

4D construction learning environment

virtual tour making

6 Resource preparation and inventory

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Table of contents

1	Overview	2
2	Preliminaries	2
2.1	Initial document list	2
2.2	Intellectual property and confidentiality agreement	2
2.3	Set up process for managing documents and resources.....	3
2.3.1	ResourceInventory.xls.....	3
2.3.2	Folder structure for storing documents and resources.....	5
3	Content collection and production.....	6
3.1	Construction documents.....	6
3.2	Factional documents.....	6
3.3	Other resources	7
4	Filing.....	7
	Appendix: ResourceInventory.xls	8

1 Overview

This guide is for project teams who are producing virtual tour surveys of a construction site that is to be included in the suite of online UQ 4D construction learning environment (4Dcle) sites. The overall goal of a 4Dcle project is to document the construction (or refurbishment) process of a selected building for (online) use in teaching and learning activities by educators and students of professions related to the construction industry.

This guide outlines the process of collecting and handling construction-related documents that will be used as 'Other Resources' in the 4Dcle being developed. The aim is to minimise the time and cost spent on this task overall but especially on quality assurance procedures.

Although the 4D application provides for uploading other media, such as audio and video files as well as the addition of tutorial materials for use in hotspots, this guide does not discuss the preparation of such items.

2 Preliminaries

Whether or not you plan to develop a library of 'Other Resources' in the project 4Dcle, you will at minimum need access to the site plan, construction program and 'for construction' building floor plans and other available drawings to refine the photographic storyboard and plan survey nodes. The site plan and building floor plans are also integral to preparing the minimaps used by the 4Dcle to navigate the survey virtual tours.

2.1 Initial document list

Draw on your initial learning activity plan and photographic storyboard to make a list of:

- topics of likely interest
 - prioritise key items (scenarios/ processes/ etc)
- potential document types to be collected and/or emulated for each topic

2.2 Intellectual property and confidentiality agreement

When this is done, you will need to:

- obtain permissions from intellectual property rights-holders for access to and use of material such as
 - plans, drawings and specifications
 - project administration documents (reports, meeting minutes, etc.)
- make arrangements for preserving confidentiality of
 - identity for individuals and organisations represented in the material

- 'commercial in confidence' items not covered by the assignment of intellectual property rights to the client
- arrange actual access to documentary archives (login, etc.)
- make arrangements for sign-off by document providers.

2.3 Set up process for managing documents and resources

Once you have a preliminary list of documents and resources by topic, set up basic procedures for collecting, storing and inventorying all the planned resources.

There is a mandatory 4Dcle inventory template, ResourceInventory.xls (download from <http://4dconstruction.architecture.uq.edu.au/>) for use in providing the filenames of 'other documents' and resources to the 4D site as well as a required folder structure and naming convention. Using these templates from the start will reduce the workload and facilitate batch transfer of the files to the 4D application when the time comes.

2.3.1 ResourceInventory.xls

This spreadsheet is designed to:

- replicate the 4D menu and associated folder structure which will contain the actual files to be uploaded to the 4D application.
- provide fields for additional information about the resource, for example, file date, document type, status, discipline, and author, which generate search criteria for users in the online 4D application.

The spreadsheet is also a useful tool for managing the collection and storage of documents and other resources expected to be accessible from within the learning environment.

Look at the document menus in the AEB 4D learning environment to see how the inventory translates into menu structure and content.

Worksheet 1: Document header sheet

No data from this tab is loaded to the 4D application. However, it contains several columns of suggested content that are useful in compiling the inventory tabs. Further, it helps consistent classification (copy and paste from here on initial input) among personnel entering data as well as minimize typos.

- Indexed list of your priority build section/learning activity scenarios
- Category
 - classify plans/drawings as 'ForConstruction'/'AsBuilt'/'Other'
- SubCategory
 - Sub-categorize document/ plan content e.g. Architectural, Civil, etc
- Document Types
 - Identify according to type such as Plan, Report, etc

- Author list
 - Indicates author Profession add initials or names in next column
- Version number (#)
 - as drawings etc re-issued, can also be used to limit your collection
- Content type
 - Identify according to file type e.g. document (pdf), audio (mp3), image (jpg/jpeg), video (mp4)

Worksheet 2: TopLevelMenu

This tab is required. It is used to name and load key indexing documents (from Resources folder) into the top level of the resources menu structure. Enter filename including extension (e.g. A00-00_2.pdf), starting at Row 2. Normally these files include:

- Drawing index (Cover Sheet)
- Program Schedule

You can expand this list to include other indexes or key cover sheets. Save these documents to the main folder 'Resources'.

Worksheet 3: WholeofBuilding

This tab is required. It corresponds with sub-folder named 'WholeofBuilding' in the Resources directory.

Use this tab for all sub-category classifications (Architectural, Civil, Fire, etc) and types of documents (Plans, Reports, Specifications, Reports, etc) that provide information about the whole building. Save those documents to WholeofBuilding folder under relevant category and subcategory subfolders.

The build section indexing is useful in identifying if a document is likely to apply in more than one Build section/ or scenario. If this is the case, and especially where the document file size is large, consider including it only under 'WholeofBuilding' or placing it in the most relevant section.

Worksheet 4+:

Tab 4 is currently labelled 'Environmental' as an example:

- rename it to something more suited to your list of Build sections/ scenarios e.g. 'LiveBuilding', 'FireEngineering', 'GroundWorks'
- Add and label additional tabs:
 - Tab names should begin with a Capital and contain no spaces or punctuation
 - Copy and paste header row from existing tab to new tabs
- Create sub-folders in Resources directory with same name as the new tab label(s) to store the documents inventoried on the respective tab

Note that folder and file names are case sensitive and should not contain spaces or punctuation except for underscore, hyphen, or brackets. For example filename:
CD_C_000_[B].pdf

Particular care needs to be taken when entering tab names (folder names) and file names as well as category and sub-category classifications and other data into the spreadsheet. Check for typos on regular basis but especially before transferring the data to the 4D application.

2.3.2 Folder structure for storing documents and resources

The main folder is named 'Resources' and contains

- Documents that will be accessed from the Top Level Menu in the 4D application
 - Drawing Index (cover sheet) and Program schedule at minimum
- Subfolders (2nd level) corresponding to named tabs (worksheets) in ResourceInventory.xls
 - Create a new subfolder as new tabs added to Inventory
 - Subfolder name must be an exact replica of tab label

The resources directory structure should follow the pattern indicated below:

- ▼ Resources (contains files for TopLevelMenu and copy of ResourceInventory.xls)
 - ▼ WholeofBuilding (no files, only sub folders)
 - ▶ AsBuilt
 - ▼ ForConstruction
 - ▶ Architectural (files)
 - ▶ Civil (files)
 - ▶ ElecCommsData (ditto)
 - ▶ Fire
 - ▶ Hydraulic
 - ▶ Mechanical
 - ▶ Structural
 - ▶ VerticalTransport
 - ▶ Other
 - ▶ Other
 - ▼ Environmental(for example)
 - ▶ AsBuilt
 - ▶ ForConstruction
 - ▶ NewTabFolder(named for learning activity building sections/scenarios)
 - ▶ HotSpots (if you are adding equipment details or other files to Survey hotspots)

In the WholeofBuilding folder (required), keep both 'AsBuilt' as well as 'ForConstruction' subfolders, even if you only plan at the start to use documents for one of those Categories.

Should you decide, at a later stage, to add documents to e.g. AsBuilt, then the menu option as well as folders will exist in the 4D application and you can load extra documents using the Admin facility. The other Tab folders and sub-category subfolders are optional and can be included or amended according to the learning activity plan.

3 Content collection and production

Ideally, collection of documents and production of navigation minimaps and other resources (for example, detailed diagrams or process descriptions) should take place in parallel with the photographic surveys. Among other advantages, the designers of initial learning activities can pick up additional ideas for topics and tasks and the photographer and production team can incorporate changes to the storyboard. If this is not possible, keep a log of events and an associated list of particular documents, so that documents may be located or produced later.

3.1 Construction documents

Documents to be obtained as early as possible include:

- construction program
- drawing index
- ‘for construction’ site and/or floor plans.

The document wish-list, derived from the learning activity design requirements, can be used to focus the collection and categorisation of the plans, drawings, specifications, reports and other correspondence. As with the photographic surveys, it is important to be selective in order to minimise storage requirements as well as the navigation and download costs for end-users.

However, unexpected problems at the construction site or changes to building design often provide good material for learning activity scenarios, so it is worth collecting all relevant documents relating to such incidents as they occur. Documents that are not relevant to the learning activity can be removed once the issue is resolved.

3.2 Factional documents

Pre-designed templates for ‘factional’ contract administration documents (minutes, reports, requests for information, variation orders, etc.) minimise workload because relevant information can be extracted (copied) from the original and pasted into the template.

Create and keep up-to-date a list of pseudonyms for organisations and individuals involved in the construction process. Substitute these in the factional documents and in the inventory author list.

3.3 Other resources

Depending on the original specification for the environment, other resources, such as descriptive texts, animations, short videos and/or audio voice-overs, may need to be prepared in advance if these resources are intended to be linked to appropriate hotspots in the virtual tour. Hotspots are created and linked (via URL) to the intended resources during PanoTour processing and before exporting the (node) virtual tour html and meta-data files. Use absolute URLs for external links and relative links for internal resources. Internal resource files should be saved to the Resources subfolder Hotspots and inventoried under a ResourceInventory.xls Tab named Hotspots.

Resources most requested by student users in usability trials were:

- names, descriptions and/or process animations linked through hotspots in survey images
 - animations should be in GIF format
- time-lapse videos, video or audio interview clips, voice-over audio which
 - can also be included as resources from appropriate hotspots in surveys
 - need to be produced in the most accessible, cross-browser format, for example, MP4 (video) or MP3 (audio) with codecs that function for most mobile devices.

4 Filing

Place documents in appropriate folders as itemised in **Resources folder structure** section above. Inventory the files as you go and enter data for all main fields in the spreadsheet tabs. Date, Category, SubCategory, Document Type and Author are essential to build the Search facility for users.

Indicate 'Content type': document for pdf, video for mp4, image for jpg and gif.

Note that folder and file names are case sensitive and should not contain spaces or punctuation except for underscore, hyphen, or brackets. For example: CD_C_000_[B].pdf
You may need to rename files as you go to conform to this specification.

Particular care needs to be taken when entering file names, including file extensions, as well as category and sub-category classifications and other data into the inventory spreadsheet. Check for typos on regular basis but especially before transferring the data to the 4D application.

5 Transfer other resources data to UQ

Zip the Resources directory. Upload to Cloudstor, using pre-arranged voucher to send to eLIPSE.

Appendix: ResourceInventory.xls

Microsoft Excel - ResourceInventory

File Edit View Insert Format Tools Data Window Help

Type a question for help

B12 fx

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	VirtualTour Resources Inventory				Database Server Name	localhost		Import Data					
2					Database Schema Name	kingston							
3					User	kingston							
4					Password	KingstonVirtualTour							
5					Web app context path	VirtualTour							
6	Refer to Resource Inventory guide for details on use.												
7	NB Folder (Tab) and file names are case sensitive and should not contain spaces or, in filenames, punctuation other than hyphen, underscore or brackets.												
8													
9	Index	Build Section/ scenario	Category	SubCategory	Document type	Author list	# = Version number	Content Types					
10	1	Environmental	AsBuilt	Architectural	CoverSheet	Architect		document pdf					
11	2		ForConstruction	Civil	Plan	Consultant		video mp4					
12	3		Other	ElecCommsData	Detail	Structural engineer		audio mp3					
13	4			Fire	Section	Main Contractor		image jpg					
14	5			Hydraulic	Elevation	Civil engineer		animation gif					
15				Mechanical	RCP	Fire engineer							
16				Structural	Report	Electrical engineer							
17				VerticalTransport	Schematic	Steelwork subcontractor							
18				Other	Warranty	Mechanical engineer							
19					Correspondance	Façade Engineering							
20					Minutes	Multiple							
21					RFI	Greenstar							
22						Building Maintenance							
23						Fire Inspections							
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Document header sheet / TopLevelMenu / WholeOfBuilding / Environmental /

Ready

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6. Resource inventory

Microsoft Excel - ResourceInventory

File Edit View Insert Format Tools Data Window Help

Type a question for help

K2

	A	B	C	D	E	F	G	H	I	J	K
1	File name	Date (last modified)	Category	Sub Category	Document type	Title	#	Author	(build section index)	Content Type	Menu Label
2											
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Document header sheet | TopLevelMenu | WholeOfBuilding | Environmental

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