



**TOWN+GOWN**

# Orientation to Policy in the Built Environment

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## INTRODUCTION

Both practice and literature point to the need to increase research activities in the multi-disciplinary area of the Built Environment, which is a recognized multi-disciplinary field.<sup>1</sup> Long-standing structural hurdles, such as the fragmented nature of the construction industry, low levels of public sponsorship and inadequate linkages between research and application, have historically conspired to produce low levels of investment in Built Environment research and development. Traditional research in this field also suffers from a tendency to become fractured, dividing “knowledge into domains with particular sub-disciplines.”<sup>2</sup>

Town+Gown, the City’s “systematic action research” program, is a pragmatic and integrated approach to increase applied research focusing the City’s particular built environment.<sup>3</sup> Town+Gown creates partnerships between academics and practitioners, who work at City construction agencies, to identify practical research projects and conduct data-based research, the results of which will generate discussion and follow-up research aimed at making changes in practices and policies.

The City’s physical built environment serves as a laboratory for the formal disciplines—Management, Economics, Law, Technology and Design—that comprise the field of the Built Environment.<sup>3</sup> Thus, the [2010-2011 Research Agenda](#) is organized around the Built Environment’s five formal disciplines. These disciplines are also found among the various professional degree programs—public administration, public policy, urban planning, business administration, architecture, engineering and law. Many of these programs also have experiential learning opportunities—capstones, workshops and clinical internships—for which the [2010-2011 Research Agenda](#) can provide the subject matter for various projects.

The Built Environment is not explicitly taught in most of the professional degree programs. An urban planning program may offer courses related to infrastructure, and a law school may offer courses in land use and construction law, but the Built Environment is typically not an explicit setting or fact pattern for these multi-disciplinary programs. Yet the analytical skills taught by these programs overlap with the necessary skills for analyzing Built Environment issues. This document is intended to provide some background and context to facilitate your consideration of undertaking a question from the [2010-2011 Research Agenda](#) that combines familiar analytical skills with the perhaps unfamiliar setting of the Built Environment.

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## MANAGEMENT QUESTIONS IN THE 2010-2011 RESEARCH AGENDA

*Role of Government.* For the questions under MANAGEMENT in the [2010-2011 Research Agenda](#), the City acts primarily in the role of an owner, in this case, a public owner. As an owner and client of construction services that implement its capital program, the City has many concerns in common with private owners; namely, project budget, schedule, quality and safety.

Owners bear the ultimate responsibility for any capital project or program—from program definition to project commissioning. The financing, design and construction of long-lived physical assets involve sets of relationships in a shifting environment of unequal information where the collective understanding of a project develops over time. Conventionally described, the construction process involves three archetypal actors—the owner, the designer, whether architect, engineer or both, and the constructor, often called the contractor, though that term obscures what is a network of specific types of contractors, craftsmen and artisans who work together on a construction project. A critical objective for the owner is to align its interests in budget, schedule, safety and quality with those of its agents in construction who often have superior knowledge at various points in the progress of any particular project.

*Management Issues “on the Ground”.* Until the period of industrialization in the 19th century, it was not necessary to speak of service delivery methodologies, which essentially define the roles and responsibilities of various participants in the construction process. The functions of architecture and construction were united in the “Master Builder”. As specialization of labor proceeded, the designer skill-sets and constructor

skill-sets began to pull apart and reside in different people, trades and professions. In a sense, service delivery methodologies are attempts to re-unite the various skill sets of the Master Builder on a particular project, at a particular time. Participants may also apply various design and construction management techniques and tools to manage aspects of the process, thus defined.

The design-bid-build service delivery methodology has been in widespread use since it evolved as the standard in the early- to mid-20th century. Since then, however, construction needs and tools have changed, and construction market participants have adapted to such change by creating an evolving menu of service delivery methodologies that respond to changes in the various construction markets as well as changes in materials, building methods and information technology. The more modern service delivery methodologies include design-build, design-build-operate-maintain and design-build-finance-operate-maintain.

As the service delivery methodologies have evolved, so too have various management theories, techniques and tools, not dissimilar to those found in other industries or sectors. Some design techniques and tools emerged from the industrial design field and were applied to construction, while others emerged from the construction field itself. Despite their different origins, design management techniques share a basic precept that the earliest practicable and continuous application of these techniques, including all relevant participants and stakeholders in the process, works best for the project. Project management techniques have emerged from the organizational management field (project partnering), from the risk management field (enterprise risk management), or from a combination of both (program management and program governance).

*City's Capital Budget.* Many of the research projects in the [2010-2011 Research Agenda](#) involve the City's capital program and budget. The City's capital program is the City's plan for capital investment in the City's structures and infrastructure, and the annual capital budget authorizes and appropriates funds to accomplish the program over time. Specifically, the capital budget appropriates funds to a wide variety of structure and infrastructure projects—both new or expansion projects and renovation or improvement projects. While the capital budget process is critical, it is important to note that the capital project process that follows budget adoption intersects with other governmental processes, such as land use processes—the City's Environmental Quality Review process and the Uniform Land Use Review process—and the public finance process.

An agency's capital program is distinct from its operating programs because its end is the creation of a long-lived physical asset in which the agency will operate its program(s). An agency's capital project is funded from the capital budget with the proceeds of City indebtedness or bonds, as opposed to an agency's program which is funded from the expense budget with the proceeds from various taxes, fees and intergovernmental transfers. Future debt service on the bonds used to finance projects, however, will later be paid out of the expense budget, making a full circle between the capital and expense budgets. The capital budget and expense budget processes proceed in tandem through out the budget cycle and they constitute, along with the revenue budget, the City's budget.

The public capital budgeting process poses analytical challenges because the City's four-year financial plan period is insufficient to account for the temporal realities of construction. The period covered in the investment decision methodology, which takes into account the debt service that finances a project, far outstrips any financial plan period, as do the real costs and benefits (negative and positive externalities) of construction. Moreover, actual construction projects often span different political administrations, further attenuating the connection between the decision to invest and the budget consequences of such decision. If all that were not enough, the natural tendency of budgeting as a process of selective revelation is complicated by the construction process which, if not a process of selective revelation, is one in which the stakeholders collectively develop an increasing understanding of the project from the design phase onward.

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## ECONOMICS QUESTIONS IN THE 2010-2011 RESEARCH AGENDA

*Role of Government.* For the questions under ECONOMICS in the [2010-2011 Research Agenda](#), the City acts in the role of either economic policy maker or regulator. The City builds and funds, through its capital program, a significant portion of New York City's public realm. The capital programs of all levels of government are, in essence, work orders for facilities relating to "social" or "public" goods and to "mixed goods" that correct for negative and positive externalities. While engaging in such activities, the City acts in its role of economic

policy maker. In its role of regulator, the City directs and regulates private capital participation in the public realm (e.g., utilities—telecommunication, electricity, gas) and regulates the safety of the construction process and the products of construction of both public and private owners.

*Construction and the Economy.* Not only does the construction industry directly contribute to the State's and the City's economies and their gross state product, but its processes, employees and products also provide an additional secondary economic impact. For a sense of magnitude, at the height of the construction boom market in 2006, according to the U.S. Bureau of Economic Analysis, the output of the construction industry represented approximately 3.1 percent of New York's gross state product. The secondary impact of construction activity on an economy, termed the "multiplier effect", is the positive increase in an economy's income due to the related increase in expenditure.

There is considerable variance in organization form among the participant firms—architect, engineering and contractor firms. Despite the presence of large firms, however, the predominant business model on the ground is the small business. The organizational and capacity issues facing emerging small contractor firms are not unlike those facing emerging small not-for-profit service organizations. There are at least two views on the prevalence of small businesses in construction. On the one hand, it may be socially beneficial to have small businesses, often emerging businesses, participate in the industry, growing over time. On the other hand, it may be viewed as an economically inefficient mode of industry organization.

*Issues Raised by Government Policies and Practices.* When exercising its unique regulatory role, government often enacts laws and regulations at odds with its role as client and owner that can diminish its ability to efficiently exploit capital programs as economic tools. Moreover, the construction industry is a fragmented industry, "dominated by a large number of relatively small firms, spread over a vast geographical area."<sup>4</sup> To the extent that regulations create regulatory complexities that operate as inadvertent barriers to effective competition in an already fragmented construction market, they unnecessarily limit the positive impact of construction on the economy. Finally, since the City's capital program comprises a significant share of the overall construction to be done within its jurisdiction, its policies and practices have an impact on particular segments of the local economy.

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## LAW QUESTIONS IN THE 2010-2011 RESEARCH AGENDA

*Role of Government.* For questions under LAW in the [2010-2011 Research Agenda](#), the City acts as an owner, primarily through the contractual relationship between it and its designers and contractors. The research questions related to the City, as a law maker, acting in the role of a regulator and policy maker, are found above under ECONOMICS in the [2010-2011 Research Agenda](#).

*Risk Allocation and Legal Constraints on Contract and Project Performance.* Any construction contract is the product of industry standard practice, governing law and past experience. Circumstances related to the project, such as the extent of scope definition, the need for schedule speed as well as certainty, the need for flexibility to make changes to the project during construction, the capacity of the owner to participate in the process and general market conditions, should influence the appropriate service delivery methodology and, equally, the appropriate contract form, which can vary from a fixed price form to a cost reimbursable form.

Professional and trade organizations representing the various participants, such as the American Institute of Architects, the General Contractors Association and the Association of Owners and Developers, however, have for some time offered, to their members and others, standard construction contracts that allocate risk in a manner consistent with their respective vision of well-functioning project. Further, various statutes mandate certain risk allocations among parties, on both public and private projects, so that the contract is not necessarily the last word on risk allocation.

There is a relationship between the statutory environment, the contract forms and risk shifting provisions of owners, especially public owners, subject to statutory constraints. Public projects are typically constrained by law to the design-bid-build methodology with the award to the lowest competitive bidder. The ability of various parties to a project to manage change in order to minimize the negative impact of change on schedule and cost may be constrained on public projects that are denied access to all available service delivery methodologies and project management techniques. To the extent public owners act as if the

statutory environment constrains both the form of the public construction contract and its risk-related provisions, the contract provisions that public owners typically use, especially those that shift risk, may inadvertently increase the risk of avoidable costs during construction.

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## TECHNOLOGY QUESTIONS IN THE 2010-2011 RESEARCH AGENDA

*Role of Government.* The City has an interest in technology solutions as an owner, and the research questions listed below under TECHNOLOGY in the [2010-2011 Research Agenda](#), are related to government in its role as owner on particular projects. Yet government can exercise a powerful role in advancing technology innovation, as economic policy maker, by subsidizing the research and development necessary for innovation in construction technology. Research questions related to this role will be found under ECONOMICS in the [2010-2011 Research Agenda](#).

*Barriers to Technology in Construction.* The construction industry is notable in the literature as one significant industry that has been somewhat undisturbed by the industrial modernization that transformed the processes within, and the organizational structures of, most other significant industries. The nature of construction projects can be a factor in the slowness of the construction industry to adopt modern technological advances. The products of construction differ from the products of mass manufactured products in critical ways because they are physically “large, heavy and expensive” objects tied to their sites and contexts, facts which limiting the ability to achieve manufacturing economies.<sup>5</sup> Further, a consequence of the industry’s fragmentation may be to “[trap] the industry in conservative practices, ensuring that any new learning will spread slowly, if at all”, producing less than socially optimum levels of necessary research and development in the absence of government subsidization.<sup>5</sup>

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## DESIGN QUESTIONS IN THE 2010-2011 RESEARCH AGENDA

*Role of Government.* The City, for research questions under DESIGN in the [2010-2011 Research Agenda](#), primarily acts as an owner and a purchaser of design (architecture/engineering) services. Research questions related to the City’s role of regulator of the visible public realm will be found in the [2010-2011 Research Agenda](#) under MANAGEMENT WITH AN URBAN POLICY TWIST.

*About Public Architecture.* Public capital programs generate public architecture. I.N. Phelps Stokes, who presided over the Art Commissioner under Mayor LaGuardia once said:

The production of beauty, especially by simple and inexpensive means is a very subtle problem and can be solved successfully only by a combination of ability, experience and care.

This is an expression of the challenges inherent in municipal architecture—or the City’s capital program—and provides an architectural context for the questions below.

The concept of beauty is one of three classical values in architecture,<sup>8</sup> with the others consisting of durability (or build quality) and usefulness (or function). Thus, at least for public projects, the beauty of a publicly-funded built item exists and must be evaluated in relation to the durability and useful function of the built item. The concept inexpensive exists in the interplay of the three values, relating the cost of the built thing to the combination of function, durability and beauty/impact that an owner wishes to or can afford to purchase.<sup>9</sup> There is also a time dimension to the cost of a project, beginning with cost of the initial construction and expanding over the life of the asset to its operation and maintenance costs. The phrase “combination of ability, experience and care” is the exercise that those at the City construction agencies, working with designers and contractors, engage in as they execute the City’s capital program.

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## POSTSCRIPT

As this document aims at facilitating your consideration of 2010-2011 Research Agenda questions, it will be of limited value once you begin work on a research question. For additional technical background information related to the Built Environment, once you have selected a project, please email (matthewte@ddc.nyc.gov) or call (718-391-2884) Terri Matthews, Senior Policy Advisor at the New York City Department of Design and Construction, who can provide you with additional background information or put you in touch with appropriate practitioners.

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## ENDNOTES

1. Paul Chynoweth, *The Built Environment Interdiscipline: A Theoretical Model for Decision Makers in Research and Teaching* (Proceeding of the CIB Working Commission Building Education and Research Conference 2006), <http://www.lawlectures.co.uk/bear2006/chynoweth.pdf>, pp. 1, 5.
2. Oaña, Joel R., "Developing and Managing a Research Program: FEU-SURE and Urbanization Issues", Conference on Urbanization and the Educator's Response, November 19, 2004, Far Eastern University Conference Center, pp. 1-2.
3. Chenoweth, op. cit.
4. Myers, Danny, *Construction Economics: A New Approach* (London: Spon Press, 2004), p. 6; Fairclough, Sir John, *Rethinking Construction Innovation and Research: A Review of Government R&D Policies and Practices* (London: Department of Trade and Industry, 2002), p. 14-15.
5. Deborah A. Burkhart, interviewer, *Oral History of Carol Ross Barney, Chicago Architects Oral History Project*. The Art Institute of Chicago, 2007, p. 8.
6. LePatner, Barry B., "Construction Technology: Adoption is slow, but hope remains." LePatner Report, Vol. 26, No. 4 (Winter + Spring 2007), (from website: <http://www.lepatner.com>), Fairclough, op. cit., pp. 6, 14.
7. See Royal Institute of British Architects (RIBA), "Architects and the Changing Construction Industry," RIBA Journal (July 2000).
8. Miles, Lawrence D., *Techniques of Value Analysis and Engineering*, 3rd ed. (Washington, D.C.: Lawrence D. Miles Value Foundation, 1989), Chapters 1 and 2.