Twenty-first Century Infrastructure:
A collaborative research exchange between the CAUI, Princeton, and the IEA, Paris

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Abstract
This proposal requests support for a joint working group between the CAUI (Center for Architecture, Urbanism, and Infrastructure at Princeton's School of Architecture) and the IEA (Institut d'Etudes Avancees in Paris). The CAUI and the IEA will serve as institutional anchors for the working group, whose focus will be on our shared interest in twenty-first century urbanism and infrastructure in Europe, North America, and Asia. The challenges facing the global city in the twenty-first century exist across national boundaries; likewise the expertise needed to solve them crosses institutional and disciplinary boundaries. The working group will bring together researchers focused on these problems and will foster collaboration on urgent issues of contemporary urbanism and infrastructure, presenting the work of Princeton faculty and graduate students in an international forum. The networking and discussion produced by the working group will enhance the standing of Princeton's scholars abroad while simultaneously enriching the intellectual environment in their home departments. Additionally, leveraging the CAUI's existing connections with China, this project will position the CAUI as a pivot between Asian and European networks.

The forum for the exchange of ideas will be provided by a series of seminars and working sessions, combined with online discussions prior to and following these collective events. Through these discussions, Princeton faculty and graduate students will engage in a global debate about the future of cities. This exchange promises to benefit scholars on three continents: the Princeton CAUI would learn from European expertise in transportation infrastructure and regional coordination, while bringing our own expertise with American, large-scale urbanism to the IEA team; finally, the case of infrastructure projects in China would integrate an entirely different perspective that is nonetheless critical to the debates in Europe and North America. Currently, the Princeton scholars have few opportunities to connect with international colleagues who share these research interests.

The support of the Princeton Global Collaborative Research Fund would promote and enhance the work of University scholars, contributing to the internationalization of the CAUI and the School of Architecture. The working group will be developed in Princeton and Paris between 2009 and 2011.
Project Description
The goal of the working group is to share ideas about how urban infrastructure can be re-thought in the new century. Urbanization is not only a global phenomenon of physical and cultural restructuring has itself become a spatial effect of the distributed networks of communication, resources, finance, and migration that characterize contemporary life. Today, the city is everywhere and nowhere. Preeminently spatial, the emergence of a global urban culture has had complicated aesthetic, economic, physical, political, and social effects.

The proposed working group would provide international exposure for the scholarship of Princeton researchers currently at work on twenty-first century urbanism and infrastructure. The proposal would support international collaboration between two existing research groups and networks: a local network based in Princeton (CAUI), and an international network based in Paris, the IEA (Institut d'Etudes Avancees), which includes researchers from France, Germany and Italy. The CAUI's research project *Twenty-first Century Infrastructure* will be the topic of inquiry for the working group, which dovetails with the current project of the IEA, *Metropoles en Miroir* (The Mirrored Metropolis). The CAUI's topic grows from an increasing recognition that existing infrastructure systems are becoming obsolete. Nineteenth and twentieth century infrastructure focused on technologies of mobility (i.e. transportation), but the technologies of this new century revolve instead around technologies of accessibility, (informational, digital) and thus need to be rethought. Working from these institutional nodes, the proposed collaboration also intends to include researchers from other countries working on similar issues through the planned conferences. The conferences and seminars would provide opportunities for career development for Princeton graduate students, giving them a platform for presenting their ideas, and permitting them to gain valuable feedback on those ideas from an international perspective, all while offering them connections that will be important for their advancement as scholars on a global stage. Collaboration between Princeton's CAUI and the IEA would be particularly fruitful because the two institutions share a similar focus, but from two different perspectives and with different areas of expertise. The CAUI would benefit from increased familiarity with the European experience and expertise with transportation infrastructures, such as regional rapid transit and bicycle sharing programs in central cities. At the same time, the collaboration with the IEA would allow the CAUI to share our knowledge of large-scale mega-regions, urban sprawl, urban infill and strategies for designing "greenways" as a new kind of infrastructure to unite such areas. The IEA team has a keen interest in comparative studies between the European and American contexts that can inform their research on the expanding metropolis. Additionally, Princeton researchers have an ongoing project studying twenty-first century urbanism in Shanghai and Suzhou, China that would be shared with the IEA. With new a high-speed rail network, freeway construction, and rapid urbanization, China offers a wealth of material for discussion around the topic of contemporary infrastructure.

Collaborative research activities planned for the period 2009-2011
The Center for Architecture, Urbanism, and Infrastructure has established an effective, though informal, network internal to Princeton University. The activities we propose would foster an increase in collaboration with the rest of the University including faculty in the humanities, the Woodrow Wilson School, the School of Engineering and Applied Science, and the Regional Plan Association. With this proposal, we are requesting support to embark on a new initiative expanding our existing working group and engaging in international research through a partnership with an established international group currently working under the auspices of the IEA (Institut d'Etudes Avancees), Paris.

We envision a coordinated collective research exchange, which would manifest itself as a series of seminars, workshops, conferences, web and print publications, and public dialogues. Here in Princeton, the Center would offer a regular inter-faculty seminar (including advanced graduate students and outside visitors) on urban topics that would enable faculty to share their research and expertise. Additionally, this inter-faculty seminar would provide the opportunity for networking and increased exposure to the excellence of the research already ongoing at Princeton.
The necessarily collective nature of the Center's work offers our students a unique experience for career development through mentoring and networking. The collaborative research also benefits emerging scholars by giving them the chance to prepare and present their research to an international audience. The proposed working group would provide a valuable opportunity for our professional Master of Architecture students (whose focus is design practice) and our PhD students (whose focus is the history and theory of architecture and urbanism) to participate in this international collaborative project.

The CAUI /IEA Collaboration Schedule: 2009-2011

March 2009
*Introductory Seminar* at the IEA (Paris), including CAUI researchers and Princeton graduate students. This working session centers around the IEA project, *The Mirrored Metropolis*, building a comparison between European cities.

Summer 2009
*Project Workshop 1* at the IEA (Paris), including CAUI researchers and Princeton graduate students. The summer session will begin to extend the research exchange to include North American and Asian examples.

Fall 2009
*Seminar 1: Transportation*, at the CAUI (Princeton), including IEA researchers, Chinese researchers, and Princeton faculty and graduate students. Led by Tom Wright, Regional Plan Association and Woodrow Wilson School, this seminar will consider changing transportation needs in an era of mega-regions, increased commuting, as well as the conflict of increased personal digital technology use and twentieth-century automobile transportation.

Spring 2010
*Seminar 2: Digital Infrastructure*, at the CAUI (Princeton), including IEA researchers, Chinese researchers, and Princeton faculty and graduate students. This seminar, led by Mario Gandelsonas and M. Christine Boyer, Princeton University School of Architecture, will continue the discussion initiated in the fall of personal digital technology and examining the role of digital networks in changing patterns of urbanization.

Summer 2010
*Seminar 3: Water and Landscape*, at the CAUI (Princeton), including IEA researchers, Chinese researchers, and Princeton faculty and graduate students. Led by Guy Nordenson, Princeton University, this seminar will focus on the impact of rising ocean levels on urban infrastructure and ecology, as well as sustainable practices for the design and maintenance of urban landscapes.

Fall 2010
*Seminar 4: Energy*, at the CAUI, including the IEA researchers, Chinese researchers, and Princeton faculty and graduate students. This session, led by Petra Todorovich, Regional Plan Association, will study strategies for sustainable urbanism, including urban infill, development around mass-transit stops and reducing fossil fuel pollution around major ports by providing electrical power at docks.

Spring 2011
*Seminar 5: Design*, at the CAUI, including the IEA researchers, Chinese researchers, and Princeton faculty and graduate students. This session, led by Sarah Whiting, Princeton University, will synthesize earlier material and will discuss strategies for the design of appropriate and responsive urban forms.

Summer 2011
*Project Workshop 2* at the IEA (Paris), including CAUI researchers, Chinese researchers, and Princeton faculty and graduate students. The final workshop in Paris will further the previous seminar on design by extending the speculation on design solutions for the core issues of the working group.

Fall 2011
*Conference* at the CAUI, culminating the research of the five seminars and including IEA researchers, Chinese researchers, Princeton faculty and graduate students, and invited international experts.
Spring 2012

Book Publication.

Proposed Schedule for Seminars (Princeton):

Thursday: participants from China arrive
Friday: participants from Europe arrive; opening dinner
Saturday:
  • morning: meeting of working group, discussion of a pre-circulated research report, focused around key themes
  • lunch for working group, informal discussion and networking among participants
  • early afternoon: continued discussion following the morning session and opportunity to collaborate on short presentations for the afternoon round table
  • late afternoon: round table discussion open to the public
  • reception for the working group and the public

Sunday: guest participants return home

About The Center for Architecture, Urbanism and Infrastructure

The Center for Architecture, Urbanism and Infrastructure (CAUI), an interdisciplinary research center within the School of Architecture, provides a collective site for an increasingly important area of interdisciplinary research across the University. As reflected in the University's course offerings, Princeton has long recognized that cities (including metropolitan regions and the suburban landscape) offer a critical, cohesive tableau for researching anthropology, archaeology, architecture, art, civil engineering, economics, history, literature, politics, religion, sociology, and the environment. The School of Architecture serves as host for the Center, providing office and meeting space, and making available workspace, computer, and model-making facilities, as well as some technical and staff support. The Center for Architecture, Urbanism, and Infrastructure offers a focused venue for sharing this existing collective research while also providing a platform for expanding it.

Since its inception in 2007, the Center has sponsored seminars, lecture series, and research. The CAUI supports an annual graduate design studio that travels to China to study the effects of rapid urbanization on contemporary life and the urban context. Princeton students analyze the current urban situation and collaborate with students at Tongji University during a day-long working session known as a charrette. The students work in small groups to generate and exchange design solutions. At the end of the session, the students present their work to faculty and engage in a larger discussion of the projects.

Professor Guy Nordenson is currently conducting a research project under the CAUI's umbrella that focuses attention on the effects of climate change on urbanism, looking particularly at the NY/NJ upper bay and the potential results of possible flooding from elevated ocean levels. The project explores the impact of the changing coastline in the metropolitan region, considering the consequences for a range of concerns, from property loss to the disruption of transportation to the impact on the ecology of the bay. The results of this research are extremely timely and provide excellent material for Princeton scholars to present to a global audience. This research project won the prestigious Latrobe Prize, awarded by the American Institute of Architects in 2007-2008.

In connection with the Center for Human Values at Princeton, the CAUI has sponsored a conference on West African cities titled "Next Stop: Kumasi." The conference at Princeton was followed by a conference at the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana which continued the discussion between participants.

The Center also sponsors a lecture series curated by Ph.D. students. Under the theme "Deflation," one year's series fostered discussions around issues such as Detroit's shrinking urban population, Zagreb's transformation into a post-Soviet city, and the role of free trade zones in global cities. Other series have presented research on Megacities, as well as on the interrelationship of natural and urban environments. The Center has additionally participated in the Regional Plan Association's project "America 2050," which includes a series of conferences defining eleven "Megaregions" across the U.S. Under the rubric of these Megaregions, issues of national planning and transportation are being entirely reconceived. The independent, non-profit Regional Plan Association is one of the oldest planning organizations in the U.S. The RPA was responsible for generating a comprehensive plan of New York and its environs in 1929;
since then it has continued to focus on that region while also expanding its attention to the nation at large, through planning, research, and advocacy. The Center is currently developing a book for publication with the material from a conference on the role of the public in the American city. This conference, which was held in 2005, brought together architects, planners, and theorists to discuss the problems facing the city. Out of these efforts, the idea for developing a project focused on twenty-first century infrastructure was born.

*Internal Collaboration*

The CAUI currently fosters collaboration within Princeton University, but the potential exists for increased funding to expand these collaborative opportunities to collect, share, and reflect on recent work. Within Princeton, many researchers are studying the phenomena of twenty-first century infrastructure and would benefit from a sustained, cumulative dialogue on the spatial implications of the development of urban infrastructure that this project proposes. The School of Architecture includes a focus on urban design, regional transportation and infrastructure. The Woodrow Wilson School of Public and International Affairs has studied the U.S.'s Northeast Megaregion in detail from a policy perspective. Scholars in the History and Art and Archaeology departments have consistently placed urbanization within a wider temporal context, and across the university, faculty are examining the phenomena of global cities such as Brasilia, New Orleans, Lagos, and Mumbai. This extensive internal network should be extended to include research into the sustainability of infrastructural engineering systems undertaken by the department of Civil and Environmental Engineering. Currently, there is a joint undergraduate major combining Architecture and Civil and Environmental Engineering, but both departments would benefit from closer collaboration and sustained discussion around the theme of twenty-first century infrastructure.

These interests and the goals of the center compliment and extend the purpose of the Global Collaborative Research Fund.

**The CAUI Research Project: Twenty-first Century Infrastructure**

The CAUI has been developing this topic of twenty-first century infrastructure for the working group since its 2005 conference on the American City and through collaborative efforts with the Regional Plan Association. The "hard" infrastructure systems of the previous age--highways, dams, telephone, and rail lines-facilitated *mobility* and altered the American landscape in the service of that goal. New, "soft" technologies of the twenty-first century instead focus on *accessibility*, yet our definition of infrastructure remains the same. The American tendency to associate the term *infrastructure* with civil infrastructure and public works keeps us focused on twentieth-century infrastructure, preventing us from seeing the urgent need to rethink the very idea of infrastructure itself.

Radical changes in new technologies of media, engineering, communication, and information processing have begun to challenge our understanding of our infrastructures and the cultures associated with them. Some of the constraints imposed by mobility requirements have been overcome by new technologies in computing and media; others remain, as demonstrated by the growth of train networks, and the vast contemporary economy of transportation. This tension, between new and old technologies, between new and old patterns of use, outlines one area of interest for CAUI's research. How can new infrastructures integrate with traditional ones in the fluid, light, modernity in which we live? How might they affect our existing cities, our understanding of the public sphere, and the roles of future urbanists and architects? Our research examines the implications of the coupling of hard and soft infrastructures for the potential development of new land use patterns and of new spatial and formal configurations at the macro-scale of the Megaregion, at the meso-scale of metropolitan areas, and at the micro-scale of urban buildings and spaces.

The urgency of the question of infrastructure stems not only from the aging of our "hard" infrastructure-as recognized by the incoming administration-but also from the recognition that the "Megaregion" has become the norm as a new form of agglomeration superseding metropolitan developments of the twentieth century. Expanding upon urban theorist Jean Gottman's 1957 notion of the "Megapolis" as a continuous chain of metropolitan areas, the Megaregion describes the urban growth that currently takes place in extended networks of metropolitan regions linked by environmental systems, transportation networks, economies, and culture. Just as metropolitan regions grew from cities to become the geographical units of the twentieth-century economy, these Megaregions, as agglomerations of metropolitan regions with integrated labor markets and infrastructures, are replacing the metropolis. The
CAUI research project proposes the state of New Jersey, the geographic center of the Northeastern Megaregion, as an ideal laboratory in which we can investigate the implications of the new twenty-first century infrastructures in addition to the reconceptualizing and redeveloping the nation's extended networks of nineteenth-and twentieth-century "hard infrastructures."

The IEA Research Project: Metropoles en miroir (The Mirrored Metropolis)
The research project of the IEA approaches many of the same issues focused upon by the CAUI, but, as our project begins with the question of New Jersey, the IEA's originates with the problems facing Paris. The relation between a hyperdense center and the territories of the first and second rings in the city's periphery, brings up critical questions: radical differences between center and periphery, between the historical and the new urban fabric, fragmentation brought by social tensions that have rapidly increased because of segregation in the periphery.
Traditional approaches are incapable of describing this new complex urban condition. The IEA’s project, Metropoles en Miroir, attempts to develop a dynamic exchange between researchers and producers of projects at the metropolitan scale through an interdisciplinary approach by creating an international research network. The confrontation of different disciplines and cultures will allow a better understanding of similarities and differences at three scales: the territorial macro-scale, the metropolitan meso-scale and the micro-scale of buildings and spaces.

The IEA's research program intends to construct a comparative analysis (a "mirroring") of the Parisian specificities and other metropolitan regions. Foreign researchers will bring their specific knowledge in exchanges to take place in seminars, ateliers and conferences where concrete examples of projects being implemented will be presented and analyzed. The CAUI's proposed working group will plug into this existing network built around Metropoles en Miroir, benefiting from their pool of international expertise on issues facing the twenty-first century global city.

The IEA research team includes:
- IEAn-Louis Cohen, Ecole Doctorale, Ville et Environnement, Paris 8, Professor, New York University
- Hartmut Frank, HafenCity Universitat, Hamburg, Germany
- Mario Gandelsonas, Professor of Architecture, School of Architecture, Princeton University
- Yannis Tsiomis, ENSA Paris-La Villette, Ecole doctorale Ville et environnement, Paris 8, EHESS
- Director: Cristiana Mazzoni, Director of research at the Architecture Culture Society (ACS) Laboratory, ENSA Paris-Malaquais

Conclusion
The support of the Global Collaborative Research Fund will provide the Center for Architecture, Urbanism, and Infrastructure with a unique opportunity to develop a working group that will formalize relationships with international colleagues researching similar issues. Given the experience of the CAUI in network-building initiatives, there is little doubt that this new initiative will meet the goals of the GCRF in establishing international collaboration, in promoting Princeton scholars on a global stage, and in contributing to the further internationalization of the School of Architecture.