Sean A Gallagher

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With

Diller Scofidio + Renfro and Gensler,
Roy and Diana Vagelos Graduate
Education Center,
Columbia University,
New York,
2016

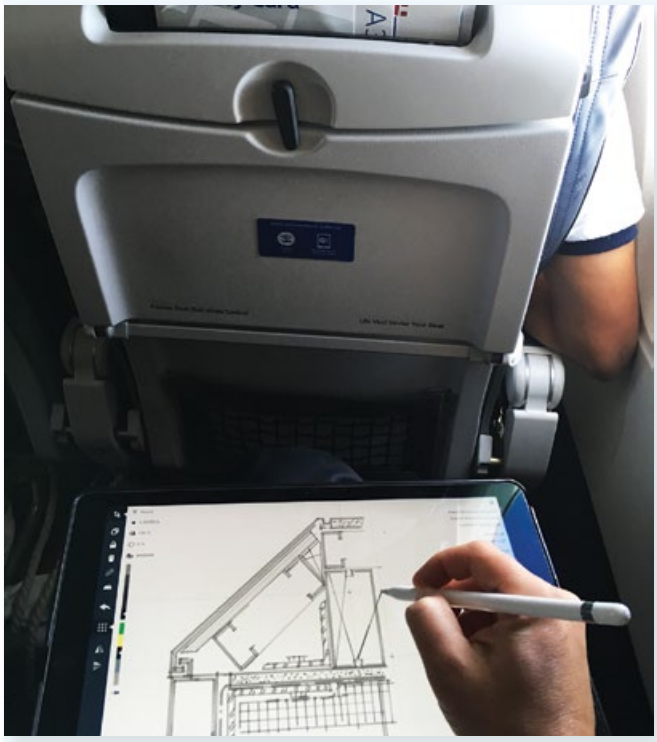
Night view illuminating the building's principal design strategy: the 'study cascade', a network of social and study spaces connected by an exposed 14-storey stairway. The interiors of the cascade, designed to facilitate collaboration and team-based learning, vary in size and configuration; opening to south-facing terraces, they also connect to classrooms and laboratories on the tower's north side.

A Return to the Hand-Driven Workflow

Does digital design constitute a death-knell for drawing? On the contrary, argues **Sean A Gallagher**, Director of Sustainable Design at Diller Scofidio + Renfro. This well-known New York architecture practice retains a strong culture of sketching at all stages, due to its immediacy in recording ideas and its efficiency in communicating them. But the firm's members embrace new technology at the same time. iPads, for instance, offer easy transportability and can capture smooth movements of the hand; while new interfaces can enhance fluidity and allow complex layering.

Architects tend to do their best thinking on planes, trains, and in remote locations in front of a fire with whiskey in hand. We currently live in a mobile digital society imagined by theorists like Richard Buckminister Fuller, who contemplated the potential of the phone and radio to transform everyday life – work and play. By 1930, Fuller was discussing ideas about a near-future global society with universal mobility embracing a digital culture and exploiting every benefit of modern technology. This near future is now, and while it has brought much of the promise imagined, for architects it has also unintentionally constrained certain aspects of our craft and workflow.

Architects communicate by drawing through spatial problems, and our ability to think through these challenges often requires a conversation between our mind and hand to organise our thoughts and critically think through the ideas. This process, grounded in centuries of instinct and practice, began to erode as digital tools evolved in the late 20th century to facilitate both the visualisation and construction documentation of an architectural project. While the digital interface revolutionised architects' ability to interrogate space within a virtual reality, a time lapse developed between the medium being produced to investigate the idea



Sean A Gallagher/Diller Scofidio + Renfro, Drafting an exterior wall detail for the University of Chicago Rubenstein Forum project on a plane, 2016

Aeroplanes are great places to focus without distraction and to think through a problem. After meeting with the project's design-assist contractors in Chicago, Gallagher took the time on a return flight to New York to draw through the problem with the meeting conversations fresh in his mind. The ability to draft on glass meant that the initial sketches from the meeting could be translated into a full-scale detail to better interrogate the problem.

and the person who was critically thinking through the design process. As a result, what was gained from digital documentation in terms of speed, precision and editability was at the expense of critical thought at every intersection of the design process.

Currently, 3D modelling platforms are expanding our power to manage, replicate and integrate the informational aspects of an idea. The architecture community's investment in the research and development of building information modelling (BIM) platforms exceeds that expended on the advancement of any previous technology in the history of the profession. And while these new platforms will improve our command over traditional practice and challenge the notion that the architecture, engineering and construction industry underutilise emerging computational technologies, will this investment begin to develop a new digital workflow that restores critical thought at every intersection of the design process?

The underlying promise of the digital interface is more than the management of information, or even the virtual world from which to explore an idea – it is cultural. The notion of working anywhere and everywhere with all the tools necessary to facilitate a discussion with oneself as well as with one's collaborators will be wildly more powerful within our design workflow than any other computational improvements such as BIM. But the resources the architecture community is devoting to developing enhanced platforms that afford the freedom to work on site, at a consultant's office, or within a place of inspiration are limited. It is in this domain that the sketchbook as an 'everywhere' tool has for centuries proven invaluable to every artist, designer and architect, although the profession has largely ignored it in the shift towards digital interfaces as a primary source of discovery.

Sean A Gallagher/Diller Scofidio + Renfro, Sketching a sustainability concept diagram for the Obama Presidential Center competition while at the Delaware Water Gap, Montague, New Jersey, 2015

Architects often travel to places of inspiration to think through the specific ideas of a project. The sketchbook, which is limited in scale and versatility, has traditionally served as the tool to critically think through these ideas on site. However, with the ability to draw on glass, the architectural investigation can range in scale as well as in complexity. This concept drawing was drawn at full scale with every stroke type – graphite, marker, sharpie – organised in sheet layers that could be further edited back at the office.

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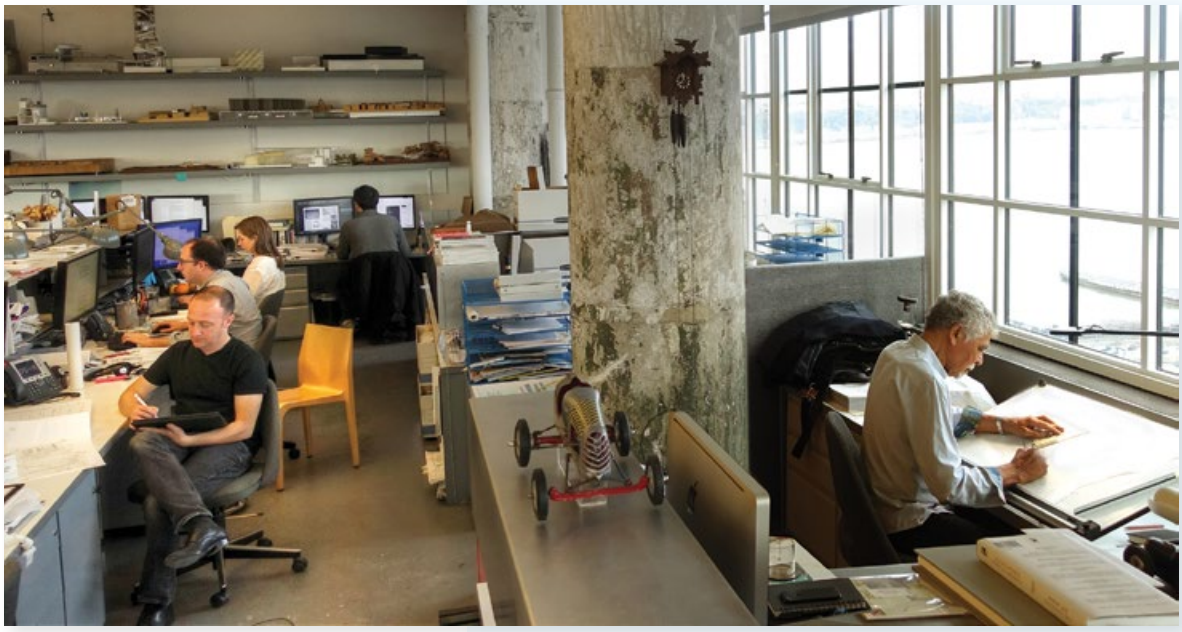
Sketching and the Digital Interface

At Diller Scofidio + Renfro (DS+R) there is a strong culture of sketching to investigate an idea and to determine an approach to a project. This affection for the architect's craft of generations past can be observed through the media released by the studio, often incorporating hand strokes of graphite layered over digital renderings to produce the final image. While it is not unusual for most practices to sketch through their concept designs, the commitment DS+R has to integrating this type of workflow into all phases of design is unique.

Sketching as a way of communication is fast and efficient – there is nothing more effective in communicating ideas between two people collaborating on a project than drawing in the presence of one another. Current digital workflow requires a longer lag time to develop media to express what one is thinking to collaborators than with pencil and paper, and quite often results in loss of momentum and inspiration within the conversation. However, due to the static nature of hand drawings, delivering a project of scale through pencil and paper is currently implausible. Drawing technologies that have the capacity to be more fluid, negotiating the continuous layering of new ideas and additional information throughout the project delivery workflow, have thus dominated the research and development landscape over the last 30 years.



Ricardo Scofidio at his drafting table and Sean A Gallagher with his iPad Pro drafting by hand in the Diller Scofidio + Renfro office, New York, 2016

Fostering a culture of drawing within the office became more difficult as architects' workspaces adapted to the constraints of the mouse, keyboard and monitor. Today, however, touchscreen interfaces afford an opportunity to re-prioritise the workspace to be conducive to drawing while working on digital platforms. Soon there will be no need for a mouse, keyboard or monitor as touchscreen drafting surfaces will accommodate all aspects of architects' current workflow.

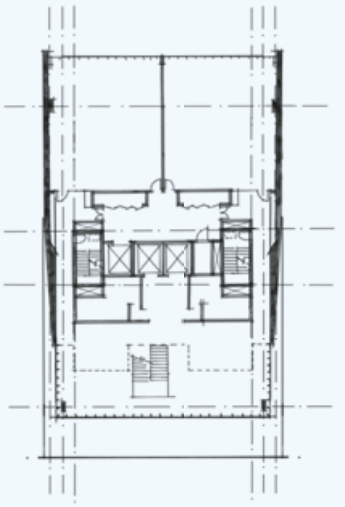
But what if the hand sketch were fluid and the paper scaleless? Drawing technologies within the digital realm so far have capitalised most significantly on these two attributes to improve architects' workflow, neither of which precludes the idea of the pencil as the primary source of informational input. In fact, the use of a pencil would have been more intuitive had the digital platform hardware three decades ago bridged the barrier between virtual space and paper. But at that time, the best technology could offer was a point-and-click tool to navigate virtual space through the movement of a mouse. Today, this is no longer the case.

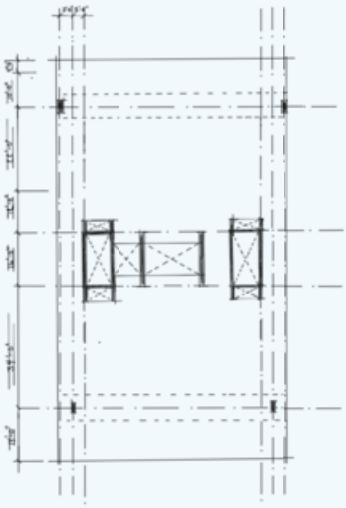
In 2012, I had adopted the iPad as my primary tool for day-to-day workflows – using it as a notebook, sketchbook and camera, and for office-related communication and documentation. But the limited scale of the touchscreen and beta versions of drawing apps restricted my ability to tackle many of the processes associated with the craft of our profession, forcing me to juggle between the drafting board, tablet and computer as the design process of a project moved beyond the conceptual phase. However, at the time it proved extremely useful as a way to organise thoughts and have all my research and documentation at my fingertips to build on an idea no matter my location. I used the touchscreen to write, sketch, view 3D models, mark-up drawings and assemble presentations. There was something familiar and intuitive when using my hand on the screen that overshadowed all the burdens and frustrations of working through the compatibility issues associated with emerging software tools.

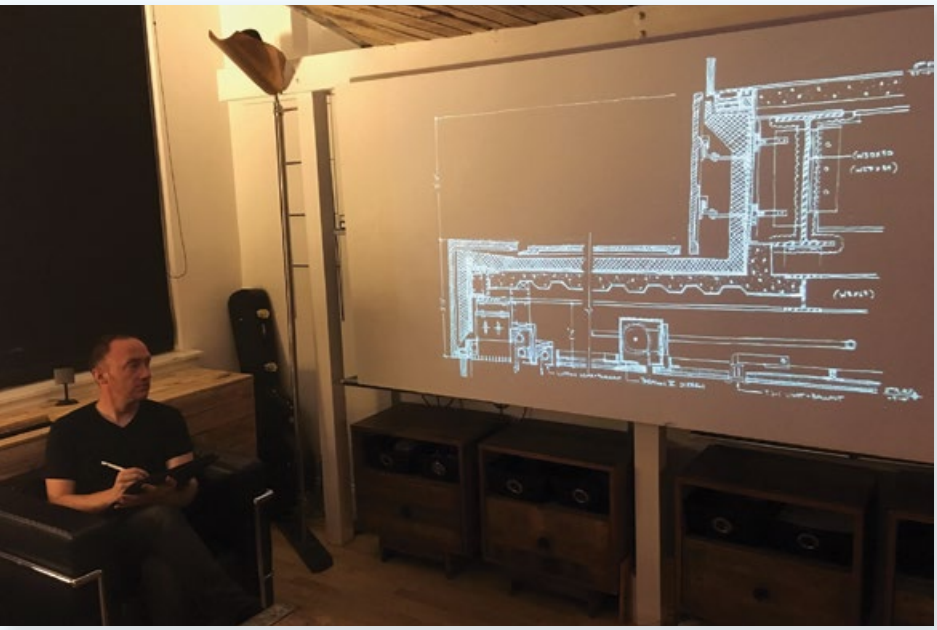
Tablet technologies for the design process improved over the years and I soon found myself sketching a great deal on the iPad. The design drawings that were initially constrained to concept-level diagrams began to expand into schematic plans, sections and perspectives. And with this improved range of capabilities I began to incorporate hand drawing more and more into my daily workflow as drafting activities could now occur in remote locations. But what was more interesting was that the drawing apps

Sean A Gallagher/Diller Scofidio + Renfro, Architectural plan study for the University of Chicago Rubenstein Forum drawn on the iPad Pro for coordination with the structural engineer, 2016

Hand drawings composed on the touchscreen interface are similar to computer-aided drafting processes and allow for the layering and organisation of various design components as well as the ability to go back and edit or change the properties of each stroke.

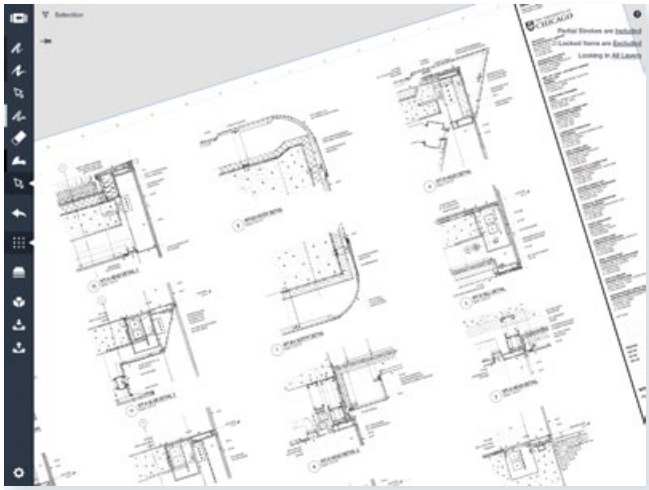






Sean A Gallagher/Diller Scofidio + Renfro, Thinking through a section detail for the Columbia University School of Business Tower on his iPad while simultaneously projecting it on a wall at half scale at his residence in Jersey City, New Jersey, 2014

The touchscreen interface as a paper medium affords the freedom to draft at any scale, and to project in real time the drawing activity at the desired scale for personal investigation or group conversation.



Diller Scofidio + Renfro, University of Chicago Rubenstein Forum design development drawing set, 2016

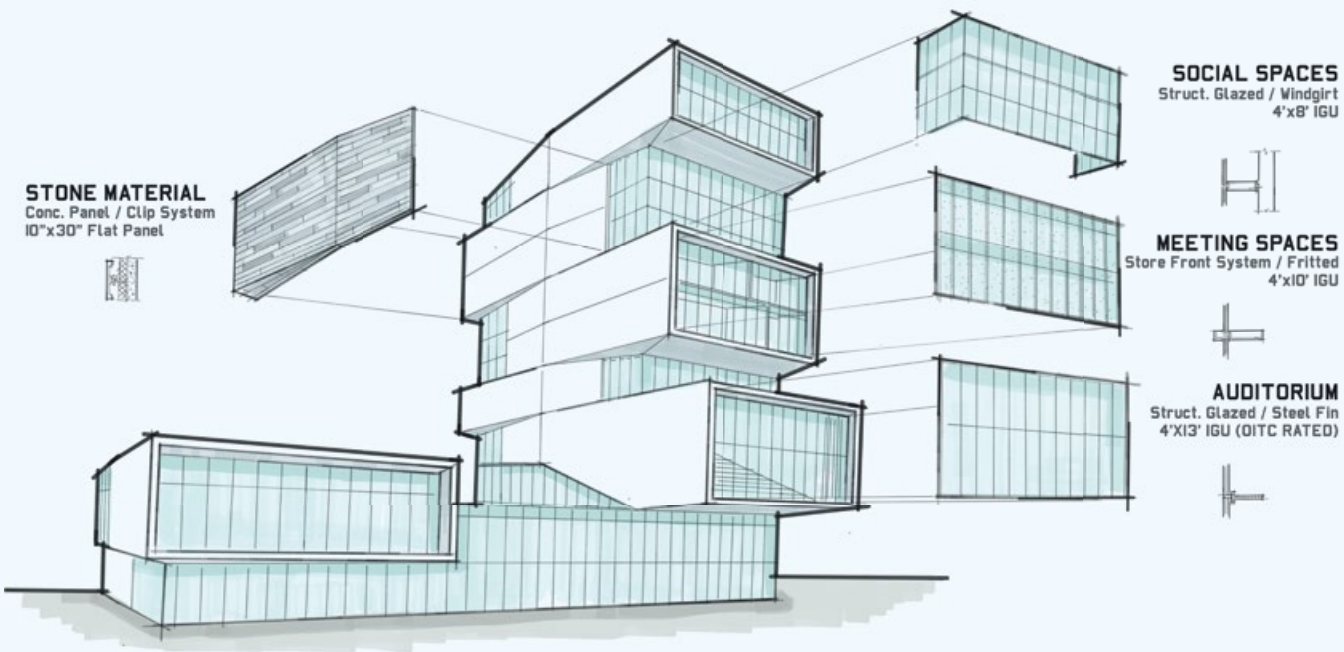
The final design development drawing set included coordinated hand-drawn detailing within the BIM-generated documentation. The details were hand drawn on the touchscreen interface and could be edited and updated throughout the design development phase in the drafting views of the BIM platform.

Sean A Gallagher/Diller Scofidio + Renfro, Exploded building perspective sketch of exterior wall assembly options, drawn on the iPad Pro during the University of Chicago Rubenstein Forum design development phase, 2016

Developing design option media that moves between various scales and style of drawing to express intent and character can be composed in a single drawing when using the touchscreen interface. There is no need for post-production formatting to bring all the pieces together which greatly increases the speed at which options can be iterated.

began to afford an ability to fine tune and adjust every hand stroke with a level of precision and flexibility only possible in digital space. This changed the static nature of a sketch by allowing the internal conversation between hand and mind to continue as the drawing built on those initial lines with a newfound freedom in the knowledge that one could go back and further tune those first strokes. Sketching became nonlinear and more fluid, and I became more comfortable and aggressive with sketching through ideas; it improved my craft.

Last year Apple altered its traditional course of making things smaller, and released the iPad Pro with a touchscreen interface much larger than previous editions. The 14-inch (35.5-centimetre) wide screen is slightly larger than a piece of A4 paper, making it a comfortable scale to draw on while standing or sitting. More importantly, this difference in surface area made it possible for schematic-level drafting and modelling activities performed with the smaller tablet to grow into serious visualisation and detailing documentation at any phase of design. This historic movement to a larger digital interface confirms there is an understanding that over the next century the necessity to have everything at your fingertips at all times will move from personal communication devices into the domain of professional workflows. Our mobile digital society is now being moulded by the millennials' digital culture of work and play in public places through a ground swell of app development. Yet to accommodate the sophistication of these emerging apps targeting professional workflows, the touchscreen devices need to grow and the tool to input the movements of the hand requires increased sensitivity and precision.



Apple Pencil embraces glass as a drawing medium. It does not attempt to replicate qualities of alternate surfaces more familiar to sketching, or the material thickness of a former drawing utensil. It has an overall weight that fosters a controlled slide across a smooth surface, and a sharp tip to take command of the precision of a virtual interface. The Pencil is a tool that feels familiar in hand and encourages experimentation with the toothless surface of glass. And while glass has previously been a material foreign to drawing activities, its physical properties encourage a fluid movement of hand as well as a layering of visual information. It is only a matter of time before glass will move from a medium that we simply look through, to one that we actively work on; the architecture profession needs to recognise this opportunity.

Collaborating on Glass

Right now there is a real necessity within architects' workflow to sketch on glass. It has become the client's expectation that the profession utilises a project delivery method that implements BIM software, and as a result our day-to-day collaborations with engineers and contractors are regularly facilitated through a shared screen referencing a virtual model of a project's current status. However, while this digital integration process of managing design components fosters a better visual understanding of the issues at hand, the conversation around the virtual table in the effort to move a project forward remains the same: 'Can you sketch that for me?' In the past, a roll of trace and thick sharpie would allow the conversation to continue in a fruitful way, but today the conversation stalls as there is no way to sketch efficiently on the screen, and a follow-up call is required after a sketch visualising the idea is produced in order to move the collaboration forward.

This time lapse in the collaboration process during the design development phases is as destructive to architects' workflow as it is to the inspirational moments of conceptual design. Most BIM and screen-sharing platforms recognise this growing challenge, and have begun to offer mark-up tools as part of their user interfaces. Unfortunately these require the motion of hand and pencil to communicate effectively, and are difficult to control with the unnatural movements of a mouse and pointer. However, BIM and share-screen software companies are quickly expanding into the tablet market and developing app versions of their digital platforms in anticipation of an increased level of remote collaborations within our professional workflow. At DS+R, project collaborations with design consultants and engineers have become more remote over the last five years, and I have now begun to experiment with running coordination meetings from my iPad Pro in order to incorporate the ability to sketch during these conversations. With the touchscreen interface and Apple Pencil, I am able to communicate more effectively with the digital mark-up tools as the discussion navigates the virtual space of the BIM model. And while the ability to sketch is solely at my end, it has greatly improved the collaboration process and restored a more familiar workflow.

Improving Architects' Craft

In truth, hand drawing over 3D model prints has become a natural part of architects' workflow, setting the foundation for a more integrated process between virtual investigations and sketching. The digital equivalent of this is similar, but is greatly improved in terms of speed, precision and editability when utilising a touchscreen interface. More importantly, the design activities carried out by hand have now become a direct part of the digital workflow required to deliver projects of scale in today's marketplace. The emerging capacity to sketch on glass has meant that DS+R is currently issuing construction document sets that are a hybrid of modelled systems with hand-drawn details, redefining the BIM implementation plan.

If the architecture profession embraces glass as a medium to facilitate the conversation between mind and hand, our craft has the potential not only to move into the territory of virtual space, but also to expand into modelling activities that forge new skills of sketching in 3D. It is only a small technological leap to imagine modelling digitally with a Pencil, but the impact this would have on our ability to critically think through space would be groundbreaking. When this is considered in combination with having the tools necessary to work in remote places, like the sketchbook, we might begin to question why architects as a profession are not leading the drive to develop better touchscreen technologies. In fact, with the tools available to us now, it is simply wrong that we use a mouse at all. AD

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