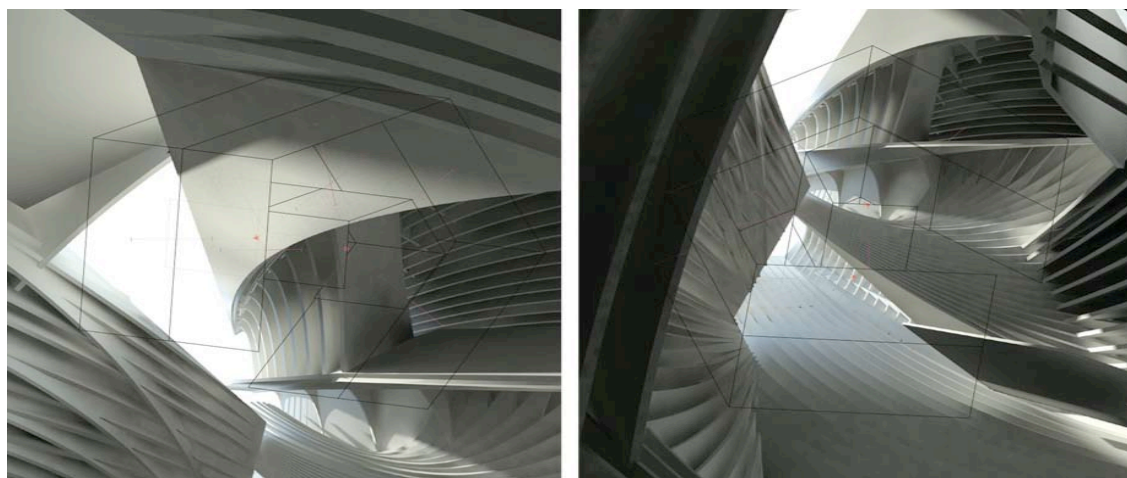


## Extended Brief Introduction



Augmented Stepped Well by Adam Holloway Dip16

*It is not the parametric, the relentless malleability of form, not is it complexity for its own sake, but rather a complex of complex relationships that produce architecture. The operational paradigm we're interested in is akin to Pierre Bourdieu's "field of cultural production" where form is the playing field within competing vectors within a larger cultural field of forces (instead of internalized language games). The specificity and agency of architecture can only happen within the particulars of its situation and in relation to the larger field. Architectural production is no longer the Marxist "us vs. them" dialectical model of resistance.<sup>1</sup>*

**Dip16** are continuing to develop alternative forms of architectural production methods and urban models based on cybernetics and adaptation to our rapidly changing environment. This year our research emanates from the production of new carbon neutral cities striving for a **homeostasis** between nature, technology and people in the pursuit of a post-Cartesian architecture.

This year's objective for **Dip16** is to speculate on the opportunity provided by the design and production of culturally & **BIOME** specific zero carbon model cities such as the primary target of Masdar City Design by Foster & Partners with the aim to develop alternative forms of urban morphologies, spatial imagination and methods of construction. We will attempt to address the design challenges these urban projects present, by exploiting reciprocally associated information and phenomena in both a parallel and iterative manner by exploiting the innate opportunities afforded by generative & associative modeling techniques, and digital manufacture.

**Dip16** are reinventing vernacular types and construction methods with emerging types of generative, material and production processes reclaiming a new sensibility in architectural craftsmanship & defining an epistemology of **ecological stoichiometry** for new city design through the specific deployment of computational design tools. We start the year with a series of computational workshops in associative modeling systems and develop an analytical **Ecosystem Model** for a specific **BIOME**. The **Ecosystem Model** is developed into a drawing machine in a series of generative modeling workshops, both together making up an **Autopoietic Machine** compositing vernacular and natural processes with digital generation and production. The **Autopoietic Machine** is forming the material for a series of workshops in digital fabrication leading to the design & fabrication of a large-scale prototype drawing from an industry-specific composite production process. Each student develops a **BIOME** specific urban manifesto and formal research abstract in order to forge an individual research consultancy and relate the project to a larger cultural context.

The anticipated project outcome is a co-evolutional manifestation of a new-built city and specific architectural production process as an **Urban Autopoietics** producing a meaningful level of complexity, public urban domain, architectural form and spatial sensibility as well as setting new ground breaking energy and carbon targets. We anticipate speculative, innovative and novel urban and architectural proposals manifested in a clear material and tectonic form. Projecting from the experimental practice of self-governance design, **Dip16** seeks to capitalize on the global rapidly changing environmental, economy and cultural conditions as a springboard for imaginative collaborative production models, innovative ecological urban and architectural design and visionary tectonics to help nurture innovation and design culture in cities emerging from our new forms of green economy.

<sup>1</sup> Excerpt from: Michael Meredith/MOS 2008, *Never Enough (transform, repeat and nausea)*, From Control to Design: Parametric / Algorithmic Architecture Actar Oct 2008 320p, p6-9

## Dip16 Unit Context



Sagrada Família Models by Marky Bury RMIT

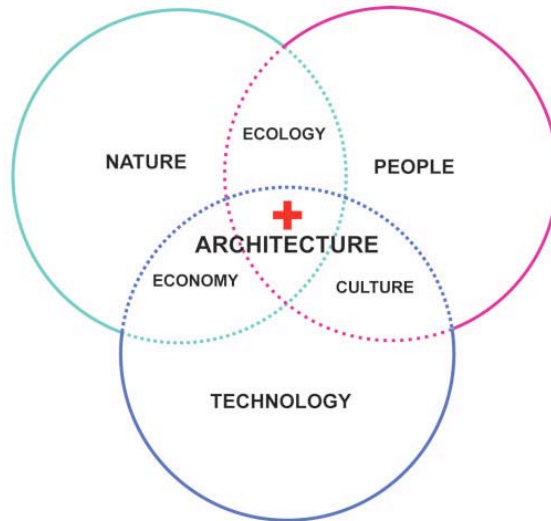
**Dip16** being antagonists of monotony is pursuing the formation of a multi dimensional architectural space and aesthetic based on composite conditions, is formulating a conceptual framework and discourse on architecture searching for notions of future scenarios and spatial imaginations defying sensible Cartesian representations. We are challenging standardised modes of production, materiality and conventional forms of representation and reductive models of topology and typology. **Dip16** is primarily interested in exploiting the host of complex relationships informing an overall architectural ecology synthesizing ideas of Technology, Nature and People across a range of scales. **Dip16** is embracing a time based holistic ecological understanding as the key to engendering spatial affects eliciting new spatial sensibilities remediated by emerging resources and technology.

**Dip16** seeks to exploit these rapidly changing environmental, economic and cultural conditions in emerging urban frontiers as a spring board for an imaginative collaborative working models, innovative green design and visionary aesthetic to emerge. We are facing overpopulation and climate change on one hand, and demographic shifts with new found natural resources on the other. These conditions have already projected cataclysmic consequences or adaptive opportunities in nature, socio-politics and economics. The eco-systemic specific interventions like biome-specific bio-diversified urban & economic developments, and the man made counter measures such as carbon economies; emission caps and passive building standards are eminent inevitably transforming our architectural discipline. CONJECTURAL architectural practice has a duty to speculate and project an alternative future and not let architecture be divided between the “green return to the past natural romantics” nor in the hands of technocrats reducing architecture to a quantifiable problem.

**Dip16** is continuing its search for design propositions in a HOLISTIC manner defining a sustainable architectural ecology, multidimensional space and a **visionary aesthetic**. We will spring from open exploration of computational techniques in the search for a more contextual and integrated mode of design, in which the rationality sought for in the industry, can meet formal, analytical and procedural experimentation across a range of seamlessly integrated scales managed. The research of **Dip16** is technique and studio based exploiting the new AA studio culture and carried out by using field studies, specialist consultancy, computational workshops, hands-on design workshops as well as prototyping workshops. This year we will actively pursue and develop a range of industrial and academic research collaborations related to fabrication and production with the aim in producing large-scale prototypical output (see workshops).

Informed by developments in computational design, new material research, new modes of fabrication and production as well as, evolving concepts of space, Dip16 will look for the production ecologies of the near future, in which more intelligent, sustainable and adaptable composite materials will make up the components of innovative building taxonomies. The notion of the composite will be applied to material research, digital methodology, programmatic organization architectural performance and formal as well as spatial quality, as students explore intricately and/or reciprocally associated information and phenomena in both a parallel and iterative manner by exploiting the opportunities afforded by generative and computational modelling techniques and digital manufacture and production.

All students are requested to engage with the main unit framework (unless another arrangement has been agreed before hand). The design projects should all develop a multidimensional composite architectural space and visionary aesthetic drawing direct inspiration from the technique workshops gradually challenge all references to an initial ground/datum or clear distinction between interiority and exteriority.



Dip16 have a firm belief in an architecture of HOL(O)-istic ambition, arguing that all great acts of architecture manages to synthesize ideas of Nature, People and Technology.

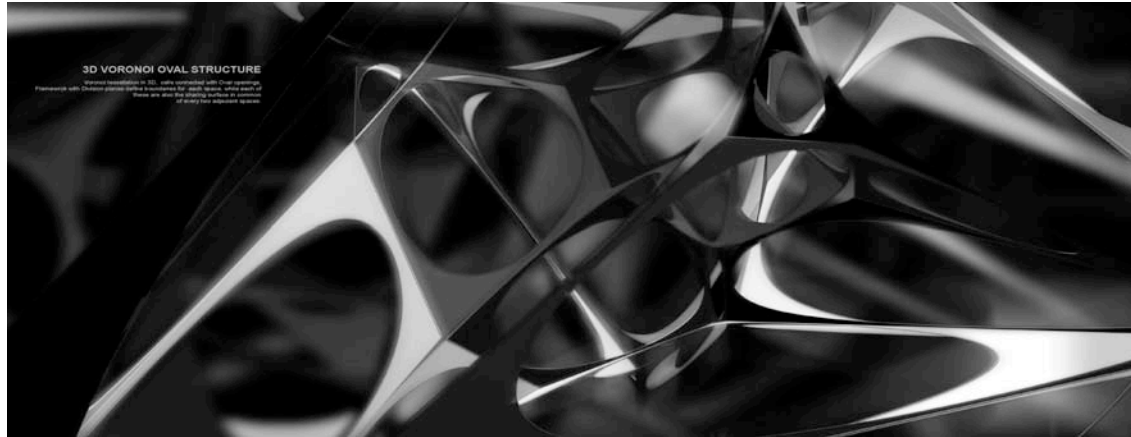
The overarching purpose for the overall unit agenda to harness technical, natural and cultural conditions caused by emerging resources and climate change and to develop an individual idea for a biome specific architectural ecology capable of not only coping with new carbon economies and energy standards but need for a sense of architectural space and aesthetic as drivers of change in evolving both the public and private domain in our rapidly changing urban sites.

Information and specificity will gradually be introduced moving from intuition to precision. Programmatically, the systems should explore notions of **cybernetic coupling**; this could be seen as an architecture enabling communicational and informational exchanges between two or more different event spaces in one structure, but also experiential exchanges between two or more micro-climates such as interior / interstitials / exterior, sea / land / forest / atmosphere etc. or materials and/or productions may be chosen as structures / volumetric insertion / membrane, partition / slabs / infrastructure or surface articulation / spatial organization / programmatic operations clusters, but the identity or performance of the these should become transferrable and blurred. The design of the systems should deploy both digital (organizational) and physical (structural/material) prototypes. Fabrication issues linked to digital design systems will be studied. Contact with researchers and suppliers will be continued, and new contact with production companies will be initiated. The material/production system will be deployed as part of a simple prototypical project situated within a biome-specific context.



Erlend Bakke-Eidsa Dip16 2008 AA Silver Medal Nomination and RIBA SOM price recipient

## Urban Autopoietics



Thomas Tong Dip16 2007 Pyroclacity

### The undertaking

An overall unit calendar will be handed out in the beginning of the autumn term and an initial draft is appended to the extended brief. The following outline and descriptions are guides. First year students have a set brief and final year students have an urban situation to address but the overall structure of Dip16 remains open for a broad range of design explorations. Each student has to outline in their research abstract how they intend to be relating to the unit agenda and organisation. Dip16 is also open to conversations with students wishing to enter the unit with an already existing research agenda.

Dip16 is still encouraging diverse research agendas and choice of sites within the unit framework and is strongly encouraging an individual extended site trip. This year Dip16 have a framework and theme for the development of the individual design briefs both for first and final year students in order to strengthen the relevance of the collective unit output.

The following outline and descriptions are guides. Detail output will be discussed on individual bases during the course of the year.

- All students must submit an individual formal design and research abstract at the beginning of the autumn term outlining a proposed thesis. This abstract will be evolved continuously throughout the year serving as a critical control and communication instrument.
- All students must submit an individual research file identifying their collaborators, affiliated research specialists and producers etc. This is also a record and a key communication of your BIOME, production, urban and contextual [SPEEC] research.
- All students must submit an individual series of drawings and models for the Computational Drawing Machine, the experimental Autopoietic Machine, and the projective Autopoietic Tectonic Project and Autopoietic Urban Legacy in relationship to the unit framework.
- All students must prepare a Progress File, a general record / portfolio of all your work from sketch to abolished design concept to unfinished drawings and models and final communication materials, with some form of structure and organization to be agreed prior final submission. This is a critical reflective and communication instrument required a great editorial effort.
- Fourth year students have a set programmatic brief of emerging urban frontier [in affiliation with forth coming AA Cluster (tbc) and Solar Decathlon Washington Competition 2013] and final year students will address a projective urban legacy related to emerging BIOME and/or resource; but the overall structure of Dip16 remains open for a broad range of design interests. Each student has to outline in their research abstract how they intend to be relating to the unit agenda and organisation. Dip16 is also open to conversations with students wishing to enter the unit with an already existing research agenda within the unit framework.
- Please find the overall unit calendar at the end of this document for your reference.

## The Urban Autopoietics Brief

### 4th year students

### Emerging Frontier [small community]

We will explore the opportunity to formulate a small community settlement as emerging frontier in relationship to your specific interests in Biome and emerging resource. We will conduct this experiment based on Buckminster Fuller's critical work *Utopia and Oblivion: The Prospects of Humanity* 1969 and the Dymaxion House 1929 and 1945 revision where effective design and organization being put into test. It is the interest of Dip16 to take on the challenge of off-site manufacturing process in-situ assembly methodology, effective and efficient in material harvesting, construction, inhabitation and transportation within the means of ecosystem (or below).

The community formation will address the energy and resource management of a small urban formation, and inarguably an zero carbon footprint with the projective lifestyles and standards of a future township or village. The critical analysis and proposition of a genre oriented customised frontier as a model for and of the future.

The project output will be tested and evolved by assessing questions of culture, economy and ecology and their cybernetics relationship between information, drawing/modelling and design decisions.

- Key output: Large scale tectonic-production prototype model, 1 to 1 details, and large scale meta drawing hyper mediating the overall project output.

### 5th year students

### Autopoietic Legacy [urban community & neighbourhood]

We will continue the Dip16's ambition for the project towards the qualification of a World Heritage Site as part of the Urban Autopoietic Legacy specific to the innate morphology of emerging resource and emerging Biome that will address immediate implications in demographics, economics and socio-ecology of an emerging populations; and project an unique contribution to local urban settings and a future for the surroundings. You will formulate your interests and design abstract and; reflect your findings in your site selection and subject matters with the intention to a future proof urban community emerged from a cybernetic co-evolution of emerging resource and implications with local culture and spatial specificity in townscape scale with both public and private domains.

You will formulate your own brief and design parameters within the framework of Dip16. It is encouraged to conduct your experimental project negotiating among individual novelty, the reality of production, tectonics, technical complexities and critically the future of humanity and well-beings.

The project output will be tested on specific biome model, energy rating and their carbon footprint management with specific future scenarios and the assessment criteria of World Heritage Site.

- Key output: Large scale tectonic-production prototype model, we will develop the specific output with each students in relationship to the unit brief.



Stephanie Peer Dip16 2011 Tango Transport

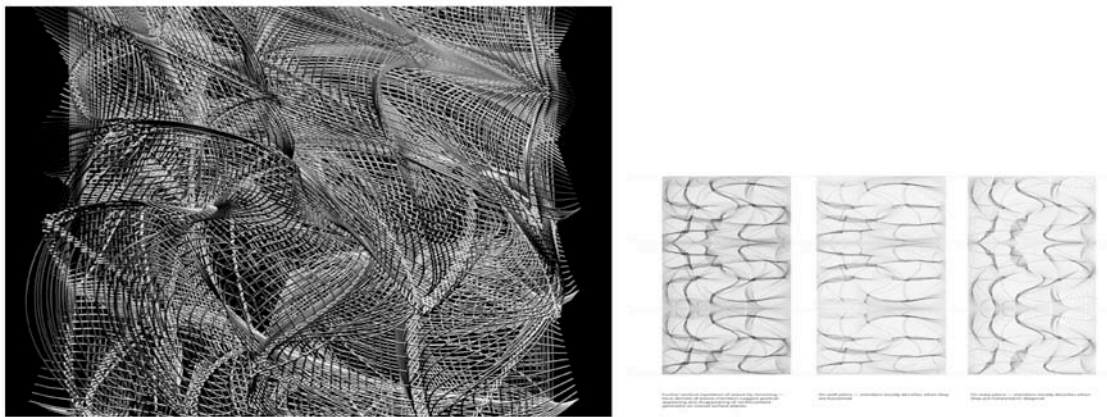
## The ORGANIZATION

### Autumn Term

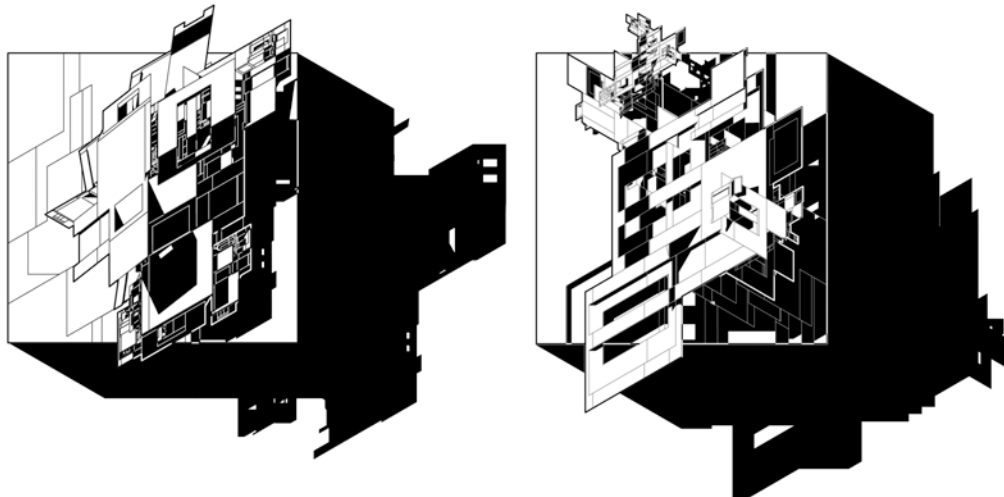
### Cybernetic Phase 1: Self-Production

In order to explore the notion of cybernetics in architecture and autopoietic systems in design, a series of computational workshops focusing on associative modeling will be introduced in the initial phase of the year. This will help all students to investigate and develop a design and drawing repertoire as the foundations for further experiments in automated design production, fabrication production, material and process compositing towards BIOME specific cybernetic ecologies in the framework of architectural production.

*Cybernetics, according to Norbert Wiener<sup>2</sup>, is a formalization of the notion of feedback, with many implications in communication, control and organization in computational process, technology, social structure, and even in nature and philosophy.*



Zoo Murayama Dip16 2007 Variable Frequency Weaving



Super manoeuvre

---

<sup>2</sup> Norbert Wiener is regarded as the originator of Cybernetics after WWII.

Reference:

Conway, F., and Siegelman, J. 2005. *Dark Hero of the Information Age: in search of Norbert Wiener, the father of cybernetics*. Basic Books, New York. p. 223–227

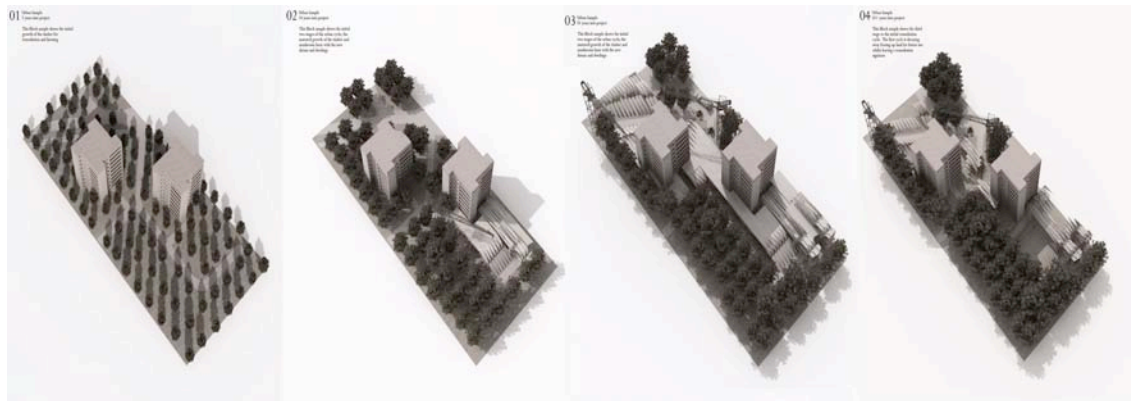
Norbert Wiener 1948, *Cybernetics: Or the Control and Communication in the Animal and the Machine*, MIT Press

## 1.1 Computational Drawing Machines – BIOME [digital construct] (2 weeks)

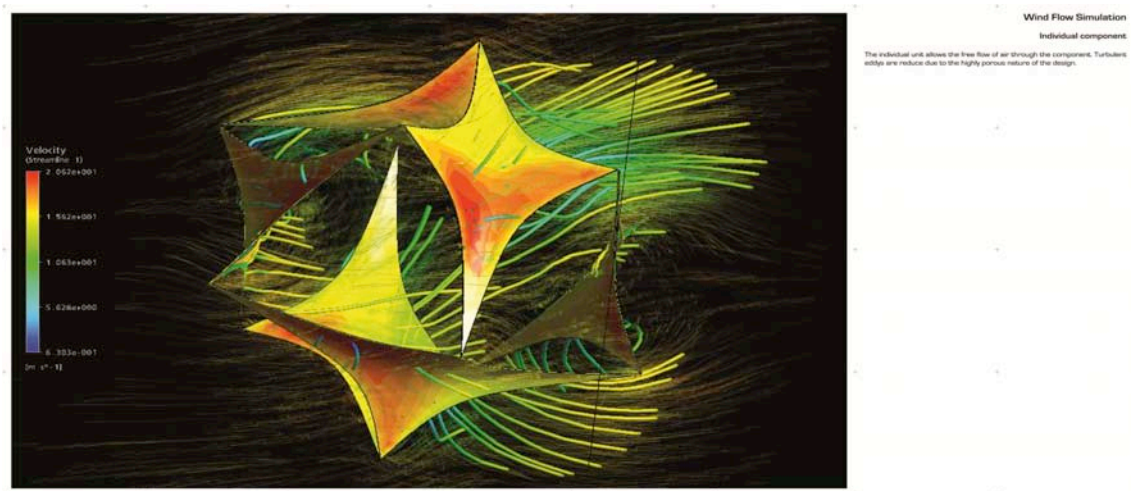
Dip 16 will explore this notion of feedback mechanism and self-production in spatial design and drawings towards a non-representational architecture. We will investigate and speculate the potentials and opportunities in associative geometry and clustering affiliating with parallel investigations in BIOME specific eco-systems. This study is aiming to formulate a catalogue of three-dimensional drawing machines initiating a new sense of spatial experience within specific ecological interests as the foundation for future Autopoietic project and Meta drawing.

This study also enables basic knowledge in the process translating 3D information into informative and performative drawings. A series of digital tools workshops will explore the transitions between 2D communications and 3D modeling applications.

- The anticipated output is a large scale mixed media drawing.



Elliot Krause Dip16 2010 Chernobyl's Ghost Ecological Phasing Strategy



Toby Burgess Dip 16 2008 Ansys simulation

## 1.2 Computational Drawing Machines – BIOME [physical construct] (3 weeks)

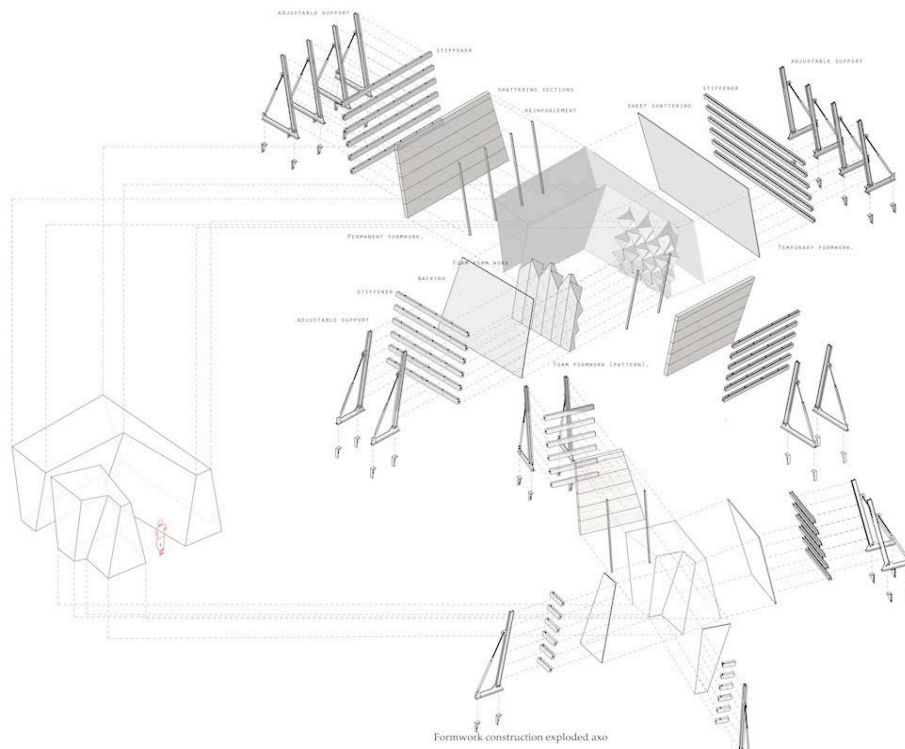
It is clear that an aesthetically potent environment should have the following attributes:

1. It must have sufficient variety to provide the potentially controllable novelty required by a man (however, it not swamp him with variety - if it did, the environment would merely be unintelligible).
2. It must contain forms that a man can interpret or learn to interpret at various levels of abstraction.
3. It must provide cues or tacitly stated instructions to guide the learning and abstractive process.

It may, in addition, respond to a man, engage him in conversation and adapt its characteristics to the prevailing mode of discourse.<sup>3</sup>

Relationship is paramount in this study. We will speculate and experiment relationships in various levels starting from between BIOME specific information and abstract associative modeling; associative modeling and two-dimensional communications; and two dimensional production instructions and three-dimensional constructs. The goal is to formulate individual architectural concept oscillating between experiments and examinations and the physical manifestation through the exploration process in physical production. It is the interest of the unit to continue the spatial exploration of *self-production* setting up initial attributes in graphical and three-dimensional spaces and experiment with their spatial effects. This study will pay specific attention to the communication or relay of information from drawings to physical constructs. The work will gradually reflect the individual interests in specific emerging urban frontier. In this exercise, the production drawings are exciting communication steps from conceptualisation [digital] to actualisation [physical] towards a proto-construct towards a manifestation of individual architectural agenda. We will initiate the essential investigation in digital fabrication techniques for the making of the physical construct.

- The anticipated outputs are a large scale proto-construct model and a series of production drawings.



Fedor Gridnev Dip 16 2011 Vineyard Subtraction

<sup>3</sup> Gordon Pask', *Introduction to 'A comment, a case history and a plan'* written prior to the Cybernetic Serendipity Exhibition (ICA 1968).

## Cybernetic Phase 2: Self-Organization

Following the development of the work in Phase 1, this brief will gradually introduce further specification to guide the work from abstraction to proposition during second phase. We will develop a series of *Autopoietic Machines* formulating the specific ecological stoichiometry between BIOME information, relational geometries, automated fabrication and production, and their communications throughout design process. We will finalise our investigation in emerging resources and conclude our emerging frontier around the globe as the framework for the second phase. We are aiming to generate a series of co-evolutional architectural artifacts and production networks.

*...how badly research is needed into the anonymous history of our period, tracing our mode of life as affected by mechanization—its impact on our dwellings, our food, our furniture. Research is needed into the links existing between industrial methods and methods used outside industry—in art, in visualization<sup>4</sup>*

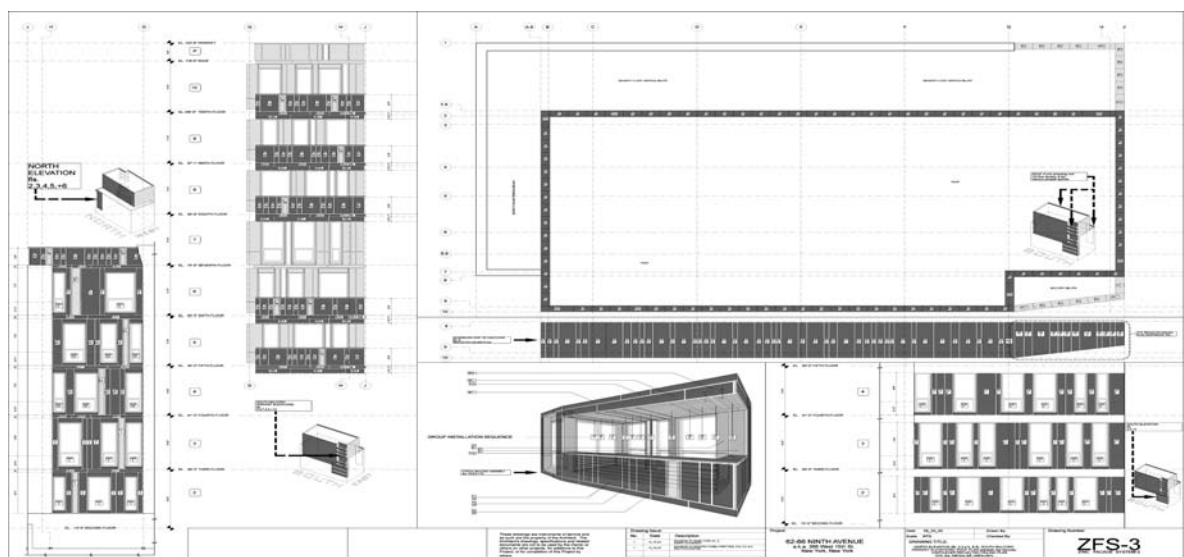
### 2.1 Autopoietic Machines V.1 – emerging frontier: emerging resources (3 weeks)

*...a belief system in itself. We remove architecture from the fluid forces of the built environment and through the institution of architecture, buttress this cathedral and guard the entrance as a sacred domain. Access is granted by belief in narratives, interpreting sacred texts, De Architectura, Architectural Principles, and so on. Meanwhile, the economic, social and physical processes of the built environment freely flow across the territories they guard, oblivious to the tenuous foundations of our holy archipelago.<sup>5</sup>*

Stepping into Phase 2, we are stepping into the journey to articulate and develop an integral relationship between architectural specificity & our innovation, empower & transform the drawing machine we have developed earlier. The aim of this brief is to establish information specificity in the work. The first *Autopoietic Machine* will be developed based on the learning from *Computational Drawing Machine*. The work should gradually organize information about the specific emerging resources for the specific emerging frontier especially in terms of eco-cultural and eco-environmental aspects; and the specific fabrication & production in eco-economical sense.

It is important to conduct critical research & analysis over the specific fabrication & production at this stage and formulate a critique enabling potential opportunities for BIOME specific architecture coupling self-production & self-organisation. This production investigation should be industry based and it is essential to develop affiliation with specific network of researchers and producers. The design of the *Autopoietic Machine* should initiate a form of feedback mechanism and communication process for a responsive cybernetic architecture.

- The anticipated outputs are an initial set of drawings suggesting materials, production and BIOME information indicating all design and quantifying criteria in performance and inhabitation.



Shop Architects

Zinc Facade System

<sup>4</sup> Sigfried Giedion 1948, *Mechanization Takes Command*, Oxford University Press, 743p Chapter 6

<sup>5</sup> Christopher Hight 2008, *Architectural Principles in the Age of Cybernetics*, Routledge Press p194

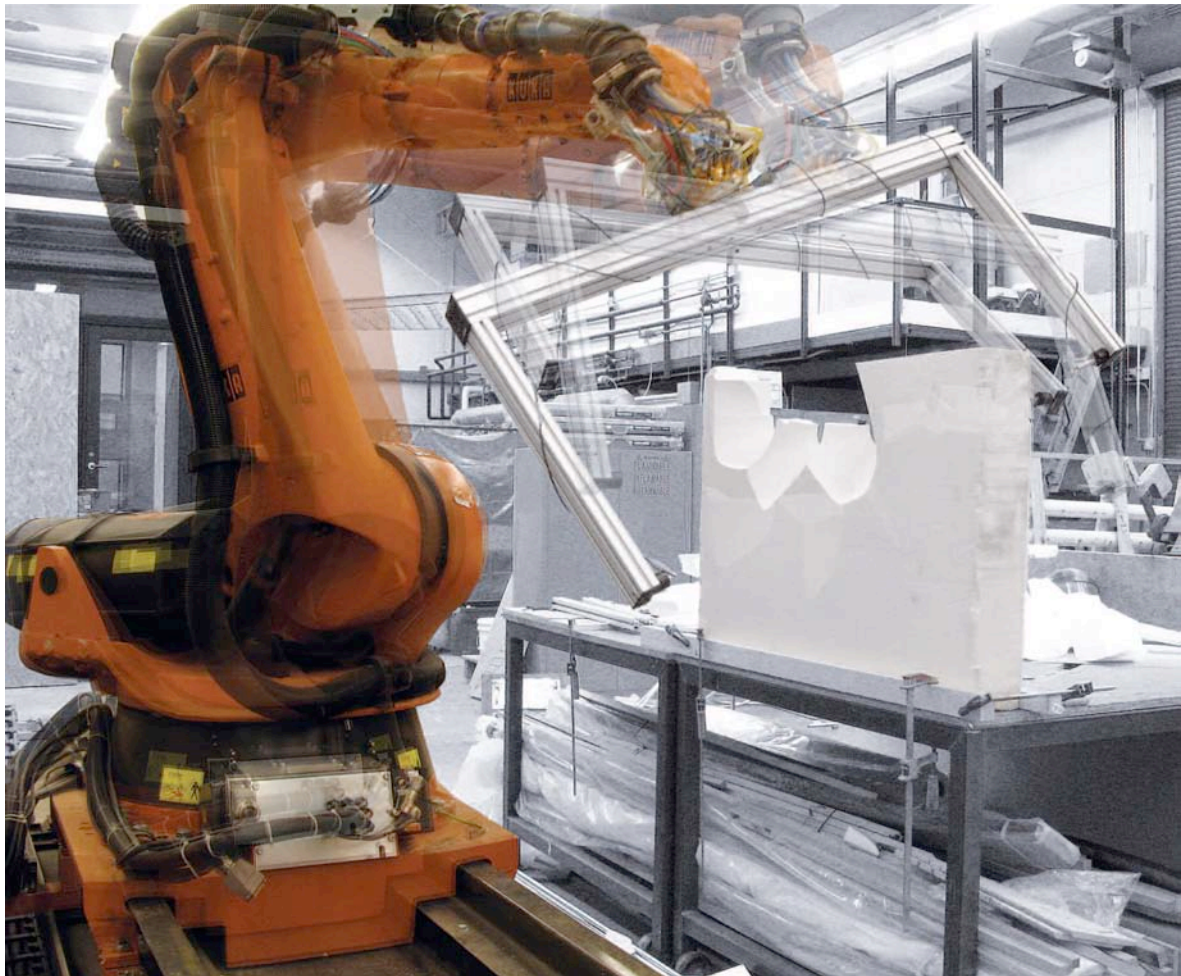
## 2.2 Autopoietic Machines V.2 – emerging resources, emerging culture (3 weeks)

...Alejandro Zaera-Polo: *nothing gets built that isn't transposable onto AutoCAD*<sup>6</sup>

Brief 2.2 attempts to develop the relationship and communication between BIOME specific fabrication and production and its impacts to inhabitation and culture of the selected emerging frontier via a series of targeted investigations and experiments. These experiments are aiming to develop a more defined co-evolutional process with ecological stoichiometry and cybernetic production within specific environmental conditions; and will formulate a transitional proposition through revising the Autopoietic Machine continuously.

The emerging culture and community is the core of this experiment. The brief continues the very ambition of the unit to construct a self-organisation of communications between information, drawings and fabrication. This will shape a potential proto frontier community from within. It is essential to filter and structure the quantifying criteria identified in previous study and enables a system of assessment.

- The anticipated outputs are a revised set of drawings concluding materials, production and BIOME information indicating all design criteria with a clear and direct a quantifying system or mechanism. It is important to incorporate input from collaborator(s) and producer(s) and it is essential produce a maquette of the production prototype including all shop drawings and information.



Super manoeuvre Robotic Fabrication Taubmann School of Architecture, University of Michigan

<sup>6</sup> Patrick Beaucé and Bernard Cache, *Towards a Non-Standard Mode of Production*, FOA 2004, Phylogenesis foa's ark p 390 – 407

## CHRISTMAS HOLIDAY

Dip16 will allow you to concentrate on your papers and the suggested readings during the holidays and expect that you can devote your full attention to the unit when you return. We also expect you to read the literature on the general theme of the unit. If you plan a visit to your own individual site, the Christmas break is a good time to do so.

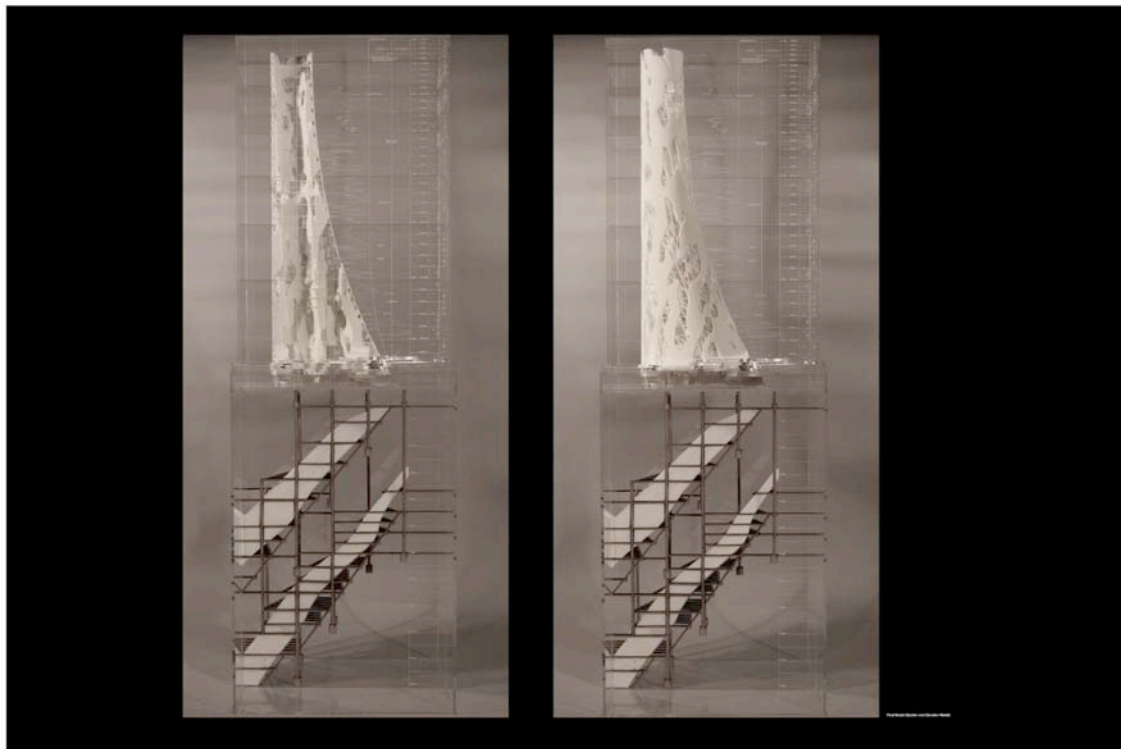


Dip16 2010 World Map – over the year's Dip16 students have travelled and conducted research all over the world

## Spring Term

### Cybernetic Phase 2: Self-Organization (continue)

#### 2.3 Autopoietic Machines V.3 – emerging culture, emerging urban formation



InSub Lee Dip16 2011. Recasting the Trace of Ice, Greenland

*The high point of Functionalism is the concept of a house as a “machine for living in”. But the bias is towards a machine that acts as a tool serving the inhabitant. This notion will, I believe, be refined into the concept of an environment with which the inhabitant cooperates and in which he can externalize his mental process.*<sup>7</sup>

In the past months, the Autopoietic Machine has been developed with producer(s) recursively. The BIOME specific environmental factor(s) has also been incorporated with the critical aspects of nature and culture of the specific locality. In this study, we will further formalize our contextual research into a series of regulatory instructions to inform our design processes, and thus the machine. This prototypical proposition will evolve into clear and final architectural taxonomies of critical communications of form, aesthetics, performances, production and organisation.

We will experiment with simulation and analytical applications and develop feedback mechanism to continuously inform and modify the machine. It is critical to finalise the scope of interests in the various subject matters in social, political, economical, environmental and cultural understandings (SPEEC). This will prepare the vision for the project and conclude the Autopoietic Machine as a proto-typology.

- The anticipated outputs are a final set of drawings concluding materials, production and BIOME information indicating all design criteria with a clear and direct a quantifying mechanism initiating a cybernetic formation with contextual information and SPEEC. A physical model of the final machine should reflect the technical interests and the direction of tectonic research. This will be supported by shop drawings and information as the preflight before manufacturing.

<sup>7</sup> Gordon Pask, 1969, *The Architectural Relevance of Cybernetics*, p496

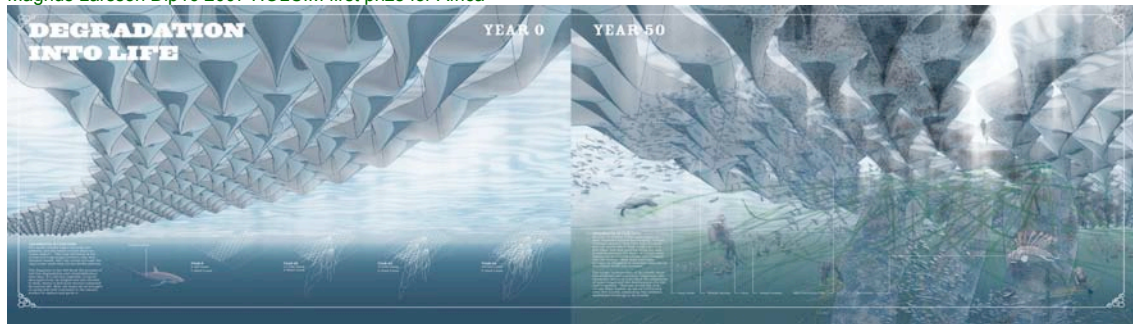
### Cybernetic Phase 3: Self-Referencing

In this final phase of the brief, we will recursively examine the work and reiterate the Autopoietic Machine instrumentally towards a BIOME typology for the emerging frontier and its very relationship with urban environment. Dip 16 will experiment with the Autopoietic Machine with critical scenarios and study its morphology with time. It is the core interest of this brief to speculate a self-referencing legacy for each of individual emerging resources in emerging frontiers.

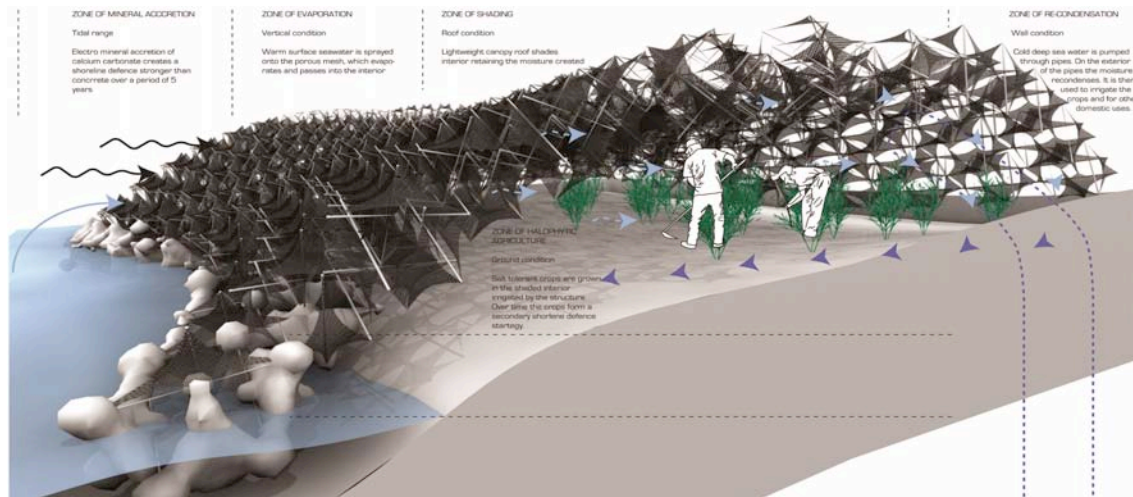
*I see computers not as an army of tedious clerks who will thwart all creativity with their demands for precise information, but as slaves of infinite power and patience.*<sup>8</sup>



Magnus Larsson Dip16 2007 HOLCIM first prize for Africa



Adam Johnston Dip16 2008 Cultivation Ocean Deserts Time based Scenario



Toby Burgess Dip16 2008 Mineral Accretion Ecology for shoreline defences at the Maldives

<sup>8</sup> John H. Frazer 1995, An Evolutionary Architecture, Architectural Association, London p18

### 3.1 Autopoietic Project [Eco-Typology] (3 weeks)

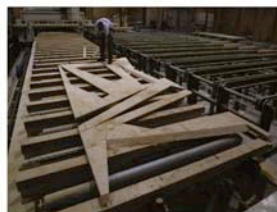
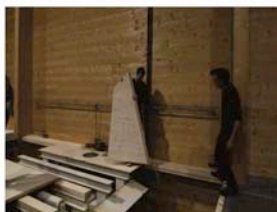
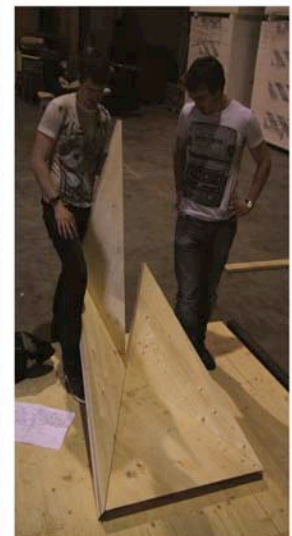
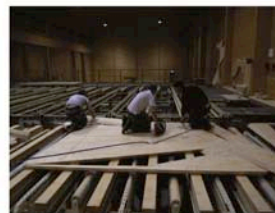
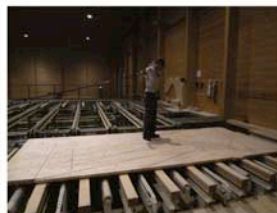
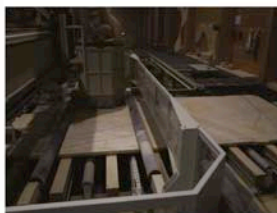
*Operations, structures and processes interlock in relations of mutual constitution. This relation of mutual constitution, at the same time, also involves system and environment. The elemental units of the system, its operations, are constituted from above, i.e. operations are always operations of a system. The operation of adding a line to a drawing (or the follow-on confirmation 'this beautifully resolves the imbalance here') is only a design decision (or a design critique) within the autopoietic system of architecture/design.*

*The specific operations, structures and processes of an advanced and specialized system of communications such as architecture form within society – most importantly language – to forge more specific, more selective and more 'technical' structure and processes.<sup>9</sup>*

The first part of this brief will rework the Autopoietic Machine in searching for an emerging BIOME prototype which engages with the critical aspect of inhabitation and aesthetic experience of the project. We will revisit and finalise the programmatic tendency of the emerging prototype, and develop an opportunity-charged and generative tectonic typology under the framework you have set out in Phase 2 regarding material effect and production logics. The development of the tectonic design will take into considerations in clustering formation and get prepared for an emerging community.

The contextual information [SPEEC] should be clearly identified and acted upon within the cybernetic relationships within the Autopoietic Machine where the principles of material, fabrication and production are to be co-evolved with drawings and models. It is essential to experiment with ideas of structural performance and physical assembly of the design throughout this level of cybernetic processes, i.e. the communication between design and production stages and their feedback mechanism within.

- The anticipated outputs are a *new* set of drawings of the tectonic proposal indicating the details of design framework and quantifying system, with integrated or independent diagrammatic information. The production of a large scale tectonic prototype generated with the Autopoietic Machine is the core of this brief. The prototype should be ideally in actual scale, definitely not smaller than 1:5. All shop drawings and production instructions are part of the communication.



14. All the panels are of a manageable size and by specifying a thickness of 60mm, they can be easily lifted from the cutting platform to the table where they can be checked and numbered.

15. Any excess CLT was cut up into smaller pieces. Those that were of a suitable size were packaged to be taken back to London for further development. Smaller pieces were simply thrown below the cutting platform into the shredder.

16. The panels were numbered and laid out. The quality of each cut was checked, and the panels themselves were checked against the original 3D model to ensure all pieces matched.

17. A selection of the panels were assembled to check the fit before the entire disassembled structure was sent off to Viserum for the Wood 2010 Exhibition.

Elliot Krause Dip16 2010. Cross laminated prototype production at KLH Scandinavia factory, Sweden

<sup>9</sup> Patrik S. Schumacher 2010, The Autopoiesis of Architecture: A New Framework for Architecture V.1, Wiley p172

### 3.2 Autopoietic Project [Eco-Clusters] (3 weeks)

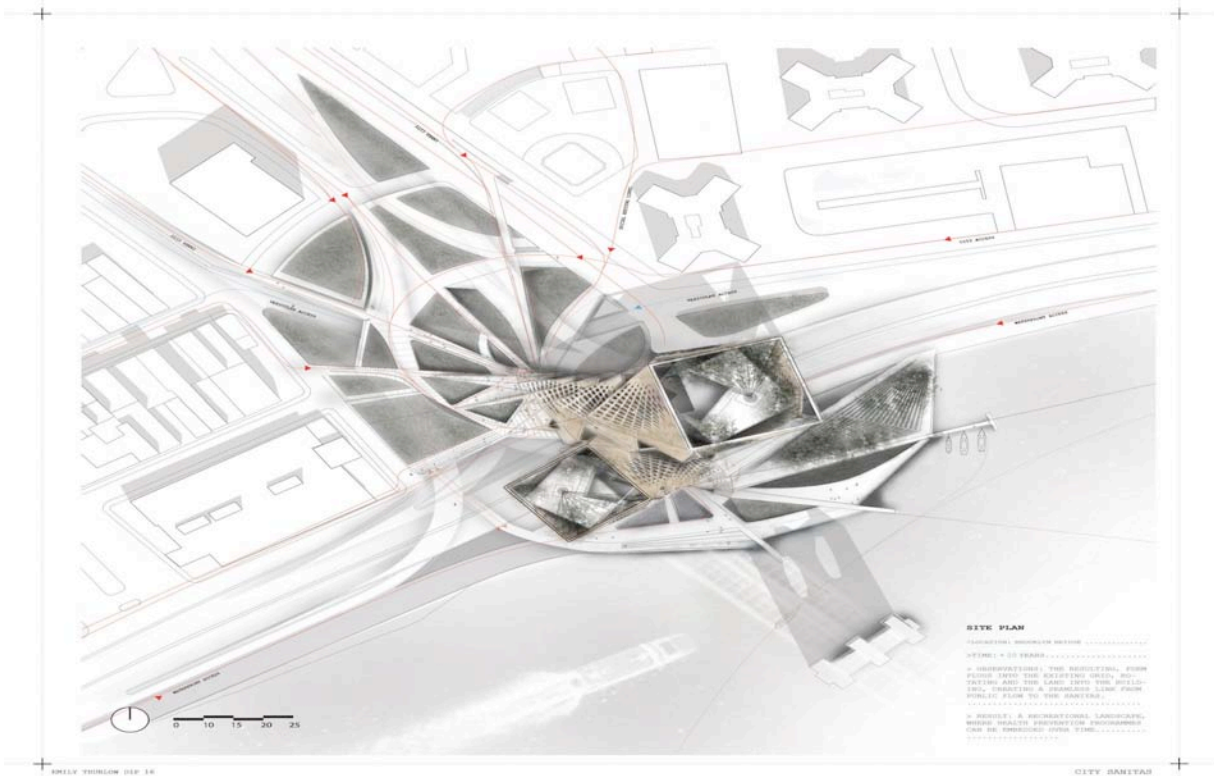
Moving from a singular formation to a clustering formation, we will further investigate the opportunity in tectonic prototype developed. Without distancing from the sensibility of experience, the effectiveness of the prototype will be tested in the context of forming a local community. The machine will now grow and negotiate all the known natural and cultural relationships within the individual research framework and the complexity in production, projecting a BIOME cluster.

The cybernetics in group dynamics, performance beyond any individual self, and the critical opportunity to articulate and control local customisation while negotiating with a larger context are the essence of this study.

*There are several key features to an open source architecture:*

1. *Designer-participants: where those who participate are also those who design the system.*
2. *A control system that one allows oneself to be part of in order to expand that structure: an example can be found in computer games that provide modules for end-users to code and create their own, sometimes startlingly different, versions of the game.*
3. *Choreographies for openness: group instructions that are interpreted and modified as necessary by participants, individually or collectively. To begin, established boundaries are required in order to foster creativity; this does not mean that they cannot be breached. They are placed as reference points, not to pre-define limits.*
4. *Re-appropriation: where existing spaces, objects or actions are both fuel and catalysts for further creativity*
5. *Capacity for sharing design problems: each person has different skills and often a problem requires a solution that can only be provided by another. A web-based example, lazyweb.org, shows how it is not important for everyone to have the technical capabilities in order to have an open source model of production.<sup>10</sup>*

- The anticipated outputs are a revised and expanded set of drawings of the tectonic proposal in a community cluster and specific context indicating the details of design framework and quantifying system, with integrated or independent diagrammatic information. The production of the large scale tectonic prototype will continue and to be finalized for preview. All shop drawings and production instructions are to be concluded and completed.



Emily Thurlow Dip16 2011. City Sanitas, New York

### EASTER HOLIDAY

<sup>10</sup> Usman Haque, 2007, The Architectural Relevance of Gordon Pask, Architectural Design Volume 77, Issue 4  
4dsocial: Interactive Design Environments

## Summer Term

### Cybernetic Phase 3: Self-Referencing (continue)

#### 3.3 Autopoietic Legacy [Urban Frontier] (3 weeks + till the end of the year)

*So that is another rule for the whole nature of architecture: it must actually create new appetites, new hungers - not solve problems; architecture is too slow to solve problems.<sup>11</sup>*

The final brief on one hand consolidates all the previous effort towards a neighborhood of clusters; on the other hand projects a visionary urban frontier that speculate the opportunities of cybernetics in architecture and their relevance in urban morphology and building / construction ecology. Dip 16 will conclude this yearlong experiment and examine the final urban effect and the possibility in provoking a new sensibility of an Autopoietic Legacy of Emerging Frontier.

We will revise and expand further the set of cluster drawings into a visionary proposal embedded with various information in various levels exploited during the course of the year. It is critical to generate a final project models beyond representation via the machine co-evolved with the tectonic prototype.

Dip16 will work with all students continuously to focus the core interest and agenda of each project after this final phase. We will discuss specific output attending any outstanding issues with the understanding that all design decision will have been finalised and most of work completed at this stage. We will emphasis the communication of the project and specific relationships between the three phases with selective works for further development. We will work with all students to customise final presentation, drawing series, model and prototype series and visualizations. Much time will be spent on how presentation to be made concise, effective, entertaining and exciting for your audience.

Full anticipation and commitment are expected as well as your full corporation in preparing and dismantling the end of year exhibition until mid July.



Dip16 2011 Projects Review Exhibition

<sup>11</sup> Hans Ulrich Obrist in conversation with Cedric Price, CITIES, SYMBOLS, LABELS, UMBRELLAS  
London, September 2000  
Cedric Price/Hans Ulrich Obrist Nov 2009, The Conversation Series No. 21, Verlag der Buchhandlung Walther  
Konig, Köln, p66

## Reading List 2011 - 2012

### Phase 1

R Buckminster Fuller July 2008, *Utopia or Oblivion The Prospects for Humanity* [Paperback], Lars Müller Publishers, 1st edition, 448p, ISBN-10: 3037781270, ISBN-13: 978-3037781272 [first published in 1964]

Peter Cook Jul 2008, *Beyond Drawings - Beyond Reality*, Drawing: the motive force of architecture [AD Primer], Wiley ISBN-10: 0470034815, ISBN-13: 978-0470034811 p177 – 202

Wolf Hilbertz, May 1970 *Toward Cyberecture*, in: *Progressive Architecture*

Kenzo Tange 1966, *Function, Structure and Symbol* in  
Udo Kultermann 1970, *Kenzo Tange 1946-1969 : architecture and urban design*, Pall Mall Press p240 - 245

Gordon Pask 1968, Introduction to 'A comment, a case history and a plan' written prior to the Cybernetic Serendipity Exhibition (ICA 1968).

Gordon Pask, 1969, *The Architectural Relevance of Cybernetics*, *Architectural Design* September 1969

Patrick Beaucé and Bernard Cache, *Towards a Non-Standard Mode of Production*  
FOA 2004, *Phylogenesis foa's ark*, Actar, p390 – 407

Team X 1968, *The Doom Manifesto, Team 10 Primer*, MIT Press

Conway, F., and Siegelman, J. 2005. *Dark Hero of the Information Age: in search of Norbert Wiener, the father of cybernetics*. Basic Books, New York. p. 223–227

Robert Henson Sep 2006, *The Rough Guide to Climate Change*, Rough Guides Reference Titles, Rough Guides Ltd; 1 edition, ISBN-10: 1843537117 ISBN-13: 978-1843537113

Michael Lind 24 July 2004, *Worldly wealth*. Prospect Magazine Issue 100

### Phase 2

R Buckminster Fuller July 2008, *Operating Manual to Spaceship Earth* [Paperback], Lars Müller Publishers, 1st edition, 152p, ISBN-10: 3037781262, ISBN-13: 978-3037781265 [first published in 1969]

Michael Meredith 2008, *Never Enough (transform, repeat ad nauseam)* in  
*From Control to Design: Parametric/Algorithmic Architecture* Actar Oct 2008 320p, p6-9

Mark Garcia Mar 2010, *The Diagrams of Architecture* [AD Reader], Wiley ISBN-10: 0470519452

Tom Verebes and Jeff Kipnis 2008, *Jeff Kipnis in Conversation with Tom Verebes*, AADRL Documents 2  
DRL X: A Design Research Compendium, Architectural Association p51-63

Patrik S. Schumacher 2011, *The Autopoiesis of Architecture: A New Framework for Architecture V.1*, Wiley London, Chapter 3 *Architecture as Autopoietic System – Operations, Structures and Processes*

John H. Frazer 2005, *The digital practice ecosystem: supporting change in the construction industry through digital practice*. *Journal of Designing in China*, 1(1), pp. 46-49.

John H. Frazer 1995, *An Evolutionary Architecture*, Architectural Association, London

Mark Wigley Summer 2001, *Network Fever*, Grey Room 04, Grey Room Inc. & MIT Press, p82-122

Benjamin Aranda, Christopher Lasch, Cecil Balmond, and Sanford Kwinter Dec 2006, *Tooling (Pamphlet Architecture)*, Princeton Architectural Press; 1st edition, ISBN-10: 1568985479, ISBN-13: 978-1568985473

Ali M. Malkawi & Godfried Augenbroe Sep 2004, *Advanced Building Simulation*, Spon Press ISBN 0-415-32122-0

### Phase 3

R Buckminster Fuller July 2008, *And it Came to Pass – Not to Stay* [Paperback], Lars Müller Publishers, 1st edition, 192p, ISBN-10: 3037781327, ISBN-13: 978-3037781326 [first published in 1976]

Robert Aish 2005, *From Intuition to Precision*, AA Files 52, AA Publications, 2005, p.62-63

Christopher Hight 2008, *Architectural Principles in the Age of Cybernetics*, Routledge Press

Cedric Price/Hans Ulrich Obrist Nov 2009, *The Conversation Series No. 21*, Verlag der Buchhandlung Walther König, Köln

Patrik S. Schumacher, *Arguing for Elegance*, Architectural Design: Elegance, vol. 77, No.1, Wiley, 2007, p.28, ISBN-10: 0470029684, ISBN-13: 978-0470029688

Reiser + Umemoto Feb 2006, *Atlas of Novel Tectonics*, Princeton Architectural Press; 1 edition  
ISBN-10: 1568985541, ISBN-13: 978-1568985541

Reinhold Martin 2003, *The Organizational Complex: Architecture, Media and Corporate Space*, The MIT Press, ISBN-10: 0262633264, ISBN-13: 978-0262633260

Anthony Burke and Therese Tierney (ed.) 2007, *Network Practices: New Strategies in Architecture and Design*, Princeton Architectural Press, ISBN-10: 1568987013, ISBN-13: 978-1568987019

M. Nadarajah, Tomoko Ann Yamamoto Apr 2007, *Urban Crisis: Culture And the Sustainability of Cities*, United Nations University Press, ISBN-10: 9280811258, ISBN-13: 978-9280811254

Christopher Alexander 1965, *A City Is Not A Tree*, Architectural Forum Vol 122, No.1 & No.2

### Christmas Fiction

Mark Lynas 2007, *Six Degrees: Our Future on a Hotter Planet*, Fourth Estate ISBN-10: 0007209045 ISBN-13: 978-0007209040

Mark Kurlansky 2003, *Salt: A World History*, Vintage; New Edition, 320p, ISBN-10: 0099281996, ISBN-13: 978-0099281993

Mark Kurlansky 1999, *Cod: A Biography of the Fish that Changed the World*, Vintage; New edition, 304p  
ISBN-10: 0099268701, ISBN-13: 978-0099268703

J.G. Ballard Feb 2006, *The Drowned World*, Harper Perennial, New Edition, ISBN-10: 0007221835

J.G. Ballard April 2001, *The Drought*, Flamingo; New Edition ISBN-10: 0007115180 ISBN-13: 978-0007115181

Attwood, Margaret Mar 2004, *Oryx & Crake*, Anchor; first edition

Henry David Thoreau 1854, *Walden*, Boston Ticknor and Fields <http://www.walden.org/Library>

### Christmas Non-fiction

Michael Hensel, Achim Menges Oct 2006, *Morpho-ecologies: Towards Heterogeneous Space in Architectural Design*, Architectural Association Publications, ISBN-10: 190290253X ISBN-13: 978-1902902531

Manuel DeLanda 2000, *A Thousand Years of Nonlinear History*, Zone Books, ISBN-10: 0942299329, ISBN-13: 978-0942299328

Sir Nicholas Stern Oct 2006, *The Economics of Climate Change: The Stern Review*, HM Treasury Cabinet Office, ISBN-13: 9780521700801

National Research Council 2003, *Understanding Climate change Feedback*, Board on Atmospheric Sciences and Climate, National Academies Press

## Further Reading

Norbert Wiener 1948, *Cybernetics: Or the Control and Communication in the Animal and the Machine*,

Sigfried Giedion 1948, *Mechanization Takes Command*, Oxford University Press, 743p

Rudolf Wittkower 1949, *Architectural Principles in the Age of Humanism*, Warburg Institute

Usman Haque, 2007, *The Architectural Relevance of Gordon Pask*, Architectural Design Volume 77, Issue 4 4dsocial: Interactive Design Environments

George L. Legendre [Guest-Editor] 2011, *Mathematics of Space*, Architectural Design Volume 81, No.4

George Liaropoulos-Legendre Feb 2007, *Mathematical Form: John Pickering and the Architecture of the Inversion Principle*, Architectural Association London ISBN-10: 1902902378

Jonathan Hughes and Simon Sadler, eds., 2000 *Non-Plan: Essays on Freedom, Participation and Change in Modern Architecture and Urbanism*, Oxford: Architectural Press

Claude Parent, Paul Virilio & Mohsen Mostafavi July 9, 2004, *The Function of the Oblique: The Architecture of Claude Parent and Paul Virilio 1963-1969*, Architectural Association 72p

Kostas Terzidis June 21, 2006, *Algorithmic Architecture*, Architectural Press ISBN: 0750667257

David Jay Bolter and Richard Grusin 2000, *Remediation: Understanding New Media*, The MIT Press, ISBN-10: 0262522799, ISBN-13: 978-0262522793

Ben van Berkel and Caroline Bos, UN Studio Sep 2006, *Design Models – Architecture, Urbanism, Infrastructure*, Rizzoli International Publications, ISBN-10: 0847828786

Manuel DeLanda 2007, *Material Elegance*, Architectural Design: Elegance, vol. 77, No.1, Wiley, , p.18, ISBN-10: 0470029684, ISBN-13: 978-0470029688

Hugh Aldersey-Williams, Peter Hall, Ted Sargent, Paola Antonelli (author, ed.) March 2008, *Design and the Elastic Mind*, NY: The Museum of Modern Art, ISBN-10: 0870707329, ISBN-13: 978-0870707322

John Fernandez 2005, *Material Architecture: Emergent Materials for Innovative Buildings and Ecological Construction*, Architectural Press; New title edition, ISBN-10: 0750664975, ISBN-13: 978-0750664974

Raymond Guidot 2006, *Industrial Design Techniques and Materials*, Editions Flammarion, ISBN-10: 2080305190, ISBN-13: 978-2080305190

Branko Kolarevic (ed.) 2005, *Architecture in the digital age: design and manufacturing*, Taylor & Francis Ltd, ISBN-10: 041538141X, ISBN-13: 978-0415381413

James M. Utterback 1996, *Mastering the Dynamics of Innovation: How Companies Can Seize Opportunities in the Face of Technological Change*, ISBN-10: 0875847404, ISBN-13: 978-0875847405

Reyner Banham 1984, *The Architecture of the Well-tempered Environment*, University of Chicago Press; 2Rev Ed edition, ISBN-10: 0226036987, ISBN-13: 978-0226036984

Helmut Pottman, et al. 2007, *Architectural Geometry*, Bentley Institute Press, ISBN-10: 193449304X, ISBN-13: 978-1934493045

Bill Mollison Oct 1997, *Introduction to Permaculture*, Tagari Publications; Reprint edition, ISBN: 0908228082

Bill Mollison, Reny Mia Slay Dec 1988, *PERMACULTURE: A Designers' Manual*, Tagari Publications; Reprint edition ISBN: 0908228015

John Ruskin 1853, *Stones of Venice Volume II "The Sea–Stories: The Nature of Gothic"*

Arthur Koestler 1967, *The Ghost in the Machine* (1990 reprint), Penguin Group, ISBN 0-14-019192-5

## Unit Survival Guide or the Small Print

### Unit context

Dip16 continues its exploratory research into the affects and emerging ecologies of production and extreme environments. Some of the largest world cities are exposed to serious natural hazards and opportunities which are increasing as temperatures are predicted to rise 1-6 degrees by 2100 [1]. New water body the size of Arctic Ocean is discovered underneath Asia known as "the Beijing Anomaly" reported by National Geographics US in 2007. Newfound oil and gas resource will increase 25,000 jobs in 2011. It has been discovered recently a water stream running through the bottom of Jerusalem in 2011. It is unprecedented with new diamond mine 7 times larger the current biggest mine in India and how this might affect the emerging urbanism, let alone the over 500K ounces gold mines in Ireland 200 meters below Monaghan. The emerging resources are contrasting the emerging risks. Greenland's collapsing ice sheets will raise sea levels by 6-7m, flooding coasts and creating 100 million refugees. The melt water's lower salinity could alter the Gulf Stream, triggering dramatic Northern European cooling [2].

New mass migration and demographics are the inevitable consequence leading to a plethora of side effects that will raise questions in our emerging frontiers and further human well beings, vulnerability and suffering. The Global Scenario Group's (GSG) essay titled *Great Transition: The Promise and Lure of the Times Ahead* in which different values regarding the environment, human well-being, and global justice might lead to three different future scenarios - Conventional Worlds, Barbarization, and Great Transitions. The apocalyptic predicament of climate change as outlined by the Intercontinental Panel for Climate Change (IPCC) and the global financial meltdown culminating with the collapse of Lehmann Brothers September 15, 2008 has fundamentally affected the role of building and architectural practice. Dip16 seeks to exploit these rapidly changing environmental, economic and cultural conditions as a springboard for an imaginative collaborative working models and innovative green design and visionary aesthetic to emerge. After all these doom and gloom scenarios WHO say GREEN has to be BORING?

We are not afraid and timid but are interested in the emergent design opportunities encapsulated in these emerging resources and cataclysmic events drawing inspiration from pioneer global thinking of Buckminster Fuller's Dymaxion projects in 1920s and 30s; Conversation Theory of cybernetics of Gordon Pask from 1960s; and Wolf Hilbertz text *Toward Cyberecture (1970)* embracing a holistic ecological understanding and an opportunist and optimistic exploitation of technology as a way to coming to terms with our changing planet.

A UN released Millennium Ecosystem Assessment in 2005 formulates an international synthesis of 24 ecosystems as summaries and guidelines for decision makers. The report emphasizes the opportunities for human well being in relationship with ecosystem services as "life support system" regarding eco-resilience and bio-capacity. Another UN resolution, A/RES/58/214, seeks reduced vulnerabilities to natural disasters and climatic change within the built environment [3] and challenges architects to propose designs as active agents within vulnerable physical, economic, social, and political contexts. These situational affects are most applicable in or around some of the largest cities where climatic hazards most certainly will cause mass starvation and ultimately migration. In a reciprocal methodology we explore architecture situated within these impending environmental conditions, speculating on how these shifting contexts impact proposals and in turn how the co-evolution of an architectural ecology might affect social, economic and political situations.

The work developed during the first three years of the unit was in immediate response to the consequences of overpopulation such as a climate change and resource depletion and the resulting vulnerability to natural disasters. With a focus on the navigation of these evolutionary parameters rather than the causes of the changes themselves, we have investigated the role of materiality and production in adapting organisations and agencies as an emerging network responding to these issues inside and outside of the discipline of architecture in the past three years. In formulating a visionary architecture and urbanism of people and affluence in the context of new form of environmental and resources consciousness and the very architectural experience of new demographic co-evolution, Dip16 continues searching for architecture of cybernetics experimenting the complexity and communications among information, performance, experience and affects.

### Design research

Dip16 is a unit primarily concerned with design based research sited within a complex context and parameter set. The research seeks innovation in computational technique, formal repertoire, tectonics or architectonics and organisations capable of coping with the contingencies of climatic change. It searches for a innovative meta-systemic thinking which is capable of performing within a multiplicity of given contexts and situations. Our design research consists of investigations into formative and evolutionary design techniques which in exploiting parametric techniques develop rule-based meta-systemic conditions between architecture and the external and internal parameter sets that inform it. The unit research prompts: Lamarckian formal, environmental, cultural and economic evolution of design, simulations of temporal 'aging' in buildings and their 'growth' within their environments, and semi-predictive calculations of future contingencies based on the Global Scenario Group's (GSG) essay titled *Great Transition: The Promise and Lure of the Times Ahead* in which different values regarding the environment, human well-being, and global justice might lead to three different future scenarios - Conventional Worlds, Barbarization, and Great Transitions. The investigation of contingencies further promotes designs capable of coping with a multiplicity of future conditions, rendering singular performances and components obsolete. In contrast to *primitives* we seek the investigation of indeterminate *composites* with the potential of co-possible organisations and behaviours. The unit's ultimate intention is to understand the built environment within the complexity of temporal projections and how the shifting cultural perspective impacts the spaces we currently design. We do this by investigating the capacity of a series of computational methods and digital design and fabrication techniques, encouraging a contextualized appropriation of tools and techniques. In simple words we base the selection of tools and techniques on the premise that one selects an appropriate tool depending on the purpose. We strive to formulate the Architectural response and proposition as series of reciprocal relationships where all variables and parameters has knock on effects on all others i.e. form cannot be separated from context, content, structure, manufacturing and production process forming the overall ecology of building. DIP16 has intended to instrumentalize the deployment of parametric design as an integral part of the overall design process as well as the project outcome. Although strategically positioned to address potent environmental issues, we strongly encourage design based research projects where the architects' role surpasses political and strategic policy and engages spatial, temporal and organisation potentials. Although dealing with negatively charged content we aim to promote the optimism energy and creativity that arise from working on design in an experimental speculative and projective architectural discourse where risk and failure engenders an opportunity for novel design solutions to emerge.

### From Adaptive architectural ecologies to Cybernetic Insurgency

Forging the experiment with the intensity of communications and feedback loops of cultural and socio-economical complexities within associative models in design and architectural production, the work of DIP16 is emerging from materials and production compositing and adaptations into the coherent but differentiated communications network of design and process specifying the co-evolution of emerging biome/resources/production and the well being of our community and individuals. Beyond the material interaction at different scales designed in composite material engineering, we are continuously looking for an articulation of the composite aspects of architectural elements; when structure infiltrates membranes and partitions, but remains legible to a certain extent, or when ventilation systems become responsive not only in regards to its technical performance, but also to its spatial effect. This formal approach is paralleled by the programmatic approach; we are looking for temporal and spatial interfaced programs, in analogy to composite materials being located in the intersection of other material families. This could mean the design of the interface between a research program and the public domain (research facility and exhibition space), a local context connected to global networks, or a temporary agency sharing space with long-term users (mitigation activities gradually changing to permanent commercial functions over time). In all cases, the shared area, as a programmatic intersection or interface between interests, should be carefully designed considering the influencing agendas for a future legacy.

We believe that a cybernetic architecture not necessarily should be based on interaction, nor the dynamic capacity in traditional sense of flexibility, nor the complexity of endless adjustment from within. Following the experiments in adaptive ecologies, architectural spaces can be made more communicative co-evolution with conscious design in sustainable spatial effects and urban qualities, an articulated form and informational flow organisation, and an cybernetic strategies of individual creativity and design machine via adaptive technological interface. Our aim is to pursue architecture of intense experiences through formal variation, and material innovation, and contextual specificity. The challenge is to develop strategies for responding to the multiple agendas of emerging resources, biome specificity, new displacement cultural complexity, material innovation and the co-evolution with industry standards.

A re-reading of historical and contemporary ecologies of production as well as biome-specific typology is therefore encouraged, with an understanding of their success or failure. Examples may come from very different contexts, inside and outside of the field of architecture, and the factors to be taken into account will be a combination of design refinement and social, cultural and economical performance. The Californian case study program meant to transform American post war industry to affordable housing, but resulted in a number of architecturally innovative but exclusive housing units in the LA area. The prefabricated housing developments around the world in the 60s have been considered being of less than acceptable quality, but are now being refurbished and turned into condominiums. Sir Norman Foster has recently re-mastered the Buckminster Fuller's Dymaxion car of 1933.

The projects developed should be deployable through the "cybernetic conversation" of technologies and biome specificity that we are investigating, but should acquire a unique identity that makes them useful for strategic communication, as prototypes in a new discourse between the different interests and phenomena we are approaching. The notion of the *cybernetics* and *composite* should also be present in the architectural organization of spaces, structures and partitions.

This suggests a differentiation of architectural elements rather than a self-similar approach in which all are variations of the same. In analogy with composite materials, different architectural elements will bring different qualities and support each other.

#### **Composite Digital Technique**

The digital revolution within architecture and the building industry can be seen to follow at least two distinct directions.

The past 15 years has seen an interest in formal experimentation, often referred to as having experiential and performative effects, or even affects. The tools of choice have ranged from special effects animation software, to NURBS modelling tools and high-end parametric systems. The primary drivers have been the capacity for conceptualizing, formally design, and physically fabricate innovative architectural solutions. In recent years this has been implemented in exceptional architectural achievements across the world, often with close collaboration between architects and structural engineers.

The other line of development has followed a path of optimization, searching for more rational methods to manage all processes that are part of architectural production. A favourite concept has been the Building Information Model (BIM), a concept that covers geometry, spatial relationships, geographic information, quantities and properties as well as logistical information of all parts of a building project. More recent developments in this trajectory is also linked to industrial development, in which systems that regulate the architectural design and production processes are formed, often featuring a version of the BIM principle, but also deploying organizational system such as Project Data Management (PDM), technical systems that manages and maintains project related data and tracks business processes.

We will spring from the past years' open exploration of parametric and computational techniques in the search for a more contextual and integrated mode of design, in which the rationality sought for in the industry, can meet formal, analytical and procedural experimentation across a range of seamlessly integrated scales managed via a building information model (BIM).

#### **Composite Formal Repertoire**

Dip16 introduces the idea of composite design systems. The integration of different platforms of design development environments is in no way new, but frequently the ambition has been to find one overarching system that can encompass everything, or neutral information formats for exchange between multitudes of systems. The notion of composite design systems suggests the conceptual integration of two or more systems in a very specific way. The exchanges between the systems may very well require to be designed specifically for the project being developed.

An example of current composite design systems is the bi-directional principle of relaxation used in structural form finding processes. An initial geometrical set-up is explored in an analytical structural package, in which step by step minute changes are performed and each iteration is tested for structural capacity. The data given is an input for the changes of the next cycle, and optimal solutions can be found. Frequently, an initial formal model as a result from the architects must be converted to the structural analytical package, and continuous exchanges between the design environment and the structural optimization environment is scarce. An analogue equivalent of structural form finding is the catenary system, the hanging flexible chain used to find structural optimum by Gaudi, Frei Otto and others. While this system is based on geometry and physics, as the form of the chain is affected by gravity, more complex systems of interacting chains need a designed configuration.

In a similar way Dip16 is looking for the design of composite systems. As part of the overall project development, students are encouraged to establish formal links between different development platforms. This may be between parametric design software and analytical tools, such as recent experiments with parametric modeller Generative Components and analytical package Ansys, but could also be other less formal connections such as between a design tool, and specific modes of manufacture. We believe that the opportunities for iterative and recursive development, through feedback between these environments, is crucial and must be considered carefully. As a model for operation in more complex situations, when the composite systems include different organizations, and many individual interests, the agendas and intentions must also be part of this exchange. The all too familiar dichotomy of form and material expression vs. cost reduction and optimization should finally be laid to rest.

#### **Composite Tectonic/Architectonic Systemic**

Dip 16 will revisit traditional building concepts such as blocks, slabs, post and beams, shells, frames, tents and fibres as well as ecologies of fabrication and production through history. In the search for composite conditions we will investigate basic building taxonomy through means of fabrication such as milling, folding, laminating, sewing, stacking, interlocking, hanging, injection moulding, compositing, extrusion, weaving, bundling etc. Spatially and programmatically this will entail various degrees of articulation from the standardized low tech component to the highly articulated formal element, avoiding self similar repetition in favour of the diversity of the composite.

#### **Composite material configuration**

Traditionally, composite materials are engineered and made from two or more constituent materials with significantly different physical or chemical properties and which remain separate. In fact, composite materials can be seen as existing in the intersection of all other material families. In these forms of composites there are normally two categories of materials: matrix and reinforcement. The matrix material surrounds and supports the reinforcement materials by maintaining their relative positions. In its application, the composite normally require to be formed to a mould during the process of production. These composite materials are typically orthotropic, in the sense that their structural performance is different depending on the direction of the applied force. In building applications the most common variant would be reinforced concrete in all its instances. Other common variants include carbon fibre reinforced plastic and wood-plastic composites. Nano materials and biomimetic materials, engineered at a nano scale, are currently being developed, and many are actually composites by definition.

Architectural component have been seen as consisting of a single material and performing a single function, the classical example being the brick. Aggregates of components may have allowed variation through different assembly, or through the agglomeration of different standard parts. The logical division of the component has in this sense been seen as the smallest part of manufacture. The act of modularization within industry involved finding new logics of compartmentalization of not only building parts, but also processes and systems.

Dip16 is looking for expansions of the concept of compositing in regards to materials, either towards a nano scale, in which material research may become an important reference in the search for new more intelligent material compounds, or towards an assembly scale, in which materials of performative capacities other than the matrix or reinforcement variants are deployed. This approach will employ not only material research, but also innovation in modes of production, and the design of processes and fabrication tools. In parallel, we are asking for a more intelligent approach to material performance, design and fabrication. This could be exemplified by phase change materials, material configuration such as the resin and polymer products developed by 3Form of Panelite, or the fabrication of re-combinable moulds for carbon-fibre casting.

A new component may consist of multiple parts, be spatial, or systemic in the sense of an electrical power systems or electronic infrastructure. Dip16 is interested in composite material configurations that establish new logics and can incorporate structural members, spatial elements or digital systems into comprehensible and customized units. If repetition of form was the crucial mode of production before, today the conditions shaping components involve capacities for formal variation, production customization, logistics and long term performance. The actual mechanisms used to produces composite components need to be planned as part of the design task of Dip16. They may operate on a micro or nano level, as in composite materials and alloys, at a scale of partitions or panels, or at a spatial scale as in volumetric elements. These mechanisms of production will also depend on organizational principles, and become part of new production ecologies that resonates with important historical programs such as the case study program in California, or the mass housing projects of the 70s. In this sense they face new conditions such as climate changes and new business models emerging as a response to this.

Research into:

- Materials (science) >> new solutions
- Production (industry) >> new processes
- Organization (non -profit organization) >> new venues

#### **Environmental context**

Overpopulation and its consequences of resource depletion, pollution, climate change, armed conflict and migration are putting the ecology of our planet under unprecedented pressure. Simultaneously the act of building however, is one of our planet's largest polluting agents. A mere return to old habits, older technologies and vernacular techniques of building and conceiving space will not suffice in the face of the adversarial affects of over population and our increased vulnerability to our natural environment. Innovation in new materials, technology, fabrication and production techniques as well as ways of conceiving space offer novel ways of reducing waste, the carbon footprint and our dependency on fossil fuels. When building industries in industrial countries are preparing

for the future, the primary concerns are based on market shares and increased costs, and environmental impact is considered primarily as a necessity directed by legislation or a way to achieve goodwill and market value. The industry is hereby responding to near-future predictions that do not take into account environmental changes nor new opportunities from material research, primarily due to risk management (in this case complete avoidance of risk taking), and choose to continue on well proven courses of business management.

Dip16 also looks at the ongoing debate in regards to the National Centre for Policy Analysis and their 278 - Living with Global Warming document. Looking at alternative or perhaps supplementary actions to the Kyoto Protocol's approach of CO<sub>2</sub> mitigation Dip16 adopts the alternative approach of adaptation. It is our interest to not only help reduce society's vulnerability to the consequences of climatic change, but to help heighten architectural qualities of living within these new environments.

Architecture is already well situated within predictive futures; designs often take just under a decade to be fully realised, once built the architecture then spans several decades, if not centuries. We are constantly designing and building for both current situations and future contingencies. Our research agenda is merely focusing this agenda in an area where the science of predictive forecasting is not only possible but currently being computed. It is quite possible that the scenarios within the unit will be the scenarios you, as a student, are actually dealing with once you establish your own practices probably within the next decade or so. It's our responsibility as architects to ensure that our architecture and building ecology adapts to these impending environmental conditions.

#### **Environmental Research framework**

Dip 16 continues setting out its research agenda in relation to the United Nations resolution, 58/214. RES/58/214's main goal is to emphasize strategies of reduced vulnerability to natural disasters and their importance to sustainable development(s) in the face of climatic change. The places most immediately vulnerable to the consequences of natural disasters are often developing countries. It is in these places where scientific and technical knowledge must work to reduce vulnerabilities to natural disasters. However, as our world continues to change developed countries will also become increasingly vulnerable. Some of the places predicted to be impacted the most are in or around large dense populations where incoming or outgoing mass migrations will occur.

1. UN, **Living With Risk: A Global Review Of Disaster Reduction Initiatives 2004**, United Nations Publication, (February 28, 2005)
2. Mark Lynas, **Six Degrees: Our Future on a Hotter Planet**, Fourth Estate (19 Mar 2007)
3. UN *Second Committee, Resolution A/RES/58/214 International Strategy for Disaster Reduction*, Fifty-eighth session, Agenda item 94(e) (27 February 2004)

AE.I advances its exploration by aligning its agenda to the activities of global networks and organizations such as UN Habitat and Architects for Humanity and approaches a building industry transforming in response to immediate economical changes through a renewed interest in industrial production in response, but follows an alternate route in which architectural innovation is a primary driver. The aim is to develop benchmark projects that can suggest long term architectural solutions with adaptable qualities that can become references to all parties above.

#### **Economic Research framework**

Within software development open source principles is not only a way to share code for idealistic reasons, it is also turning into a proven business model.<sup>12</sup> The number of international Non-governmental Organizations (NGOs), frequently associated with humanitarian issues, developmental aid and sustainable development, is estimated at 40,000 and they are increasingly recognizing the need for refined project management finding alternate routes to influence governments and corporate powers.<sup>13</sup> Microcredit enabling impoverished people in developing countries to engage in self-employment projects is increasingly gaining credibility in the mainstream finance industry, the borrowers categorized as pre-bankable.<sup>14</sup>

Material production must respond and adapt to the new conditions faced in the near future, but the organization and deployment of architecture is also active in the production of new lifestyles and cultural ecologies. The next decades will inevitably be a time of transition, forced through the economical control mechanisms devised by governments or trade organizations as well as being the result of emergent new cultures of multiplicities, introduced through mass migration, new habits in travel and new kinds of economies.

#### **Research consultancy**

Numerous old and new agencies are responding to actual effects of climate changes around the globe, often with short term solutions based on currently available resources and technologies. While these agencies are often able to respond quickly to new needs, they may not have the capacity to include innovation and long term sustainability in their projects. The work of Dip16 is aimed at supporting these agencies, and potential new ones, with an innovative approach that provides an agile and adaptive framework for operation. The purpose is here to allow new constellations of actors to emerge, and a new long term resistant and sustainable yet dynamic and responsive architecture to be deployed.

Dip16 will continue its pursuit of architecture as an intense group activity. We will be seeking consultancies from all across the field that will form an integral part of the formulation of the architectural output. The architect's role as lead designer of a design team is unique due to the fact that we operate as a generalist who must attempt to synthesise large amounts of information and attempting to have an overview of the overall process of design. This, we find, is very interesting because it allows us to be both speculative and projective without the burden of knowing anything in too much detail from the onset of a design project. It's actually this level of ignorance that we attempt to hone in on us as the opportunity for unexpected solutions and proposals as the base for innovation. Every project will need experts both from within the building industry but also from other disciplines that can cross fertilize the rather conservative discourse of building. In relation to the UN's documentation the unit has built up an extensive outline of adaptive responses to extreme phenomenon & vulnerable environments. Many of our projects from the past three years are situated somewhere within this outline. Below is a reduced excerpt from that outline which has been reworked and directed towards this year's brief and the consequential effects and adaptations within potential climatic changes.

#### **UNIT WORK/BRIEFS**

Work within the unit is conducted by briefs distributed throughout the year. In order to build a strong platform for your individual research we strongly encourage collaborations and consultancy both within and external to the unit. We expect for all work and all the sources of the research to be shared at joint tutorials, reviews and critiques. Tutorials are both individual and with the unit as a whole. Work is primarily individual, but we have periods when we encourage group work. Dip16 also believes diploma studies should be independent and self-directed and we are also willing to listen to alternative research proposals and accommodate for group projects since we believe that architecture is fundamentally a group activity. Production is expected each half week/week and you must plan unit work and your course loads progressively and carefully. The more one contributes to the unit, the more one usually is rewarded in form of feedback, tutorial time, and network connections which usually contribute to individual success. We are asking you to formalise these collaborations and consultancies in a series of research files that become an important instrument at your various stages of presentations throughout the year. Dip16 will actively strive for an active unit culture with our new dedicated diploma workspace as a base. We expect to see significant amounts of new design work on a weekly basis primarily for the main tutorial day on Wednesday when we also expect everyone to work from the unit space for the full day. You are asked to continually keep a up to date research abstract, design research file (need to be present at every tutorial day) as well as we expect you to update your blog on [www.Dip16.net](http://www.Dip16.net) on a weekly basis.

#### **UNIT CRITS & REVIEWS**

We organize three types of main feedback events usually one of each every semester. Joint tutorials are group sessions conceived as brainstorming sessions mainly with your peers but also by invited guests as we attempt to encourage internal debate within the unit. Reviews are intended to be generative feedback sessions with a mixture of former student and external guests on the panel. The critiques are formal events that you will receive written feedback from intended to pass a critical assessment on to your work in a similar manner as the way your work will be evaluated at the end of the year. Essentially there are two formulative and generative events that usually remain quite informal coupled with one formal event intended to simulate the ambience of the final tables each semester. Active participation in these events and the arising discussion is instrumental in order to gain an in depth understanding of the overall body of work of the unit. We expect everyone to be present and on-time for these events to show some respect for your peers as well as our invited critics. Should one be late, the chance of presenting (your opportunity) is forfeited.

#### **TUTORIALS & WORKSHOPS**

Tutorials are divided between the topic of your research and your design experiments; weighted emphasis is given depending on which brief we currently occupy. We are a technique based unit and will offer workshops in both analogue and digital techniques. In accompaniment these workshops will contain discussions of theory and applicability. The unit runs a series of brief related workshops. These workshops cover specific modelling techniques, composite theories workshop, Lamarckian & generative scripting examples, simulation & testing workshops, prototyping and basic portfolio development. Our main tutorial days are typically Wednesday and Friday. These days will be confirmed at the start of Term01. We typically meet for longer days on Wednesdays (generally two tutors present) and most of the workshops, group activities and reading seminars will be on Fridays (generally 1 tutor present). Wednesday tend to be more focused on individual tutorials. We have on-going extended technique based workshops on Saturday mornings. There will be a few meetings outside these days and a couple of week-long workshop sessions for which we will try and give at least two weeks' notice at the very minimum.

<sup>12</sup> [http://en.wikipedia.org/wiki/Open\\_source](http://en.wikipedia.org/wiki/Open_source)

<sup>13</sup> <http://en.wikipedia.org/wiki/Ngo>

<sup>14</sup> [http://en.wikipedia.org/wiki/Micro\\_loans](http://en.wikipedia.org/wiki/Micro_loans)

#### UNIT TRIPS

One of the continued successes of the unit is its individual field study trips. Because every student has a related yet individual natural phenomenon they will need to undertake the study of individual sites. The diversity that this gives to the unit has been highly supported by the external examiners and provides around the world discussions during reviews and other unit events. There will be an option of two field trip weeks built into the briefs when you are urged to schedule your site visits. Suggested travel dates are typically working break between Term01 and Term02 and/or sometime in February. In addition we always have a workshop-oriented unit trip. This trip helps facilitate team building and is more technique based. We attempt to arrange the technique-based trip accordingly to the interest of any given year. We will endeavour to give an eight week notice before all unit related trips if possible in order to give sufficient time for visa applications etc.

#### READINGS

Specific readings are typically written into each brief. We will usually discuss the readings briefly on Fridays; however we will assume in our general unit discussions that everyone is familiar with the readings. The readings are there in order to augment your understanding of a subject matter that you are currently processing. This knowledge is not a prerequisite understanding by any means to do the design work at hand, and nor is it meant to serve as a justification of your work. The readings however are an excellent resource for you to expand your knowledge of the subject area and for you to find new inspiration for your design work. Many of the readings are on reserve on the library for your reference. We strongly suggest that you try to acquire the readings that are specifically listed in the different briefs since they will help you directly with the task at hand.

#### PORTFOLIO DELIVERABLES

We attempt to define the portfolio as a series of different interrelated bodies of work or types of information. We will not ask for everyone to keep a large scale portfolio as a record of all the graphic information but we would rather like for everyone keeping a continual individual blog as well as an edited an illustrated hardcopy that we will call a design research file in a smaller book format. For each feedback session you will be asked for

- an up to date formal research abstract
- a large scale Meta drawing
- large scale output specified in each brief
- design research file (your account of all your own design work)
- a set of research files (all your exchanges with consultants and collaborators)
- an updated blog on www.Dip16.net
- physical output specified in each brief
- short digital thesis presentation (optional)

The information requested for each feedback session will also have to be uploaded to [www.Dip16.net](http://www.Dip16.net) the unit website before each feedback event. We will conduct portfolio workshops at the beginning of the year where we will insist that all formatting is complete and that you work creatively.

#### DIGITAL WORKSHOPS

Dip16 will offer a broad range of technique based workshops that are critical to attend. We endeavour to get everyone to high competency level in a range of techniques from the very beginning of the year. All workshops this year will be directly linked your briefs. We expect that you seriously attempt to use the techniques that we are promoting in order to expand your repertoire of tools and techniques. We have a number of affiliated or former members of Dip16 teaching these workshops and we expect everyone's full participation. After the completion of each workshop we will assume that you are in control of the techniques unless you inform us of otherwise. We will offer the following digital tool training this year:

- Vector Drawing (MicroStation)
- Surface Modelling (Rhino)
- Mesh Modelling (Maya)
- Solid Modelling (SolidWorks/MicroStation)
- Associative Modelling (Grasshopper+plugins)
- Visualization (Maxwell)
- Lasercutting & STL output
- Robotic Fabrication (robotic instructions)

#### DEFINITIONS AND ABSTRACTS

##### UNIT NOTES: DEFINITIONS AND ABSTRACTS

The rise of new spatial, temporal and material organisations that can respond to a multiplicity of future contingencies opens potentially novel methodologies, techniques and design strategies. We will be discussing and running workshops related to the above categories and some of the following abstract thoughts.

##### 1. AUTOPOIESIS

(from Greek *αὐτο-* (auto-), meaning "self", and *ποίησις* (poiesis), meaning "creation, production") literally means "self-creation" and expresses a fundamental dialectic between structure mechanism and function. Autopoiesis was originally presented as a system description that was said to define and explain the nature of living systems. A canonical example of an autopoietic system is the biological cell.

##### 2. BIOMES

are climatically and geographically defined as similar climatic conditions on the Earth, such as communities of plants, animals, and soil organisms,[1] and are often referred to as ecosystems.

##### 3. COMPOSITES and CO-POSSIBLES

Composites derive a method of 'chunking' together smaller bits of components or elements into more advanced possibilities. Composite materials are engineered from two materials with different chemical or physical properties that remain intact after the composite procedure. Compositing in visual effects is the combining of visual elements from separate sources into single images, often to create the illusion that all those elements are parts of the same scene. In a normative architecture there is the material component, the detail, the wall section, the building section, all integrated to one another in order to achieve an overall architectural performance. The action of compositing requires design activities linked to systemic techniques and production, whether in the case of material engineering (such as nano-scale biomimetic principles or the matrix and reinforcement principles of reinforced concrete or carbon fibre reinforced polymers), visual effects (such as blue or green screen, background projection or matting techniques) or architecture (ranging from masonry techniques to differentiated structures and mass customized panels). The performance of the composite system operates beyond the level of the primitive within the 'chunking' of the individual elements as a result of the intelligence in its design. This suggests composite or co-possible characteristics, in which adaptive behaviour can emerge at several scale, ranging from structural performance to spatial organization. The composite/co-possible however is also semi-simultaneous. An example in the computer exists as an oscillating byte hovering between all 256 possibilities, appearing somewhat like 888 on an analogue-digital readout. Every cell in a body contains the DNA-coding necessary to become any specific type of cell. DNA-coding works not by individual switches but by chunks or composite arrangements of this code. Inherent then within a DNA strand are co-possibilities.

##### 4. CONJECTURAL ARCHITECTURAL PRACTICE

Architectural and design practice based on an temporary or momentary conclusion formed on the basis of incomplete information.

##### 5. CYBERNETICS

is the interdisciplinary study of the structure of regulatory systems. Cybernetics is closely related to information theory, control theory and systems theory, at least in its first-order form. In Architecture, Gordon Pask, a psychologist and cybernetician has developed Conversation Theory: is a cybernetic and dialectic framework that offers a scientific theory to explain how interactions lead to "construction of knowledge", or, as Pask preferred "knowing" (wishing to preserve both the dynamic/kinetic quality, and the necessity for there to be a "knower")

##### 6. ECOLOGICAL STOICHIOMETRY

considers how the balance of energy and elements affect and are affected by organisms and their interactions in ecosystems. Ecological stoichiometry has a long history in ecology with early references to the constraints of mass balance made by Liebig, Lotka, and Redfield. This research area in ecology has recently gained momentum by explicitly linking the elemental physiology of organisms to their food web interactions and ecosystem function

##### 7. ECOLOGIES OF PRODUCTION

In certain points in history the ideas, skills and entrepreneurship of individuals or groups coincide with cultural influences, industrial interests or recent research discoveries, and ecologies of a specific nature emerges. In the field of architecture, this may take the form of a characteristic practices in which design and

production are intertwined and the mode of architectural practice is evolving. Ray and Charles Eames are perhaps the clearest example, with a practice of material and media research closely linked to fabrication and industrial production delivering a wide range of ideas and products influencing the way of life for millions. The case study program was an initiative that gathered a large group of previously unknown architects (including Charles Eames) in an effort to adapt the war industry of America to produce repeatable houses of architectural significance. Buckminster Fuller's lifelong passion for technology and its performance, led to a number of discoveries and inventions within geometry, structure, production and energy management, and his inventions have influenced society on many levels. Konrad Wachsmann was a promoter of systems and networks, and he applied his ideas to prefabricated houses and aircraft hangars, as well as the spatial and process organization of architectural research.

Contemporary equivalents to these phenomena are emerging, but in the near future we believe they have to interact with the issues presented in Dip16. Today, many firms are applying new technologies into their practices, potentially achieving similar modes of design and productions as these historical references. New York based SHoP architects are merging parametric thinking, fabrication and production innovation and business entrepreneurship in a way that allows them to deliver building that explore particular innovative issues while operating within the realm of the rational. Office dA in Boston has a production ranging from furniture to urban design and infrastructure, and frequently combines innovative structural and architectural solutions with adaptations of classical building techniques. Bernard Cache of Objectile has been seminal in the definition the non standard of architectural production, both as a theoretical concept and as an instrumental mode of production within his own practice.

#### 8. ECOSYSTEM MODELS

are formed by combining known ecological relations (e.g. the relation of sunlight and water availability to photosynthetic rate, or the relation between predator and prey populations) with data gathered from field observations. These model systems are then studied in order to make predictions about the dynamics of the real system.

#### 9. FABRICATION VS PRODUCTION

Fabrication implies the creation of something new, and potentially something fictional. It is used as the act of exploring and defining new formal properties, through digital and physical manifestations. The means used are employed to achieve maximum effect in formal performance, but may not be applicable to rational serial or mass-customized production, even though these means and methods often coincide. Production relates to the issues of rational reproduction, to be implemented more or less with contemporary praxis as a constraint rather than a driver. There is no clear border between the two concepts, but rather mediation. While principles for fabrication may be a driver when designing a formal variation, a later development can rely on production principles as constraints, looking for rational means to reproduce the particular variations on a larger scale. We will continue investigating industrial techniques in collaborators with digital fabricators and producers that intend to reduce this divide when means of fabrication become the future production opportunities.

#### 10. HOLON (free from Wikipedia)

A **holon** (Greek: *ᾠλον*, *holon* neuter form of *ᾠλος*, *holos* "whole") is something that is simultaneously a whole and a part. The word was coined by Arthur Koestler in his book *The Ghost in the Machine* (1967, p. 48). Koestler was compelled by two observations in proposing the notion of the holon. The first observation was influenced by Nobel Prize winner Herbert Simon's parable of the two watchmakers, wherein Simon concludes that complex systems will evolve from simple systems much more rapidly if there are stable intermediate forms present in that evolutionary process than if they are not present. The second observation was made by Koestler himself in his analysis of hierarchies and stable intermediate forms in both living organisms and social organizations. He concluded that, although it is easy to identify sub-wholes or parts, wholes and parts in an absolute sense do not exist anywhere. Koestler proposed the word holon to describe the hybrid nature of sub-wholes and parts within in vivo systems. From this perspective, holons exist simultaneously as self-contained wholes in relation to their sub-ordinate parts, and dependent parts when considered from the inverse direction.

#### 11. HOMEOSTASIS

from Greek: ὁμοίος, *hómoios*, "similar"[1] and στάσις, *stásis*, "standing still";[2] defined by Claude Bernard and later by Walter Bradford Cannon in 1926.[3] 1929[4] and 1932[5][6]) is the property of a system, either open or closed, that regulates its internal environment and tends to maintain a stable, constant condition. Typically used to refer to a living organism, the concept came from that of milieu interieur that was created by Claude Bernard and published in 1865. Multiple dynamic equilibrium adjustment and regulation mechanisms make homeostasis possible.

#### 12. RECURSIVE PROTOTYPING AND LAMARCKIAN EVOLUTIONS

Recursion entails processes that repeat actions in a self-similar way. Within computer science it is a method of defining functions in which the function being defined is applied within its own definition. It suggests an evolutionary way of working, in which a problem can be compartmentalized and studied iteratively, without breaking an overarching line of development. The feedback involved is conceptually related to the idea of Lamarckian evolutions, that argue for an informed evolutionary feedback system, rather than just the mutational accidents of natural selection. In Lamarckian evolution there is a parental 'passing of learned traits' to their off spring. The importance is here threefold: 1. the relative speed of species evolution, 2. the importance of cultural/environmental contexts onto the immediacy of evolutionary change and 3. in relation to design, the relationship between the generative (mutational) and the parametric (Lamarckian learning). In the work of Dip16, the prototype is considered an object of continuous investigation, initiated early on in the process. It can co-exist in and shift between multiple media, and resembles a transitional device, in the sense that it instigates change and development. An important aspect is its deformability; it can operate to a certain degree, but it must also be adjustable and refinable. We are not interested the prototype in the classical sense of forerunner, role model or template, but rather in its performative capacity to promote innovation (as outlined by Michael Schrage of MIT<sup>15</sup>) and as technical and material mediator (as suggested by Foreign Office Architects<sup>16</sup>). When incorporating new production technologies, the prototype allows a direct link between the design stage and production, enabling a mode of operation that has been detached from the architectural profession for a long time. When we construct an analogue or digital prototypical model of a system and begin to stress and deform this, we build the results of that stress into the next subsequent model exercising recursive and Lamarckian processes. The model can only be stressed within the parameters of its system but the offspring of that model can further advance the particular constraints. Advancements will occur two ways: by accident and selection or by informed evolution. As we are interested in the co-evolution of environments, production ecologies and designs we are interested in developing a more systematic method of a recursive Lamarckian-type evolution.

#### 13. REMEDIATION

Remediation is a continuous exchange between different media, which affects both an older and newer one. In the representation of one media in another, an older medium might be highlighted and represented uncritically in digital form, as in the case of making collections of historical texts or images available to the public. Immediacy is a principle of remediation in which the medium in itself becomes transparent, making the viewer forget that the experience is mediated by being completely immersed. Hypermediacy on the other hand is defined as making the use of multiple media obvious, often with annotation or collages of simultaneous representations, allowing for understanding rather than experience.<sup>17</sup> The inscription technologies used to produce text can make writing and materiality come together (as in the form of printing presses and computers), but the structures that make the materiality of the texts visible and addressable by a reader can still be traced.<sup>18</sup> Comparing the presence of inscription technologies in literature to the instrumental modes of representation within architecture, it is important to note how these are operational, through the drawing, the model and projection. They imply an active, transitive condition, negotiating the gap between ideas and material, allowing the architect to transform reality by indirect means. In a way, they have always included aspects of remediation through the translations between drawing and building, although the critical approach to these tools of the trade may have been weak. While architectural notational systems were developed to allow collaboration in the building of complex projects, they also establish the design environments and protocols that allow multiple authors to participate in the design. The act of remediation in architectural design is further developed with the introduction of multiple prototypes that operate in parallel, requiring a transfer of information between different media such as digital surface modelling, parametric design models, behavioural simulation software and physical prototyping. The interfaces between these prototypes, or the different disciplines sharing a Building Information Model, may have to operate both on a level of immersion (experiencing the proposal or parts of it) and hypermediacy (to a certain extent understanding the conditions and prerequisites of a particular solution). A well-developed interface for a parametric system as part of a prototype may shift between data-driven hyper mediated elements such as spreadsheets of data and design environments where experiential effects are an important part of the parametric set-up.

#### 14. TECHNO-UTOPIANISM (free from Wikipedia)

Technological utopianism (often called techno-utopianism or technoutopianism) refers to any ideology based on the belief that advances in science and technology will eventually bring about a utopia, or at least help to fulfill one or another utopian ideal.

#### 15. URBAN AUTOPOIETICS

The theory of autopoietic systems (Maturana and Varela, 1980), and in particular reference to the process of co-determination and co-evolution between environment and organism, highlights the way in which a system can subordinate its own changes to the conservation of the invariability of structural organization, drawing a sense of identity from difference between itself and its context.<sup>19</sup>

<sup>15</sup> Schrage, Michael, *Serious Play, How the World's Best Companies Simulate to Innovate*, Harvard Business School Press, 2000, p. 7

<sup>16</sup> *Foreign Office Architects*, 2G International Architecture Review, Editorial Gustavo Gili, 2000, p. 133

<sup>17</sup> Bolter, David Jay and Grusin, Richard, *Remediation: Understanding New Media*, The MIT Press, 2000

<sup>18</sup> Hayles, N. Katherine, *Writing Machines*, MIT Press Mediawork Pamphlet Series, 2002

<sup>19</sup> S.R. Cunwell, Mark Deakin, Martin Symes 2007, *Sustainable Urban Development: The environmental assessment methods*, Taylor & Francis ISBN 0203299914, 9780203299913