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**THE ARCHITECTURAL PRACTICES
AS FIRST CURATORS OF THEIR ARCHIVES**

Introduction

During this conference on “hybrid” architectural archives, I will be using the term “hybrid” in a very particular way. Many of the talks we have heard over the last two days have been speaking about computerised architectural archiving projects which are hybrid in the sense that they *partly* require use of archives, or in the sense that they can be perceived as “archives” (i.e. sources of information) whilst not representing the organic output of one person’s actions. I want to take a more traditionalist approach and talk about architectural archives in their most fundamental sense – in the sense that an archivist would refer to them – in other words records produced and received during the exercise of a particular function. In this sense, if we refer to hybrid archives, their hybrid nature refers to the fact that they contain both conventional records and digital records. And what we are interested in here is the digital aspect of these records.

I want to talk about production and management by the producer of computer-generated archives from architectural practices. This study is based on two surveys carried out in 2003 and 2004, which I will talk about shortly, and on a number of in-depth visits to Paris architectural firms in 2008 (Architecture Studio, Paul Chemetov AUA, Renzo Piano Building Workshop, and Jean Nouvel Architects).

Here are the basic points I would like to stress. Although some conclusions are drawn from French examples only, I am assuming (and this may be an interesting point to discuss), that they are more broadly valid.

Architectural practices not only produce records, but they are their own curators. They are obliged to store some of them for decades, which is much longer than what a public agency does with its records; they have to dispose of them, either under the pressure of urgency, or along carefully thought out lines; and for the electronic records, they have to modify their physical packaging and to migrate them. Every practice is its own master and has to find its own way out of the sea of issues raised by its records.

It should be stressed that, from the point of view of professional archivists in specialised archive repositories, the practices are already doing a part of our job, taking decisions on the fate of each document or file. We consider that they are fully responsible for the ‘records management’ step, but also, looking further forward, a part of the long-term archives management. Although not all of their decisions result from a balanced reflection, some do, and both types of decision are of interest to us.

Concerning digital files, while the philosophy (if any) differs significantly from practice to practice, the results might not be so vastly different. Two issues seem to be particularly relevant for us: should the 'master' copy – the one to be kept the longest – be digital or paper-based, and what format policy can best provide access to the files in the future. Besides, and outside of the scope of this paper, how far ahead is the future?

Today we observe the tendency – which, I believe, is relatively new – to use a wide (although perhaps narrowing) variety of programs to create the files, but simultaneously to create at a given moment in time, a digital output of each original, in a very small series of formats. Then, often, in addition, there is also a paper output: even large studios with excellent procedures on file production, migration and storage seem to trust paper above all and put their care on systematically printing the files and storing the prints. The creation of these outputs (digital and/or hard copies) usually happens at a critical point of the project – typically, the completion of a project phase –, and happens only to files retained for preservation. Thus, the first – and sometimes the only – choice is made at a very early stage of the record's life, even before the architectural project in itself is completed.

Even if every practice has to define its own rules about managing its records, these rules, if applied consistently within each practice, should help us archivists a lot in our task of accepting and managing an archive.

Before I get properly started, I want to stress that this presentation is based on six years of work by the Gau:di programme Architectural Archives working group which I helped to coordinate. I would like to thank the whole group, which I am representing at this conference. Gau:di is a European programme whose aim is to bring together the experience of architectural archiving institutions in different European countries. Over the two three-year cycles of this programme, from 2001 to 2008, specific work was carried out regarding architectural archives, drawing together a number of representatives of specialised archive centres. The NAI and IUAV from Venice, which are represented here today, and the Mendrisio Architectural School from Switzerland, the RIBA archives in London, the architectural museums of Finland and Norway and the Deutsches Architekturmuseum in Frankfurt were all part of the programme. Some of the work carried out by this group has been published on the website <http://archivesarchitecture.gaudi-programme.eu/>. One of the group's activities was to discuss and share experiences with respect to electronic architectural archives and the way that these records are managed within archive centres. We quickly realised that we were absolute beginners in this field. When the programme started in 2001, all we knew was that we could not keep on ignoring this aspect of archives for much longer. In 2007, we organised an international conference on the subject and the proceedings of this conference were published in autumn 2008.

I would also like to emphasise how indebted we are towards the Art Institute of Chicago and the unrivalled study that it carried out over the same period. Following extremely in-depth analysis, the institute offers on its website an exhaustive list of file formats for migrating the native formats used by architects along with recommendations regarding records management within architectural practices.

I want to start by talking about the production of records in architectural practices from an archivist's perspective and then go on to talk about the way in which firms managed their records today.

1. The production of digital records in architectural practices

The digital archives produced by architects will depend significantly on the way their production structures operate. Some of the key features are as follows:

- Record-producers are private-sector structures of variable size, but often very small. There are very many such producers, who often work with a fairly unsophisticated approach. In France, very few architectural practices have more than 150 employees. Such firms have a long history of mergers, associations and temporary partnerships, particularly in working towards architectural competitions.
- The records produced often feature complex structures. They include graphic files in two or three dimensions, structured as “layers”, with associated databases. They require other documents in order to be complete. A large number of software packages are used to generate such records, hence the broad variety of outputs (drawings, written documents, tables, videos, sound files etc.).

The vast majority of architectural practices started using computer technology over a very short period of time at the end of the 1980s and start of the 1990s. Two surveys in 2003 gave an insight into the way in which this IT take-up and change of medium took place. The Europe-wide survey found that one-quarter of agencies surveyed said they became computerised between 1980 and 1989. 1994 seems to have been the last year in which a practice could still be set up without immediately requiring computer hardware. As we will see, when we refer to “computerisation”, it is often the practice staff who gained access to computer equipment, but the founding practice partner did not necessarily start using this technology.

The relationship between architects and IT, between architecture and cybernetics, is much older and goes back many decades earlier in the twentieth century – in tangible, experimental, imaginary or fantastical ways. The backdrop to this relationship is the idea – which has still not become a reality – of one day no longer requiring paper, achieving the *Paperless Studio* – which, by the way, was the name of a programme of study at the Columbia University, New York. Do any paperless practices exist today? This is a twofold question. From an archiving perspective, is it possible to only store computer files and no physical records? From a creative point of view, is it possible to carry out all stages of design on screen and using computers only? Although it may be true that nothing is impossible, it should nevertheless be noted that despite the ubiquity of information technology, computers remain a tool that has not actually brought about the metamorphosis in architectural practice and design that the utopic thinkers dreamt of in the years between 1940 and 1960. What is today referred to as “non standard architecture” is a borderline case and may be an exception to what I have just said – I will come back to this shortly. The use of a computer by the practice partner or the project managers – i.e. the “creative” architect – may be the last bastion of resistance. Whatever the architect’s generation and whether or not they were trained in computer technology during their studies, some designers still work only by hand and pass on their sketches to their teams to implement. For drawing, in addition to the conventional office software used in any company and e-mail, which is used in the same way as everywhere, architectural practices have gradually taken up computer-aided design tools (CAD), 3D modelling tools, image editing and animation (video) solutions. A number of software packages or formats are now so widely used that they have become the de facto standards (e.g. AutoCAD, with its DWG format, which became a near-standard solution by around 2000) or official standards (e.g. the PDF format from Adobe). These standards facilitate transfer operations for the files that are generated today. However, the first ten or fifteen years of computerised architectural output in many practices may well become inaccessible in the near future – and in some cases this is already so. In 2003 however, three-quarters of European practices surveyed claimed they were able to access the computer files created in their firms 10 to 15 years earlier.

In the area of design, the situation is a lot less standardised. In 1996, a survey looked into the use of IT in architecture outside of computer-assisted drafting tools, looking both at the production of

presentation documents and initial project design. Responses given at the time highlighted the magic and fascination of images available in image banks or pictures that could be created prior to a project. However at the same time there was a lot of mistrust with regard to the ease of this process, which could quickly get out of control.

Less than ten years later, exhibitions such as *Architectures non standard* at the Centre Pompidou in Paris (2003-2004), demonstrated that design tools, as used by a small minority of architects, are capable of changing not only the form, as had been anticipated as early as 1996, but also the build and manufacture methods used in architecture, by developing non-standard modules (with or without the use of computer-numerically-controlled manufacturing or “computational processes”). These exhibitions often highlighted theoretical research projects, which used 3D modelling and animation software from the domains outside of conventional architectural work in a new and experimental way.

Beyond such experimental projects, it is also important to highlight the continuing importance of physical documents – sketches, design models etc. – in architectural design.

Digital architectural records thus feature a large quantity of drawings, graphic representations with dimensions – in other words CAD files. However, programs such as Photoshop, Excel, Word and PowerPoint clearly have a major importance in architectural practices (as highlighted both by the European survey and the Chicago study) to the extent that the architects surveyed mentioned them even more often than AutoCAD, the leading CAD package. Architectural design is a process that therefore cannot be reduced simply to the use of CAD files.

However, these CAD files are the biggest issue in terms of long-term preservation, raising issues of transfer and migration – transfer from one medium to another, migration to more up-to-date, optimised formats or formats specifically designed for preservation purposes. In the case both of transfer and migration, not all features of the original file can be preserved.

2. Records management within architectural practices

It took architectural firms a number of years to realise the need to organise their IT filing system in a much stricter way than their paper records had been organised. Internal rules needed to be drafted. In France such rules started to be put in place in the early part of this decade, in simple or complicated forms, and such rules are obviously implemented to a greater or lesser extent by practice staff. To give an example, the Renzo Piano practice, an international architectural firm with more than one hundred employees (which means it is a big firm for France) only drew up such rules in 2007 and has been gradually implementing them over the 2008-2009 period, with a major concern to avoid cutting across the individual approaches of their staff members. When shared data storage systems are used (such as external servers and drawing archives), these systems help impose a structure. This organisational approach may, for instance, be embodied in a tree structure for organising files within a project and which can be implemented for all projects, naming rules, both for files – project code, phase code, drawing type code – applicable both to files and the layers within the files.

In addition, the development of a quality management system and ISO 9000 certification to guarantee its implementation, are a real help to architectural practices in structuring their data and creating a solid, reassuring archive structure. The ISO 9000 standard can be used as an inspiration without being fully implemented and without certification necessarily being the final goal.

These days, architectural firms tend to distinguish two types of digital records and formats:

- “source”, “native”, “exchange” files (for exchange inside the firm and with project partners), which are used in the short-term,
- and “output”, “distribution”, “print” or “archiving” files.

Internal guidelines recommend that the second type of file be systematically generated from the first type and that clearly differentiated objectives, statuses, production times and life cycles be specified for the different types of files.

Let me first of all talk about the source or native files.

Vector-type drawing files “accumulate within a single file the results of an ongoing differential process of information and knowledge accretion, whereby this single file ends up constituting a varied collection of expressions of reality, knowledge and memory”¹. Three features of such files make preservation and migration rather difficult – their layers, cross-referenced files and pen files. Layers are used to design a variety of different embodiments (“outputs” or “print-outs”) for a single file. In AutoCAD, until the “Presentation” tab was developed in the LT 2002 version, the architect’s preferred view could not be reconstituted. Cross-references (xref) may lead to blank spaces in the output file if they are not preserved with the file in the original file structure. Finally, pen files were only included with the drawing file from version LT 2002. Previously, a user needed to know the codes used by the architectural firm in order to reconstitute the initial appearance of any drawing. In France, for example, there is no generally accepted convention for these codes nor is there necessarily a standardised usage within a single architectural practice – individual project managers or even individual draftsmen may use such codes differently. Obviously these days, individual habits are starting to give way to common standards, which are described in documents referred for example as a firm’s “graphic charter”. However, such habits do, surprisingly, live on, as they can still be observed in some major firms to this day.

Output or archiving file formats

Drawing files are used in two ways in the project development process. Firstly, they are used to draft the plans for which they are being designed at any given phase of the project (e.g. preliminary design phase), and to make any edits to this drawing. Secondly, it may be used as a starting point for the drawing of the same item in the next phase, in which this drawing will be issued a greater level of detail (e.g. detailed design phase). Once the project has reached a subsequent phase, the drawing file is no longer used as a production tool and the practice only requires printable versions of the drawing for each phase.

This has led architectural practices to implement the following methodology, which is often described in internal guidelines. At the end of each project phase, the project manager sends off or saves in a particular location on the server, all plans for this completed phase in a preservation format from which the files can be directly printed out. These are “frozen” formats in which the drawing cannot be edited. They may, at this stage, be defined as the only official records within the practice, as opposed to the source files which can still be edited. In archiving terms, these records comply with the criteria of integrity and authenticity, which are fundamental for long-term preservation. It is therefore

¹ Stéphane Loret, Pascal Garret, « Crévilles, un système d’archivage, gestion et diffusion d’images sur la ville », *Architecture et images numériques*, 2008, p. 509.

recommended that AutoCAD files be converted into DWF format, Word or Excel files into PDF format and Photoshop images into PDF or JPG formats.

DWF seems to be coming to the fore as the standard distribution format for vector drawing files particularly from AutoDESK applications. This will continue to be the case unless it is overtaken by a version of the PDF format. DWF is generated from within AutoCAD by using the “Publish” function.

The PDF format has become a standard and is used as an exchange format between different Adobe software packages (Photoshop, Illustrator, InDesign, etc.). It can be generated from AutoCAD – including in batch mode – using software such as Adobe Writer 8 and PDF Creator.

Other CAD file conversion formats exist, mainly for the process of file exchange. In particular, the DXF format should be mentioned, an AutoDESK proprietary format which is generic and can be used to exchange files between all CAD programmes. The IGES, STEP, IFC, STL and the new PDF/E formats are used for 3D files.

In some architectural firms, the guidelines state that the DWG files must be stored in parallel, each one accompanied with a ZIP file containing all the pen and “xref” files.

Many architectural practices also have PowerPoint files (PPT) which include files of many formats (CAD files, pictures, animations etc.). Some firms systematically use PPT files to preserve an “overview” of their projects in the same way that in the past key project documents were kept in folders or bound portfolios. At the Renzo Piano practice, each project manager is responsible for defining one or more “iconic” representations at each stage. This may be a plan view, a section or any other representation.

E-mails raise specific issues which are currently not well dealt with. Recommendations are often made to print them and attach them with the paper file for each project. Digital conversion and presentation is not always required.

Various firms store one or more file types in parallel, either chiefly in native formats or chiefly in output formats or both. Sometimes part of the project files are gathered together in PPT files.

Some practices highlight the need to select files in order to avoid keeping all files generated during project development. The total file volume within architectural firms runs into terabytes, leading some people to pay attention to the amount of data stored. One rule that is frequently mentioned, but which does not appear to be consistently implemented, is that parallel versions of the same drawing should never be created, but the same name should always be used in order to overwrite each successive iteration. Even with such rules, it is often recommended that each person involved in the project, and the project managers, regularly delete everything that is not “fundamental” (at the end of each phase).

The key moment for data management actions seems to be **the end of each phase** whenever any deliberate archiving activity is implemented. It would however seem that conventional project management phases, as found in archive records, have significantly changed over the last twenty years, with the use of IT tools. The successive preliminary sketching, design and construction drawing phases have been blended into a continuum, since digital data can easily be reused and imported from one phase to the next, even going as far as model making and the information used in building, since the advent of computer-numerically-controlled (CNC) manufacturing processes.

Storage media and metadata

Most practices systemically store their data on the hard disks of a server, with back-up and security procedures that these days should be well documented and monitored. Files are also often duplicated onto other digital storage media (CDs or DVDs). However, firms seem not to have specific, well-monitored rules for file organisation prior to creation of the disk (often at the project manager's request at the end of each phase), or procedures for actually burning the disk. Likewise, CDs are rarely subject to periodical checks.

Other types of storage media, such as cassettes, tapes, cartridges and floppy disks, seem to have been phased out. Some practices have old storage media of this type and have still not organised transfer processes. They run the risk of losing the files stored in this way. However, this situation is never viewed as a major issue.

The use of metadata other than the filename and sometimes the date of creation also seems to be a rare practice, although at times it is referred to in the guidelines.

What is the original? Should hardcopies be kept?

Many digital files are printed out or otherwise output as a hardcopy. In 2003 the question of "What is the original, the hardcopy or the electronic version?" seemed to be a relevant question for architects and the majority of them stated that the hardcopy was considered to be the original. At the time, we expected rapid changes in this perception.

The real question is whether this shift has now taken place? What is striking these days, in France at any rate, is that even those practices who place the most trust in their hardware and IT procedures consider that the hardcopy is still the chief record to be preserved or archived for the long-term (sketches, physical models and print-outs of CAD drawings). The storage of such items is organised as carefully as their digital records. What is less clear is whether such hard copies are output using materials (paper, ink etc.) that are suitable for long-term preservation. The printed records that I observed in France are stored in the open-air with significant exposure.

Training architects in the practices

Meetings between archivists and architects have raised a number of questions about methodology. Since electronic records management begins at the time of creation, it seems vital for all document producers – i.e. almost every employee in an architectural practice – to be aware of a number of general principles and specific rules that have to be systematically implemented. It would also be useful to raise awareness of the continuum between the document created today and the file that will be stored in the firm's archives as evidence or as a historical record in a somewhat more distant future.

More often than not, architects display fairly limited interest in the long-term preservation of their archives. Forming a "historical" archive which could be transferred to an archiving institution is rarely talked about as a goal and sometimes explicitly rejected. Having said that, firms always find a way to document their projects. Presentation documents are generated throughout every project. These records are intended for a wide audience and are often managed by the person responsible for press relations. The architects often trust these documents, which are available in commonly-used but non-editable formats such as PDF and JPG, to provide any record that will be used for future

reference. The contractual and administrative documents are rarely needed beyond the legal guarantee period, which is ten years in France.

In-house management of archives should draw on the principals of *records management* as laid down by the ISO 15489 standard. Architectural agencies – and any records-generating organisation – can use this standard to define, internally circulate and implement specific rules in the following areas that have been listed by the AIC:

- File naming, in particular codification of project names, phase names and graphic file types (plans, sections, elevations etc.).
- Print-out conventions (pen codes).
- Timetables for the validation and selection of documents to be disposed of (and the person responsible – e.g. project manager), with a report given to an external manager (at the end of each phase, ideally).
- Arrangements for CD or DVD transfer, where applicable.
- Monitoring of the records stored (e.g. opening the CDs on a periodical basis).

Lists of rules to be implemented by architectural practices were drawn up following the two abovementioned surveys in 2003, and can be downloaded from the Gau:di working group's documents and from the AIC's records. The findings of the latter organisation are summarised in the proceedings of the 2007 conference.

Conclusion

My observation is that between the initial surveys in around 2003, approximately ten years after the mass roll-out of computer technology, and my most recent visits, the issues raised by electronic records and archiving have somewhat diminished in architectural firms. Although rules for production and storage do not exist everywhere, there are now guidelines for drafting and implementing such rules and the practices are aware of their need to make an effort in this area. These days, unless there is an exceptional occurrence, any losses likely to occur will not prevent archivists and researchers gaining an overview of and an insight into the output of each firm. This finding is clearly positive in general terms. However if one looks closer, a number of issues remain. A second issue has now been raised – although architectural practices are becoming credible curators of their own records, the methodologies for transferring their records to long-term archives remain to be defined. The 2007 conference provided an opportunity to map the problems, current research and contradictions in this area. The solutions presented were mostly applicable to small volumes of records or else were clearly experimental projects. For the moment, we still have no generic long-term solution that is ready to be implemented.

Bibliography

This paper is based on several presentations at the “Architecture and Born-Digital Archives” conference, Paris, 8-10 November 2007, the proceedings of which have been released as:

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