CRISIS FRONTS :: Cognitive Infrastructures

Pratt Institute School of Architecture
Degree Project Research and Studio
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2008 marks an important milestone as the year when for the first time in history the majority of the world's population will reside in urban areas. An explosion in urban growth is underway, most notably in the developing world where the urban population is expected to double by 2030.

Cities are already the sites of rapid cultural change and they are the primary economic and cultural engines of societies. An increasingly globalized and urban world is at once inevitable and it is also necessary. This urban world produces its own forms of diversity, innovation, and intelligence, but the unprecedented growth of cities worldwide is not without challenges. The extraordinary scale and speed of urban growth already exceeds the capacity of the systems that would service, support, and manage it. Much of this growth will take place beyond the legal and administrative boundary of the city proper, uninhibited by centralized planning or management, and in absence of an adequate set of municipal infrastructures.

The decentralized growth of the city - that which takes place in patches, on the periphery, self-regulated, and remote from central administrative control - is the site of extraordinary volatility and undergoes a constant process of transformation. Current forms of infrastructure are outdated before they are even completed and remain fixed in the scale and possess neither the speed nor the flexibility and responsiveness that would enable feedback between them and the growth of the city. They are no longer adequate. The failure of infrastructure will be an enormous factor in the increase of worldwide poverty, hunger, disease, overcrowding, and instability. New, more intelligent infrastructures and new understandings and readings of urban infrastructures will have to be invented - ones that have the potential to engage changing forms of organization, operative processes, and generative logics found in the contemporary city.

Of particular relevance are the areas of the city that are the fastest growing, the most contested, the most fragile, and the least served by conventional infrastructures like energy, clean water, and transportation. These are areas that grow following logics of extreme pragmatism and efficiency on a granular level, that are self organizing and self regulating, and that will require new tools and systems of intelligence to comprehend and negotiate. At issue is the development of a fundamentally different view of infrastructure, but also of systems of intelligence, memory and cognition.

Cognition refers not only to the acquisition of information and data, but to its processing, and its culmination in action. Research in the studio will focus on the underlying structure or logic that enables cognition and also on approaches to introduce new forms of cognition into the city.

Cognitive Infrastructures are poly-scalar, working across intensity, quality, and a range of relationships that exist at the scale of architectural components and assemblies at one extreme and urban and infrastructural scales and effects at another. They are dynamic formations of data, material, and services. They include physical formations and also practices that acquire an infrastructural scale. They are organizational and responsive, and must be engaged in continual feedback with their environments.

Work in the studio will concentrate on developing specific rules and models for cognition through computational research in Rhinoscript. Projects in the studio will be conceived of not as envelopes or scaffolds, but as cognitive techno-ecologies: nimble and responsive to their environment, taking advantage of new and future technologies, and employing the feedback between inputs, processing, and action that are the characteristics of all cognitive systems. They seek to identify and actively augment the performance of the opportunistic programs and patterns of use that will emerge around them. These patterns are understood to comprise a complex social feedback system and will afford the opportunity for speculation on new forms of material intelligence, formal innovation, new social practices, institutions, leisure, commerce, and piracy.

Crisis Fronts
Crisis Fronts is an ongoing inquiry into contemporary global crises that suggest new demands and agendas for architecture, and the potential afforded by parametric and generative digital design tools.

Collaborative Research
Collaborative research is required in the Fall semester and will be conducted at several scales throughout the term.

- **Research Archive:** Students will make individual and team contributions to a collective archive of sources and research materials. Archive research will take the form of individual articles or entries consisting of explanatory text, annotated images, captions, and bibliographic sources, and will be formatted to a standardized template. These entries will comprise an important resource for the seminar and will be dedicated to outlining a set of specific research agendas within the larger topic of Cognitive Infrastructures. These topics may be related to larger cultural or discursive contexts that may influence the priorities and outcome of any design research, or they may relate to examples of technologies, urban data, cultural movements and social phenomena, and techniques that are of particular interest or relevance to the studio at large.

- **Cognitive Maps:** Students will collaborate in teams of two to generate a Cognitive Map as the basis for their design research. The cognitive map will consist of four important components: a data set to be collected through collaborative research on one of the world's most populous cities; a cognitive model, developed through research into different forms of intelligence and information processing; code written in Rhinoscript that processes data in manner consistent with the cognitive model; and outputs in the form of 2-dimensional maps and graphics that are generated by the script.

- **Project Text and Research:** Following the Cognitive Map review (Tue, Sept 30) students will have the option to reorganize into new teams of two to three to produce a final proposal. This collaborative proposal will consist of chapters as outlined in the general Degree Project syllabus including a Précis and chapters on Field of Operations, Programmatic Frame, Performative Techniques, Genealogies, and an annotated Bibliography. In addition, each collaborative team will be responsible for generating a minimum of one application scenario per team member that anticipates the implementation of their proposal. These scenarios are speculative in nature and will take the format of a final text and relevant visual material.

  Spring Degree Project Studio projects may be produced individually or in teams.

- **Standardized Format:** All research entries and work product will be formatted to a standard dimension for publication comprised of a two-page spread Crown Quarto Size, measuring 7.444 in x 9.681 in per portrait format page. Students will be required to post weekly updates to their entries and project pages to the Crisis Fronts website.

Computation and Scripting Workshops
Three mandatory Saturday computation workshops are scheduled for September 13, 20, and 27. Workshops take place between 12:00-6:00 in Room HHS 109 and are specifically related to developing techniques and strategies for the required Cognitive Maps.

•Workshop 1: Introduction, Data Strategies
•Workshop 2: Creating Digital Design Tools
•Workshop 3: Creating Outputs

Website
The Crisis Fronts weblog is available at www.crisisfronts.wordpress.com. We maintain a studio blog and make regular postings. All the materials for the studio will be available online and all research generated will be posted. Students will make mandatory weekly postings of new research and current book pages and will post all scripts and presentations on the website. The site will be updated regularly with required readings, news, and other resources.

FALL SEMESTER SCHEDULE

Week #1 **09.02.08** **Studio Selection**

Preliminary Research Assigned
Gather statistical data and information pertaining to the infrastructure of a selected city. Make a series of speculative statements that anticipate the conditions in the selected city in the year 2030.

Week #2 **09.09.08** **Urban Data**
Pin-up, Group Discussion
Review of Primary Research, Documentation, Drawings, Diagrams.
Research pairings

Cognitive System Research Assigned
Growth / Expansion
Tracking / Monitoring
Navigation / Negotiation
Selective Memory

09.13.08 **Computational Workshop 01**
Skill set survey, introduction to the premise of computational design, introduction to code variations, pseudo-code, translation from data to performance, designing outcome. Introductions to data sets and processing tools

Week #3 **09.16.08** **Cognitive Systems**
Data Sets, Data Tools
Pin-up, Group Discussions.

Data Set Refinement Assigned
Using cognitive system attributes to refine and gather urban data

09.20.08 **Computational Workshop 02**
Review of data set work and cognitive models, creating design tools, and mapping

Week #4 **09.23.08** **Feedback Ecologies**
Preliminary Mappings
Pin-up, Group Discussions.

Analogue Cognitive Map Assigned
Test and refine data sets and cognitive systems in drawing form.

09.27.08 **Computational Workshop 03**
Review of design tools and data input/output, creating graphical outputs

Week #5 **09.30.08** **REVIEW: Cognitive Maps**
With Assessment Committee Members and Outside Critics

10.04.08 **Language-Making Workshop 01**
Analogues and Concepts

Week #6	**10.07.08**	**Urban Crisis** *Re-organize into teams of 2-3*
		Preliminary Agenda / Position / Precis Assigned *Outline position and research agenda*
	10.11.08	**Language-Making Workshop 02** *Mapping and Surveying*
Week #7	**10.14.08**	**_Urbanism** *Pin-up, Group Discussions.*
		Additional Research Assigned *Refining Characteristics of behaviour and effects*
	10.18.08	**Language-Making Workshop 03** *What is your Thesis?*
Week #8	**10.21.08**	**Cognitive Engine Feedback** *Pin-up, Group Discussions.* *Identifying opportunities for feedback*
		Scenarios Assigned
	10.25.08	**Individual Writing Consultation**
Week #9	**10.28.08**	**Urban Infrastructure Scenario Development** *Pin-up, Group Discussions.* *Writing speculative scenarios*
	11.01.08	**Individual Writing Consultation**
Week #10	**11.04.08**	**MIDTERM REVIEW** *With Assessment Committee Members and Outside Critics*
	11.08.08	**Individual Writing Consultation**
Week #11	**11.11.08**	**Memory Redux** *Pin-up, Group Discussions.*
		Formatted, revised current Booklet Assigned **Includes revised Scenarios**
	11.15.08	**Individual Writing Consultation**
Week #12	**11.18.08**	**Feedback Corrections** *Pin-up, Group Discussions.* *Review formatted, revised current Booklet, including revised Scenarios*
	11.22.08	**Individual Writing Consultation**
Week #13	**11.25.08**	**PENULTIMATE BOOKLET SUBMISSION**

Week #14	**12.02.08**	**Cognitive Urban Infrastructure** *Final Mock-Up* **Formatted, revised current Booklet** **Chapters: Precis, Cognitive Engine, Urban Focus, Pre-emptive Methodology, Scenarios**
	12.06.08	**Individual Writing Consultation**
Week #15	**12.09.08**	**STUDIO FINAL REVIEW WEEK** *No Class*
Week #16	**12.16.08**	**FINAL REVIEW** *With Assessment Committee Members and Outside Critics*
	12.18.08	**FINAL BOOKLET SUBMISSION**

COURSE BIBLIOGRAPHY

A current listing of sources and texts including assigned weekly readings will be available at http://crisisfronts.wordpress.com/course-readings

UNFPA Report on the State of the World Population, 2007

Critical Art Ensemble, *The Molecular Invasion*
Matthew Fuller, *Media Ecologies*
Matthew Fuller, Usman Haque *Situated Technologies Pamphlets 2: Urban Versioning System 1.0*
Adam Greefield, *Everyware: The Dawning Age of Ubiquitous Computing*
Alexander Galloway and Eugene Thacker" Protocol, Control, and Networks" *Grey Room 17*
Adam Greenfield, Mark Shepard, *Situated Technologies Pamphlets 1: Urban Computing and its Discontents*
Jeff Hawkins, *On Intelligence*
Jonah Lehrer, *Proust was a Neuroscientist*
Norbert Wiener, Cybernetics: or Control and Communication in the Animal and the Machine

Stan Allen, "From Object to Field"
Stan Allen, "Diagrams Matter"
Stan Allen, "Field Conditions"
Philip Ball, *The Self Made Tapestry*
Manuel Delanda "Deleuze and the Genesis of Form"
Manuel Delanda "Deleuze and the Use of the Genetic Algorithm in Architecture"
Steven Johnson, *Emergence*
Kevin Kelley, *Out of Control*

Sanford Kwinter, *Architectures of Time*
Anthony Vidler “Towards a Theory of the Architecture Program”
Bernard Tschumi and Irene Cheng, *The State of Architecture at the Beginning of the 21st Century*

Achim Menges “Manufacturing Diversity” *Techniques and Technologies in Morphogenetic Design*
Achim Menges, “Polymorphism” *Techniques and Technologies in Morphogenetic Design*
Michael Weinstock “Self Organisations and Material Constructions” *Techniques and Technologies in Morphogenetic Design*
Achim Menges, Michael Hensel, *Morpho-Ecologies*
George Jeronimidis, “Biodymanics” *Techniques and Technologies in Morphogenetic Design*
Ali Rahim/CAP *Catalytic Formations*
Aranda/Lasch *Tooling*
Reiser+Umemoto, *Atlas of Novel Tectonics*

Bruce Mau, et al, *Massive Change*
William McDonough, *Cradle to Cradle*
Bruce Sterling, *Shaping Things*
Alex Steffen, ed. *Worldchanging*

Reyner Banham, *The Architecture of the Well Tempered Environment*
Reyner Banham, *Megastructure: Urban Futures of the Recent Past*
Gilles Deleuze, “Postscript for Control Societies”
Keller Easterling, *Enduring Innocence: Global Architecture and its Political Masquerades*
Saskia Sassen, *Global Networks, Linked Cities*

“Eco-tecture” New York Times Magazine, May 26 2007, Section 6

Online Resources

UN Habitat - http://www.unhabitat.org/

UNFPA - http://www.unfpa.org/

USGS GIS Data - http://webgis.wr.usgs.gov/globalgis/

US Census Tiger/Line Data - http://www.census.gov/geo/www/tiger/

Maps and Arial Images - http://earthshots.usgs.gov/tableofcontents

Spatial Cognition 2008 Conference - http://conference.spatial-cognition.de/sc08/

Online Governmental and International Resources on Climate Change - http://www.istl.org/01-fall/internet.html,www.climatetechnology.govUSGS

US Strategic Plan for Climate Change - www.climatetechnology.gov/stratplan/final/index.htmUS