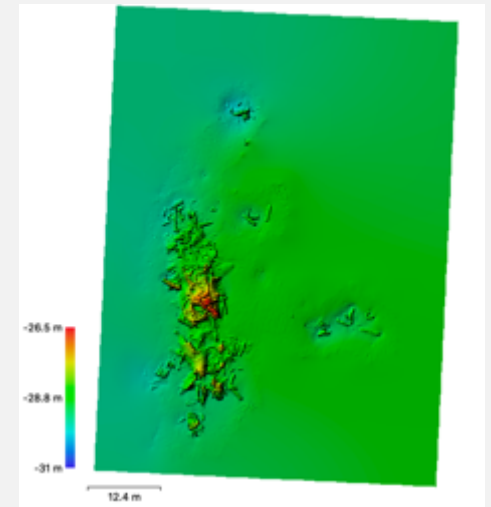
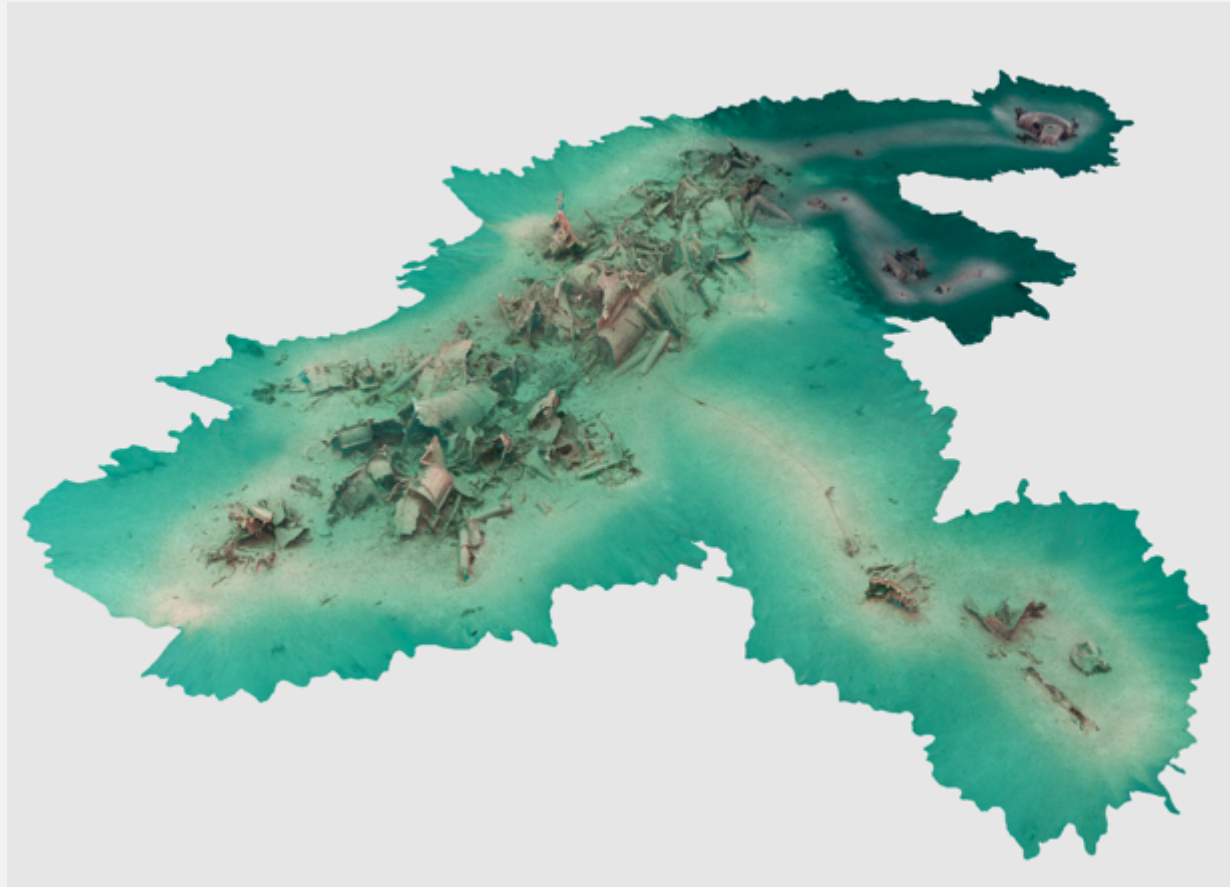
What is Photogrammetry?

Automating the capture of thousands of images



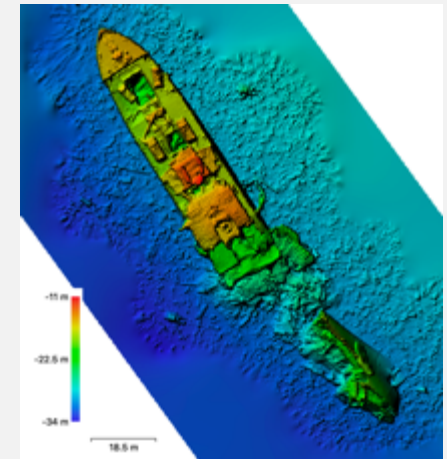
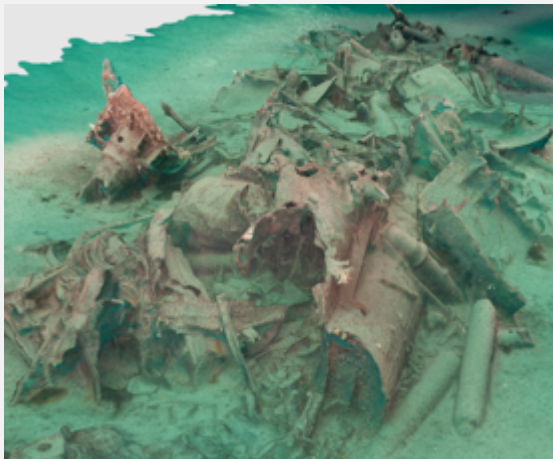
Image by Mike Postons
www.deep3d.co.uk

Uses of Photogrammetry

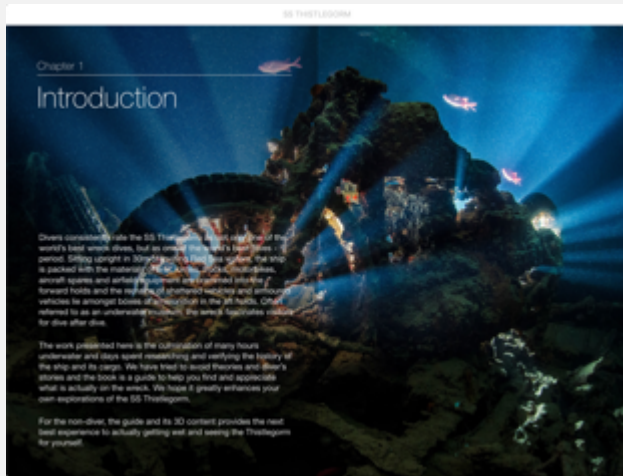


Uses of Photogrammetry

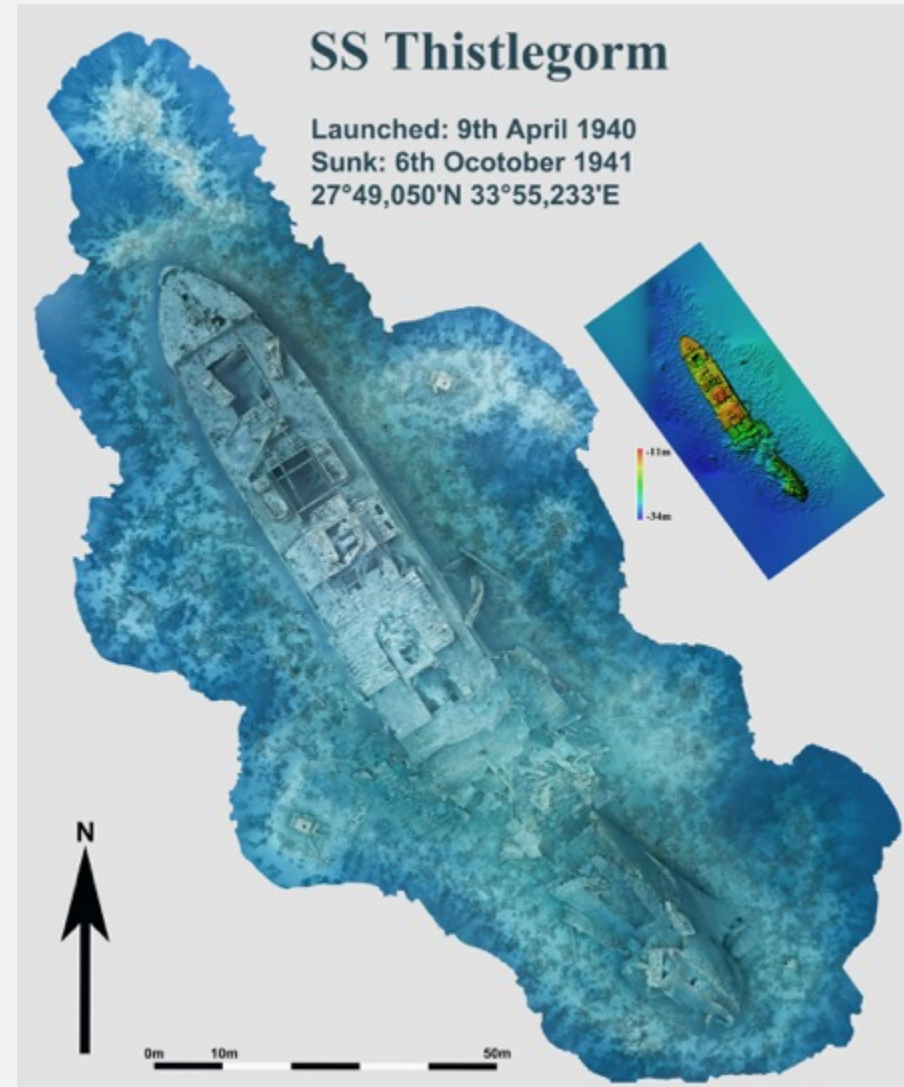
- Cultural heritage – interpretation and persistent record.
- Law enforcement – gathering evidence.
- Media – digital reconstruction.
- Gaming – photorealistic content.
- Mapping – positioning and measurement.



Uses of Photogrammetry



www.deep3d.co.uk



Metadata and 3D Workflow

The screenshot displays a Mac OS file browser window titled 'RAW'. The left sidebar shows 'Favourites' (Dropbox, Applications, Desktop, Documents, Downloads, Recents, simonbrown, Creative Cloud Files) and 'Locations' (iCloud Drive, KPLMacbookPro, WorkingBackup, Remote Disc, Network). The main pane shows a list of files with columns: Name, Date Modified, Size, and Kind. The files are Nikon RAW files (NEF and XMP) from October 2018. To the right, the EXIF metadata for the selected file is shown.

Name	Date Modified	Size	Kind
SBrown-20181019-1251.NEF	19 Oct 2018 at 14:05	25.7 MB	Nikor
SBrown-20181019-1251.xmp	21 Oct 2018 at 14:32	7 KB	XMin
SBrown-20181019-1252.NEF	19 Oct 2018 at 14:06	25.6 MB	Nikor
SBrown-20181019-1252.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1253.NEF	19 Oct 2018 at 14:06	25.4 MB	Nikor
SBrown-20181019-1253.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1254.NEF	19 Oct 2018 at 14:06	25.6 MB	Nikor
SBrown-20181019-1254.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1255.NEF	19 Oct 2018 at 14:06	25.6 MB	Nikor
SBrown-20181019-1255.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1256.NEF	19 Oct 2018 at 14:06	25.5 MB	Nikor
SBrown-20181019-1256.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1257.NEF	19 Oct 2018 at 14:06	25.5 MB	Nikor
SBrown-20181019-1257.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1258.NEF	19 Oct 2018 at 14:06	25.4 MB	Nikor
SBrown-20181019-1258.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1259.NEF	19 Oct 2018 at 14:06	25.5 MB	Nikor
SBrown-20181019-1259.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1260.NEF	19 Oct 2018 at 14:06	25.7 MB	Nikor
SBrown-20181019-1260.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1261.NEF	19 Oct 2018 at 14:06	25.6 MB	Nikor
SBrown-20181019-1261.xmp	21 Oct 2018 at 14:32	11 KB	XMin
SBrown-20181019-1262.NEF	19 Oct 2018 at 14:06	25.5 MB	Nikor

EXIF

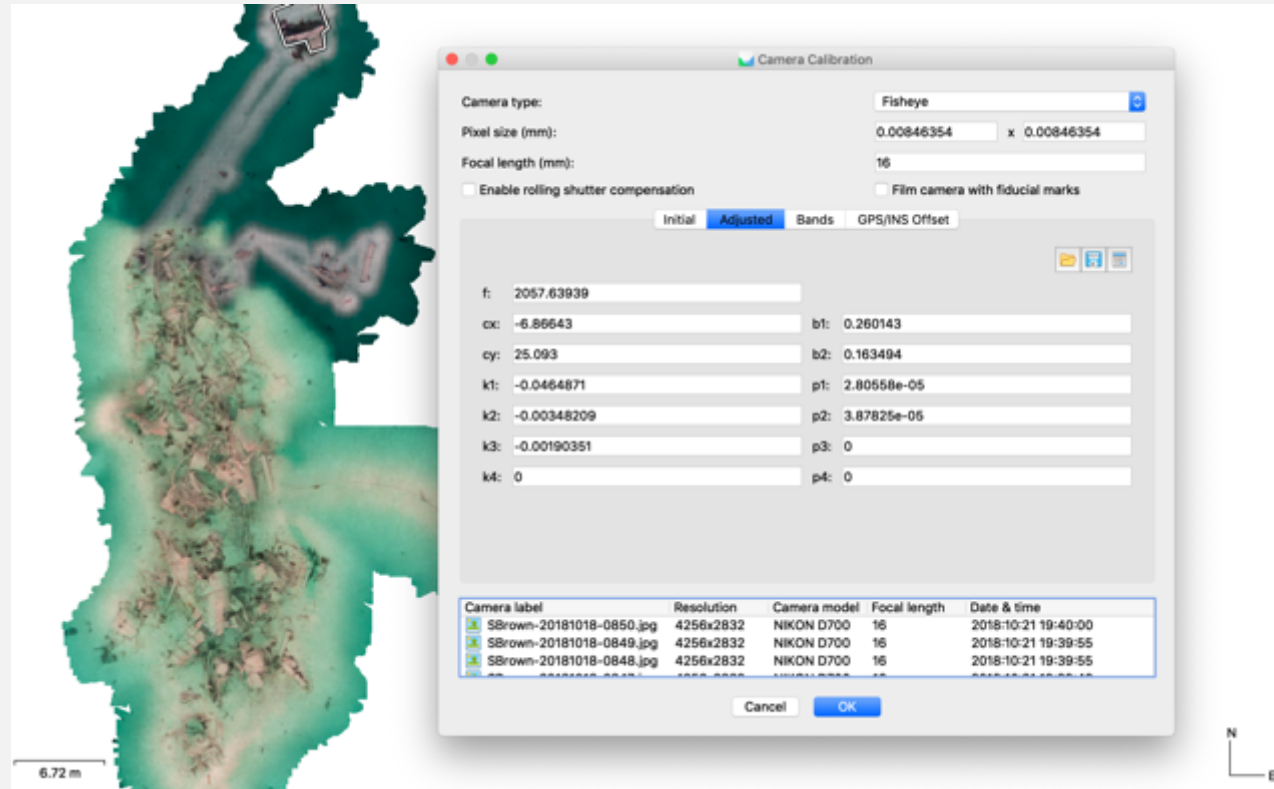
Dimensions: 4256 x 2832
Cropped: 4256 x 2832
Exposure: 1/100 sec at f / 3.5
Exposure Bias: 0 EV
Flash: Did fire
Exposure Program: Manual
Metering Mode: Spot
ISO Speed Rating: ISO 1250
Focal Length: 16 mm
Focal Length 35mm: 16 mm
Lens: 16.0 mm f/2.8
Date Time Original: 19/10/2018 14:41:19
Date Time Digitized: 19/10/2018 14:41:19
Date Time: 19/10/2018 14:41:19
Make: Nikon
Model: NIKON D700
Serial Number: 2204474
User Comment:
Artist: Simon Brown
Software: Ver.1.03
GPS:
Altitude:
Direction:
Contact:
Creator: Simon Brown
Job Title: Photographer & writer
Address: 94 Tavistock Road
City: Fleet
State / Province: Hants
Postal Code: GU51 4EZ
Country: United Kingdom
Phone: +44 (0) 1252 653 759
E-Mail: simon@simonbrownimages.com
Website: www.simonbrownimages.com

Metadata and 3D Workflow

EXIF data is mandatory for accurate photogrammetry

Required by 3D software to understand physical characteristics:

- Lens type
- Pixel size
- Sensor size
- Lens focal length



Metadata and 3D Workflow

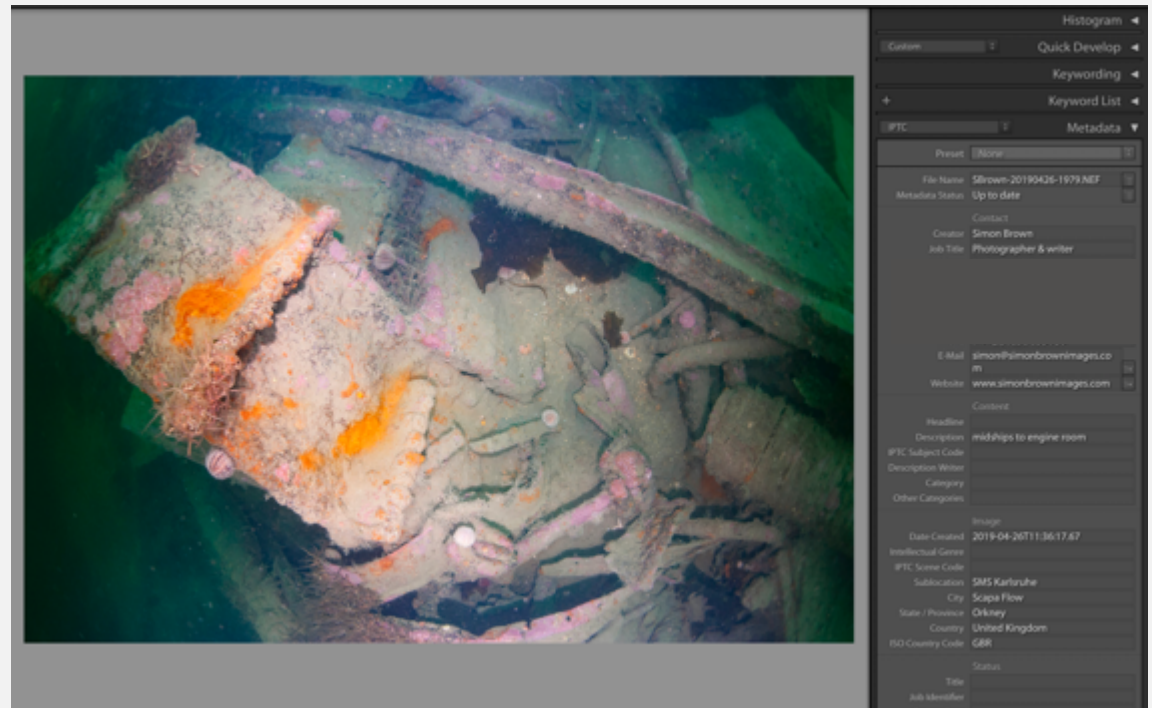
IPTC schema used for digital asset management (DAM)

Typically:

- Sublocation
- City
- Province
- Country
- IP rights
- Creator

EXIF:

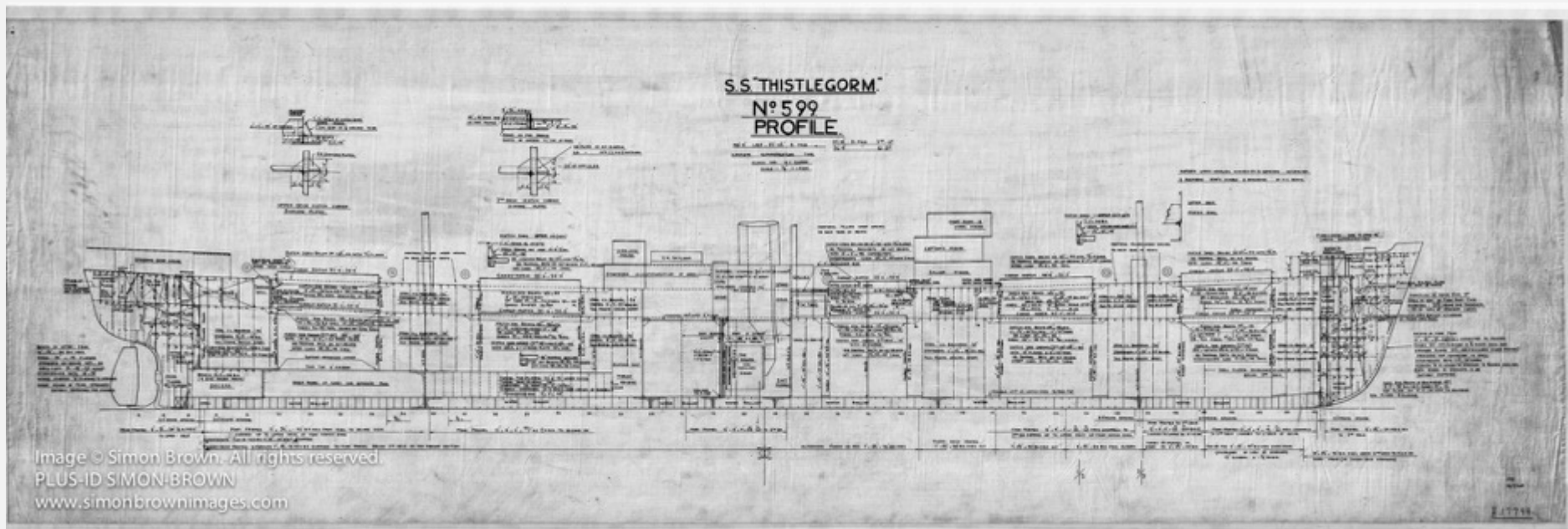
- Creation date
- GPS – lat, long & altitude/depth



For more than one 3D project, projects with multiple contributors, or projects conducted over longer period of time, IPTC entry becomes mandatory.

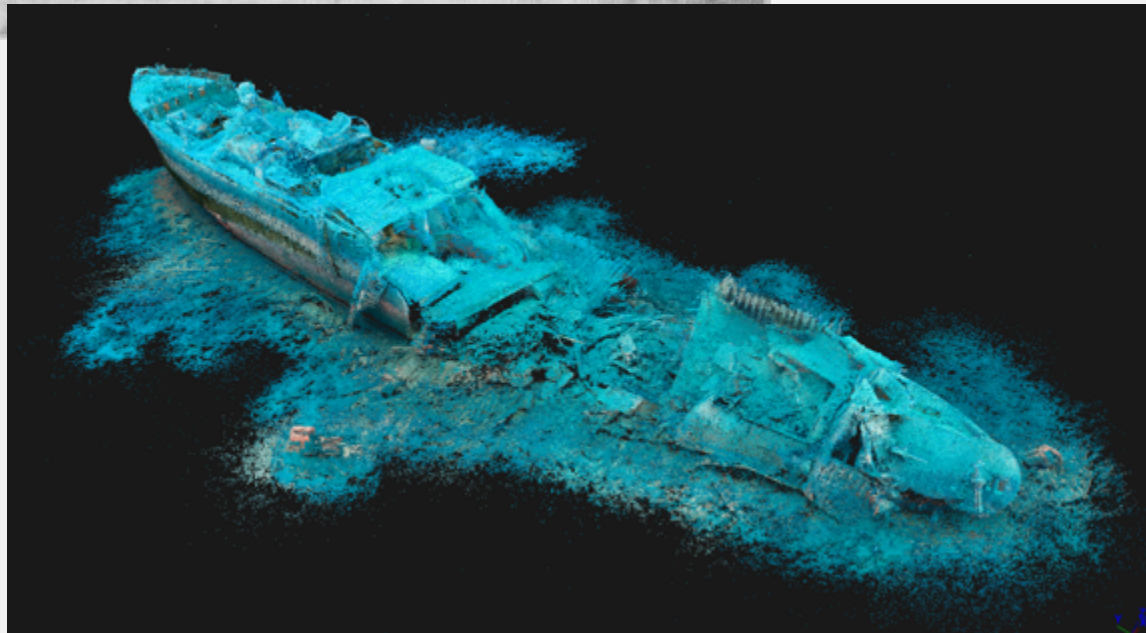
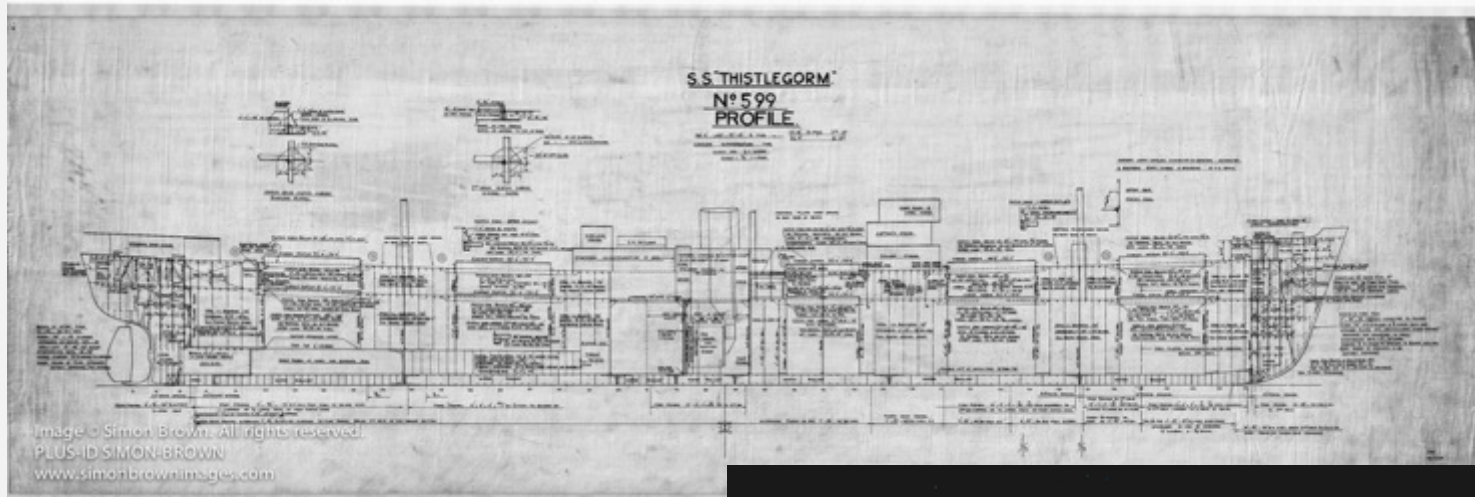
Metadata and 3D Workflow

Keywords used to describe specifics on large/complex subjects
Builders plans, common naming conventions, zones, subject or area.



For more than one 3D project, projects with multiple contributors, or projects conducted over longer period of time, keyword entry becomes mandatory.

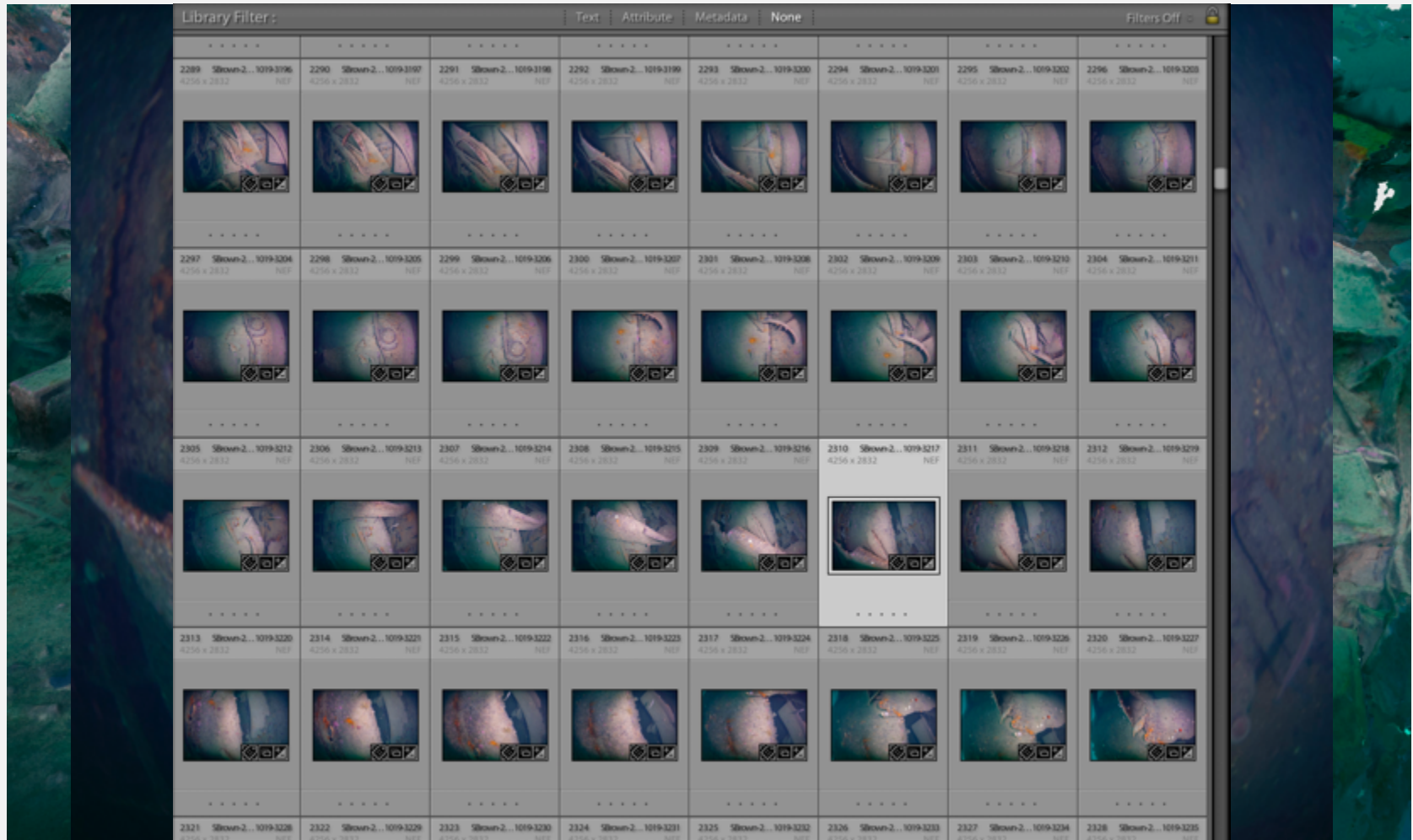
Metadata and 3D Workflow



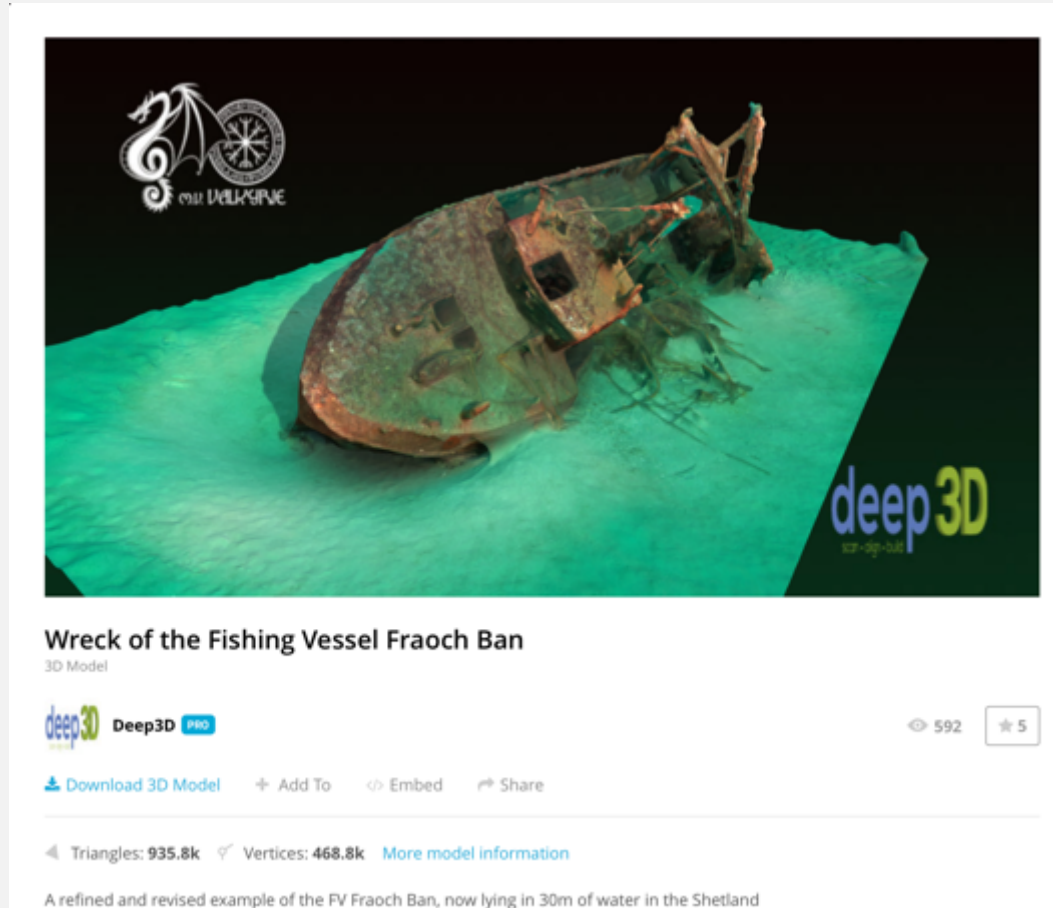
Metadata and 3D Workflow

Non-descript images are of extreme value!

Knowing where they fit into a 5440 tonne ship 150m long that's in bits is priceless.



Photogrammetry, Metadata and the Future

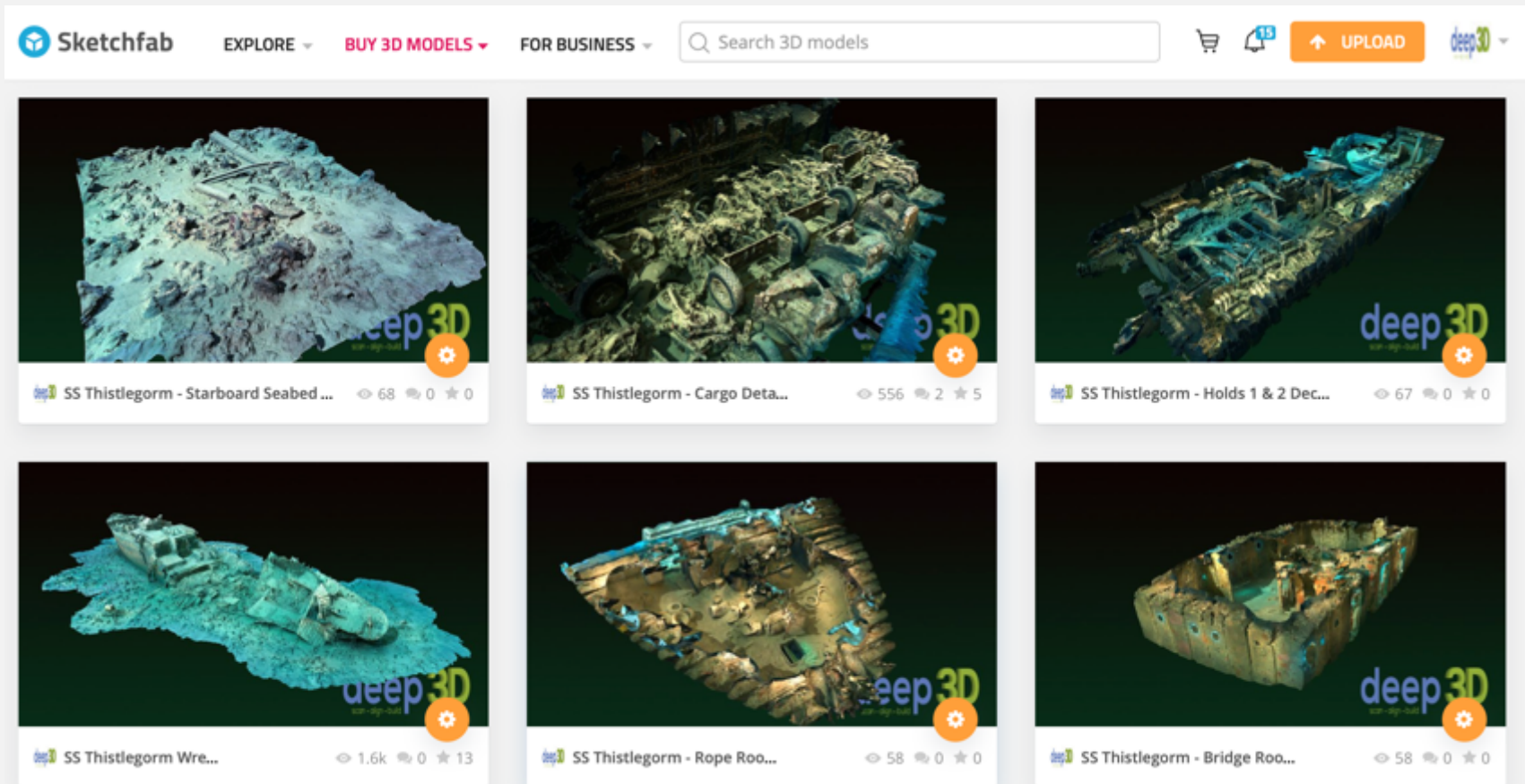


Photogrammetry, Metadata and the Future

- Underwater GPS
 - Increase data capture efficiency, particularly in low visibility.
 - Automated embedding of latitude, longitude & depth into EXIF/IPTC fields.
- Autonomous Underwater Vehicles
 - Remove the diver from the environment.
 - Work at depth and duration beyond human capabilities.
 - Simultaneous Location Acquisition and Mapping (SLAM) with concurrent 3D processing.
- Adobe Lightroom to handle native size ortho photos
 - At 1mm to 1 pixel image size frequently exceeds 512 megapixels/65,000 pixel longest side.

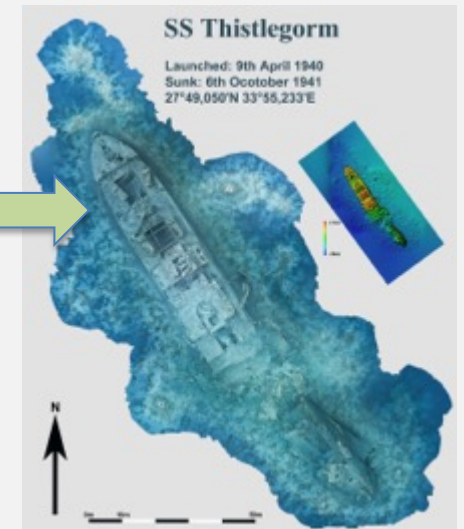
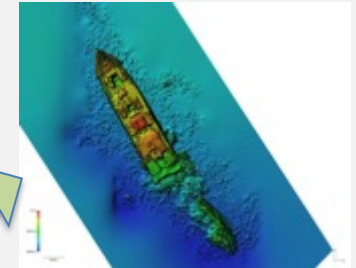
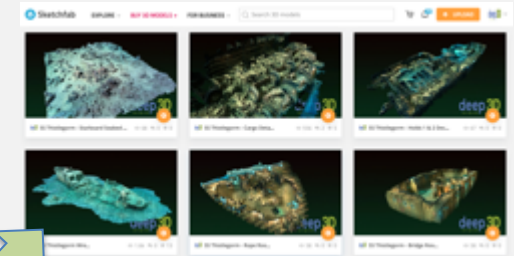
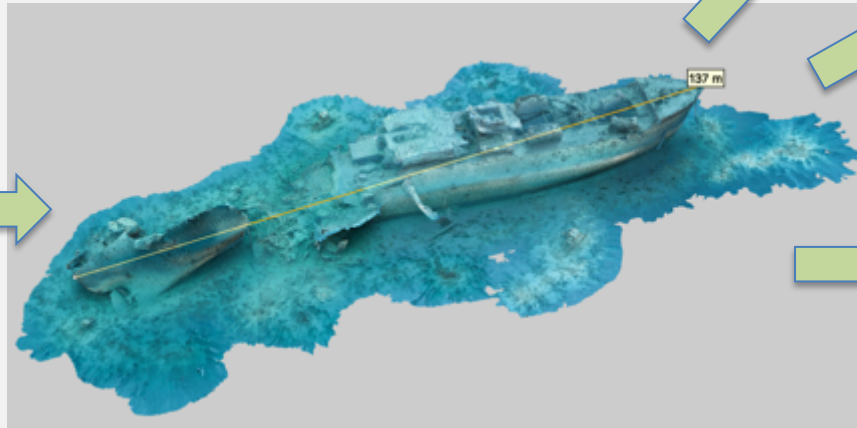
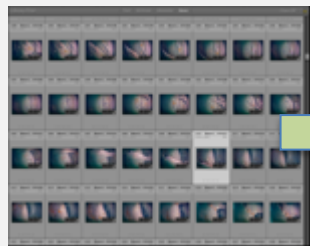
Photogrammetry, Metadata and the Future

- 3D asset management
 - Apply the IPTC schema to 3D data.



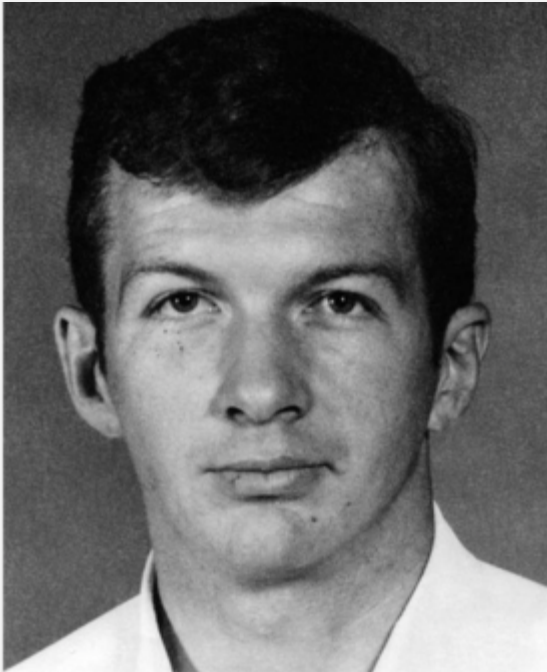
Photogrammetry, Metadata and the Future

- Inalienable relationship between:
 - Source images
 - 3D assets
 - Digital Elevation Model
 - Ortho photo



Photogrammetry, Metadata and the Future

- Personal project – Photogrammetry in the English Channel
- Cold War era – Sgt Paul Meyer and the stolen Hercules C-130 crash site
- Book/Film/Documentary using photogrammetry of crash site



Do we still need photo metadata in 2019?

**Metadata will become more valuable and relevant than
at any time in the past.**

Until AI can fully replicate human interpretation

By Simon Brown

