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# The Imperative of the Metastudio

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## Introduction: Genesis of the Metastudio

The activities we engage in when we design form a broad and disparate palette. We explore, research, make marks, make artefacts, experiment, review, discuss, critique, assess. The 'home' of this palette of activities is 'the studio'; a combination of laboratory, library, workshop, forum, exhibition.

It became apparent a few years ago, that the nature of the central plank of the studio dialogue, the tutorial, was changing. Students were bringing a wider range of media to the tutorial to represent their developing ideas. Importantly, this included, increasingly, electronic media, typically 'live' CAD models on laptops.

As a tutor, the importance of the internet in tutorials, to share material, images, precedent with students, was also increasing. The tutorial was enriched. But it was harder to organise, and particularly it was harder to record, to provide a cohesive log of the dialogue, the feedback, the references. Much of the feedback in tutorial is drawn, and drawn freehand, in quick and dirty, intuitive mode. It became apparent that it would be very helpful to find a way of pulling this melee of feedback and discussion together, of organising it for students and staff, but retaining the immediacy of the quick and dirty drawn discussion and freehand feedback.

The 'Metastudio' refers to the consideration of the design studio existing beyond the traditional physical space where we draw and review design projects. In particular, it is exploring the extent to which the studio can exist electronically, without physical artefacts or space. The Metastudio is developing use of a range of readily available tools which aims to increase the utility and richness of the studio experience, and respond to the current changes and pressures on resources. It is a 'beyond studio'; and in part, at least, a studio about studio.

Much computer input, notably CAD, is parametric by nature: we need to input data to satisfy parameters. To draw a line we need to let the software know the co-ordinates of the start and end of the line, or the start point, the angle and length of the line. The use of 'snaps' and other 'intelligent' aspects of a CAD software can make

this a little more intuitive, but the interface for this process is largely dependent on complex nested menus, the mouse to pick commands, and the keyboard to enter data. In short, to draw, CAD demands a huge amount of non intuitive input; of clicks and taps.

This precision of data input may be necessary and appropriate for the complex matter of putting together detailed, organised, cross referenced information that form the instructions and contract information to build a building. However, the early stages of design flourish with an intuitive, quick and dirty, *invisible* interface. The torn cardboard and gluegun model. The sketch on the back of an envelope. The availability and 'worthlessness' of quick and dirty media allow the 'gesture', which is so key to initial moves in design, to flourish without the inhibition of expensive media, a heavy investment of time, or a complex process of input. The quick and dirty methods are long evolved, established as the 'fittest' methods for capturing those fragile, ephemeral first ideas.

## Initial Development and the Current Metastudio

It seemed to me that touch screen tablet computers had the potential to electronically record the making of the intuitive freehand marks which are central to early stage design development and feedback dialogue. There would probably be a way of combining images generated by CAD and the internet, and it was important to be able to store and share the records from the tutorial in a simple and accessible manner.

Microsoft Onenote<sup>1</sup>, a hugely undersold programme, forms part of the Microsoft Office suite. It allows this to be done very straightforwardly. It also allows a great deal more to happen.

A typical tutorial, using Onenote, (Fig.1) uses freehand drawing and notes, made on a touch screen computer. Written input can remain drawn, it can be 'handwriting recognised' or keyboard typed. It can include images from any source; student work on USB stick, email, images from the internet, photographs of student drawings and models taken during the tutorial. The images can be drawn over and annotated. Video and sound recordings can be embedded. Files from any other software can be embedded, or 'printed out' in Onenote, and marked up.

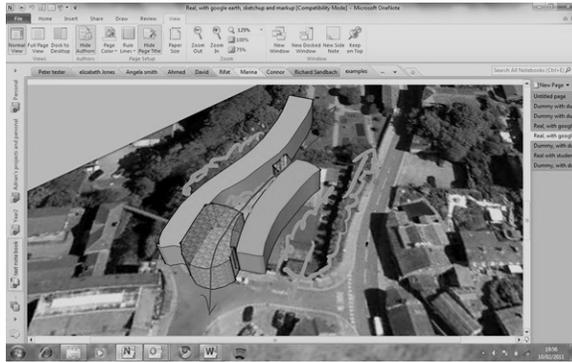


Fig.1 Onenote screenshot

This can all be done using the intuitive input of stylus on screen, the same 'act' as pen on paper.

The metaphor OneNote uses for its organisation is also highly familiar. A 'shelf' of notebooks sits down the left hand edge of the screen; 'section' tabs, or dividers can be inserted into the notebook, and each section can be filled with any number of infinitely long (and wide) pages.

A notebook is made for each year cohort, and a section for each student in that cohort. Each tutorial (or review, or any other sort of discussion...) forms a new (infinitely long and wide) page in that students section.

These documents can get large very quickly, but the onenote search function is powerful, and will identify a search term whether typed, remaining hand written, or even appearing in an inserted jpeg image.

It is also very helpful to make folders and sections that put all the material for a project or module close to hand, (briefs, reading list, module specifications...) a successful net reduction in clicks.

Onenote also allows use of templates. Any page can be saved as a template, and this allows very easy use of matrices for feedback and assessment.

Onenote is designed to be used with Sharepoint<sup>2</sup>. A Onenote folder exists as multiple copies of the same document: A copy sits on each tablet computer we are using, and also on the Sharepoint server. All the tablets communicate with the server via the network (wired or wireless) every few minutes. An update which occurs on a tablet (a new tutorial session, say) is recognised, and the copy on the Sharepoint server is updated. A few minutes later, the updated copy on the server is recognised, and the copies on all the other tablets are brought up to date, so the new record from my tutorial with a student is seamlessly made available on the other computers. If next week, the same student has a tutorial with a different member of staff, the full record of previous tutorials is available to that discussion.

Students can be emailed pdf copies of each tutorial, or they can be given (read only) access to the tutorial feedback log.

Future developments to explore include student use of Onenote to build up portfolios of development and scholarship as their projects evolve.

The studio encompasses many different activities in enabling design. As well as tutorial, review of work, drawing and making, discussion and workshops are activities which are important parts of the studio at Huddersfield.

Metastudio has also explored using ISSUU<sup>3</sup>, an online publication website, as the mechanism for enabling electronic reviews, with good success.

ISSUU has a simple, free registration process, and allows substantial numbers and size of documents to be published. It can convert a wide range of file formats to the ISSUU publication format.

The online presentation of the uploaded documents is that of books on a bookshelf. Accessing a publication gives the experience of turning a page, and the use of the mouse to pan and zoom, and thumbnails make navigation very easy. The real power is in the tagging facility. The students are given a 'secret' tag, designed not to be publicly searchable, to tag their presentations with. Once the presentations are uploaded with this tag, it can be used in a simple search to pull up all the publications for a particular submission.

(Fig.2) Variations on a tag can be used to group students in a tutorial group. Accessing a students home page will show all the presentations that have been published, and in effect, creates an online academic portfolio. The presentations can be downloaded, providing a submission record. They can also be printed if required.

This method of presentation, using a projector, reduces the wallspace needed for a presentation, allows a presentation to be viewed (or assessed) in many different contexts.

The ISSUU presentations can easily be dropped into Onenote for feedback, using the pdf downloads or the 'print screen' button.

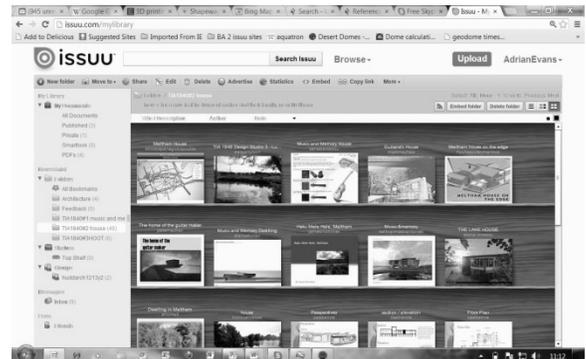


Fig.2 Issuu screenshot

We have experimented with Skype<sup>4</sup> tutorials. Skype provides an informal interface for video conversation. It enables a remote 'face to face' discussion, and allows a

student to share drawings and models. (Fig.3) 'Print Screen' again allows views of the drawing or model to be captured and dropped into Onenote for annotation and feedback. Using the 'share screen' function with Skype works very well with a Onenote tutorial. If the student has uploaded a presentation to ISSUU, the tutor can bring the presentation up, and 'share screen' with the student as they discuss the work. Again, 'print screen' can be used to drop the presentation into Onenote, and the student can see drawn and written feedback live. This will work both ways, for a full dialogue about the work, and the student, whether sitting around the table or in another building or another country even, can use 'Print Screen' to obtain an instant copy of the tutorial feedback.

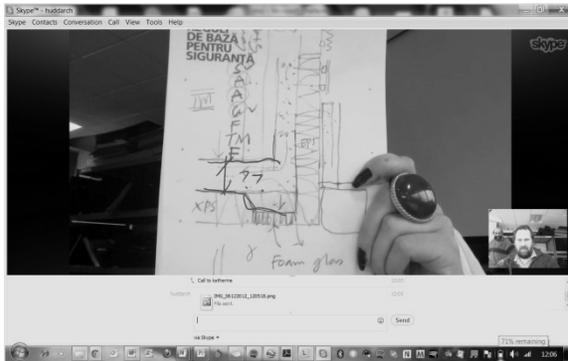


Fig.3 Skype screenshot

To date, then, these are the first steps in finding the Metastudio. Onenote provides a very flexible way of bringing together a wide range of media, and can be used in many aspects of the electronic studio. In conjunction with the internet, the web publication site ISSUU, and video telecoms provided by SKYPE, it is showing very significant potential for providing much of the infrastructure of the Metastudio. The interface is fluent and intuitive. However, at present, there are two areas which are lacking in the prototype Metastudio.

#### Next Steps

The tools explored so far have limited potential for discussion between studio members in remote locations. It may be that social media has a role to play here, but the lack of searchable archives and the single track presentation are significant obstacles with Facebook. The industry standard forum software, php Bulletin Board<sup>5</sup>, however, provides a clear and easy if slightly clunky interface, which would allow students to post threads within peer groups (members of a cohort, or module) and invite discussion of general or specific points about their projects, or precedent, or other issues. It would allow discussion between cohorts or even courses, and would provide a searchable archive for reference.

The second area that needs development is 'making' within the Metastudio – the intuitive electronic 3d interface.

#### The 3d Intuitive Interface and Garry's Mod

At present, we can record 2d images of intuitive, quick and dirty, cardboard and glue gun 3d models, and annotate the images with intuitive 2d freehand drawing and writing. We can also include 3d CAD work, embed walk throughs, and share through use of a projector, or SKYPE, the 3d experience, but the CAD interfaces don't come close to the intuitive connection we get with the rough sketch model. SketchUp goes a little way down the road, and is readily available, but there is a long way to go. If we look further ahead, there is much exciting primary development happening, notably by the Tangible Media Group<sup>6</sup> at MIT. (T)ether, deFORM, and BEYOND: Collapsible Tools and Gestures for Computational Design, notable among many relevant projects, all explore exciting strands of intuitive 3d computer input both haptic and gestural input. (T)ether provides an intuitive building environment. I pads provide a 'window' into a virtual environment, which exists in 'real' space. The user wears a glove which the software recognizes, and responds to simple glove gestures to allow the generation and manipulation of virtual objects. The environment is co-operative, allowing more than one user to manipulate the same model. There are also many projects (outside MIT) which explore a 'virtual clay' interface, with varying degrees of fluency, and many versions of the haptic glove, or data glove. These projects, however, are mostly at an early stage/proof of concept, and have considerable distance to go before they approach existing as consumer useable tools. The data gloves, where commercially available, are very 'high end.' In short, they are not readily available, not easily accessible to the Metastudio at present.

There are, however, some very intuitive 3d interfaces currently with millions of users in gaming communities. There is a huge advantage working with open source software, (or very low cost software) and peer production, in a large community of enthusiasts.

The hugely popular Minecraft offers a graphically very crude, but very intuitive way of building extraordinary structures and environments; a kind of sandbox Sim City. Potentially more useful to the Metastudio is Garry's Mod<sup>7</sup>. This uses the 'Source' software developer's kit, used to construct components, characters and environments for many of the games from the Valve software house. Gary's Mod is a sandbox game; an open ended, no objective environment. Although the player has access to weaponry, characters and a revolting herd of MOBS, the emphasis is very much on building. The game offers the player simple graphic menus of components, often reusing 'props' from other Source based Valve games. The menu components include a range of building materials. The components

have a highly realistic graphic appearance, but also have physical properties, like mass, fragility (they will break under stress) acoustic properties and flexibility. When a second component is placed roughly against a first, the first will move, or flex.

There are two key tools in Gary's mod; the physics gun, which, allows you to lift, move and rotate components in the virtual space in front of you; and a welding tool, which fixes components in space, or to each other.

The menu items, and these two simple tools allow the player to build model buildings very readily and intuitively. (Fig. 4)

The game is also multiplayer, allowing collaborative building.

In the near future, I intend to set up student projects using Garry's Mod, to explore the potential for a virtual equivalent of the corrugated cardboard and gluegun physical model.

The possibility for developing an Architectural mod to Garry's mod is a strong one, to make the interface more architectural, to look at being able to bring 'real' sites into the software, and particularly looking at the potential of the physics of the components, which may help students explore structural principles intuitively, for example.



Fig. 5 Garry's Mod screenshot

### Conclusion and Future Development

To date, the Metastudio has had success in establishing viable use of tools which can start to respond to the changing nature of the studio. The use of OneNote with Sharepoint and touch screen computers has streamlined the recording and management of the enriched tutorial dialogue. Sharing, presenting and reviewing work by adding projectors, ISSUU, and Skype, starts to free elements of the studio from location and physical space. A programme of discussion, interview and questionnaire with students and staff will continue to evaluate application of the tools.

The next areas of development will be a trial of the use of a forum, and experimenting with Garry's Mod, through

short workshops and day designs, to see if it has potential as a virtual, quick, dirty and intuitive interface.

Future developments in interface may be very significant, particularly in the area of intuitive 3d virtual modeling. The (t)ether project at MIT, providing an intuitive, co-operative virtual building experience in real space, looks particularly promising, especially if it were combined with a Head Up Display, like Google Glass<sup>8</sup>. The prospect of an immersive co-operative experience, through a Head Up Display, as demonstrated by (t)ether, but utilizing the sort of component based sandbox offered by Garry's mod, and perhaps a plastic sculptural 'virtual clay' is enormously exciting.

Development of the Garry's Mod 'physics' could also provide a powerful intuitive learning experience for structures, and even environmental science. It is feasible to consider that virtual buildings assembled from components with a full suite of physical properties could become self testing.

If, for a moment, we also consider the threshold which 3d printing is in the process of crossing, the possibilities are truly 'game changing.' 3d printing is no longer about small plastic components made in what looks like a hi tech microwave. The architectural press is peppered with mooted projects for printed buildings. Currently existing commercially, or at least prototype, are printers that can print in a huge range of materials: many metals including stainless steel and gold, and glass; polyjet printers which can print multiple materials at once; printing precision which can virtually eliminate not only the need for machining, but assembly too; and, significantly for architects, a printer exists that can print, in reconstituted stone, objects up to 6 metres by 6 metres by 6 metres.

A world where the architect can wave their arms around in virtual space, create architecture which tests itself, and then, instead of being built by a contractor following a weighty set of contract documents, can then be printed full size by a building printer without the need for drawings, may not be too far away.

**Notes**

<sup>1</sup> <http://office.microsoft.com/en-gb/onenote/>

<sup>2</sup> [http://sharepoint.microsoft.com/en-gb/pages/default.aspx?CR\\_CC=200157895&CR\\_CC=200157895&WT.srch=1](http://sharepoint.microsoft.com/en-gb/pages/default.aspx?CR_CC=200157895&CR_CC=200157895&WT.srch=1)

<sup>3</sup> <http://issuu.com/>

<sup>4</sup> <http://www.skype.com/en/>

<sup>5</sup> <https://www.phpbb.com/>

<sup>6</sup> <http://tangible.media.mit.edu/>

<sup>7</sup> <http://garrysmod.com/>

<sup>8</sup> <http://www.google.com/glass/start/>