CAD IN PRACTICE PROFILE: R.M. KLIMENT AND FRANCES HALSBAND ARCHITECTS

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R.M. Kliment and Frances Halsband Architects (KHA) is a firm recognized—among many outstanding achievements—for designing award-winning computer science centers at major universities (e.g., Columbia, Dartmouth, Princeton). With that design experience, it is no surprise that the firm has adopted an aggressive stance towards its own use of information technology (IT). One indication of this proactive approach to technology is that KHA, with a total staff of 33, carries a full-time CAD/systems manager position, as contrasted with the A/E-firm industry-wide average of one such full-time equivalent staff position for every 40 total employees. In effect, the firm has set its investment in and commitment to the role of IT at a rate twenty percent higher than the industry average. Such above-average investment in IT is consistent with other high-profile design firms that have won the prestigious Firm Award of the American Institute of Architects. (1)

What does this extra IT commitment buy, in terms of design quality and client service? According to KHA's CAD/systems manager, George K. George, the greatest benefit is the ability to deploy whatever IT tools and techniques are appropriate to the task at hand. The firm is large enough to sustain a high level of IT investment, yet small enough so that everyone, up to and including the founding partners, enjoys a hands-on involvement with the tools. A mid-1998 snapshot of the firm's IT infrastructure shows the type and diversity of design technologies required to operate a successful practice in today's competitive environment and also the strategies necessary to accommodate a doubling of staff and office space within a one year period.

Starting in mid-1997, George replaced the previous fifteen-station 10Base2 (coax) network with all new Category 5 twisted-pair cabling: 100BaseT for the network backbone and to serve the CAD work stations; 10BaseT for word-processing and administrative stations—33 nodes in all. As the firm expanded it took space on two widely separated floors of an office high-rise near New York's Pennsylvania Station. Servers, and a 100BaseT backbone switch, are located on the original, higher floor, linked to hubs there and on the newer, lower floor. The server lineup, running Microsoft WindowsNT3.51, includes a Dell PowerEdge primary server with 13GB of storage (9GB of which is mirrored) and a Tri-Star secondary server with 8GB of storage, that also handles the firm's internal Microsoft Exchange email system.

Although KHA maintains a 56K connection to the Internet, as of mid-1998 the firm had not yet deployed either an FTP site or a public Web site. However, George has set up an office intranet that includes office policy manuals, general employee information, word-processing standards, and CAD standards (e.g., layer lists, drawing set up instructions, title blocks and symbols, detail libraries, bitmaps of hatches, etc.). This low-key intranet implementation does not rely on a separate Web server, but simply makes HTML files in ordinary directory folders accessible from every desktop via the standard Internet Explorer browser.

Every station, including the laptops used by four of the firm's five partners, runs the full Microsoft Office97 suite of applications. Associates and partners also use Microsoft Project for scheduling and project management tasks. Some of the more advanced uses of the Office applications include Access databases for tracking submittals on the firm's fixture-laden school projects. Because of the time that would be required to rekey the text, the office's master specification still is maintained and edited by paper-based cut and paste. Some standard contract forms are generated directly from the disk version of the AIA Documents, Electronic Edition, and proposals for Federal projects requiring standard forms 254 and 255 are still formatted in SF254/255 Generator, a DOS program dating back to the early 1990s. KHA had struggled for several years with an accounting system specifically geared to architectural practice, but the partners had grown frustrated with that product's closed database format because it limited the flexibility in reporting that they wanted for budget monitoring and staff scheduling. Finally, the firm switched to the AccPac accounting system by Computer Associates, although input as of mid-1998 was still from paper-based timesheets.

KHA uses AutoCAD as the principal design and drafting software, running on a minimum hardware configuration that consists of a 200MHz Pentium processor with 64MB of RAM. The minimum is constantly upgraded as newer machines, with double the CPU speed and RAM, replace older equipment. In mid-1998 the firm was approximately half way through a project-by-project conversion from AutoCAD r13 to r14 (i.e., projects already underway remained on r13 until completion, while all new projects were started in r14). Additional tools available on an as-needed basis include Accurender for quick perspective studies and Lightscape for full-blown rendering. Some partners actually prefer to do design studies directly from straight AutoCAD wireframe output. Quark Express is available for page layout of presentation boards and binders, and is used by about one-third of the staff for this purpose. The entire slide library of completed projects has been scanned and archived onto Photo-CD, so that principals and the marketing coordinator can select images to incorporate into custom presentations and brochures (also laid out in Quark Express).

CAD output options include a Hewlett-Packard HP4MV laser printer in the studio, for 11x17 check prints, and a Hewlett-Packard HP650C DesignJet plotter for full-size plotting. The firm is considering purchase of a color laser printer. KHA burns its own CD-ROMs for project archives and for transmitting large sets of project files to consultants. George's experience has shown that CDs are preferable to email for this purpose when large files are involved, and that consultant turn-around time is not a significant issue (although occasional glitches do arise with consultants who still need files formatted with AutoCAD's "save as r12" command). Government clients and private university clients, who together comprise a significant proportion of KHA's work, now expect CAD file transfers at all project deliverable stages.

All CAD work and output at KHA is done directly in AutoCAD, without any architectural add-ons or overlays. Staff are largely self-taught, or have brought along their AutoCAD expertise from school or from prior employers. While George provides some support at each project kick-off, and some maintenance of overall standards, each project team is responsible for the proper setup of its own drawings. Typically, the most experienced user on the team sets up the sheets, the text styles, drawing conventions, and so on, as prototype sheets for the project. The project prototype sheets are, in turn, derived—with appropriate project-specific modifications—from office master sheets. This system affords a reasonable balance between uniformity and flexibility. In conjunction with the firm's intranet-based CAD standards and libraries, the prototype/master sheet system frees designers to focus most of their attention on resolving design issues rather than on the procedural mechanics of CAD and drawing issues. This system also avoids the implicit design assumptions and limitations built into some of the commercially available add-on/overlay products. One minor drawback to KHA's system, compared to using shrink-wrapped overlay software for drawing setup, is that small projects with very short turn-around times may occasionally move too quickly for George and/or the project team to ensure proper setup beforehand.

KHA's partners have adopted an approach to CAD that reinvests the productivity benefits of computer assistance into additional design studies. Some clients recognize that, as a firm's computer capacity increases, it becomes possible to generate additional views or to consider multiple alternatives that might have been too costly or time-consuming to consider before. High-profile firms, like KHA, respond to these expectations as an opportunity. CAD thus serves not only as a medium for representation and communication, but as a tool for expanded client service and enriched design quality. This enhanced level of analysis and control can be maintained throughout the project delivery process. For example, KHA "takes the time saved on each drawing and applies that savings to producing more sheets of drawings and more details per sheets, thereby tightening design control." (2)

Two representative projects illustrate how these principles of CAD utilization at KHA work out in practice. First, an office project in Stamford, CT. This is a prototype to test design concepts for a Business Technology Consulting Office, a new activity within a worldwide management consulting firm. KHA established three design goals for the project: the creation of ideal individual workspaces; the creation of flexible group workspace; and the development of an overall plan that encourages informal interaction and communication. Design concepts were tested in full-sized mockups and evaluated by the office staff. The project was under construction in the latter part of 1998. Figure 1 is an early fast study done in Accurender from an AutoCAD model. Figure 2 is a slide from a walkthrough also done in Accurender from an AutoCAD model (both images by George K. George).

Another example is the U.S. Courthouse and Post Office, Brooklyn, NY. This renovation of a 575,000sf building built in 1892 and on the National Register of Historic Places will house bankruptcy courtrooms, judges' suites, a Post Office, and offices for the U.S. Attorney. It is a component of the Brooklyn Civic Center. The project was awarded through the Design Excellence Program of the General Services Administration. Figure 3 depicts a judge's chambers, rendered in Lightscape from an AutoCAD model by George K. George. In figure 4, Steven Kilian and George K. George modeled a courtroom interior in AutoCAD, then rendered it in Lightscape. Finally, Figure 5 illustrates how the project's historic atrium will appear when restored to the original Victorian color scheme (AutoCAD model, rendered in Alias by David Miller and George K. George).

As the rendered examples clearly demonstrate, today's most successful, critically recognized design firms, like R.M. Kliment and Frances Halsband Architects, incorporate extensive computer technology—including advanced modeling and visualization—into the everyday fabric of professional practice.

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(1) Laiserin, Jerry. "Information Technology and Architectural Practice: The State of the Art." *ACADIA Quarterly.* Summer 1996. pp. 13–19.

(2) Laiserin, Jerry. "Meeting Client Expectations." *Architecture.* May 1997. p. 190.

... "Beyond Y2K", continued from page 10

ing session at last year's Quebec conference for ACADIA 98. These were conducted on two separate days. The first was a panel discussion including four representatives of the major constituents of the ACADIA community. These included academia, the architectural profession, the software industry, and the international community. Included were Glenn Goldman, of the New Jersey Institute of Technology, representing the academic community and Thomas Seebohm from the University of Waterloo in Canada, representing the international community. Architect and writer Jerry Laiserin represented the architectural profession, while Christopher Yessios of Auto•des•sys talked on issues relating to the software industry and ACADIA's history. Each gave a brief presentation on ACADIA's importance with respect to their particular interest. These presentations were followed by a lively - at times tense - discussion with the audience. For each participant in the audience was a member of at least one of the interests represented on the panel. And each had a strong opinion to bear.

At the brain-storming session the following day the audience of some eighty people was divided into six groups. Each group member represented one of the four constituencies covered in the previous days discussion. Participants either took these roles voluntarily or were assigned them upon entering the room. Each group was given a packet of brief statements describing scenarios projecting developments in architecture and CAD industry with respect to the different constituents of ACADIA. These brief statements were issued in the form of headlines and paragraph-long articles taken from fictional newspapers in the near-term future:

April 6, 2003

TEACHERS SUE SCHOOL OVER INFORMATION RIGHTS, JOBS

(Pearl, TX) Instructors at Longhorne University's School of Architecture have brought suit against the school for using their course materials in creating an on-line program for the school. College Teacher's Union representative Mark O'Brian believes this is the first step in a long battle. "Copyright infringement is just the tip of the iceberg. What's really at stake is job security. By creating an on-line university environment the school reduces its need for teaching staff, and that means jobs. Having my own course material put me out of work is a bit much to take."

October 21, 2003

STUDENT FAILED FOR "BREEDING" HIS DESIGN

(New Haven, CT) Student Timothy Vollaro has filed suit against the Vale School of Architecture for being failed from a design studio. Vollaro submitted a design created with a design-generating software package produced by Genetic Arts Inc. "We are here to train architects, not computer programmers," says Dean Roger Stern, "Design cannot be delegated to a machine." Not so, says Vollaro, "We were encouraged to use CAD software, and I just took it to the next level. Who cares whether the machine helped? I'm the one who selected the design." He may have a point, last week the design won second place in a student design competition sponsored by the American Institute of Architects.

Though these articles were fictitious, they catalyzed ensuing discussions within the teams. Team members could reject or accept any headline as appropriate to ACADIA's interest or propose topics on their own. The teams selected statements they felt most apropos, then, pretending to be ACADIA's future Steering Committee, developed ACADIA's policies to meet these projected challenges.

This led to lively discussion and a lot of paper left on the floor. Headlines were torn up and new ones written on the easels and paper provided by the Quebec Site Committee. Inside an hour all groups completed mission statements with bulleted items outlining courses of action for the near future.

The group presentations touched on many themes drawn from the false headlines and ensuing discussions. These may be loosely categorized as matters relating to ACADIA's role, its presence as an organization and, finally the issues members feel ACADIA will have to address and coming years. Below is a summary of some of themes covered in the discussion.

ACADIA's Role

What is ACADIA's vision? What is it that we have from offer? While ACADIA draws its strength from the educational community, many presentations looked to its expanding role in architectural profession. With the swift acceptance of computation in both academic and professional settings, some felt ACADIA's original objectives had been met and that - for the organization to have meaning - its emphasis might better be placed on architecture itself rather than its technology. This theme was reinforced by calls to preserve the profession. Some even argued for retrenchment, arguing that architects should not claim what is not theirs — a surprising sentiment given the vision of ACADIA's founders.

Others saw in the success of CAD a justification for ACADIA's leadership role. The organization was originally in the vanguard and it should continue to provide resources for change in the profession. ACADIA would accomplish this through its support of pedagogy, research and of the architectural community by expanding its level of professional expertise.

ACADIA's role an agent for change was stressed in several presentations. Some were taken by the zeitgeist, seeing a possible expansion of the profession into virtual architecture. Others believed ACADIA should deal with ideas that are not necessarily new, yet still have to be dealt with. For instance, addressing the impact of tools on profession might be just as meaningful as the development of tools. How does technology affect not only the process but the very content of design — or of building itself? ACADIA has the history and constituency to lead the profession in technological matters — perhaps it could lead in ethical ones as well.

ACADIA's Presence

Participants expressed concern over ACADIA's visibility. One group led by Peter Jordan believed ACADIA should

have a place — that is, if not physical offices, at least a productive and influential site on the Internet. Others felt ACADIA should extend its influence by sponsoring ACADIAn presentations in other venues and conferences. This idea was taken up by several groups, some suggesting CAD workshops be set up by ACADIA's members. These could be offered at conferences, or by videotape to the profession as a whole. Many felt this would be a natural extension of the organization's pedagogical role.

Others proposed that ACADIA transcend its boundaries by reaching out to other organizations through collaboration and joint research projects. Interdisciplinary collaboration was also suggested as a way to increase ACADIA's presence in the design community.

Issues for ACADIA

Several participants believed ACADIA's emphasis on CAD would wither away in the face of the profession's acceptance of CAD. After all, computers are even being used in design studios! But the tech demon is hard to shake. While the original ACADIAns were faced with technological challenges, today's membership faces ethical ones. Some questions may haunt us for years: how does information technology affect the built and natural environments? Will generative systems replace professional systems? If so, what is the nature of professional expertise — or academic expertise for that matter?

Many regarded the growth of distance learning and online degrees as a challenge to the conventional model of professional training. Some feared academic displacement as a result. Others saw dangers to intellectual property as course material appeared on school Web sites. Here computation — the very raison d'etre of ACADIA — could put its own members out of work.

Is the sky falling? Probably not. But ACADIA's right to be restless. It's our nature - and the nature of our time. Technological change has out-stripped anyone's expectations, new national boundaries are pencilled in daily. Anyone who thinks ACADIA can be complacent is wrong: the profession is changing, academic security is evaporating, and ACADIA's very constituency is evolving. Ironically, in its first conference held outside the U.S., not one of the group presentations mentioned ACADIA's world role or its international membership. Self-awareness is the first step toward building a future. For ACADIA to lead the profession, it must first address what it is, who it comprises, and to where it will lead.

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*Look for a review of Peter Anders new book "**Envisioning Cyber Space: Designing 3D Electronic Spaces**" in the next issue of ACADIA Quarterly v18:2.*

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AN ALLEGORICAL ARCHITECTURE: A PROPOSED INTERPRETIVE CENTER FOR THE BONNEVILLE SALT FLATS.

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Man models himself on earth,
earth on heaven
heaven on the way,
and the way on that which is naturally so.

Tao Te Ching XXV, Lao Tze

Architecture is the physical expression of man's relationship to the landscape- an emblem of our heritage. Such a noble statement sounds silly into today's context, because civilized society has largely disassociated itself from raw nature. We have tamed the elements with our environmental controls and turned the deserts into pasture. I find much of the built environment distracting. Current architecture is trite, compared to geologic form and order.

I visited the Bonneville Salt Flats- (Utah's anti-landscape) in the summer of 1997. The experience of arriving at the flats exceeded my expectations. I was overpowered by a sense of personal insignificance - a small spot floating on a sea of salt. The horizon seemed to swallow up the sky.

Off in the distance I noticed a dark fleck. It looked as foreign as I felt on this pure white plane. I drove across the sticky salt toward it, only to discover an old rusty oil barrel half submerged in salt. In my mind, the barrel has a history. It tells the story of a man's attempt at achieving a goal, or maybe it represents a broken dream left to corrode in the alkali flats. The barrel remains planted in the salt as a relic for those who venture into the white wilderness. This experience left me to ponder whether or not architecture can serve the same purpose - telling the story of a place through its relationship to a landscape, and connection to events.

This project tries to recreate my experiences - *where artifact, event, and landscape merge to define a phenomenological experience* - using architecture as the link between events and the landscape.

Process

The success of this project was dependent on the ability of my committee to understand the site. I obtained USGS DEM data to use as a deformation map within form•Z. These digital elevation models are converted to grayscale images with DemView shareware. I cropped the larger context to include 500 square miles. Landsat Photos and digital painting were used to create texture maps for the geometry. The site models were imported into Electric Image for texturing, rendering, and animation

Once the landscape was created, I printed out birdeye perspectives of the turnabout at the end of the five mile access road, to which all construction is restricted. I used graphite and pastels to test the site with sketches. At this point design was beginning, and I needed to understand and interpret the