Gordian Knots and Endless Loops

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Despite the current buzz surrounding the concept of integrative design, architects have always attempted to form greater wholes from disparate parts. It is nearly redundant to pair the words “integrative” and “design” together as what is design without integration? At the most fundamental level, good design must synthesize different and often conflicting parameters in order to achieve some higher level of performance. So why has the term “integrative design” emerged to described the contemporary design paradigm?

The answer lies within the current information explosion and its tendency towards positive feedback loops. New information leads to more information ad infinitum. At first, the architect was the master builder, the individual who had mastered the various flows of information. From mathematics to stone masonry, the master builder consolidated and managed building information. However, as materials systems diversified and projects expanded in size and scope, the profession splinted under the raw weight of information. Sub-disciplines emerged and continued to bifurcate to deal with the increased demands of an information-rich society. The architect was no longer the master builder but rather one of many specialists involved in the production of buildings, each segregated to their specific area of expertise and priorities: fabrication, engineering, design, etc. The profession was information-rich, but organization-poor and buildings often were the result of the lowest common denominator. The profession had created a Gordian knot of special interests, impossible to untie the competing priorities of specialists uninformed about each other's contribution.

Currently, Integrative Design is seen as the knife that can cut the Gordian knot by making collaborative and multi-disciplinary tools and teams again the center of the design process from the start. The theory is that through the application of diverse design information early in the design process, buildings will be more effective as they will have integrated the essential data into their core design. Central to this process will be the development of techniques that enable the various disciplines to communicate with each other by bridging the technical and conceptual gaps that exist between them.

The papers in this chapter explore an incredible range of integrative design tools and techniques that attempt to pave the way for this design methodology. From connecting design software with daylighting analysis to bridging human behavior with digital simulations, the papers all strive to create connections between previously separated disciplines or research areas. Many of the papers focus on the difficult missing links between our digital modeling environments and the materials and spaces of physical reality. Other papers, like Portable Generative Design for CAD Applications, seek a design computation “rosetta” stone for the portability and interoperability of design concepts from one digital design platform to another.

In reading these excellent papers, one can begin to imagine a near-future design software that will integrate everything: material usage and fabrication, human behavior, environmental analysis, etc., into one fully scriptable, parametric and evolutionary design package. Each of the papers in this chapter describes various aspects of this uber-ware however there is one thing that we must not forget in this vision: information begets information and thus design integration is never fully possible. The more information is integrated into the design process, the more we are aware of the limits to our knowledge and the need for limits and priorities in the design process. Although integrative design tools have the potential to cut the Gordian knot of confused disciplinary threads, they also have the potential to create endless loops within the design process by multiplying the available design parameters. As designers working at the forefront of design computation, the struggle will be when to cut the knot and when to keep it tied. We must craft our tools so that we are designing in neither an information vacuum or information overload. The key to this will be the custom crafting of software and hardware that still allow design teams to focus on only the most pertinent design criteria while filtering the rest out.