

# PhD Focus

Spring 2006

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## Maybeck and the Expressive Power of Architecture

The publication of Robert M. Craig's recent book, *Bernard Maybeck at Principia College: The Art and Craft of Building*, culminates over thirty years of study which began with the author's doctoral dissertation at Cornell in 1973.

With the recent publication of newly translated theoretical writings from 18th and 19th century French and German writers on architecture, Craig extends his well-established positioning of Maybeck as a leader of the Arts and Crafts Movement and Beaux-Arts trained architect concerned with style, to focus on Maybeck's awareness of contemporary ideas regarding the "psychology of style" and "theories of empathy": Maybeck's buildings reflect the expressive power of architecture.

Thus, for a client interested in the metaphysical, as well as physical, aspects of building, Maybeck was the ideal architect to produce a campus of extraordinary natural beauty, to create an environment intended to provide a positive impact on the students who would study there.

Designed by Maybeck in the idealistic 1920s and built during the worst years of the Great Depression (from 1931-37), Principia College is Maybeck's last, longest, and largest commission, a collection of nearly a dozen extant buildings recently recognized as a



National Historic Landmark. The commission included numerous unexecuted designs published here for the first time.

When the American Institute of Architects asked its members in 1991 to name the ten best architects in American history, Bernard Maybeck was selected on the "top ten" list.

A few years earlier, Reyner Banham had warned that there was a "covert plot against Maybeck" observing that functionalists historians had "dislodged" the Beaux Arts Classicists and Eclectics from their rightful place in the pluralistic American architectural history, "effectively underplay[ing]" the quality of the work and doing "a disservice to [Maybeck's] craft and originality as a designer."

Craig's revisionist study of Maybeck seeks to address this disservice by looking beyond style to idea, to architectural intention and that relationship of theory to practice, and to the materiality or tectonics of building. The author encourages, for instance, a greater appreciation of Maybeck's use of concrete, his rich juxtaposition of materials and textures informing the "craft" of building, and the architect's coloristic and painterly aesthetic. As earlier Maybeck historian Kenneth Cardwell expressed it, Maybeck was artisan, architect, and artist.

Favorably reviewed [most recently with a full-page illustrated book review in the respected international daily newspaper, the *Christian Science Monitor*], *Bernard Maybeck at Principia College: The Art and Craft of Building* received the 2005 Book Award of the Southeastern Society.



## Prototyping the Low Energy House

Georgia Tech has been selected as one of 20 universities to participate in the US Department of Energy Solar Decathlon 2007 competition.

The project proposal, led by Ruchi Choudhary, Chris Jarrett, and Franca Trubiano, also includes participation of Godfried Augenbroe and Russell Gentry from the College of Architecture's PhD and Architecture Programs, Ajeet Rohatgi and Ian Ferguson from School of Electrical and Computer Engineering, Marc Weissburg and Jeanette Yen from Center of Biologically Inspired Design (CBID), and Carol Carmichael from the Institute for Sustainable Technology and Development (ISTD).

The latest advances in Building Integrated Photovoltaics (BIPV) will be incorporated within the design of an innovative low energy house exhibiting the highest level of excellence in architectural design, construction and comfort.

Building on shared research interests in ecological design, building performance, and materials research, this interdisciplinary team will develop the project with the goal of achieving substantial innovation in the research and development of solar energy housing, its technologies, implementations, and testing.

The project provides opportunities for research activities that span from conceptualization to physical manifestation of design intentions. An interdisciplinary team of Georgia Tech students pursuing degrees in architecture, engineering, and biology is being assembled for this project.

The Solar Decathlon 2007 competition is already challenging the students to think in new ways about how research, available technologies, and the practice of building influence one another.

Ultimately, this project will not only serve to disseminate more responsible actions when making energy choices but also provide cross-disciplinary dialogue that can strengthen both development and end-use of energy efficient building technologies.

## Computing, Structuring and Integrating Information for Building

GTPPM is a formal product modeling method to derive a product data model from information used in multiple processes. It was developed by Dr. Ghang Lee, with Prof. Charles Eastman and Dr. Rafael Sacks, initially as a part of the North American Pre-cast Concrete Software Consortium (PCSC) project and then as his thesis topic while he was a doctoral student at Georgia Tech.

GTPPM has been employed in several research projects to analyze construction information flow by Carnegie Mellon University, Purdue University, the Technion in Israel, and other research and governmental institutes in Europe and Canada. GTPPM is composed of three phases: the process modeling phase, the product information specification (PIS) phase, and the logical modeling phase.

The GTPPM method begins with specifying design, engineering, and manufacturing processes of a product

(the process modeling phase). Product modelers specify information required by each activity in the processes with domain experts (the PIS phase). In the logical modeling phase, GTPPM automatically extracts and integrates information items specified in the processes and integrates them into a single product model.

Although it was initially developed as a product modeling method, it can be also used as an information flow analysis method and a data view definition method for a specific use case. Dr. Ghang Lee's thesis received the ARCC / King Medal for Excellence in Architectural + Environmental Design Research. For more information on GTPPM, visit its official website at <http://dcom.arch.gatech.edu/glee/gtppm>.

Dr. Ghang Lee has been working as a Research Scientist at Georgia Tech since his graduation in 2004 and recently moved to the Department of Architectural Engineering of Yonsei University in Seoul, Korea as Assistant Professor. He can be reached at [glee@yonsei.ac.kr](mailto:glee@yonsei.ac.kr).

## Modelling the Flow of Materials in Urban Centers

Obsolete computers pose an increasing problem regarding the sustainable management of resources and material flows in urban centers. There is a need to seek productive ways to keep them out of the waste stream, due to the value of the materials they contain and to the harm that their hazardous material inputs pose to the environment when disposed of in landfills.

A multi-disciplinary team of Georgia Tech researchers is studying the problem under a grant by the MUSES (Material Use: Science, Engineering and Society) program of the NSF. Included in the work is the development of estimates of obsolete computer stock from households and businesses for Atlanta and Seattle. The distribution of home and business computer ownership in the area covered by the Atlanta Regional Commission has been mapped using GIS. As shown in the accompanying Figure, both business and household computers cluster around urban nodes. Further,

the location of business computers is highly concentrated along interstate roads. Workplaces and households have approximately the same number of computers, but household computers are more widely dispersed. This finding suggests that the process of used computer management and collection from households will be more challenging than that for business.

The work represents an important contribution towards integrating the urban landscape and its associated material flows in our models of sustainable industrial system growth. Urban centers hold the largest share of population and material and energy flows associated with the use and disposal of products. Thus, they are critical factors in the human influence on the environment.

Other challenges were identified in a one-day symposium, "Electronics Recycling Today and Tomorrow," hosted by the SISFUR team in conjunction with the ECLiPS (Expanding Closed Loop in Production Systems) project on December 9, 2005. The attendees from government, non-profit organizations, universities, and private

## Healthcare Environments Research Summit 2006

As the United States enters the largest healthcare construction programs in its history, with healthcare spending expected to exceed \$40B a year by 2010, we are shaping US healthcare for a generation. There is a large and growing body of rigorous evidence demonstrating that the design of the physical environment of healthcare settings can be an important tool in improving safety, quality, efficiency and reducing stress for patients, families and caregivers. This growing body of evidence can support the emerging practice of "evidence-based design," where design is based on the conscientious and explicit use of research evidence about the probable impacts of design decisions.

But to be effective, healthcare decision-makers need a deep, rigorous and relevant body of research that they can access when they need it, in a form they can use. To assess the state of healthcare environments research, Georgia Tech hosted the *Healthcare Environments Research Summit 2006*

on February 8-9, 2006. This invitation-only meeting of 65 national healthcare thought leaders—top designers, healthcare providers, nurses, physicians, researchers, manufacturers, leaders of professional organizations, representatives from funding agencies and others—was jointly sponsored by the Robert Wood Johnson Foundation, the US Agency for Healthcare Research & Quality and Steelcase and was organized by Craig Zimring and Mahbub Rashid (now at the University of Kansas) and the College of Architecture Healthcare Environments Research Group: Sheila J. Bosch, Young Seon Choi, Mine Hashas, Michael Herndon, Kemaporn Jayanetra, Keith Jundanian, Yi Lu, Eduardo Lyon, Selen Okcu, Paula Peche, Hyun-Bo Seo. The participants represented some \$60B in planned healthcare construction.

The purpose of the meeting was to address three sets of questions:

1. *Topics:* What are some key research topics and directions linking the physical environment of healthcare facilities to safety, quality and efficiency outcomes? The group created a working, prioritized

list of research topics relating to how design can improve healthcare safety and quality.

2. *Pipeline:* What is the current state of the "pipeline" from research to application? For example, do we have what is needed to create and sustain an active community of researchers? Do we have what is needed to help decision-makers understand the implications of emerging research and to use it for everyday decision-making?

3. *Call to action:* What short- and long-term actions can be taken? The group is adopting what the Robert Wood Johnson Foundation calls the "bear hug" approach to field-building: an all-embracing approach rather than simply a research agenda. The group discussed short-term and mid-term actions that might move the field forward.

It was an important first step in creating an active field of applied healthcare environments research, with substantial research funding, training opportunities, translational mechanisms and the chance to use research evidence as part of everyday healthcare decision-making.

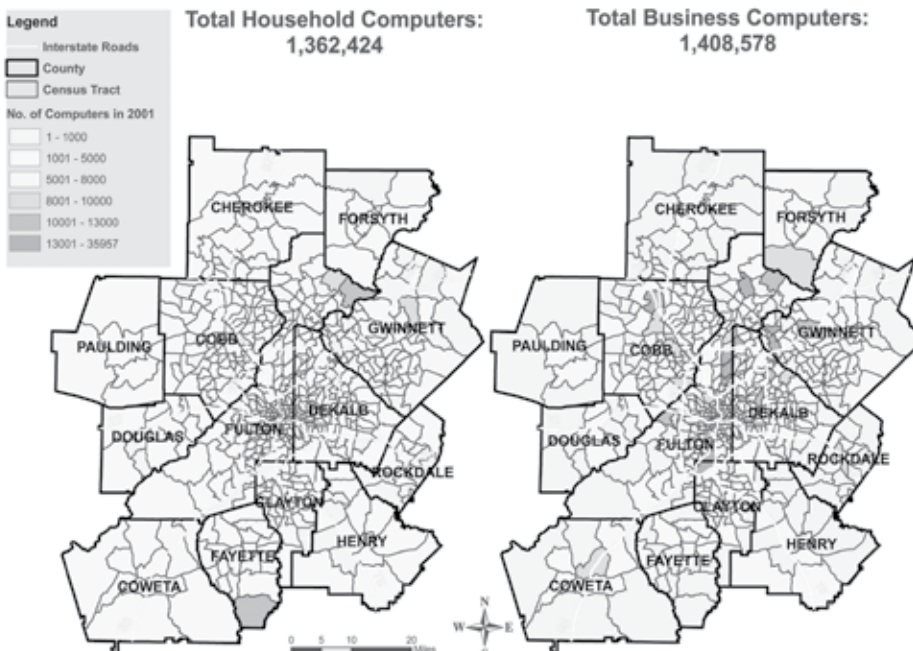
recycling firms identified the major barriers of electronics waste recycling to be: inadequate legislative support, lack of social awareness, and inconvenience of current recycling options. The team is headed by Professor Nancy Green Leigh as Principal Investigator and includes Catherine Ross (CRP) as co-PI;

Steve French (CRP), Matthew Realf (Chemical Engineering) and Bert Bras (Mechanical Engineering) as Senior Investigators; and City and Regional Planning Ph.D. students Ning Ai, Jaecheol Kim, and Eric Sundquist as researchers.

## National Building Information Model Standards

As the US construction industry moves to adopt building information modeling, government is picking up the banner. The General Services Administration has run well publicized demonstration projects around the country and are about to announce the second set of BIM Excellence Awards with the AIA, at the AIA National Convention in June. Chuck Eastman, Director of the COA Ph.D. Program, is a juror on the awards committee.

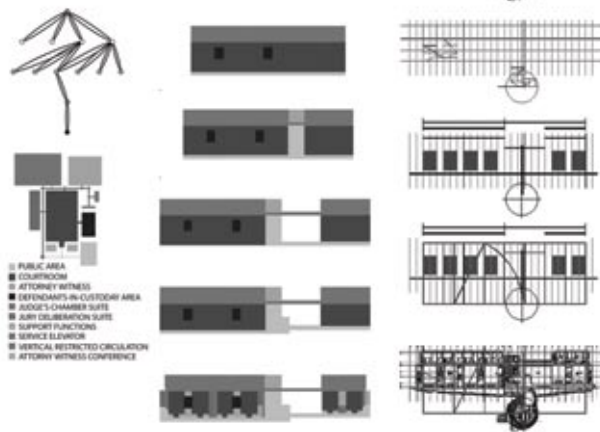
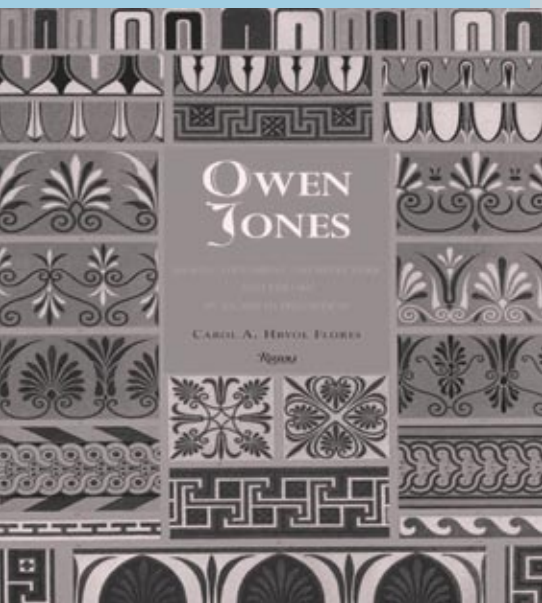
The Facilities Information Council and the National Institute of Building Sciences have initiated the definition of a National BIM Standard. This will identify workflows and information production capabilities that can be supported by BIM technology. For each workflow, the standard will specify the content of the exchanges. For example, a capability may be to generate from a design tool the information needed to undertake a structural analysis, and also specify the return information that merges back into the design model. Each workflow scenario will be a separate section of the standard. It is undecided if there will be certification for sections or not. Eastman is also a member of the Scoping Committee for the NBIMS.



## Flores Turns Thesis into Book

Dr. Carol Flores's book *Owen Jones: Design, Ornament, Architecture and Theory in an Age in Transition* (Rizzoli International, 2006) is the first book dedicated to the theory and works of one of the most influential writers and multi-faceted designers of the nineteenth century. An early advocate for a new style of architecture appropriate to the industrial age, Jones's (1809-1874) schemes for advanced iron and glass structures demonstrated how a new style could be achieved.

He demonstrated an advanced understanding of color and the psychology of perception in his decoration of the Crystal Palace in Hyde Park for the Great Exhibition of 1851. Jones's transformation of an otherwise monotonous structure into a vibrant building praised for its beauty and magical effect raised him to the status of national hero and he used his position to campaign for improved design education and the elevation of public taste. He identified principles of good design in articles, lectures and in *The Grammar of Ornament* (1856), an encyclopedic analysis of Western and non-Western ornament. The Grammar of Ornament was fundamental to education in art and architecture well into the twentieth century and Jones's principles influenced generations of designers. *Owen Jones: Design, Ornament, Architecture and Theory in an Age in Transition* reveals the significance of Jones's ideas, innovations, and contributions within the context of nineteenth century architecture and traces the influence of his ideas in the work of later designers, including Le Corbusier and Frank Lloyd Wright. Carol Flores is an Associate Professor in the College of Architecture and Planning, Ball State University.



## PhD News Recent Theses

Dahabreh SM. The formulation of design: the case of the Islip Courthouse by Richard Meier

The thesis asks whether the constraints imposed by complex functional programs and associated design guidance limit the ability to deploy design languages with entail their own precise compositional requirements. The Islip Federal Courthouse designed by Richard Meier under the General Services Administration's Design Excellence Program is chosen as a case study for two reasons: first, the functional constraints are explicitly documented, and their effects can be studied through a comparative analysis of recent Courthouses also built under the same GSA program; second, Meier's language has received much scholarly attention, is well understood, and can be described with rigor. Both the functional requirements or constraints and the compositional principles associated with the design language are described as formal structures.

The thesis shows that, in this instance, all functional constraints can be satisfied without compromising the elaboration of the language. Thus, the thesis contributes to our understanding of design logic and supports the idea that design intentions as well as design considerations can be reconstructed through a systematic study of the designed object.

Joseph A. Where People Walk: Assessing the relationship between physical environmental factors and walking behavior of residents in retirement communities

The thesis reports an inquiry into choices of walking routes made by elderly residents in continuing care retirement communities (CCRCs). It aims to establish which aspects of path design in such campuses play a significant role in those choices. Three CCRCs were selected for this study; data were collected on path choices through self-reported questionnaires. The more noteworthy findings

include 1) a verification of the assumption that different factors (how paths interconnect) are more operate in route selections for recreational and destination-oriented walking, 2) that for recreational walking, structural significant to route selection, as compared to local experiential/aesthetic factors, and 3) that indoor paths (corridors and passages) tend to be preferred over outdoor paths in recreational paths. The thesis ends with suggestive guidelines for designers of such facilities, particularly in the context of current concerns for promoting healthy lifestyles.

Shpuza E. Floorplate Shapes and Office Layouts

A model of understanding the constraining effect of floorplates on the integration of office layouts is proposed. Floorplate shapes are described according to measures of compactness and convex fragmentation, leading to a typology of office buildings. Layouts are described according to the skewness and density of connectivity. Sparse grids, dense grids and fishbones emerge as alternative principles of layout design. Experiments with dense grids and fishbones, demonstrate strong but differing effects of floorplate shape on layout integration. These are subsequently confirmed by an analysis of a large sample of real examples of office buildings and interiors in the US. The proposed model enhances the evaluation of existing portfolios of buildings for their suitability for different types of office layouts and aids the design and planning of new work environments.

Zhang Y. A method to estimate reverberation time in the preliminary design phase of concert halls

The thesis focuses on developing a model to predict the most important acoustical performance index of concert halls, reverberation time, based on the accessible information in the preliminary design stage. Based on a study of the assumptions of existing methods, it is argued that their predictions are based on either too demanding or over-

simplified information for evaluation in the preliminary design stage. The thesis develops a model that makes maximum use of available information and improves prediction accuracy in comparison with current simplified methods. Through literature survey and data analysis, three factors (geometrical shape, non-uniform material distribution and scattering effect) are recognized as most significant for reverberation time prediction. A simplified model is consequently developed based on studies in virtual simulation experiments, case studies, existing prediction methods and analytical wave equation solutions.

The final model integrates a shape factor parameter that recognizes the interaction between non-uniform material distribution and the scattering effect. This is significant as it is the first time that the scattering effect is introduced in a simple analytical equation. To compensate for inaccuracies the model is calibrated using empirical concert hall data provided in Beranek's seminal book. This is accomplished using a hierarchical statistical model to represent the complicated uncertainties structure contained in the data. A Bayesian rather than traditional regression method is used to make inference on the calibration parameter to ensure the coherence between data and theory. The application of Bayesian method in such an engineering problem is considered as a significant contribution from the thesis. The improved accuracy of the model is demonstrated by comparing its prediction with results from existing analytical equations and empirical measurements on der Grosser Musikvereinssal Hall.

Verheij H, Collaborative Planning of AEC Projects and Partnerships

Project planning in the Architecture, Engineering and Construction (AEC) industry at present relies heavily on individual skills, experience and improvisation. In an attempt to increase predictability and efficiency, and to improve knowledge retention across projects, this dissertation describes a more systematic approach to project planning. It does so by introducing the notion of a meta-process model that embodies and cultivates the logic and intelligence of incremental and collaborative planning activities in a given domain.

Planning tasks are encoded and enforced as a set of structured dialogues between project partners. To make this possible, a taxonomy extension to current workflow modeling technology is introduced, which effectively supports process mediation through structured dialogues. As proof of concept the approach is applied to the particular example case of the planning of Design-Build project delivery for which a detailed workflow model was created

that supports actual dialogue scenarios. A prototype system architecture is devised as an extension to an existing collaborative virtual environment developed in the European e-HUBs research project. This experimental Web-based platform supports the enactment of workflows that are expressed in the standardized syntax of the neutral process definition language XPDL. The functional richness of the structured dialogue extensions is demonstrated through a dialogue management prototype developed as a separate MS Access database application.

## Publications

### Books and Book Chapters

Lewcock R, has two books published on the web: 1. The Old Walled City of San'a', available at [http://www.worditute.com/ebooks/unescopdf/sana\\_eng.pdf](http://www.worditute.com/ebooks/unescopdf/sana_eng.pdf)  
2. Wadi Hadramant And the Walled City of Shibam, available at <http://unesdoc.unesco.org/images/0007/000719/071939eo.pdf>

Lewcock R, (2005). "Generative Concepts' in Vernacular Architecture" in *Vernacular Architecture in the 21st Century*, ed. Lindsay Asquith and Marcel Vellinga. Oxford.

Zimring C, Dogan F, Fuller C, Dunne D & Kampschroer, (2005). The facilities performance evaluation working group. W. Preiser & J Vischer (eds.) *Building Performance Evaluation*, New York: Wiley.

### Journal Articles

Augenbroe G, (2006) New perspectives on Building Simulation (in Dutch). *TVVL*, 2, February (2006): 32-34.

Craig RM, (2005). "Maybeck and 19th century Theories of Empathy." *SECAC Review*, Vol XIV, No. 3 (2003): 219-228 (issue late, appeared 2005).

Harris-Kojetin L, Kiefer K, Joseph A, & Zimring C, (2005). Encouraging physical activity among retirement community residents - The role of campus commitment, programming, staffing, promotion, financing and accreditation. *Seniors Housing & Care Journal* 13 (1). Awarded the 2005 best research paper award.

Zhu Y, Augenbroe G, (2006). A conceptual model for supporting the integration of inter-organizational information processes of AEC projects. *Automation in Construction*. 15(2): 200-211.

### Conference Proceedings

Ho CH, Eastman CM, "How Representations and Strategies Influence Design Spatial Problem Solving," Symposium on Reasoning with Mental and External Diagrams: Computational Modeling and Spatial Assistance, AAAI Spring Symposium, Technical Report SS-05-06, Stanford, March 2005.

Fernandez-Solis JL, "Building Construction Challenges and Capacity for Change," The Proceedings of the 5th International Postgraduate Research Conference of the Built and Human Environment, University of Salford, April 2006.

Yagmur E and Eastman C, "Automated Construction Scheduling & Cost Estimation for Designers," The First Conference on The Future of the AEC Industry: Engaging the New Generation of Doctoral Students in U.S. Universities, Las Vegas, March 2005.

## Presentations

Augenbroe G, "New perspectives on building simulation," Keynote Speaker at IBPSA-NL conference, Delft, Netherlands, October 2006.

Craig RM, "Architecture of Ocean City, Maryland: From Hotel to Tourist Cabin to Motel" [plenary], Nineteenth Century Studies Association (NCSA), Salisbury, Maryland, March 2006.

Craig RM, "Humphrey Repton's Legacy & the Scenographic," Southeastern American Society for Eighteenth Century Studies (SEASECS), Athens, USA, March 2006.

Eastman CM, "Redesigning Architecture: the Impact of Building Information Modeling," Invited Lecture at New Jersey Institute of Technology, September 2005.

Eastman CM, "Progress in Building Information Modeling", e-commerce Roundtable, North American Steel Construction Conference, San Antonio, February 2006.

Gharipour M, "A Study on Light as The Definer of Spaces in Kahn's Kimball Museum," The Annual PCA/ACA National Conference, Atlanta, April 2006.

Gharipour M, "Historicism in Japanese Modern Architecture," South East Conference of Association for Asian Studies, Atlanta, January 2006.

Gross MD, Do EY, "Sketching Human Computer Interactions," CHI 2006 Conference Workshop of Sketching Nurturing Creativity: Commonalities in Art, Design, Engineering and Research, Montreal, Canada, April 2006.

Johnson G, Gross MD, Do EY, "Flow Select: A Time-Based Selection and Operation Technique for Sketching Tools," International Conference of Advanced Visual Interfaces (AVI 2006), Venice, Italy, May 2006.

Nicoll G, "Spatial measures that influence stair use," Active Living Research Conference, San Diego, February 2006.

Nicoll G, Poster Presentation at the International Congress on Physical Activity and Public Health sponsored by the Center for Disease Control and Prevention (CDC), Atlanta, April 2006.

Nicoll G, "Building design strategies which promote stair use," Conference poster, International Congress on Physical Activity and Public Health, Atlanta, April 2006.

Park CS, Augenbroe F, et al. "Normative Thermal Comfort Assessment," International Building Physics Conference, Montreal, Canada, 2006.

Setiawan AB, "Architecture and Identity: Learning from the ordinary in the contemporary world," Hawaii International Conference on Arts and Humanities, Hawaii, January 2006.

Zhang Z, "Vector Road Map Compression -- A Prediction Approach," ASPRS 2006 conference, Reno, Nevada, May 2006.

Zhu Y, "Crossing the Border: The view of Chinese architecture in Europe in the seventeenth century," Art History Society Symposium, Iowa City, March 2006.

### Honors and Awards

Craig R, 2005 SESA Book Award for *Bernard Maybeck at Principia College: The Art and Craft of Building* (Gibbs Smith Publisher, Salt Lake City, Utah, 2004).

Craig RM, Foreword Magazine Book Award finalist, Architecture category, 2005, Robert M. Craig, *Bernard Maybeck at Principia College: The Art and Craft of Building*.

Craig RM, Honorable Mention: 2005 Independent Publisher Book Awards (category of Architecture) for Robert M. Craig, *Bernard Maybeck at Principia College: The Art and Craft of Building*.

Fernandez-Solis JL, Received the "Most Innovative Postgraduate Research in the Built and Human Environment" Award.

### Other News

Craig RM, has written thirty essays on architecture for *The New Georgia Encyclopedia*, a web-based publication of the University of Georgia Press. Ranging from short monographs on architects, to a building type study, to theme and period essays on architecture in Georgia, new essays are regularly appearing.

Gharipour M, has written fourteen entries on Persian history and architecture for The ACB Encyclopedia of World History, which is supposed to be published in 2007. These entries cover a wide range of history from the Achaemenids to the Qajar period.

RS Means is taking up Thomas Keel's work on life cycle costing of intelligent and integrated building systems to produce a software tool for architects and building owners that will be hosted on the RSMean's web site.

Lewcock R, Advisor to the Government of Yemen on the conservation of the Great Mosque, Sana'a, January 2006.

Lewcock R, Visiting Lecturer at the University of Queensland, March 2006.

Zimring C, Joint Commission on the Accreditation of Healthcare Organizations Roundtable on the Hospital of the Future, 2005-2006.

Zimring C, Supported the planning and design and planning of a new Emory University Hospital neuro intensive care unit.

Zimring C, "Creating Effective Design Tours for the 21st Century Hospital" \$149,988, 12/15/05-12/14/06 Robert Wood Johnson Foundation. This planning project explores the feasibility of providing hospital designers and decision-makers evidence-based tours of best-practice examples.

Zimring C, Advising the Robert Wood Johnson Foundation on how they might support the rebuilding of Charity Hospital in New Orleans.

### Alumni News

Lee G, a tenure-track faculty position (Assistant Professor) at the Department of Architectural Engineering, Yonsei University, Seoul, Korea, March 2006.

Moon HJ, a tenure-track faculty position at the Department of Architectural Engineering, Dankook University, Seoul, Korea, March 2006.

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