Surfing the Tide of Change

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Surfing involves a delicate balance between the surfer, gravity and a rising wall of water-borne energy generated many miles away. Catching a wave isn't automatic. The surfer must move towards shore under his or her own steam in order to catch the wave. Too slow and the wave passes beneath them. Too fast and they may slide down the face of the wave and have it break over them. The ideal balances the rise of the wave towards the shore with the surfer's descent on the front face of the wave, propelling the surfer forward.

Moving water, whether rising gently as the incoming tide, or rushing wildly towards or past us as wave or flood, provides powerful metaphors for change. I hope you will bear with me while I use a number of them in this essay.

The Past: The balance of the pragmatic and the theoretical

Time and Tide wait for no man.

Digital technologies are changing the world. No surprise, then, that they are changing the practice of architecture, the teaching of architecture, and the study of computer-aided design in architecture. The fact that CAD *is* a digital technology is almost irrelevant. When those who formed ACADIA first met in 1981, just a little over a quarter-century ago, it was already clear to some that computing was going to be important to the practice and education of architects. Perhaps they didn't explicitly predict the emergence of the iPod or the handheld cellular computer-phone, but the potential utility of computers as tools for representation, simulation, synthesis and visualization was already clear (just read Bill Mitchell's 1977 book: *Computer-aided Architectural Design*).

At the time individuals involved in computing were responsible for writing software, developing curricula, establishing policies, and advising others in the use of software. It was all pretty-much unexplored territory, with only a handful of institutional landmarks. The early adopters

were scattered across the country, isolated geographically and (often) culturally within their departments, but they *needed* to get together, to learn from each other and develop information links to nurture this nascent sub-discipline of architecture. They also *wanted* to get together to establish social ties with like-minded persons. The formation of ACADIA addressed both the need and the desire.

One of the recurrent discussions in early Steering Committee meetings had to do with the balance between the instrumental and the theoretical at conferences (or perhaps you'd prefer *pragmatic* and *academic*?). The issue was this: should there be two simultaneous tracks at the conference, with one track for papers related to new programs, algorithms, and software (the developer perspective), and another for theory, pedagogy and practice (the user perspective) — in effect, are there two kinds of ACADIA members? At the time, persuasive arguments were advanced advocating balance, and the benefits of hearing from both constituencies. As a consequence, the tradition of one-track conferences was maintained. Interestingly, the last heated discussion to take place on the ACADIA mailing list was a discussion of whether programming should be taught to students of architecture or not—a question which resides squarely on the boundary between the two streams of thought. In fact, if you compare proceedings from a decade ago and today, you'll find that the roughly 50/50 split that existed between the two kinds of content has shifted to 75/25, with a preponderance of content today describing experience in practice or pedagogy. The tide has clearly turned in favor of the user perspective.

The Present: The Instrumental Tide

"A Rising Tide Lifts All Boats"

Some see this shift as shoaling of academic rigor and depth, but others might view it as a shift in the main channel to another part of the ocean. In 2006 the "non user" is a vanishing breed, an anomaly. Almost all new students and new faculty of architecture are computer and Internet users, unafraid of mouse or keyboard. However, the values, skills, needs and desires of newer users, on the whole, are quite different from those of the early adopters. They are more computer-literate than their predecessors, but don't routinely possess a deep literacy. They have been taught to accomplish tasks with digital tools, learning about computing and software in terms of commands and menus, not underlying data-types, processes and strategies. The focus has, naturally and gradually, shifted from what computer devices do to what we can do with them. Use of university-written software, like shelves of technical manuals, is mostly a thing of the past, as are most local user-groups. The Internet, replete with bulletin boards and product help-desks and tutorials, provides much of the technical and social support network that social organizations used to provide.

In sum: the population of students interested in the interaction of computing and architecture, *per se*, has not changed much, and the population of architecture students interested in emulating the design-forms and design-logic in the popular press has not changed much either. But, now, the latter group consists

of computer users. And, of course, we teach more digital media courses than we used to. Students who might, a decade ago, have found a path towards a deeper focus on design computing are now seduced by the numerous digital media opportunities of the rising tide and may never develop those nascent interests. This is unfortunate.

The field of architectural CAD, or design computing, is not alone in this shift towards the instrumental. If you are a long-time reader of the *Communications of the ACM* (CACM) you may have noticed changes in the nature of the author pool. In the last decade more and more of the articles in that flagship publication on computing have been produced by academics and professionals from business schools and business-support activities. Across the board, the new users of computation, affected by what systems do, want to add their voices and insights to the discussion.

It is said that "a rising tide lifts all boats." Wikipedia tells me that this quote originated with John F. Kennedy. It took all of 20-30 seconds to find that out in 2006. A decade ago it would have taken quite a bit longer. Clearly, the rising tide of information presents us with opportunities and needs that have changed us. Each technologic change enables a new domain of activity and spins off a set of computational specialties: simulation, generation, representation, interface, collaboration, and fabrication—all these areas of computation have seen the spotlight of rapid development and maturation as important sub-topics. Each has sparked a flurry of publications around the topic.

The rising tide of computer use is, in some ways, more like a rising river. Once it jumps its banks, it spreads broadly but shallowly, slows, carves new channels, and settles in to new patterns. In the process, it sweeps away existing things and deposits fertile soil for future growth.

"Time Flies Like an Arrow"

While time *has* flown and the digital tide *has* enveloped us all, both culturally and professionally, most of the potential of the 1980s still remains potential. While tremendous strides have been made in many, if not most, aspects of design computing, and the "best practices" and business models that produce buildings are changing, the core cognitive processes of architecture—design, communication, persuasion, and documentation—the core human components that can make a building into a work of art, a cultural rather than an engineering artifact, remain extremely challenging areas of digital action. The subtlety and challenge of human communication is epitomized by the alternative parsing of the sentence, "Time flies like an arrow."

"Plus ça change, plus c'est la même chose"

In 1983 Autocad 1.4 had the "donut" command. It still works. I haven't used a UCSD P-system in 25 years, but I remember the disks needed periodic defragmentation. In memory of VMS, I sometimes name sequential versions of the same file with a semicolon and number suffix in a crude indication of "same but different." While disk capacities have grown from kilo-bytes to giga-bytes, every

operating system on every computer I've ever used has had a similar file structure. With the exception of one or two programs, each application has required an explicit write operation to save edited content to disk.

So what? A fairly common view of research cites these steps: Research involves making measurements. Organized measurements become data. Analyzed data becomes information. With reflection, information becomes knowledge. It seems reasonable to characterize a mature computer user in a similar way: layers of experience with particular programs, projects and bugs laid down like sediment on an ancient sea-bed, then compressed, metamorphosed, uplifted and distorted by time into visible patterns that speak to long-term process and change.

The assumption is that there are constants in the midst of all the change. In fact, one key premise behind education is that coursework accelerates this process—laying down a few extra layers of experience, injecting greater comprehension through an admixture of explanation and theory—artfully and artificially abbreviating and compressing experience. The challenge, of course, is to identify the finished product—to predict the diamond or oil deposit—ahead of time.

Computing in the early 1980's was largely a thing apart from architecture. This was due, in part, to cumbersome interfaces, limited accessibility, sluggish hardware (by modern standards), and possessive attitudes about file exchange and market share on the part of vendors. Users had to tolerate a lot of pain to get results. One result was that people who wanted to learn about computing generally

had few preconceptions, knew they would need to learn some theory, and wanted the big picture overview as well as the details.

In the intervening years, computing has penetrated all levels of the pre-college experience, becoming a part of standard education. Most students have no fear of computing, and they have high expectations. But they've been taught to approach the computer as a tool for accomplishing specific tasks, not as an aid to thinking—to designing. They are focused on the computer as a means to an end, not as an end in itself. This shouldn't be surprising. It is a natural consequence of the rising tide. As computer-use expands, it changes the means not the ends.

The Future: Education

Donald Schön wrote about *reflection-in-action* in his *Reflective Practitioner* books. He used the term to describe the special character of design activity (among several improvisational activities) and the means by which the practitioner grows and extends their own understanding. He also described the process by which a design mentor inculcated the reflective attitude in students. He offered this model in contrast to that of technical rationality, action based solely on facts, and it seems to fit. I fear, however, that the increase of computer-use in the studio, though inevitable, threatens the reflection-in-action model of studio education.

The near-universal acceptance of computing in the design studio challenges studio mentors, many of whom are not steeped in digital media, to find and demonstrate a reflective practice of their own. Design studio instructors should not

be expected to be technically proficient in the use of any particular program, much less a wide range of software, but as digitally-mediated design moves become more and more common, they need to make sensitive and appropriate responses. At the same time, while technical consultants should be accessible to the student, that technical rationality needs to encourage, not undercut, the development of an appropriately reflective approach.

Finally, to encourage reflection, we should resist the allure of the homogeneous environment. Homogeneity encourages brittle thinking. One of the constants in my two decades of teaching has been returning students who laud a heterogeneous approach, despite the fact that it doesn't serve the short-term instrumental.

The Future: Research

The emergence of building information modeling, whether you call it that or not, means we need to learn to accept, process, consider and display vast quantities of information related to building projects. What's the best way to review that kind of information? How can we teach students to utilize such systems and not lose track of their design in the process? How does one convert a geometry model into a circulation model or a thermal-analysis model? How can we visualize tentative decisions as opposed to firm ones? What business models work best in practice? Is the over-the-wall fixed-bid contract doomed? How is coherent design actually achieved in a large project? How can we deliver design information to those "on the ground" in a way that reduces mistakes? How does a distributed design team best

share and collaborate on the design of a building? There are many, many questions, and university research is needed to address them.

Technological change is both inevitable and desirable, and each new technical innovation spawns opportunity. As users, we can seize the innovation as an opportunity to explore new aspects of the pedagogical puzzle. As researchers, we need to reflect on the new opportunities and perhaps apply Occam's Razor, considering how they resemble or differ from familiar ones.

The Future: ACADIA

ACADIA began as a venue for knowledge-sharing, knowledge-building and social networking. When launched, the current wave of change brought about by information technology was barely visible on the horizon. With the hard work and input of many dedicated volunteers we caught that wave. We're now in the delicate process of riding it. Decisions in favor of a smaller-scale, reflective meeting kept the ACADIA conference human in scale and focused on the zone where technology and pedagogy come together in the service of the discipline of architecture. While many of the early active members have been absorbed into administrative positions in their institutions, the rising tide of computer-use produces more potential authors and members.

Recent efforts to reach out to new members through joint conferences with AIA and others have begun to produce results. A growing focus on the knowledge captured in past proceedings, now available through CumInCAD, promises

to strengthen institutional support. There is significant potential in the CAMEO system's role as online directory and cross-reference.

ACADIA still needs an input of energy to stay with the wave. We need individuals willing to serve as officers, conference hosts, competition organizers, and technical chairs. There are experienced members who will help you and guide you, so you don't have to do it all by yourself, but change is at the core of any dynamic organization. And, riding that wave is a real rush!