CAD AND VECTOR GRAPHICS PROCEDURES (VERSION 1.170)

DIGITAL ARHIVISTS
ARCHAEOLOGY DATA SERVICE
https://archaeologydataservice.ac.uk/

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Authors:	Jen Mitcham, Kieron Niven, Tim Evans, Ray Moore, Jenny O'Brien, Teagan Zoldoske, Digital Archivists
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1. Purpose of this document

1.0.1 This documents current ADS procedures for the production of dissemination and preservation copies of CAD datasets and vector images. It contains a list of current dissemination and preservation formats and how to migrate files to required formats. More information on this data type can be found in the G2GP for CAD https://guides.archaeologydataservice.ac.uk/g2gp/Cad_Toc

2. Formats

2.0.1 AutoCAD DWG (and DXF) files have the version no. embedded in the file header. To quickly work out the version open the file in a text reader and look for these codes {internal access only}.

Offered format	Accepted	Preservation	Presentation	Notes
Autodesk **.dwg** (+ .shx, .fmp)	YES	AutoCAD .**dwg (2018)**	AutoCAD **.dwg (2018)**, Drawing Interchange Format .**dxf (2018)** AND Portable Document Format **.pdf.** Where auxiliary files are included the each group is packaged in ZIP **.zip** form.	Any linked auxillary files are taken. CAD files should be checked for 3D content and disseminated as 3DPDF if possible. **.shx** Generated by AutoDesk AutoCAD, essentially a "shape file" that is referenced in the drawing, but can also include fonts. If this is not found at the same path as the CAD file then is not included and user gets an error message. These need to be retained. Do not need to be converted as are ASCII-based. **.fmp** A Font Mapping File: a list of text fonts and their substitutes. An ASCII text file and should be retained.

Drawing Interchange Format **.dxf**	YES	AutoCAD .**dwg (2018)**	AutoCAD **.dwg (2018)**, Drawing Interchange Format **.dxf (2018)** AND Portable Document Format **.pdf.** Where auxiliary files are included the each group is packaged in ZIP **.zip** form.	*As above.*
Scalable Vector Graphics **.svg**	YES	Scalable Vector Graphics **.svg**	Scalable Vector Graphics **.svg.** Where auxiliary files are included the each group is packaged in ZIP **.zip** form.	Fine as is. There may be additional functionality provided by Javascript, if the svg is specifically built to be viewed within a web page, or similar container. The container and svg must be treated as linked files and both preserved and/or presented together. See ADS Data Procedures: HTML (or markup, or whatever it is to be called) for web pages.
Adobe Illustrator **.ai**	NO			Please note as of September 2015 we are not accepting these files in the SIP.
Coreldraw **.cdr**	NO			Please note as of September 2015 we are not accepting these files in the SIP.
Rhino3D **.3dm**	NO			Rhinoceros CAD file. Fully-functional CAD application producing 3D wire or textured

				models. Files can be imported into AutoCAD.
Design Web Format **.dwf**	NO			DWF has progressed over the past few years and the latest incarnation can hold 3D data. Also the file format is compressed XML (much the same as OpenOffice documents), although it does to have binary elements, and is an open format. Depositors wishing to deposit DWF we would recommend that they deposit the origina DWG/DXF rather than an effectively pointless format like this.
Portable Document Format **.pdf**	NO			We can accept this, but it can only preserved in PDF/A 2 form.
DGN/Design format **.dgn**	NO			Used by CAD software developed by Bentley Systems, MicroStation and Intergraph. These files can be opened by AutoCAD but there are recognised limitations to the conversion.[1] Better to get the depositor to export to DXF and check result.

[1] https://knowledge.autodesk.com/support/autocad/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/AutoCAD-Core/files/GUID-3F4F7D09-E6A7-444F-B9C3-CA6A6E466DB1-htm.html

3. Documentation / Metadata

3.0.1 Alongside the standard metadata for files, the following additional documentation is required for any CAD. The current metadata template is available from the Guidelines for Depositors.[2]

Element	Description
Layer/drawing convention	Where possible an layer or drawing conventions should be documented and supplied as part of the archive.
Supporting Documentation	
Supporting documentation	Please enclose any supporting documentation associated with the drawing, this would typically include any codes, abbreviations or terminologies used within the drawing (name, description and type) alongside any information on any external relationships (images, data files, etc).

4. Accessioning checks

4.1 Checks

- Hidden layers within these files. Some layers can be hidden by the depositor but appear again when you migrate the file to a new format. We would currently assume that they were intended for deposition.
- Fonts/text are rendered correctly: should be obvious as software will prompt you to replace fonts
- Examine files for material for which the depositor does not own copyright (specifically OS vector data). Any Vector data from a third party cannot be archived without permission/licencing of said party. Background Raster data is more complex: we cannot disseminate this content in the normal manner (see below) as we'll effectively be distributing separate files of OS/BGS data. There is a way round this, we are allowed to archive 'flat' files (i.e. pdf) that would be used as figures in a report. We could do this as a last resort, but best course is to raise this with depositor and get them to resolve.
- Auxiliary files should be supplied where appropriate with relative links used within the drawing/file(linked files, object libraries, bitmaps, custom linestyles; shapes). Check and bind external references (x-refs)

4.2 Significant properties

- The significant properties of vector images and CAD are described in detail in: Jisc's *The Significant Properties of Vector Images*[3]...but are summarised in the Guides to Good Practice.[4]

[2] https://archaeologydataservice.ac.uk/advice/guidelinesForDepositors.xhtml.
[3] No longer accessible.
[4] http://guides.archaeologydataservice.ac.uk/g2gp/VectorImg_3

4.3 File-naming

4.3.1 Where possible files should retain the same name as the original (though the file extension may be different). This should be possible if the file being converted is simple (i.e. has no shared linked files).

4.3.2 If the file includes auxiliary files that are shared by more than one drawing then the file will need to be duplicated in original, preservation and dissemination and the process recorded in the CMS (these files should be stored according to the 'Storage' section below).

/{original_structure}
    /original_drawing_name1
        original_drawing_name1.dwg
        original_drawing_name1_shapefile1.shx
        original_drawing_name1_fontmap1.fmp
        original_drawing_name1_image2.tif
    /original_drawing_name2
        original_drawing_name2.dwg
        original_drawing_name2_shapefile1.shx
        original_drawing_name2_fontmap2.fmp
        original_drawing_name2_image2.tif

4.3.3 Where files include auxiliary or linked content, then these should be disseminated as a zipped archive with the name of the original drawing AND include the extension of the disseminated drawing e.g.

/dissemination
    /{original_structure}
        original_drawing_name_dwg.zip
        original_drawing_name_dxf.zip

4.3.4 All files and metadata should be placed in the appropriate location as outlined below.

5 How to convert files

Starting Format	Procedure	End Format	Checks
Autodesk **.dwg**	**AnyDWG** See notes on AnyDWG batch converters.[5]	Autodesk **.dwg (2018)**	• If we have been given a file as both DWG and DXF: MIGRATE THE DWG. We should only be migrating DXF files if they have not been given to us as DWG. • Open the file in AutoCAD and compare with original - are all layers there? • Any broken references to fonts or images? • Does the PDF have all content?
Autodesk **.dwg**	**AnyDWG to PDF** For the PDF conversion use Any DWG to PDF Converter - this saves both the modal and all layouts in a single file. see AnyDWG batch converters, details here: AnyDWG.[6]	Portable Document Format **.pdf**	
Autodesk **.dwg** (+ .shx, .fmp)	**AnyDWG** See notes on AnyDWG batch converters.[7] All converted files must be disseminated in discreet ZIP archives (according to format dwg or dxf).	ZIP archive **.zip**	• If auxiliary files ,including Raster images, exist; zip all files together, creating one zip of dwg + auxiliary files (raster converted to dissemination format and link reference changed in the dwg) and another zip for dxf + auxiliary files (again raster converted and link reference changed accordingly). • Auxilary files such as shx do not need to be converted, just leave alone!

[5] Internal access only.
[6] Internal access only.
[7] Internal access only.

			• Raster files need to be converted to their appropriate preservation and dissemination formats and any references to these files in the preservation and dissemination dwgs/dxfs need to be updated accordingly.

6 Storage

6.1 Storing data

6.1.1 Data should be stored in appropriately named folders, as described in the ADS Repository Operations manual.[8] Any directory structure from the SIP should be retained in the AIP. In some cases editing/restructuring may be necessary, but such restructuring should be recorded in the Processes section of the CMS.

6.1.2 Original: Simple files

original
/{original_structure}
original_name.dwg

6.1.3. Original: Includes linked content
As noted above, any supplementary and linked files, such as images, shx or fmp, should be stored alongside the dwg/dxf in a folder with the same name as the original drawing (this may involve duplicating any files shared by multiple drawings).

original/
/{original_structure}
/original_drawing_name/
original_drawing_name.dwg
original_name.shx
original_name.jpg
original_name.fmp

6.2 Storing metadata

6.2.1 If there is documentation associated with CAD files, this should be stored in a 'documentation' folder.

6.2.2 Preservation: Simple files

/dissemination/
/{original_structure}/
myaudiofile.mp3
/documentation
myaudiofile_metadata.pdf

6.2.3 Preservation: Includes linked content and documentation.

[8] https://archaeologydataservice.ac.uk/advice/PolicyDocuments.xhtml#RepOp.

/preservation
/{original_structure}
/original_drawing_name
original_drawing_name.dwg
original_name.shx
original_name.jpg
original_name.fmp
/documentation
original_drawing_metadata.csv

6.2.4 Dissemination: Simple files

/dissemination
/{original_structure}
original_drawing_name.dwg
/documentation
original_drawing_metadata.csv

6.2.5 Dissemination: Includes linked content and documentation.

/dissemination
/{original_structure}
original_drawing_name_dwg.zip
original_drawing_name_dxf.zip
/documentation
original_drawing_metadata.csv

7. Creating and linking objects in the OMS tables

7.0.1 See Match Objects Overview for general overview {internal access only}
see also CMS-OMS TableStructure for MOS data requirements {internal access only}

8. Tech watch / things to note

Item	Person	Date
STEP is being developed as a neutral and fully documented CAD and CAM exchange format standard (ISO 10303).	CATS	?
SVG is potentially a better option than DXF, however it does not yet adequately support layers, currently this must be done by including elements in groups and using Javascript to control their visibility, of course the whole must be in a web page.	CATS	?
CAD Versions change fairly regularly and CATS noted issues such as 'downgrading' versions to previous versions, potential loss of data and functionality resulting from this process (backward normalisation) and the unknown effects (data loss, incompatibility) of normalisation/migration via third-party software (DWG in particular) as of concern. Consequently, it was noted that CATS need to keep a	CATS	27 May 2020

watch on the release of new versions of the format to facilitate an ongoing normalisation to the latest version of the format. See CADReassessment for a wider discussion.[9]		

9. Archival notes

Item	Person	Date
.dwg (2018) replaced **.dwg (2010)** as version for preservation for CAD drawings.	TKZ	27 May 2020
.dwg (2018) and **.dxf (2018)** replaced **.dwg (2010)** and **.dxf (2010)** as version for dissemination for CAD drawings.	TKZ	27 May 2020

10. References

- Guide to Good Practice for CAD[10]
- Guide to Good Practice for Vector Images[11]
- Green, K., Niven, K. and Field G. (2016) 'Migrating 2 and 3D Datasets: Preserving AutoCAD at the Archaeology Data Service'. *ISPRS Int. J. Geo-Inf.*, **5(4)**, 44. Available https://doi.org/10.3390/ijgi5040044.

[9] Internal access only.
[10] https://guides.archaeologydataservice.ac.uk/g2gp/Cad_Toc
[11] https://guides.archaeologydataservice.ac.uk/g2gp/VectorImg_Toc