Director’s Message

Welcome to the first issue of the PhD Newsletter. I am excited about sharing with you the varied activities of the students and faculty in the College of Architecture PhD Program at Georgia Tech. As the program continues to grow, the activities have increased in their impact and intellectual contribution. The faculty have been exploring ways for this exciting work to become better known to our friends and supporters. This newsletter is one of the methods we have created to share our work. We plan to publish the newsletter “hard copy” in the fall, winter and spring, and it will also be available on the Architecture PhD website. The newsletter is an ongoing and continuously evolving diary of the research and scholarly activity of the PhD program. It is our hope that alumnae who have left Georgia Tech will report back to us any noteworthy activities in which you have been involved, so the information can be shared in later issues. We are very enthusiastic about the activities described here. We hope you will join us in that enthusiasm.

Sincerely,
Chuck Eastman
Director, COA PhD Program

Issues in Architectural Conservation in the Twenty-first Century

Growing problems in protecting the character of historic buildings and cities is a common theme in three keynote addresses Professor Ronald Lewcock has been asked to give in the Middle East this year. Lewcock’s lectures have centered on two different issues. The first, which he calls the poetics of conservation, is critical of over-restoration: the increasing tendency to renew buildings—including the imaginary recreation of missing parts—rather than respecting their integrity and the qualities of venerable aging. The second concerns the need for flexibility in applying traditional conservation principles to the fabric of living historic cities—contrasting the goal of many conservators: the open-air museum, suitable for son et lumiere evocations of a romantic, imaginary past (see figure below) with the more progressive and vital goal of a continuing real and prospering city, which yet accommodates the fabric of its historic past.

Lewcock cites a concern with integrity as the central issue of conservation, which does not exclude the possibility of judicious face-lifting, providing that that is done transparently with thorough documentation and display. Integrity is, however, quite difficult to maintain when conservation is combined with adaptive reuse. For this reason, Lewcock argues that the latter should be advocated only when buildings are not of supreme importance because of their quality, uniqueness, or historical associations. Architectural masterpieces have to be treated with the respect accorded to the Parthenon or the Sistine Chapel; in their case reuse is out of the question. For other buildings, varying degrees of modification are conceivable, and, in the case of houses and ordinary buildings, only the facades need to be kept faithful to their
original character; internal changes should be allowed to accommodate the new functions so important to the continuation of prosperous urban life.

The pressures for change in living in old cities in the modern world are enormous. Dealing with them forces conservators to compromise many of their principles—if the historic areas are not to die. But, unfortunately, much of conservation theory has yet to come to terms with these new pressures and evolve satisfactory compromise solutions. Lewcock cites three cases in point: motorized traffic, parking, and the need for increased security. Motorized traffic in narrow streets, which were traditionally used by pedestrians and slow-moving small vehicles, can be oppressive and ultimately destructive. One of the first issues motorized vehicles bring is the need for tough paving. Traditional streets were cobbled with small stones, if they were paved at all. Lewcock argues that cities must find a way to provide vehicle-resistant paving which is stouter than the original, but not too dissimilar in scale and character—certainly not using smooth, polished, or alien modern materials (see figure above).

When it comes to the size, density, speed, and parking of modern motorized vehicles in old cities, the great architectural historian C. G. Argan long ago laid down the policy that has saved many Italian cities—no concessions at all!

But Argan’s policy is now inadequate, and strategies such as the use of vehicle-restricting hydraulic bollards, the taxation of vehicles entering historic zones, and the provision of parking on the periphery are essential. Lewcock stresses that conservation activities are under pressure as never before. Now, principles of conservation need to be re-examined and revalued—with more stringency at one extreme and provision for more flexibility and change at the other.

Professor Lewcock has been technical coordinator of several World Bank conservation projects in the Middle East, of two UNESCO international campaigns for urban conservation, and of a recent UNDP initiative in Uzbekistan. He serves on the UNESCO Committee of Experts on the safeguarding of the historic city of Jerusalem.

One of his books on a historic city and its conservation has been published on the Internet this year: (http://www.worditude.com/ebooks/unescopdf/sana_eng.pdf)

A Rapid Performance Assessment Toolkit for Buildings

Organizations feel an increasing need for actionable and up-to-date information about their buildings. Whereas owners are beginning to view their building portfolio as a vital production factor, commissioned surveys routinely reveal serious building deficiencies, maintenance backlogs, and unsatisfied occupants. It is now well recognized that buildings should be constantly monitored to verify that they offer a safe, healthy and productive environment to their occupants and facilitated processes.

To respond to this need, Georgia Tech has developed a set of objective and quantitative measures of building performance. The development team consists of Professor Fried Augenbroe and his recent graduates (now post-doc) Dr. Cheol-Soo Park, with GRA support from Mate Thitisawat and Shariar Makarechi, PhD students in the PhD Program. The measures have been harnessed in a toolkit for rapid and efficient deployment. The method assesses a building in its actual setting and usage, based on performance indicators that provide cost-effective, quantitative predictions and assessments of how well a building supports specific client functions. They can both be used to state requirements (expectations) as well as quantify actual performances (fulfillments). The current version of the toolkit contains measures for energy, lighting, thermal comfort and maintenance, embodied in a set of performance indicators (PI) based on normative calculation routines.

The building performance toolkit offers a vital instrument for continuous commissioning strategies and tactical services management over a building’s service life. It has already been benchmarked on 10 large office buildings in Georgia and is currently being used in the trial phase of an energy and sustainability initiative on the Georgia Tech campus. The toolkit development was funded by the General Services Administration (GSA). It was officially launched in a GSA hosted summit meeting in Washington DC on 8 and 9 June 2004.
Steel Industry Leads the Construction Market in the Adoption of Building Information Modeling

Over the last eight years, the North American steel industry has shown the rest of the construction industry the time and productivity benefits of parametric 3D modeling. For steel fabricators, similar to the automotive and aerospace industries, the best practices in building structural steel involves design and fabrication based on 3D modeling systems, with integrated structural analysis, integration with Computer-Aided Manufacturing (CAM), with later transfer to materials management systems. These different computer systems have all been integrated using a building product model, allowing valuable workflow benefits.

Ph.D. Program faculty and students in the College of Architecture at Georgia Tech have played strategic roles in helping the American Institute of Steel Construction (AISC) to realize these goals. Under the guidance of Professor Chuck Eastman, Ph.D. students Joon You, Frank Wang, Donghoon Yang and Jaemin Lee have worked since 2000 to spread the use of 3D modeling applications and their integration, using the CIMsteel Integration Standard, Version 2 (CIS/2) building product model, for fast and reliable data exchange. Currently fifteen applications, spanning 3D steel structural design, structural analysis, steel detailing and fabrication, production management and erection applications have been integrated using CIS/2.

The CIS/2 data model is a data exchange standard for steel structures. In some ways, it is similar to Rich Text Format (RTF) but more complicated, allowing passing of complex structural steel information between applications. The Georgia Tech team provides technical support for software developers implementing translators using CIS/2, undertakes testing of candidate translators, undertakes workflow analyses of selected steel production operations, and develops prototype software for enhancing data exchange. For example, Joon You has developed software allowing very different applications to exchange data iteratively, without the data from either application being dropped. Called incremental update and merge, this capability allows richer and more complex workflows to be carried out automatically. The team has published four research papers on their work so far. In addition, the student team has developed a database implementation of CIS/2, allowing all the CIS/2 applications to build up a repository model of a complex steel structure and all its design, analysis, detailing and production information. Such “building model repositories” are expected to be the ultimate replacement of a set of drawings in the future. This summer, the team and Georgia Tech licensed the intellectual property for the repository database system to a company who is planning to develop a Building Model Repository system for the steel industry.

Currently, the GA Tech team is undertaking a harmonization project between CIS/2 and the Industry Foundation Class (IFC) product model, developed by the International Alliance for Interoperability (IAI). The IFC has become the standard product model in the architecture and construction parts of the building industry. The goal of this effort is to allow smooth exchange between architect, contractor and steel fabricator, using any of a wide variety of 3D applications. Will 3D digital models of steel structures of buildings replace traditional construction and shop drawings? Recently, the AISC has amended its Code of Standard Practice to support the use of modeling files in place of drawings within construction projects. Similar work is underway to develop new standard contracts by the American Institute of Architects.

Model of Soldier’s Field in Chicago and corresponding photo. All aspects of the steel cut pieces, connections, stiffeners and other detailing were used for NC production and drawing preparation (courtesy Thornton Tomasetti Engineers).
More specifically, measures of accessibility predict the degree to which visitors will become aware of single exhibits, while measures of visibility predict the degree to which they will actively engage with them.

Further, the movement choices that visitors make are influenced by the extent to which exhibits are manifestly grouped into thematic units according to color, adjacency, or other architectural devices.

These results were obtained by studying two traveling science exhibitions from the Carnegie Science Center. One exhibition was devoted to advanced surgery technologies (ZAP surgery), and the other to robotics.

The exhibitions were studied in different settings, and host institutions, to determine the effects of alternative layouts. The locations were: the Great Lakes Science Center in Cleveland, Ohio, the Tech in San Diego, California, and the Carnegie Science Center in Pittsburgh, Pennsylvania. The project was funded by a National Science Foundation grant (through the Informal Science Education Program).

A paper reporting the main findings was recently published in *Environmental and Planning*, see publication section.
He developed a data structure that allows future users of the data to make future inquiries and analyses of the data and particularly link physical parameters to users' needs. This data structure is a considerable advance because it points toward a new way of conducting research for making the results usable for subsequent decision-making.

Eastman, Sacks, and Lee developed a data structure for the public services administration to support the US General Services Administration's initiative to support new modes of knowledge workers and agile. Research Scientist Dr. Mahbub Rashid has analyzed the innovative federal offices and has observed the behavior of work. He has found that layout and work behavior are strongly related to the spatial layout and work behavior in several innovative federal offices and has observed the federal government’s office planning process.

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PhD program researchers and faculty members have also worked extensively with the public services administration to support new modes of knowledge workers and agile. Research Scientist Dr. Mahbub Rashid has analyzed the innovative federal offices and has observed the behavior of work. He has found that layout and work behavior are strongly related to the spatial layout and work behavior in several innovative federal offices and has observed the federal government’s office planning process.
Lectures and Presentations


Peponis J., Main invited speaker, Three day conference and workshop on "Games- Architecture", School of Architecture, University of Thessaly, Volos, Greece, May 2004.


Awards and Scholarships

Han B., Winner of the first prize in the first annual Southern Design Competition at this year’s Southern Building Conference in Atlanta, June 2004.


Joseph A., Awarded a Dissertation Grant from The Robert Wood Johnson Foundation through its Active Living Research national program for a study of the environmental factors that promote physical activity in older adults, August 2004.

Nicoll G., Awarded a Dissertation Grant from The Robert Wood Johnson Foundation through its Active Living Research national program for a study of the environmental factors that promote voluntary stair use, August 2004.

Bellal T, Winner of International Fulbright award from the Fulbright Foundation Program for Senior Scholars in order to spend six months at Georgia Tech to work in association with Dr. John Peponis, August 2004.


Rieke V, Winner of the Doctoral Student Research Grant, Department of Housing and Urban Development (HUD), September 2004.

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