

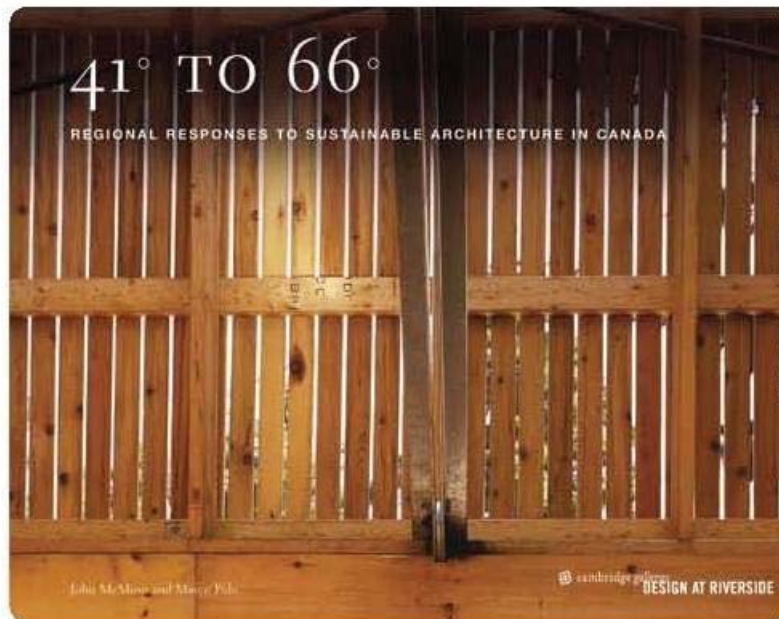
EMERGENCE OF RESEARCH IN

Architectural Science

We began teaching architecture at Ryerson in 1948, since then the program has certainly evolved,” says Professor George Kapelos, Chair of the Department of Architectural Science. “Our faculty is involved at all levels of research in architecture, engineering, and construction industries, from presenting research strategies on the international stage to participating in local developments such as green roof strategies and community outreach projects. We’re doing research that enables us to examine all aspects of architecture - the elements of design and building, how these elements are brought together, and how we teach students to be critical thinkers who are willing to engage in problems at a deeper level and come up with not only immediate solutions, but solutions that will have farther reaching impacts. There’s a balance between the academy and the real world here, this is where thoughts are generated and tested both in studio and in the field. We’re looking to create new ways of exploring architecture, and that means research in addition to our teaching.”

A trend in cross-disciplinary research in architectural science has emerged, says Professor Marco Polo, Department of Architectural Science, “Research is becoming an increasingly important component of mainstream architectural academe. And architects in professional practice are increasingly involved in research activities in order to expand their knowledge base and offer more specialized services to their clients.”

Professor Polo’s work challenges the conventional perception of sustainable architecture as driven by technology and energy performance, looking instead at the relationship between regional and vernacular building practice and sustainability. These ideas are the focus of an exhibition catalogue Professor Polo co-authored with Professor John McMinn of the University of Waterloo School of Architecture entitled, *41° to 66° : Regional Responses to Sustainable Architecture in Canada*. [SNL1]



A great example of integrating this breadth of study is the Ryerson Embodied Architecture Laboratory (R.E.A.L.) - a collaborative research project that received funding from the Canadian Foundation for Innovation (CFI) in 2005. This project involves the work of more than eight faculty including Drs. June Komisar, Ian MacBurnie, Mark Gorgolewski, Zaiyi Liao, Miljana Horvat, and Professors Colin Ripley, John Cirka, and Arthur Wrigglesworth. The laboratory will feature an infrastructure of software and hardware enabling Ryerson University faculty and visiting researchers to simulate and test the sensory environment of buildings both prior to and post-construction.

This new area of research focuses on how our sensory perceptions extend the way we experience the built environment, including concepts of how urban and architectural space may be conceived, experienced and understood. Historically, architectural research has emphasized the conceptual and the visual. New fields of study in “embodied” architecture can transform the way in which buildings and even cities are designed and eventually experienced. The Ryerson University team has identified three main streams of study: sound, bodily comfort, and studies of movement, facility and immersive representations.

“What is interesting about R.E.A.L. is that we’ve managed to take very diverse areas of research and find a core focus,” says Professor Ripley whose research involves developing tools to study the acoustic properties of buildings, and developing materials, techniques and

technologies to use these acoustic properties for architectural expression.

Dr. Komisar concurs albeit from a different point of view, "My doctorate is in two different areas of architecture, one being history and theory and the other being design methods. So with Arthur's [Wrigglesworth] expertise in Virtual Reality, we're hoping to combine it with my background in design methods. What will enable us to help young designers think about architecture in a robust way using the tools of Virtual Reality?"



Professor Wrigglesworth says, "Other industries have developed very powerful tools that are now easily brought into the realm of architectural design. So the Eureka or Aha! happens in the actual design process - being able to perceive what you are designing and deciding how you as a designer will interact with that. We are thinking outside of the visual paradigm. And we're designing speculatively, it will exist as a building eventually. This department is very much grounded in the fact that we're working towards something buildable. But the process of design can be very much affected by the tools you use. The potentials actually allow you to engage with design and the creative process very differently than you would in a traditional approach to architecture."

"Some of this software is on the boundaries of what traditional architecture would use," says Dr. Gorgolewski. "A lot of the research we do falls between the humanities and sciences, and we needed to bring these tools together into one comprehensive integrated lab. Many researchers are looking at sound and thermal performance but we want to apply that data to the architectural implications of performance quality and potential creativity."

Professor Cirka says, "There are interesting things that happen from that kind of transfer from one area to another, and one sense to another. The algorithm that led to more realistic lighting software came from heat transfer algorithms, they realised it can be applied to the way light falls within a room." Professor Cirka works in computationally based advanced design techniques, which involves collecting physical-tactile data in a quantitative form for output into starch or plastic models, to measure human tactile and kinesthetic responses.



Dr. Miljana Horvat looks at building performance & thermal comfort, how architectural design affects heat transfer and energy efficiency. "Architectural design touches on more than physics and heat transfer," she says, "it's also physical comfort and long term sustainability, the relationship between people and their environment - measuring it, documenting it, and using that data."

This collective realization is reflected in the undergraduate program. Dr. Komisar says, "The students we're getting now have different skill sets than students even five years ago. They come without the manual drawing skills but very advanced computer skills, so we have to reassess what we teach them from the beginning and how we can prepare them. So research greatly informs our teaching methods at all levels."

"R.E.A.L. is a research lab but the work will filter down into the way we teach," Professor Ripley says. "It's incredible the power this new research has in terms of affecting the students and then feeding back. I've seen a kind of cycle happening - you get some really bright students as research assistants, set them loose on an idea you have, and before you know it you have three times as many of them in studio really working on a suggestion that came up just months earlier."



Working on questions of sound as a design element with Professor Ripley is Dr. MacBurnie, whose primary research interests are in the areas of housing, urbanism, and urban design. Dr. MacBurnie's Flexi-Living project presents an innovative approach to residential design and redevelopment, founded on the principle of affordability and sustainability through flexibility and choice. It is a concept he designed for the Centre for Future Studies at the Canada Mortgage and Housing Corporation and was work funded by SSHRC. "My research into infrastructure isn't about the technology so much as the concept of infrastructure - a bridge that is inhabited, so it's not just a bridge, it's also housing and shops."



Partnering with the City of Toronto has brought research funding for both Professor Hitesh Doshi and Professor Margery Winkler who work in very different areas. Professor Doshi's study into the benefits and costs of green roofs in Toronto, has led to Toronto City Council's decision to adopt a green roof policy. This collaborative effort involving the Architectural Science, Civil Engineering, Economics and Geography departments, brings together knowledge of sustainable technologies, environmental economics, and geographical information systems to create decision support systems for policy making. "The research was the first major study of its kind in the world on green roofing. Other municipalities have carried out studies on green roofs but none have been as encompassing," says Professor Doshi.



Professor Winkler's Community Outreach course put her fourth year students in front of City of Toronto officials. The students were from all three disciplines in the Department of Architectural Science - design, project management and building science. Students were involved in developing concepts for a landscape restoration plan for Toronto's Historic Allan Gardens - to return the site to a cultural

horticultural & heritage resource and signature tourist attraction, and to enhance its community use and enjoyment. The design process was supported by individual and team research, selected readings, case studies, field trips, site reconnaissance, charettes, presentations, & critical assessments. This type of community development research was also presented to industry and city partners at the International Council on Monuments and Sites (ICOMOS) Congress coordinated by Dr. Komisar, and hosted by Ryerson University . The theme of this conference was, "Conserving monuments and sites in changing Canadian Landscapes" and it provided undergraduate students with the opportunity to work with ICOMOS at Historic Fort York

"Being at Ryerson has a dual attraction for me" says Dr. MacBurnie. "Everybody in this department is working together to set up a Master of Architecture accredited degree program. The last time that happened in Canada was 30 years ago. Secondly this department from its inception has had multiple streams of interest - we have engineers, project managers and building scientists all in the same department and that is extremely unusual in a school of architecture. Interdisciplinary is how the industry works and it is how we work here."