Prompt:

What changes do you see coming in the design and construction industry over the next 5, 10, and 25 years that will affect the role of the architect and the profession of architecture?

Response:

Since the Great Recession and subsequent burst of the housing bubble, the global architecture community has experienced period of slow growth amidst the fast-paced changes in our marketplace. While this may have been unfortunate for billings and profits, the period offered a unique opportunity in our timeline to refocus and redirect our industry to the context of the surrounding cultural landscape – one in which societies are more connected than ever. Our profession is caught in middle of the rising digital age, which has forced us to adapt to societal changes and the "approaching hour of profound transformation in the design and construction industries" (AIA Foresight Report, 2). An underlying current is pulling radical shifts in the realities of our profession and is beginning to swell in the mentality of modern-day architecture students. The future of architecture is driven by innovation woven into every aspect of our profession. Rising architects are faced with navigating an intangible network that covers the globe, reshaping the working culture of our profession, and operating in a fully client-driven marketplace.

Pythagoras is credited with coining that the world is round. As history goes, he is said to have rejected the traditional view of the flat, planar world in the 6th Century BC. It turns out, however, that Pythagoras was wrong. Today's world is flat, and it fits conveniently on top of your lap. At the time of writing this essay, there are 7,296,166,055 people on this earth, 3,070,121,980 of which have direct access to the internet (Worldometers, Internet Live Stats). The astounding reality of these figures is

that over 42% of the people in the world are connected at some point in time by a world behind the screen. And this number is up from 0 public users in 1991 (Internet Live Stats). The space between the filaments of the World Wide Web is growing steadily smaller as more people across the globe connect to the network. The future of architecture lies somewhere within the new connections that are forming between societies.

Throughout the tumultuous history of our profession, architecture has taken the lead in collaboration. Finding a way to simultaneously accentuate the talents and ideas in a room of seemingly conflicting voices is what we do. Within the past two decades, our ability to collaborate has markedly accelerated; this period of fast paced marketplace change is highly influenced by the rise of the internet and increased societal connectivity that is marked by the onset of the digital age in architecture. The future of our profession, which the rising generation of architects will see accrue during their careers, is solidly rooted in the digital age.

With the rise of the internet and the ever-increasing connectivity of our global society, architecture has the capability to reach over 40% of the people on earth. Coupled with and complimentary to this reality is the swift advancement of technology in recent years. Modeling programs, both 2D and 3D, have driven the market toward a propensity for technology and have markedly increased the speed at which we are able to work (Autodesk AutoCAD and Revit, Rhino and Grasshopper, and Google SketchUp to name a few). Now, clients are "wowed" by walkthroughs, developing a comprehensive understanding of the space without having laid the first brick. Not only can we view the projects in the virtual, three dimensional world, but our final products can now be fabricated using digital means as well. Advances in science and engineering have produced digital fabrication techniques and tools with strikingly massive potential (the 3D printer and the CNC-milling machine, for example). While these technologies currently have a sizeable cost, the products are

slowly coming to market - 3D printers such as the MakerBot and a DIY CNC-milling machine can be purchased for under $1,500, fully enabling the common person to fabricate their own realities. I'm not sure that the profession fully realizes the impact that digitally fabricated projects can have as of yet, but over the next generation, architects will be reaching the far corners of the globe with ease by using technology as the powerful tool of the new age.

The applications of the newfound technology are virtually limitless. This is another exciting time in the history of architecture in which our way of conceiving the built environment experiences a sudden shift (following the marketplace). Everything that we know architecture to be can change for the better. We can recycle material in a more intelligent and efficient way – plastic spoons can be melted down, become the filament for a 3D printer, and end up speeding down the highway as the parts for a car. The 3D printer can be scaled in such a way as to print structures using concrete as filament, such as the community of 3D printed homes by WinSun Engineering in China, the structure of which costs only $4,800 each (Wang). CNC-milling machines can be utilized to fabricate a home as a kit-of-parts in a new age Sears Roebuck type, such as Clemson University's Indigo Pine home, which costs under $250,000 fully furnished and net zero ("Indigo Pine"). As technology advances and becomes more available, the tools will become more affordable in many capacities and scales. At that point, these structures, which exist solely as a set of rather complicated digital files, can tap into the existing network afforded by the internet, thereby reaching over 40% of the globe by simply emailing the files anywhere they need to go. This is the future of architecture, and it is encroaching upon us with increasing validity.

The new wave in the profession has begun to swell with the current generation of architecture students (Gen Y and Gen Z) – the rising architects who have not known life without a screen. Architecture students across the world are on board with the current flow of the cultural

marketplace. This phenomenon seems to have arisen in our generation due to our seemingly innate knowledge of digital realities, our need to differentiate ourselves in the job market, and our underlying love for innovation. The onset of this new digital age, however, presents some unique challenges to our profession. Rising architects lack the wealth of knowledge gained by the leading generation (the "baby boomers") – information that affects the design and constructability of every project. The challenge in the fast approaching years will be to transfer the knowledge from the leading generation of architects to the rising generation, who reside in and are largely dependent on the virtual world. These two seemingly contrasting mentalities about design, when reconciled, could ignite a fervent sweep of globally focused projects. The buzz over the digital age, however seductive, carries some important implications to our profession with great longevity and weight.

Our profession's increasing involvement with these new digital technologies and the internet in the coming years will permanently change our relationship with our eye and our hand. Architecture has toyed with the idea of the digital hand since the development of Computer Aided Design (CAD) programs in the mid-1980s. Up until that point, the architect's relationship to the hand and the eye was strictly practiced: the eye was the lens through which we saw and imagined the world, the hand directly manipulated the pen as the tool used to interpret our imaginations, and the paper was the tangible evidence of our creative process. The onset of the digital age, however, yields a dramatically different mindset. To "craft" a building takes an innately different kind of "practiced eye and hand." The eyes are still the lens by which we see and imagine our world, but part of that world is flat; the majority of the design world we know today is not reality, but exists as an intangible image or imagination. The hands still manipulates a tool and the tool still documents our imaginations, but the hand is no longer required to manipulate physical material or steadily drag a pencil across the page. Digital hands have remarkably different roles; our hands are now responsible for injecting

reality into virtual imaginations and for reaching into the screen to model those intangible pieces. In order for our profession to grow outside of the virtual reality in which we work, architects will need a concrete understanding of constructability. Otherwise, the architecture of the digital age will be marked a "unique anomaly" in architectural history.

Management of this new type of information will be the key to the success of our profession over the next generation. Our profession is exploding with thousands of files created on a daily basis; much of which are no more than "digital trace paper." The capacity to store information today is truly astounding. For example, the Clemson University Solar Decathlon Team (of which I am a part) recently delivered all the cut files required to fabricate the home, Indigo Pine, to our CNC fabricator on a flash drive. My team and I fit an entire house in the palm of our hands and still had room for our construction-day music playlist. The most remarkable part: the information contained on this flash drive, once finalized, is 100% repeatable. This reality is truly astounding and highly seductive. The capacity of digital systems offer a unique solution for affordable or disaster relief housing and presents a myriad additional applications. Digital realities can be a great asset for our profession, but only if used wisely. Behind the veil is an underlying system that could permanently destroy the ethos of our profession. The moment that architecture falls into the industrial model of mass-production, designs become a commodity in which the only differentiator (in the eyes of consumers) is the price. Our profession has longed for a closer relationship to the client and we are nearer to that reality than ever. It will be imperative that the next generation of architects give thought to this relationship in order to fully understand what an immersion the digital practices, that lead to mass-production, mean for a profession that is built on quality, not quantity.

This leads to considerations of a radical change in our relationship with our clients caused by the onset of the digital age. Architecture is following the realm of the business world toward a client-

driven market (this in stark contrast to the generally accepted neoclassical economic perspective of profit-maximization in the early-1900s). Clients today are "smarter and more sophisticated" than ever before with access to "ever increasing amounts of real-time information about services, abilities, and prices" (AIA Foresight Report, 12). The informed consumer now has the ability to create space for themselves; free software such as Google SketchUp shifts the knowledge base to the hands of the many. Our business conduct will change over the next generation to move toward the modern necessities of clients: "Firms are evolving their value propositions, service offerings and communication platforms to achieve greater relevance" (AIA Foresight Report, 3). Take, for example, SHoP Architects, voted the world's most innovative company in architecture by Fast Company for "transforming the business behind erecting buildings" (Rice). SHoP offers a fresh take on the business of architecture by focusing on what clients' value most: cost. By trading services for equity in the project, SHoP is both relieving the client's immediate debt burden and increasing its own potential for steady future cash flows. It's an innovative, win-win relationships like this that will become common place as our profession progresses.

The main concern of the new interconnected, client-driven market is who we will design for. If architecture can now reach upwards of 40% of the people in the world, who is our client and how can we design for them without seeing them face-to-face? Furthermore, if we have the potential for such a widespread impact on the earth, how can we ever manage the liability that is associated with designs for the masses? I certainly do not have the answers to this, but I do believe that digital architecture is in the works, that my generation of architects will be responsible for carrying the profession forward, and that we have a lot of thinking to do.

The future of architecture calls for innovation to fill every crevice of the profession. The next generation of architects is challenged with operating alongside the ever-increasing connectivity of

the internet, leading the development of digital architecture and navigating the realities of a fully client-driven marketplace. The upcoming age of digital architecture is an exciting time in the history profession but holds weighty implications that could change how we are perceived in the eyes of our clients. As I get ready to graduate and enter into the workplace environment, these considerations will be the steady hum in the back of my mind. Soon, my generation will be navigating the marketplace and steering the profession in a direction that can sustain itself on a base of social, economic, and environmental concerns. The way has been paved for us to continue developing the realities of digital architecture, but this new age of architecture can only take us so far. After a generation of following clients to new heights, our profession will flow right into the cultural shift that will define our next phase of history.

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