



**STUDIO**  
FOUR ZERO TWO

COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

UNIVERSITY OF CINCINNATI | CAPSTONE STUDIO | HANS KOESTERS | PROFESSOR MING TANG | CLASS OF 2012

STUDIO\_ four zero two

STUDIO  
FOUR ZERO TWO

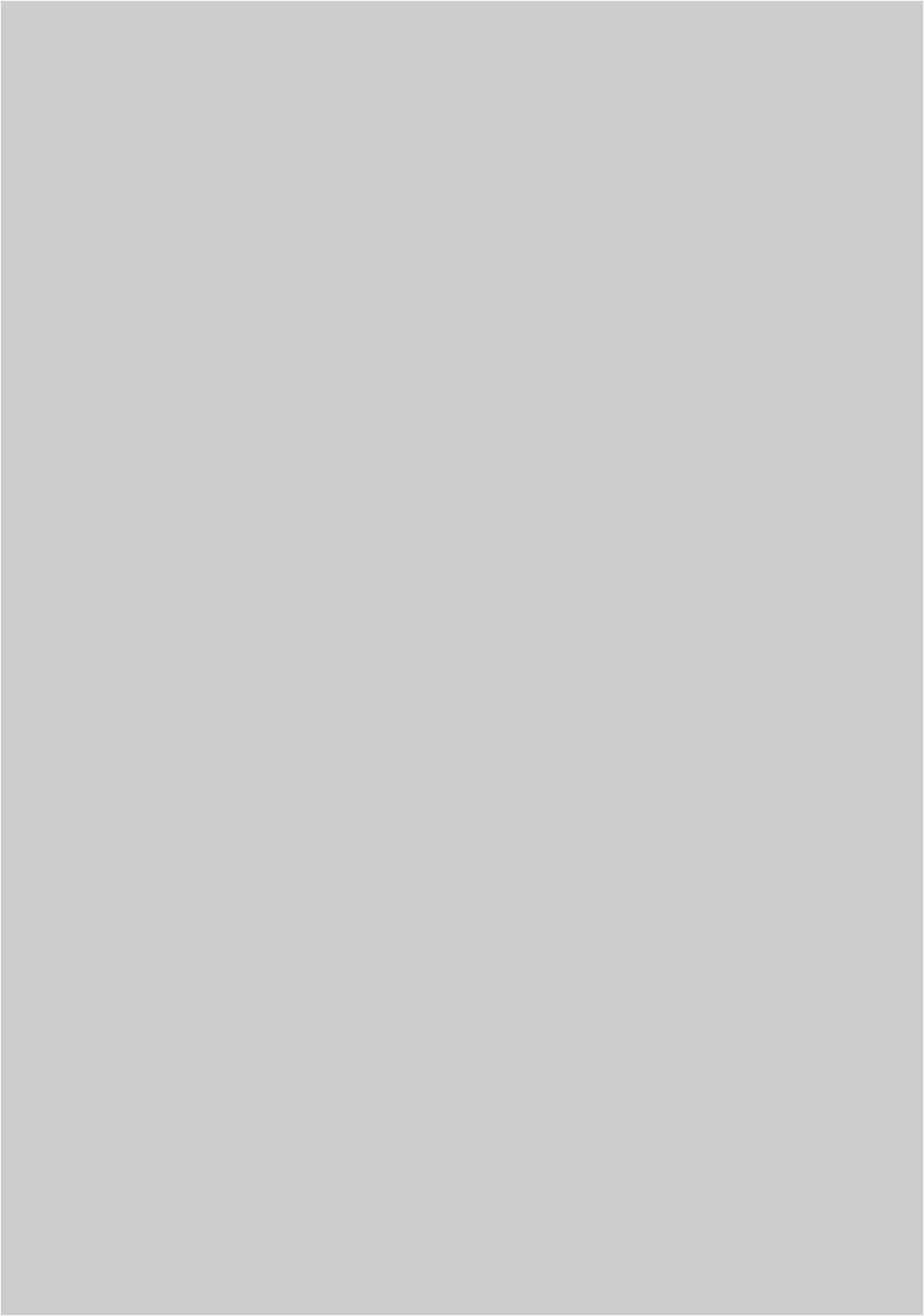
COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

STUDIO\_ parametric design

UNIVERSITY OF CINCINNATI

COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

EDITOR / HANS KOESTERS  
PROFESSOR / MING TANG  
DIRECTOR / WILLIAM WILLIAMS  
CLASS / 2012



## CONTENTS

|    |  |
|----|--|
| 7  | PREFACE                                |
| 9  | INTRODUCTION                           |
| 11 | PROLOGUE                               |
| 13 | COURSE BREIF                           |
| 14 | RESEARCH                               |
| 15 | MING TANG                              |
| 17 | TOPICS ON ARCHITECTURE & PARAMETRICISM |

### PROGRAMME AND OVERVIEW

|    |                        |
|----|------------------------|
| 14 | PROJECT                |
| 15 | SITE OVERVIEW          |
| 16 | PROGRAMME              |
| 16 | POSTULATIONS           |
| 16 | DISCOURSE TRIFURCATION |

### CONTEXTUAL AND CULTURAL

|    |                                 |
|----|---------------------------------|
| 18 | STYLES                          |
| 20 | POPULAR CULTURE & PARAMETRICISM |
| 22 | FIELD PARAMETRICS               |
| 24 | HISTORIC CONTEXT                |

### PARAMETRIC THINKING

|    |                           |
|----|---------------------------|
| 18 | PARAMETRIC HEURISTICS     |
| 20 | TOP DOWN VERSUS BOTTOM UP |
| 22 | MATERIAL EXPLORATION      |
| 24 | ANALOGUE PROTOTYPING      |
| 24 | TOPOLOGY VERSUS TYPOLOGY  |

### PARAMETRIC TOOLS

|    |                        |
|----|------------------------|
| 18 | TOOLS & TECHNIQUES     |
| 20 | EVOLUTIONARY DESIGN    |
| 22 | MORPHOGENESIS          |
| 24 | PERFORMATIVE DESIGN    |
| 24 | HYBRIDIZED METHODOLOGY |

ONE

TWO

THREE

FOUR

## PREFACE

This book includes a collection of work completed by undergraduate students of architecture within the school of Design, Architecture, Art, and Planning at the University of Cincinnati. The work is limited to a single capstone studio section taught by professor Ming Tang; it investigated the role of Parametricism within the current discourse of architecture. A panoply of responses and criticisms were generated during the quarter and were manifested in numerous writings and designs. This book serves as a record of the intensity and scope of research that is essential for the final studio. Equipped with the experience of seven design studios and nearly a year of professional employment, it was time to challenge design intent, methodology, theory, materiality, technique, and program. Although this studio provided a general program for an Art Center, it was imperative to re-examine everything considered to be standard or traditional for an artist studio or gallery.

In catechizing some of the basic conjectures of designing art galleries, studios, workshops, and museums, several conflicts arise within the attention framework; our parameters should be re-evaluated according to the tactile realities of our physical environments and localized sensory thresholds within the context of the contemporary hegemonic paradigm. The emerging associative methodologies and theories inspire more than simply a fascination with the techniques of a digital age; it is imperative that we develop a strong grasp of the complex thinking necessary to achieve truly parametric design. We are members of a generation that knows how to use technology to do things unimaginable 10 years ago, yet we have no concept of how any of it truly works. We don't understand the complexity and thought behind its development. Understandably, we have grown accustomed to learning and adapting to any new technology that emerges, without inquiry. In order to maximize the full potential of these parametric technologies, it is paramount for us to question, understand, and think through solutions parametrically so that we can meaningfully and successfully execute the design.

—Hans Koesters, Student/Editor

## INTRODUCITON

Parametric Urbanism, pioneered by Zaha Hadid & Patrik Schumacher Architects with support coming from advanced computational technology, has been the interest of architects and urban designers in recent years. This new design thinking has been used in projects ranging from large scale urban development to building façade/surface design. The studio presents a study investigating the information processing of Parametric Urbanism and describe a new procedure coined -Information Urbanism. Compare with parametric urbanism, Information Urbanism emphasis cultural cues and demographics as input parameters. Information urbanism is defined as a hybrid method which seeks logical urban forms and analyzes its' importance through architecture & urban design education. The studio extended this method by exploring, collecting, analyzing, and visualizing urban information and physically representing the information through various computational technologies.

This studio will investigate how to use the geospatial database to provide a rich resource and optimize urban forms with respect to ecological performance criteria. The demographic, traffic, economic data from GIS provides the trace of activity and event parameters of the urban life process. As Schumacher described in the parametric city, "parametricist continuation is always possible in myriad, unpredictable, and qualitatively diverse ways, but it is never random" (Schumacher, 2010). Different from traditional urban design process, the information urbanism provides us a range of abstracted urban diagram, rather than a particular design solution. In another word, the outcome of information urbanism is the consistently morphing forms driven by the changing relationship of information, which can be interpolated into physical landscape features.

The studio investigation is intended to realize the potential of quantifying demographic, social, and cultural data into a parametric equation. In the experiments, the integration of non-geometrical parameters within the form seeking and performance evaluation process resulted in a series of conceptual make-ups of city. The projects will be developed by manipulating zoning, transportation network, city block and various building types. Ultimately, Information Urbanism looks to build upon the strengths predefined in the Parametric Urbanism method and capture the benefits of Geographic Information System (GIS) by seamlessly integrating vital geo-spatial components in the equation and altering the way people explore the possible design solutions in order to generate the ideal urban forms . —Ming Tang, Professor



## PROLOGUE

At the 2009 Intensive Fields Conference, Patrik Schumacher stated that philosophy consumes architecture at moments of crisis; it only recedes once we know what we are doing. He proclaims that Parametricism is the answer to the ontological shift in primitives as the profession struggles to distance itself from the residual fragments of modernist ideologies. This crisis is evident in the architectural discourse of the previous two decades following the end of post-modernism, minimalism and deconstructivism. In the last 10-15 years, Parametricism appears to be the most salient of the design research programmes and has played a fundamental role in the collective cycles of innovation and theory that have included Swarm Intelligence, Morphogenetic Urbanism, and the multiplicities of Rhizomatic Urbanism. Although the fundamental principles in the parametricist manifesto have been gaining traction in recent years, the plausibility of this approach has been hindered by its inability to realize truly performative design in which the style could develop as the paragon for a sustainable future. The manifesto explicitly proclaims many sensible positive and negative logics, but requires a further investigation in relation to the aforementioned, emerging associative methodologies and theories. Some of the basic conjectures should be re-evaluated according to the tactile realities of our physical environments and localized sensory thresholds.

The success and proliferation of Parametricism will be tied to its integration into architecture pedagogy for young design students as a means of thinking and problem solving. The techniques and tools that generate current aesthetic of parametric design will rapidly evolve; we will become less enamored by the animation-derived methods of form finding. Perhaps the style will transition into a performative-based conceptualization that can actually embody the environmental benefits of the nature that the present geometries resemble. Regardless of the multitude of shared concepts, formal repertoires, and computational techniques that have formulated a contemporary hegemonic paradigm, the future of architecture should bridge the looming disconnect between the built environment and the human experience.

—Hans Koesters, Student/Editor

## COURSE BRIEF

The capstone coordinates the study of a neighborhood, township or region in Cincinnati (or the near Tri-State) with various topical studios, which share the same locative focus. Students study the issues of the neighborhood in the workshop, and investigate architectural responses in the studio. Projects may be at nearly any scale and engage urban design issues in conjunction with the building project; however, the project emphasizes an integrative approach to architectural production in which all of the forces that act upon and within a building are considered. The design projects are exhibited at DAAP Works as part of a thematic exhibition coordinated within the capstone workshop.

## RESEARCH

This studio will investigate how to use the geospatial database to provide a rich resource and optimize urban forms with respect to ecological performance criteria. The demographic, traffic, economic data from GIS provides the trace of activity and event parameters of the urban life process. As Schumacher described in the parametric city, "parametricist continuation is always possible in myriad, unpredictable, and qualitatively diverse ways, but it is never random" (Schumacher, 2010). Different from traditional urban design process, the information urbanism provides us a range of abstracted urban diagram, rather than a particular design solution. In another word, the outcome of information urbanism is the consistently morphing forms driven by the changing relationship of information, which can be interpolated into physical landscape features.

The studio investigation is intended to realize the potential of quantifying demographic, social, and cultural data into a parametric equation. In the experiments, the integration of non-geometrical parameters within the form seeking and performance evaluation process resulted in a series of conceptual make-ups of city. The projects will be developed by manipulating zoning, transportation network, city block and various building types. Ultimately, Information Urbanism looks to build upon the strengths predefined in the Parametric Urbanism method and capture the benefits of Geographic Information System (GIS) by seamlessly integrating vital geo-spatial components in the equation and altering the way people explore the possible design solutions in order to generate the ideal urban forms.

Using a real urban site in Cincinnati, students will learn the architecture / urban design logic and generative processes, as well as the potential of parametric thinking as a resourceful tool for achieving diversity and complexity in urban form generation. With a minimum input and knowledge of details of all the individual professions, the parametric model becomes one that allows an individual to seek novel and buildable designs. It is the seamless transition between the human brain and the computer processes that allows the design field to reach new innovations. By utilizing parametric thinking and non-linear design pipeline, an individual is realizing the marriage of the dynamic digital and static physical world through an interdisciplinary collaboration that emerges in the design field. —Ming Tang, Professor





## PROFESSOR | ARCHITECT | AUTHOR

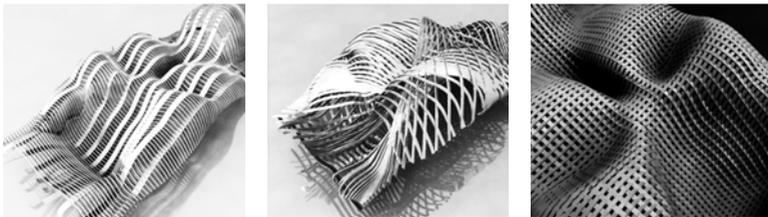
As a researcher, educator, designer, and founder of Tang & Yang Architects, he has won numerous international awards and published his projects and research in many books and papers. His projects have been exhibited in China, Mexico, Italy, Spain and United States. More detail about his teaching and research is available at <http://ming3d.com>

Before he taught at the University of Cincinnati, he led the Electronic Design program (Digital Design + Computation) at the Savannah College of Art and Design and was a professor in the Architecture Department. He has taught various studio and lecture courses since 2003. He has worked with Michigan State University's M.I.N.D Lab, University of Southern California's Institute for Creative Technologies, and China Architecture Design & Research Group.

He holds Master of Architecture Degree from Tsinghua University, Maser of Art Degree in Digital Media and Technology from Michigan State University, and Maser of Final Art degree in Interactive and Game Design from Savannah College of Art and Design.

His multi-disciplinary research includes parametric architecture & urban design, digital fabrication, BIM, performance driven design, digital computation, virtual reality, algorithm & programming, GIS, simulation, Mathematical form, interactive design and visual effects. His research has been published in various international conferences, journals, books and exhibitions. He is the author of the book, urban paleontology.

## MING TANG\_professor



# TOPICS ON ARCHITECTURE & PARAMETRICISM

**CONTEXTUAL & CULTURAL:** PARAMETRIC ANALYSIS / MODERNIST PRELUDE / POSTMODERNISM / DECONSTRUCTIVISM / EMERGE PARAMETRICISM / STYLE OR TOOL / ARCHITECTURE AS A STYLE / CRITIQUE OF PARAMETRIC STYLE / SUPERABUNDANCE / GIRL TALK / DILUTED DESIGN / PARAMETRIC RESPONSE / PARAMETRIC URBANISM / FIELD PARAMETRICS / CRAFTSMANSHIP / TANGIBLE FORCES / HISTORIC CONTEXT //

**PARAMETRIC THINKING:** PARAMETRIC VIABILITY / TOP DOWN VERSUS BOTTOM UP / METHODOLOGY HARMONY / ANALOGUE PROTOTYPING / PROTOTYPING PROCESS / SCULPTURE FOUNDRY / HOMEOMORPHIC / TYPOLOGY / TOPOLOGY / EXPERIENCE / PARAMETRIC MENTALITY / PARAMETRIC SNAG / CAUTERIZE / COMPUTATIONAL OUTPUT / AIKIDO / DATA MANAGEMENT //

**PARAMETRIC TOOLS:** GENERATIVE MODELLING / PARAMETRIC BEAUTY / ALGORITHMS AND MEANING / EMOTIONAL PARAMETERS / EVOLUTIONARY DESIGN / NATURAL SELECTION / GENERATIONS / DESIGNER INTERVENTION / PERFORMATIVE MORPHOGENESIS / COMPLEX NETWORKS / PERFORMANCE & STRUCTURE / PERFORMATIVE DESIGN / SUSTAINING DESIGN / KINETICS / AUGMENTED MEMBRANE / PERFORMATIVE SKIN & PATTERN / HYBRIDIZED PROCESS / MAGNETIC DISPLACEMENT / OBSTRUCTED VIEW / MULTIFARIOUS STRATEGY / GRASPING PARAMETRIC CONTROL / ITERATIVE MASSING

# ONE. PROGRAMME AND OVERVIEW

PROJECT SUMMARY  
SITE OVERVIEW  
PROGRAMME  
POSTULATIONS  
DISCOURSE TRIFURCATION



The **PROJECT** is a medium size Art Center that features art studios and retails. Close to the Pendleton Art District, the Center is a place offering convenient access to various galleries, retails, work space and machines for artists and engineers. The Center should also be a public place for professional makers and Pendleton neighborhood residents to collaborate. It includes shops, gallery space and a public gathering plaza to serve the entire community.

—Ming Tang

Opposite: Poster for the end-of-year DAAPWORKS display which served to introduce the studio to visitors. —Hans Koesters



# PARA-METRIC

/PARA- BESIDE; NEAR

/METRIC- QUANTIFIABLE INFORMATION

/PARAMETER- A MEASURABLE FACTOR THAT CAN HELP IN DEFINING A PARTICULAR SYSTEM

/PARAMETRICISM- A FORMULA, SET OF RULES, AND MENTALITY ADOPTED BY A DESIGNER THAT CONSIDERS THE FUNCTION, THE SURROUNDINGS, AND THE USERS.

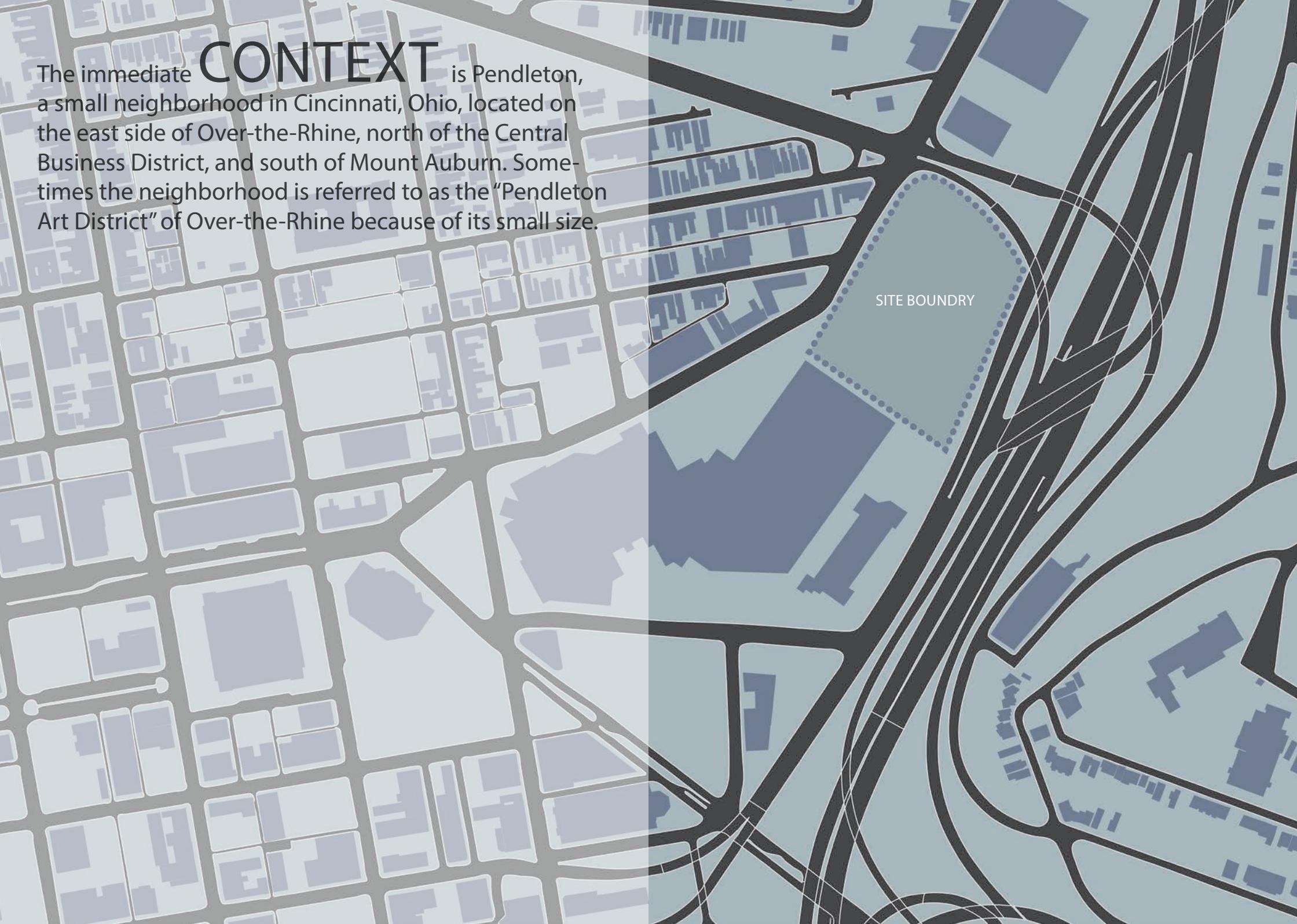
## THE STUDIO

PROMOTED PARAMETRIC MODELING AS THE PROCESS TO SEEK THE URBAN FORM GENERATED OUT OF A NETWORK OF PARAMETERS. THE STUDIO PRESENTS A MULTITUDE OF SHARED CONCEPTS, FORMAL REPERTOIRES, AND COMPUTATIONAL TECHNIQUES THAT HAVE FORMULATED WITHIN THE CONTEMPORARY HEGEMONIC PARADIGM.

B.S. ARCHITECTURE

# CONTEXT

The immediate context is Pendleton, a small neighborhood in Cincinnati, Ohio, located on the east side of Over-the-Rhine, north of the Central Business District, and south of Mount Auburn. Sometimes the neighborhood is referred to as the "Pendleton Art District" of Over-the-Rhine because of its small size.

A stylized map of a city grid. The map is composed of various shades of blue and grey. A prominent feature is a large, irregularly shaped area outlined with a dotted line, labeled "SITE BOUNDARY". This area is situated in the middle-right portion of the map. To the left of this area is a dense grid of smaller, rectangular blocks. To the right, there are larger, more irregular shapes representing buildings or blocks. The overall style is clean and modern, with a focus on geometric shapes and lines.

SITE BOUNDARY

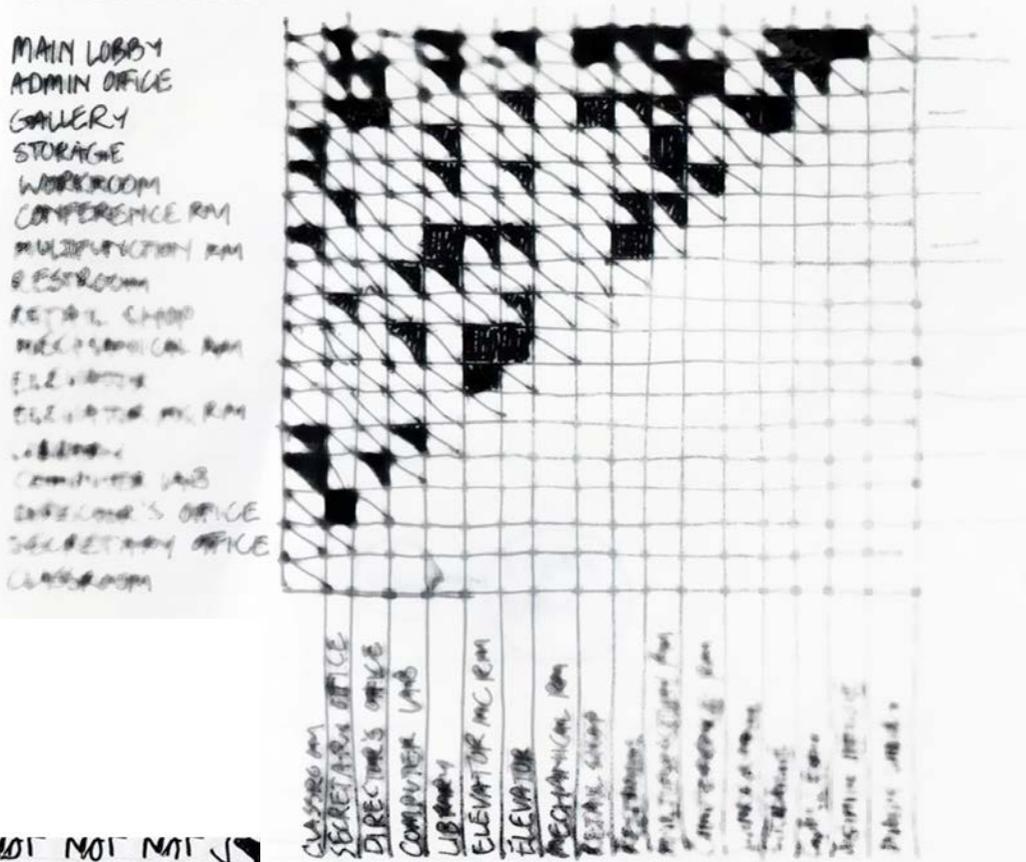


The **SITE** is approximately 660' X 250', currently a vacant surface parking lot, located at the northeast corner of CBD of Cincinnati, across the Reading Rd to the Pendleton Art District. It is adjacent to the Hoseshoe Casino, which is under construction, and Grayhound Bus Station.

# A place to PRODUCE; a place to DISPLAY.

This duologue is the raison d'être of the pendelton Art Center [PAC] in downtown Cincinnati, serving the community as a vessel for creative talent and cultural interest. At this juncture, the users' inter-proximity enhances both the individual and collective output. The topology should be influenced by both parametric rationale and parametric techniques responsive to the site context and environment. —Hans Koesters, Eric Barr

## ADJACENCY MATRIX



## PROGRAM BREAKDOWN

unit:sf

|                                     |                        |                |
|-------------------------------------|------------------------|----------------|
| <input checked="" type="checkbox"/> | Main Lobby             | 500            |
| <input checked="" type="checkbox"/> | Administration office  | 200            |
| <input checked="" type="checkbox"/> | Gallery                | 8000           |
| <input type="checkbox"/>            | Storage                | 600            |
| <input checked="" type="checkbox"/> | Workroom               | 5000           |
| <input type="checkbox"/>            | Conference Room        | 2 X 400        |
| <input checked="" type="checkbox"/> | Multi-Function Room    | 3000           |
| <input type="checkbox"/>            | Rest room.             | 2 X 200/ level |
| <input checked="" type="checkbox"/> | Retail Shop            | 4 X 500        |
| <input type="checkbox"/>            | Mechanic Room          | 500            |
| <input type="checkbox"/>            | Elevator               | 100            |
| <input type="checkbox"/>            | Elevator mechanic room | 100            |
| <input checked="" type="checkbox"/> | Library                | 400            |
| <input checked="" type="checkbox"/> | Computer Lab           | 400            |
| <input type="checkbox"/>            | Director's office      | 200            |
| <input checked="" type="checkbox"/> | Secretary office       | 200            |
| <input checked="" type="checkbox"/> | Classroom              | 5 X 400        |
| <input type="checkbox"/>            | Parking                |                |
| <input checked="" type="checkbox"/> | Public Gathering Plaza |                |

## POSTULATIONS

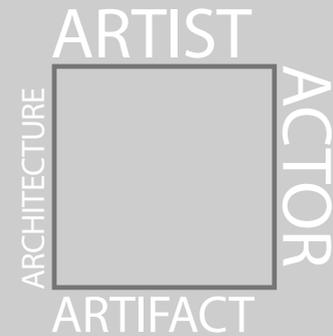
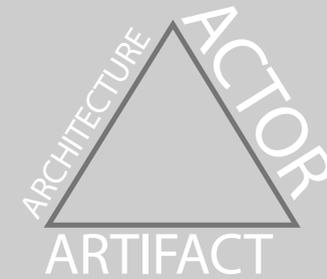
Architectural discussions on museums traditionally center on the two-way relationship between the architecture and the artifact. A conflict in the attention framework exists, but the real issue is much bigger than this. The most important question asks, how does the space condition the actor?

In spaces for contemporary art, which are generally optimized as ambulatory galleries, is it possible to design for display space that favors an independently idealized approach to the artifact? Architects ought to coordinate galleries that are easily navigable and self-orienting for the actor by using the building topology to establish spatial connections, hierarchy, and circulation.

But if we further theorize along this trajectory, we can quadrangulate these three agents with a fourth: the artist. This new facet inextricably links the fabrication process to the actor's understanding of the media. Actor and artist engage through the architecture and artifact. Enter [PAC]. - Eric Barr / Hans Koesters, Collaboration



ARCHITECTURE  
ARTIFACT



# DISCOURSE TRIFURCATION

ONE  
Site View: Parametric Analysis  
Modernist Prelude  
Postmodernism  
Deconstructivism  
Emerge Parametricism  
Style or Tool  
Architecture as a Style  
Critique of Parametric Style  
Superabundance  
Girl Talk  
Diluted Design  
Parametric Response  
Parametric Urbanism  
Field Parametrics  
Craftsmanship  
Tangible Forces  
Historic Context

TWO  
Parametric Viability  
Top-Down versus Bottom-Up  
Methodology Harmony  
Analogue Prototyping  
Prototyping Process  
Sculpture Foundry  
Homeomorphic  
Typology  
Topology  
Experience  
Parametric Mentality  
Parametric Snag  
Cauterize  
Computational Output  
Aikido  
Data Management

THREE  
Generative Modelling  
Parametric Beauty  
Algorithms and Meaning  
Emotional Parameters  
Evolutionary Design  
Natural Selection  
Generations  
Designer Intervention  
Performative Morphogenesis  
Complex Networks  
Performance & Structure  
Performative Design  
Sustaining Design  
Kinetics  
Augmented Membrane  
Performative Skin & Pattern  
Hybridized Process  
Magnetic Displacement  
Obstructed View  
Multifarious Strategy  
Grasping Parametric Control  
Iterative Massing

CONTEXTUAL AND CULTURAL

PARAMETRIC THINKING

PARAMETRIC TOOLS

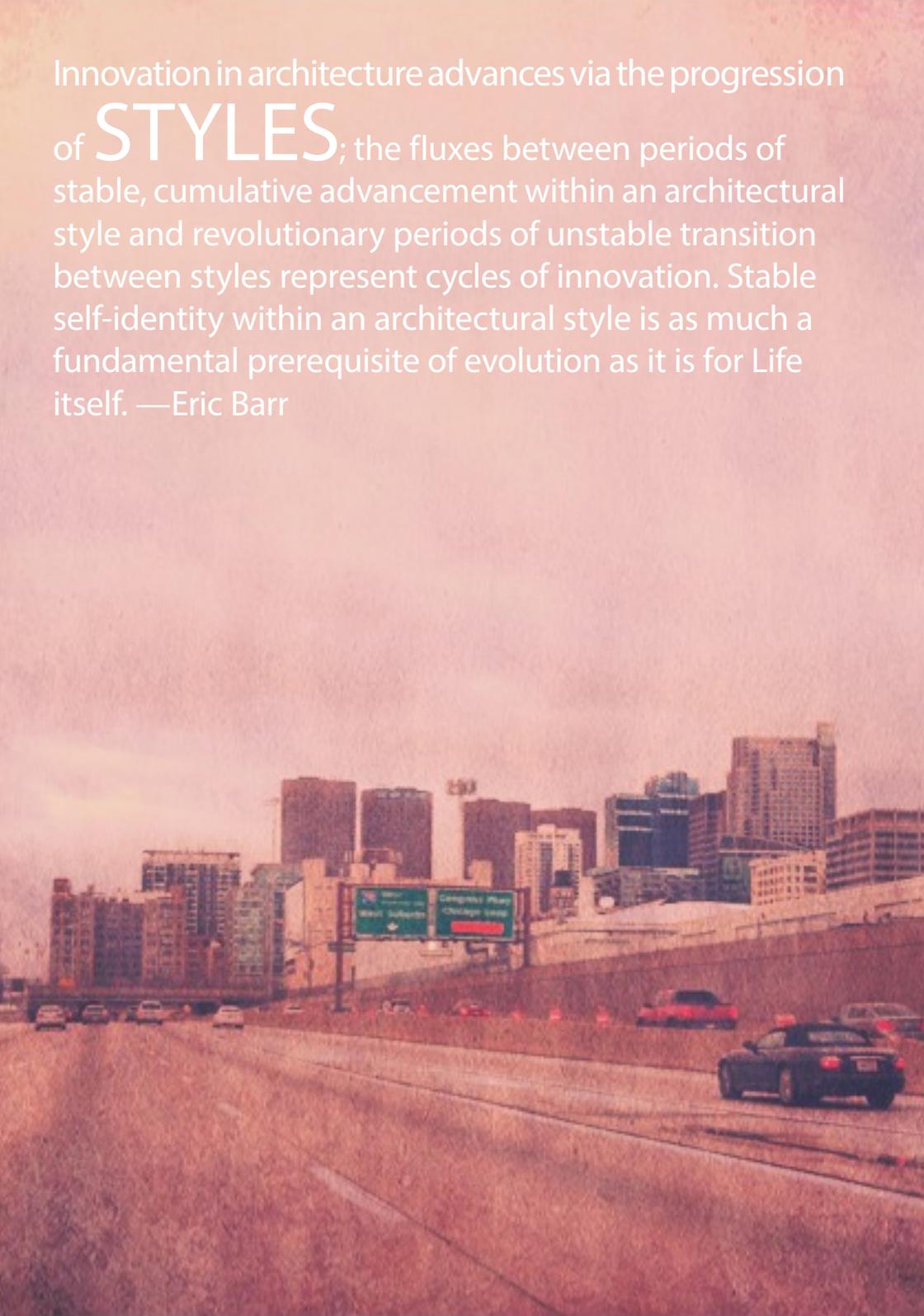


# TWO. CONTEXTUAL AND CULTURAL

STYLES  
POPULAR CULTURE / PARAMETRICISM  
FIELD PARAMETRICS  
SITE CONDITIONS  
HISTORIC CONTEXT



Innovation in architecture advances via the progression of **STYLES**; the fluxes between periods of stable, cumulative advancement within an architectural style and revolutionary periods of unstable transition between styles represent cycles of innovation. Stable self-identity within an architectural style is as much a fundamental prerequisite of evolution as it is for Life itself. —Eric Barr



#### MODERNIST PRELUDE

Since the crisis and demise of the last stable architectural style, Modernism, 35 years ago, the discipline has been led by the transitional styles of Postmodernism and Deconstructivism for nearly a decade each. Modernism, the global style genial to Fordist mass society, perpetuated the immense materialist mentality enabled by the industrialization and mechanization of all aspects of life during that era. But Modernism found its limits here. The next level of architectural progress calling for greater social diversity and individuality, more rapid innovation, to support a richer and more complex social life process, was no longer supported by the minimalistic Modernist principles of zoning, specialization, and standardized repetition.

#### ENTER POSTMODERNISM.

Picking up on these needs of the maturing Baby Boomers, Postmodernist sought to inject greater variation into the monotonously minimalist environments of the Modernist era by referring back to a vast collection of historical styles and motifs. Of course, insatiable for long, the very Baby Boomer generation who craved diversity and individuality grew impatient with this regressive architectural style that they had evolved, and the style progression evolved further.

#### ENTER DECONSTRUCTIVISM

This style stifled the Postmodernist ideas of diversity and collaged complexity and turned them into abstract principles, ousting the ultimately extraneous historical references that had driven the Postmodernist collage ideology. Advancing beyond Deconstructivism, a new stable style evolved, shifting the instated emphasis from the mere clustering of differences to the organization and articulation of a complex, variegated order.

#### EMERGE PARAMETRICISM

In contrast to the previous transitional styles of Postmodernism and Deconstructivism, Parametricism has the self-reinforcing rationality and constructive capacity to permeate mainstream world architecture as the dominant design ideology. It is both open-ended and ultra adaptive to the world's diverse cultures and climates of contemporary society because it does not impose a direct international form language. It is a framework, a set of rules, a way of thinking, amped by the computational power of technology. It is not, in and of itself, a form language. It is design dogmas, to increase adaptive variability, differentiation, correlation, stand abstract enough to become universal without any sense of closure. There is permanence in the style. In fact, these dogmas stand so universal as to mimic the cosmic model itself. Just as in Nature, there exists infinitely myriad ways to differentiate, to correlate, and adapt variegated parametric connections. Parametricism opens to floor up to an inexhaustible supply of design solutions. —Eric Barr, Student

#### STYLE OR TOOL

To create an architectural style one needs to establish a systematic ideology that contains methodology addressing all essential architectural elements—fulfillment of functionality, articulation of aesthetics, and convey of meanings, etc. Other than the external factor of immature construction technology might have impeded parametricism's fulfillment of functionality, inadequacy of both the latter two are generated domestically within the nature of parametricism itself: the loosely organized aesthetic system due to parametricism's positioning aesthetics as by-product rather than among the architectural goals, and the inefficient convey of ideas due to indirect correlation between raw data and meanings. —Liu Liu, Student

## ARCHITECTURE AS A STYLE

To delve further into the idea of architecture as a style I think it is important to understand the way that designers think. We are constantly trying to come up with something novel. A new design or technique is something exciting that stands apart. With technology we are now able to create smooth, undulating forms that seems to defy all previous notions of how building work. These new primitives at our disposal, splines, blobs, nurbs, and particles are not the language necessitated by parametricism as Schumacher would have us believe, however. They are simply the current trend of formal language that happens to coincide with this surge in parametric enthusiasm. It is a mistake to group these together. Parametricism is the translation of quantifiable data into physical geometry. The form of this geometry is completely dependent on the methods of translation which are determined by the designer. One could just as easily design a rigid, parametric box than a smooth, parametric blob. The form and the procedural way of thinking are not handcuffed to one another but rather are flexible and open to interpretation.

## CRITIQUE OF PARAMETRIC STYLE

As to the newness of the parametric "style," Corbusier is already one example of how parametric thinking was already influencing design before the present, but I think it is also possible to look back further and to expand to a wider time scale to consider parametricism. We consider it parametric to design a single building or master-planned community. What this means is that we view parametricism on a singular time frame. This is not the way nature works and I would argue that it is probably one of the least successful implementations of parametric design.

In nature there is never a process that considers several possibilities for an individual and produces the best one. Instead, the refinement happens over numerous generations of individuals through natural selection. Nature blindly tries out different combinations of variables and evaluates their performance. If we were to attempt this in architectural practice it might appear something like the design practiced by the Inuit of Northern Alaska. To quote Designer Victor Papenek who identified the Inuit as the best designers in the world, they are "forced into excellence by climate, environment, and their space concepts." Presumably, many years ago when they were first living in the harsh environment of northern Alaska they began trying to build shelter out of the sparse resources available. Over time, it became clear which shelters held up better or provided more warmth or more space, etc., and more of the Inuit began to modify their homes to align with such designs. This process continued over generations making small improvements until they arrived at the current, recognizable igloo.

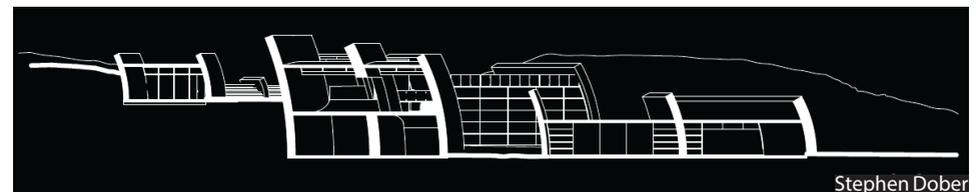
—Stephan Dober, Student



Stephen Dober



Stephen Dober



Stephen Dober



# PARAMETRICISM AND POPULAR CULTURE

#whereisthis-  
#whereisthisgo

## SUPERABUNDANCE

We now live in a world where your 15-mins of fame has been reduced down to a 30-sec YouTube video and then compressed even farther to a 150 character tweet. It is not because we have gotten lazy or fail to produce but actually quite the opposite. We have entered a time of over production. The saying “quality over quantity” has now been reversed to “as much as possible in as little time as possible”.

## GIRL TALK

Realizations of this have been already been represented in various media ranging from the television show Robot Chicken, a show comprised of 5-10sec sketch clips displayed as if the watcher was flipping through channels, to the musician Girl Talk, whom digitally remixes short verses and melodies from multiple artists into one single track. This rapid output of media is also represented in the form of social networking sites, users are encouraged to share and post and link and tweet and share more and comment. It has become overwhelming.

## DILUTED DESIGN

So where does architecture and design find its place in this over productive world we live in? In one sense, everything has become watered down, where the good, the bad, and the ugly all share the spotlight for equal amounts of time. Your average design blog (dezeen, archdaily, you name it...) will post 8 new buildings/projects a day, 5 days of the week, roughly 50 weeks a year. That comes out to 2000 new projects a year... for one single blog. Now add in your other websites you religiously visit, tack on the architectural record that you subscribe to, and don't forget word of mouth (“Have you seen the new Calatrava bridge in Dallas?”).

## PARAMETRIC RESPONSE

Back to the main point this paper was supposed to address, parametricism. What does it mean?!@\$&# In my eyes I see the movement attempting to address every aspect of everything. Schumacher even states that as part of the agenda of the parametric paradigm is an interarticulation of subsystems. He states; “The goal is to move from single system differentiation (for example, a swarm of facade components) to the scripted association of multiple subsystems – envelope, structure, internal subdivision, navigation void. The differentiation in anyone system is correlated with differentiations in other systems.” This is great! It becomes a wonderful snowball effect that improves inhabitants lives, creates smarter buildings, saves us more money and streamlines the process of design. Everything is connected and responsive to everything. Now just try and tell me this isn't what Facebook is trying to do? Take over the world and control everything? Less is more is dead. Everything is now in.

—George Faber, Student



Hans Koesters

## FIELD PARAMETRICS

considers the temporality of the contemporary urban typologies, demographics, organization, and codes through an expanded spectrum of data inputs. This thick drawing is a graphic representation of site data, coalescing geospatial information with city organization patterns and zoning hierarchy. Experience and sensory conditions inform the material and textural detailing. — Hans Koesters

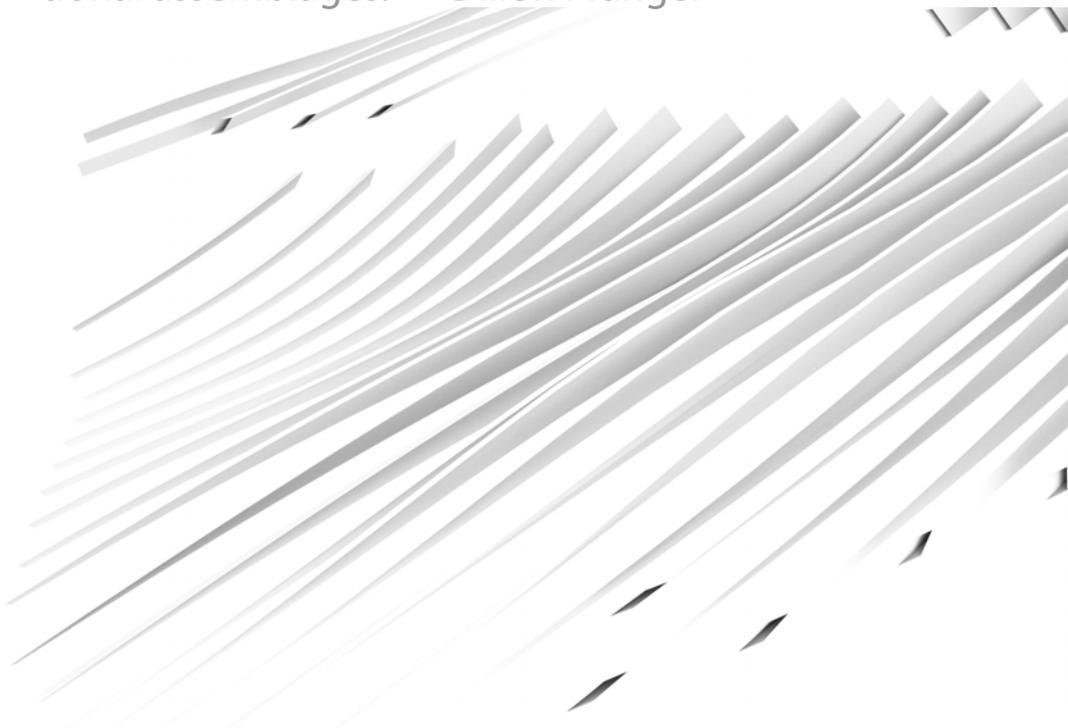
### PARAMETRIC URBANISM

Parametric Urbanism relies on the idea of relationality. This total integration of the evolving built environment requires each of the previous agendas to provide this deep relationality, as described by Schumacher. The integration of each of these principles seems to successfully achieve an overall form that is responsive to itself and its current contextual environment, but overlooks the context's past, present, and future.

### FIELD PARAMETRICS

Field parametrics resolves the issues previously stated with parametric interarticulation of subsystems, parametric figuration, and parametric responsiveness. Field parametrics looks beyond parametricism as just a digital technology that transfers photographic, cinematic, and information data into pixels and bits of information, but rather as logistics. —Dillon Pranger, Student

The Pendleton Art Center provides an opportunity to study and evaluate the existing **SITE CONDITIONS** and carefully defined rules for intensive linkages at a local scale with the urban context. Within this framework, The Art Center in Pendleton will attempt to stimulate positive urban responses in environmental, social, and urban processes of the Pendleton district through abstract systems of associations, attempting to shift from teleological programming to open diagramming. Thus allowing for a shift from the conscious manipulation of typological configurations and dogmatic conventions to the systematic management of virtually open relational assemblages. — Dillon Pranger



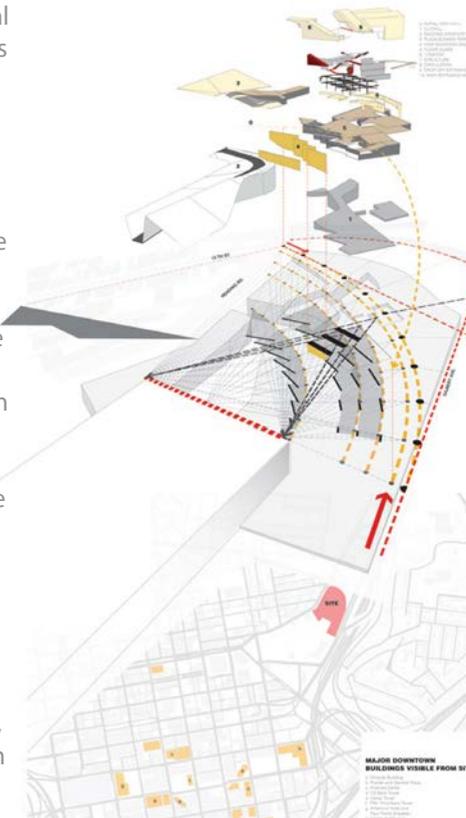
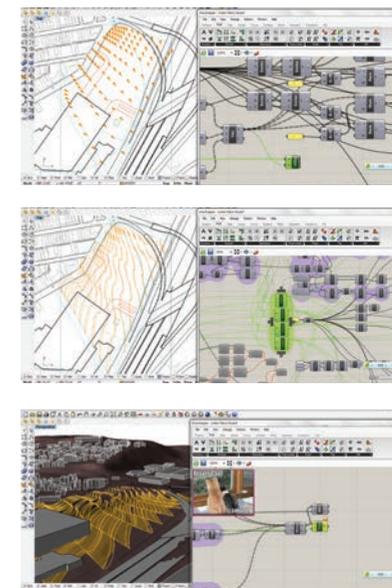
#### SITE VIEWS: PARAMETRIC ANALYSIS

The basic idea of my proposal is to utilize view control as the generator for form making. As the site has both advantage (view to downtown Cincinnati) and disadvantage (large casino garage between downtown Cincinnati and the site) of views, the general methodology will be blocking the undesired portion of view while leaving the desired portion of view clear.

My first attempt was to accomplish the view control with landscape features that are deeper in z dimension at the edge of the site and shallower close to the center of the site. Vectors are used to generate curvy forms of the landscape feature to react to the existing urban fabric.

With a series of mesh shadow study in grasshopper I was able to locate the optimal zone within which the desired view towards downtown Cincinnati will be unobstructed. To further cope with the undesired view of the parking garage, another grasshopper script was written to generate a series of view control walls that are at minimum height & width required to block the garage façade based on an initial exterior view path. This initial view path is a simple bezel curve controlled by the two major site force lines: the mirror of 13th Street and the parallel of Gilbert Ave. Again, the initial path was subject to modification as the building form being shaped by other factors such as function zoning (which could potentially be obtained through script components, for example Galapagos, based on the interrelationship between functional connection and square footage requirements). Ideally, several rounds of calculations should occur to finalize the height and width of the view control walls base on the refined view path, which will again fine tune the building form in detail until equilibrium is obtained.

—Liu Liu, Student



## HISTORIC CONTEXT

Any large structure constructed in such an intricate and historic urban environment must pay homage to the intense technical and articulate craft that buildings in the neighborhood exemplify. Structures built in Pendleton during the late 1800's and early 1900's pushed the limits of craftsmanship and architectural fabrication. Together, each apartment, factory, warehouse, and office building align to create an urban grid that is both collectively grand in scale and individually responsive (as far as each building was able) to deal with the environmental challenges it faced. Respectful of buildings that have stood the test of time and weathered the elements for nearly a century, any building constructed today in the same neighborhood must strive to produce an array of architectural responses that allow the building to deal just as well (if not better) with environmental implications as buildings in the same neighborhood have dealt with the environmental implications for the past hundred years.

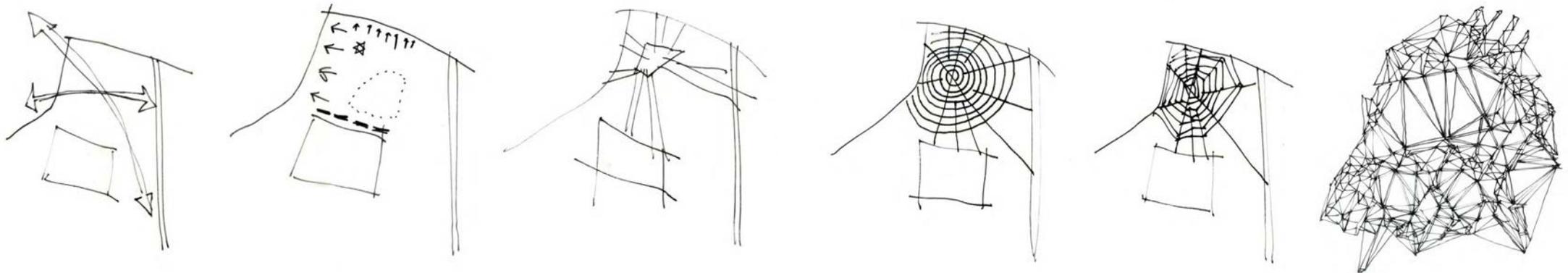
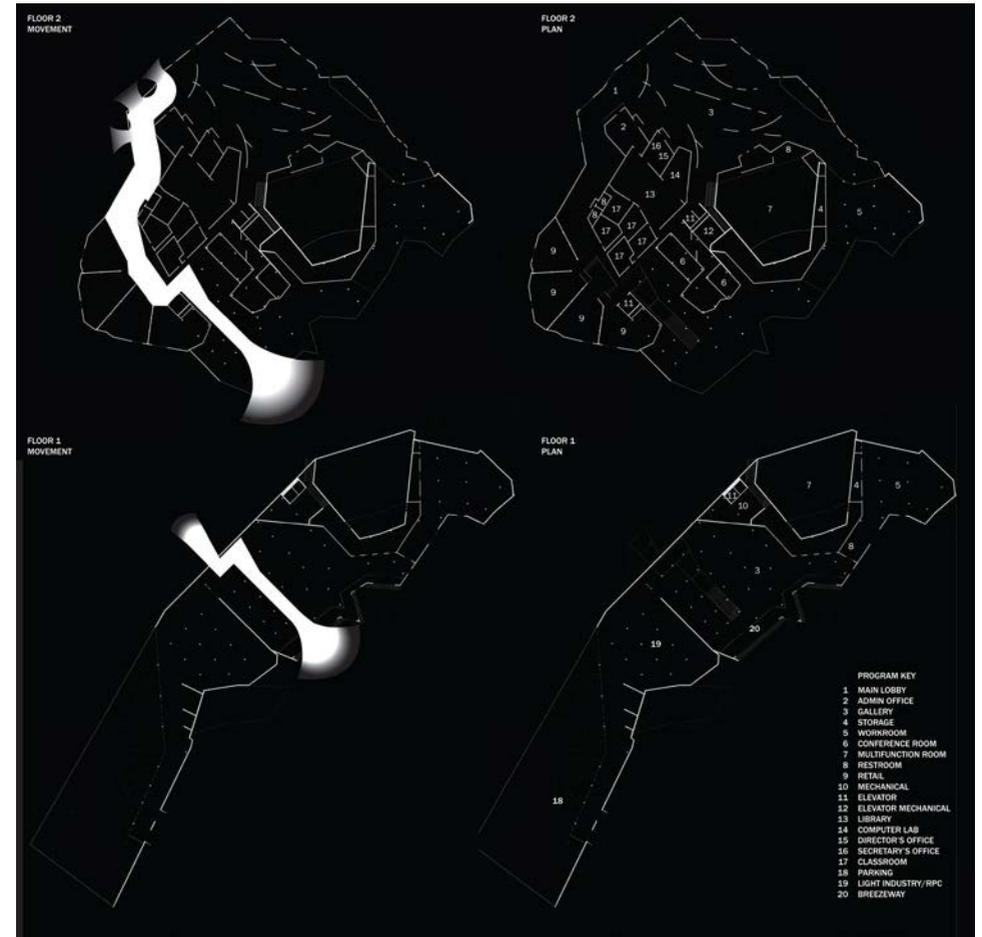
## CRAFTSMANSHIP

The design of a Craftsmanship Center in the Pendleton neighborhood of Cincinnati Ohio poses a unique opportunity. For an architectural solution to be successful in such a historic urban context a wide array of contextual and environmental factors must be taken into account.

## TANGIBLE FORCES

I have endeavored to reference immediately tangible site considerations such as meteorological forces (ie. wind, sun, and climate), and I have given further emphasis to macroscopic considerations such as lines of sight, site forces, and contextual alignment with adjacent buildings. However, my project development also makes persistent consideration of what social impact an arts center would have relative to Pendleton's rich cultural and architectural history.

The traditional inputs of site topography, meteorological consideration, lines of sight, site forces, and scale each play a major role in the form of the building; but just as important as the form of this building to tangible site considerations is the ability of an art center to respond to Pendleton's almost intangible heritage of technical aptitude and immaculate craftsmanship. —Nathaniel Hammit, Student





THREE.  
PARAMETRIC  
THINKING

PARAMETRIC HEURISTIC  
TOP DOWN VERSUS BOTTOM UP  
MATERIAL EXPLORATION  
ANALOGUE PROTOTYPING  
TOPOLOGY VERSUS TYPOLOGY

# PARAMETRIC HEURISTIC

is both economically and environmentally imperative in this day and age, and it simultaneously generates unique and self-reinforcing architectural forms.



## PARAMETRIC VIABILITY

Parametric application is both economically and environmentally imperative in this day and age, and it simultaneously generates unique and self-reinforcing architectural forms. This is responsible design. This is also only at a building level. A danger exists when such parameters are programmed at a city scale to control urban traffic flows, class zoning, districting, building heights, etc. based arbitrarily, albeit consistently, upon geospatial or environmental information.

As scale expands, design strategies gravitate toward the two-dimensional planometric, inversely diminishing the complexity of parametric relationships (thus fundamentally defying the entire point of the dogma in the first place). Rather, architecture should emerge not as just 2D plans or just 3D envelopes, but as inseparable webs of structure and form that are derived from social, economic, and environmental relationships. Is this not what analog design has been striving for all along?

The first rule taught in architecture school mandates that every design decision reinforce every other design decision. This mantra is essentially what Patrik Schumacher is formalizing as Parametricism, on a digitally advanced level. Analog or digital, though, every design approach should conform to this parameter. With the computational power of digital design programs today, this fundamental rule of design can be extrapolated to incredibly high levels of complexity to generate locally derived, sensible form solutions.  
—Eric Barr, Student

The beauty of such advancement lies in parametric thinking. Certain materials and systems can react to input on the fly, whilst other more entrenched forms will likely not change over the course of their built-lifespan. Architects must act in either case to appropriately respond to long and short-term vacillations of context. Parametric tools yield a powerful method of processing data on both fronts. A well-constructed building can provide a parametric shell fully responsive in form to any aspect of its context. This form can be based on any number of processed data input streams. However, once constructed a building's form is very unlikely to change and specific place-based material technologies come much more into play. Parametric design in this sense can be applied equally at macro and micro scales, in each case reacting as needed to any range of social, economic, formal, ecological, and material data inputs.

—Nathaniel Hammitt

## APPLICATION

The design theory of parametricism allows one the ability to manipulate all architectural aspects through a rigorous parametric process. However, the application of this parametric process can be interpreted in several different ways. The heuristics of parametricism are continually evolving with today's use of advanced computational design, which allows the possibility for parametricism to continually adapt and respond to information data. But, this approach only accounts for a bottom-up design process, which does not consider all factors. In order to fully address all societal, environmental, and urban issues in architecture, parametricism must not only be looked at from a computational design perspective, but also a parametric thinking perspective.

—Dillon Pranger, Student



## CAUTERIZE

These conclusions led me to turn away from an intense parametric response and rely rather on typical linear design progression to develop a form that worked to progress the quality of the street, pronounce the entrance, coexist with existing topography, mitigate negative stimuli, draw in passive solar, and to do so with the human experience and existence within the space as a major driver. This is not to say that these things could not have been done more efficiently with a computer script but this is the prompt which draws the divide. William Morris in the mid 19th century wrote a book titled "Textile and Wallpapers" in which he denounced modern industrial techniques as they undermined the craftsman.

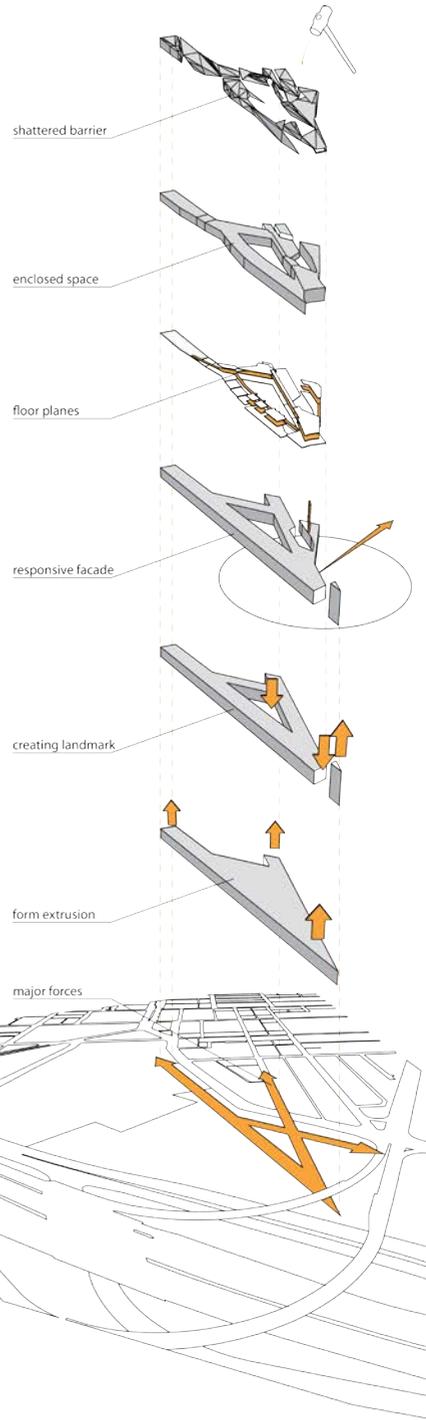
He argued that prior to the industrial revolution the craftsman such as a cabinet maker was not only the creator but also the designer and the final output of his efforts was something he could take pride in because it was the expression of the labor of his hands and each piece was unique unto itself. afford maximum interior lighting while minimizing direct solar gain during the summer months.

After the advent of the machine, however, he stated that the laborer had lost his dignity and the relationship between designer and the materials had been sheered by the machine.

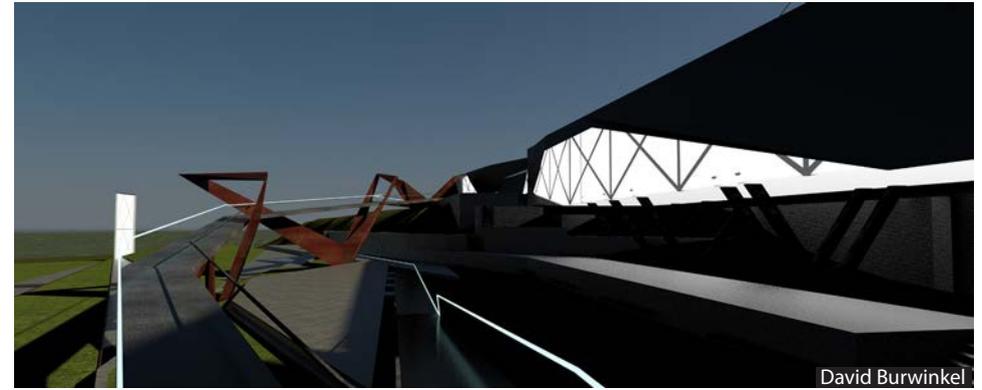
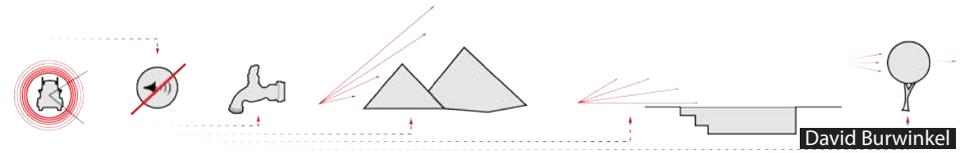
## PARAMETRIC SNAG

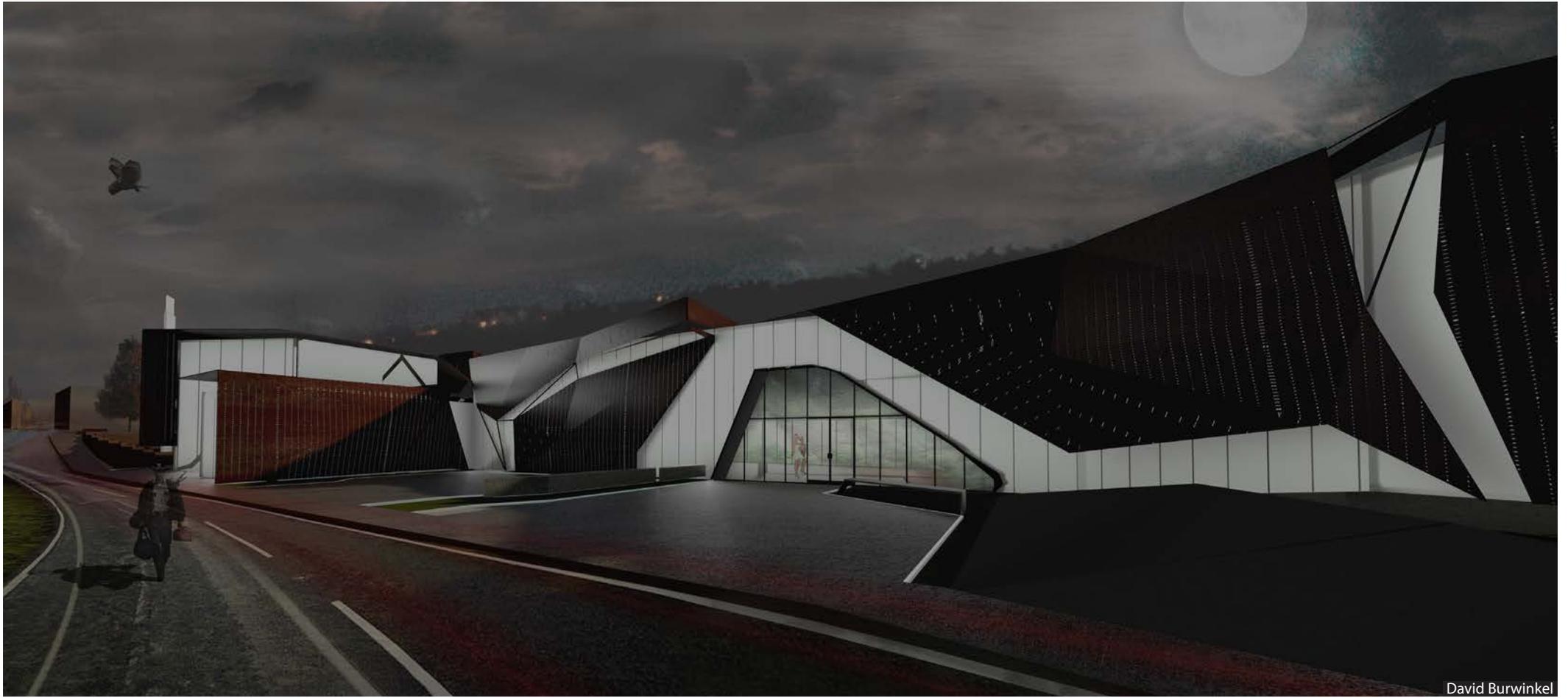
The pitfalls of the parametric process are not the concept or the equipment but the human factor. This factor has long stood as the limiting element of our species. Despite our best efforts we can not seem to overcome the fact we are fallible, inefficient and emotional we are the faulty component in the script which renders otherwise perfect results, inefficient. The machine is beautiful because it is purely functional, so too is a perfectly parametric building because it represents the dream of what we wish to be.

The dream disappoints in its final realization because it relates to our desires but fails to provide for our deficiencies. The forms created through true parametric methods are in large amorphous evocations of alien constructs that do not evoke or convey the stimuli that we typically rely on to orient and place ourselves comfortably within the environment. Just as the inside of a CPU lacks the components of "good" architecture so too do humans lack the components of a good computer.

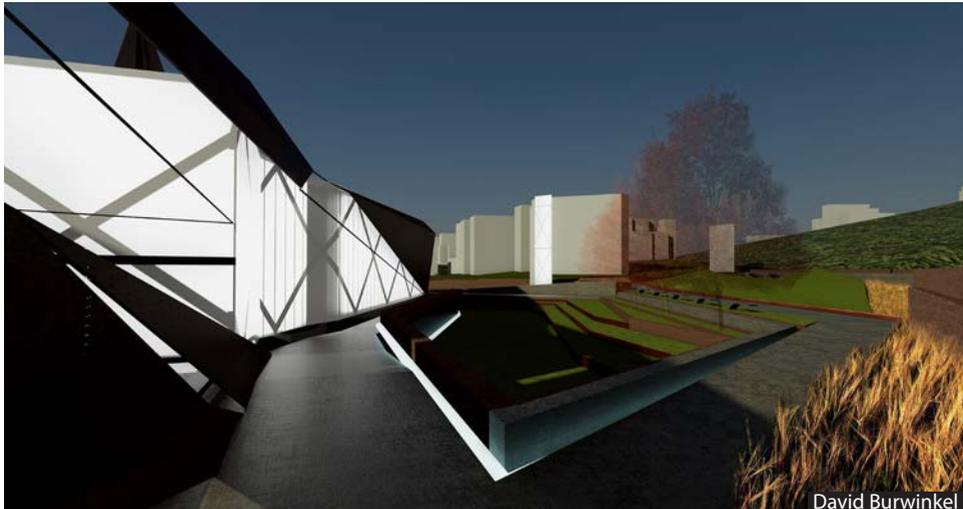


David Burwinkel

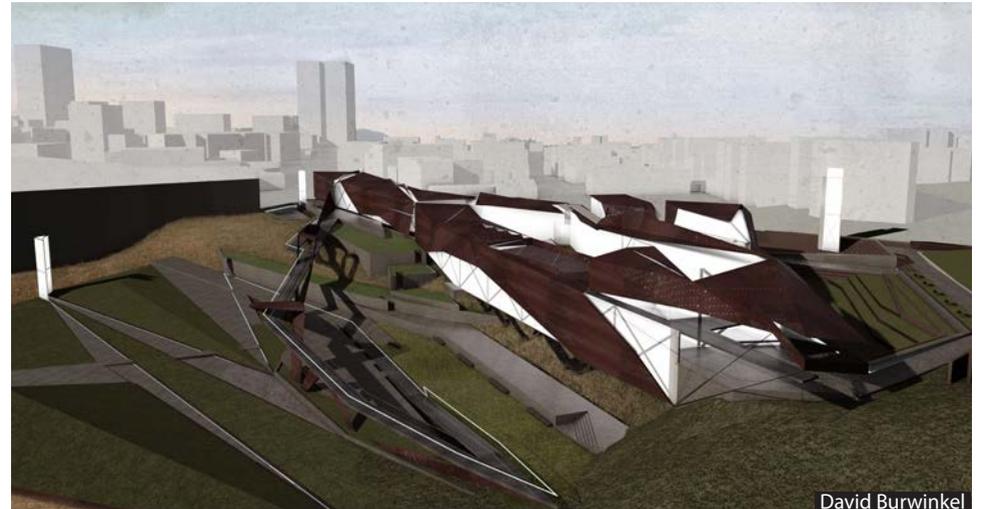




David Burwinkel

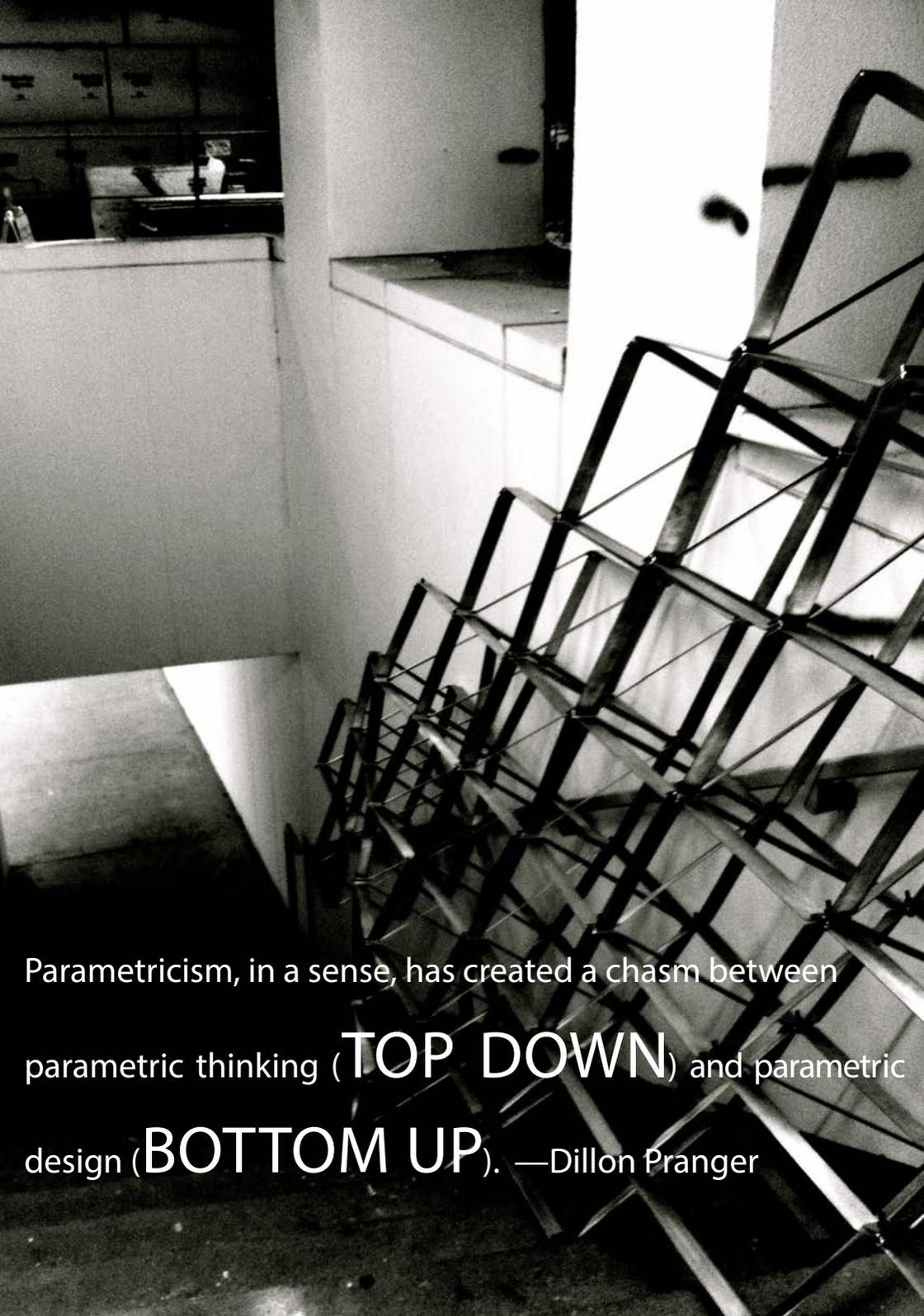


David Burwinkel



David Burwinkel





Parametricism, in a sense, has created a chasm between parametric thinking (**TOP DOWN**) and parametric design (**BOTTOM UP**). —Dillon Pranger

### TOP DOWN VERSUS BOTTOM UP

Parametricism, in a sense, has created a chasm between parametric thinking (top-down) and parametric design (bottom-up). Due to the advancements in computer technology this divide is becoming more transparent. Both in academia and professional practice there has been a paradigm shift in the architectural design approach from a traditional top-down theory to parametric responsiveness, which aims to respond and adapt to prevalent occupational patterns through only the use of advanced computational design. This newly defined approach looks at parametricism as a digital technology that transfers current photographic, cinematic, and information data into pixels and bits of information. These bits of information are initially registered allowing for real-time changes and adaptations to the building form early in the design process. In contrary, a parametric thinking approach would rather imply that there must be a closer attention to existing conditions and carefully defined rules for intensive linkages at a local scale with the urban context, thus considering the past, present, and future of the site by applying these adaptations at a more localized level. Although there is validity in each of these approaches neither one can successfully justify building design at both the urban and local scales. Therefore, in order to effectively evaluate and construct a framework for which a building is to be constructed within both top-down and bottom-up design approaches must be applied to the project.

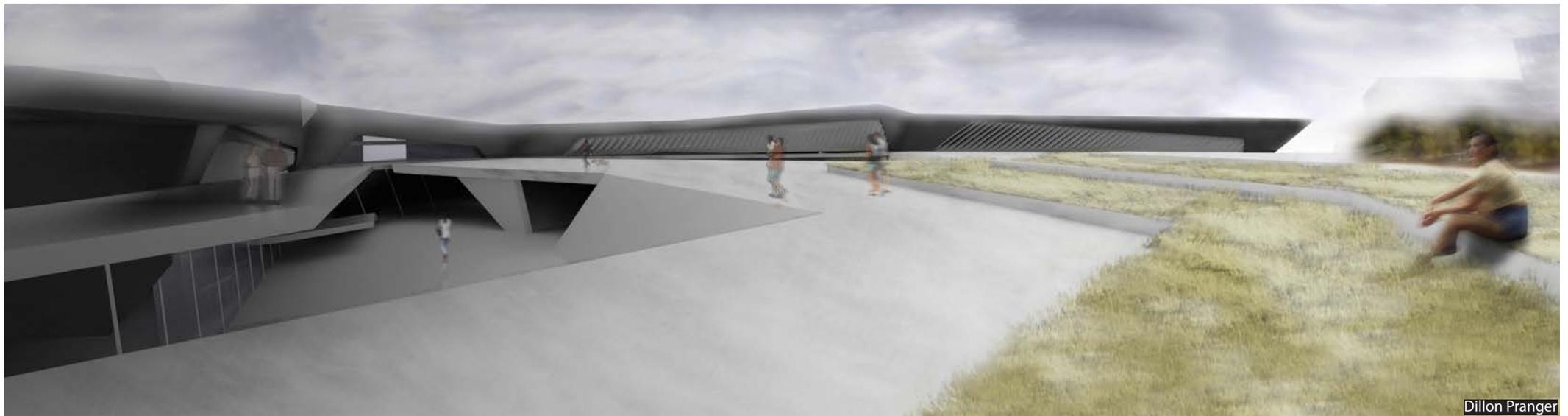
The Art Center in Pendleton provides an opportunity for a top-down study through the evaluation of existing site forces and realization of given parameters defined by rules introduced at both an urban and local scale.

Within this framework, The Art Center in Pendleton has successfully stimulated a positive urban response in environmental, social, and urban processes of the Pendleton district through abstract systems of associations. By shifting from teleological programming to open diagramming the building form is now able to fully evolve and respond to contextual conditions in the past, present, and future. This top-down process allows for the flexibility in the formal design aspects early in the design process. By approaching this project from a parametric thinking perspective, one is able to shift from the conscious manipulation of typological configurations and dogmatic conventions to the systematic management of virtually open relational assemblages.

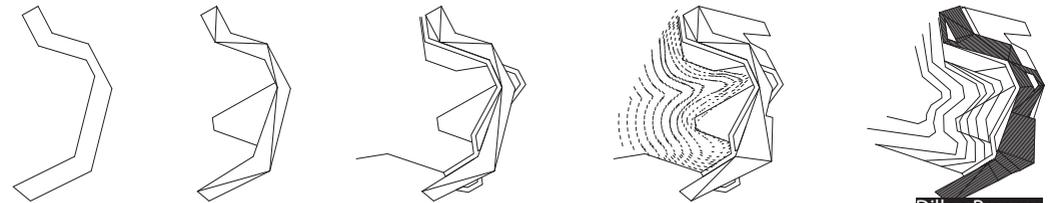
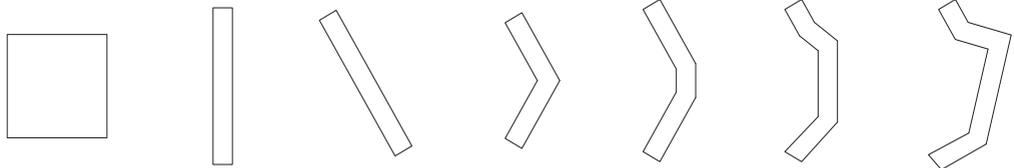
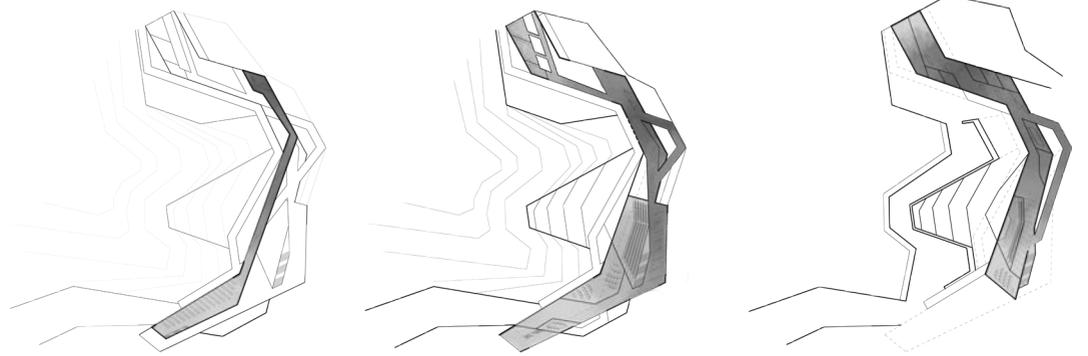
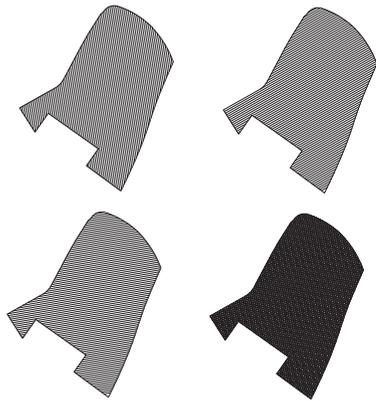
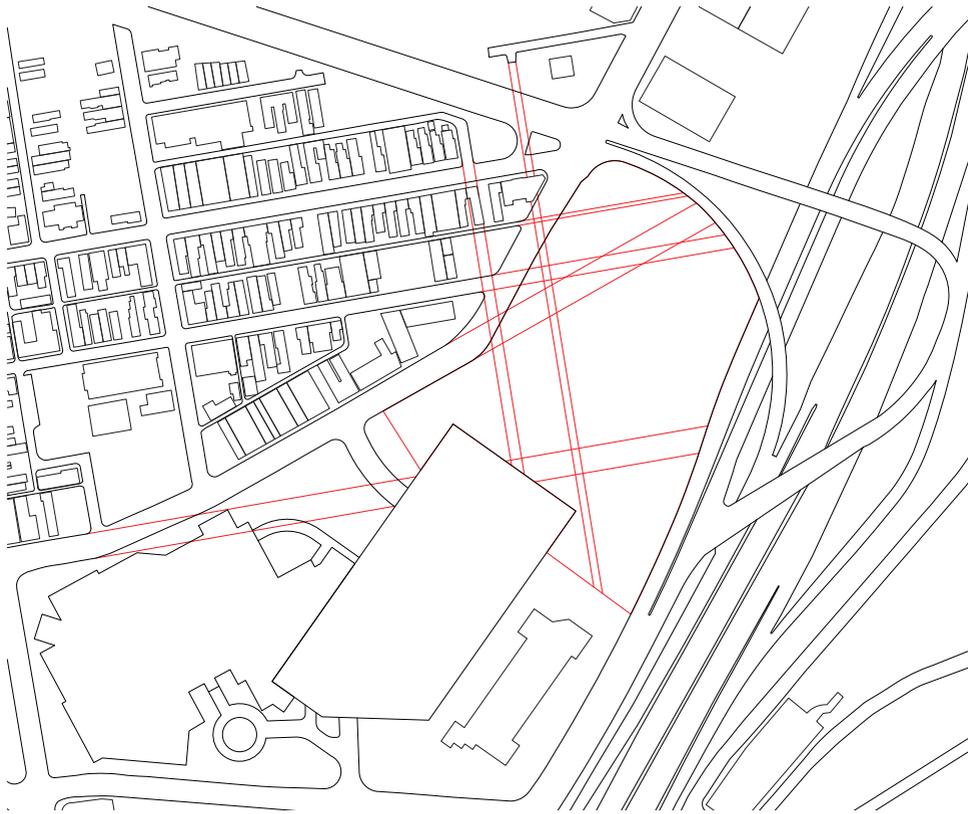
In order to successfully create a system that responds at both the urban and local scale, one must also consider a bottom-up design philosophy in conjunction with the previous top-down design approach. This bottom-up approach is better defined within the building's performance and system optimization, rather than formal assemblages. In this renewed framework, The Art Center in Pendleton is now able to incorporate the concurrent constitution of a medium that consistently produces appropriate responses out of a multitude of stimuli. Using microcontrollers, as well as predefined programmatic data, The Art Center in Pendleton's aperture system collects and responds to environmental data thus allowing the building skin to continually evolve and update. Being a truly bottom-up design approach, the system's outcome is completely defined by live data, which cannot be fully realized until its translation onto the building's skin. —Dillon Pranger, Student



Dillon Pranger

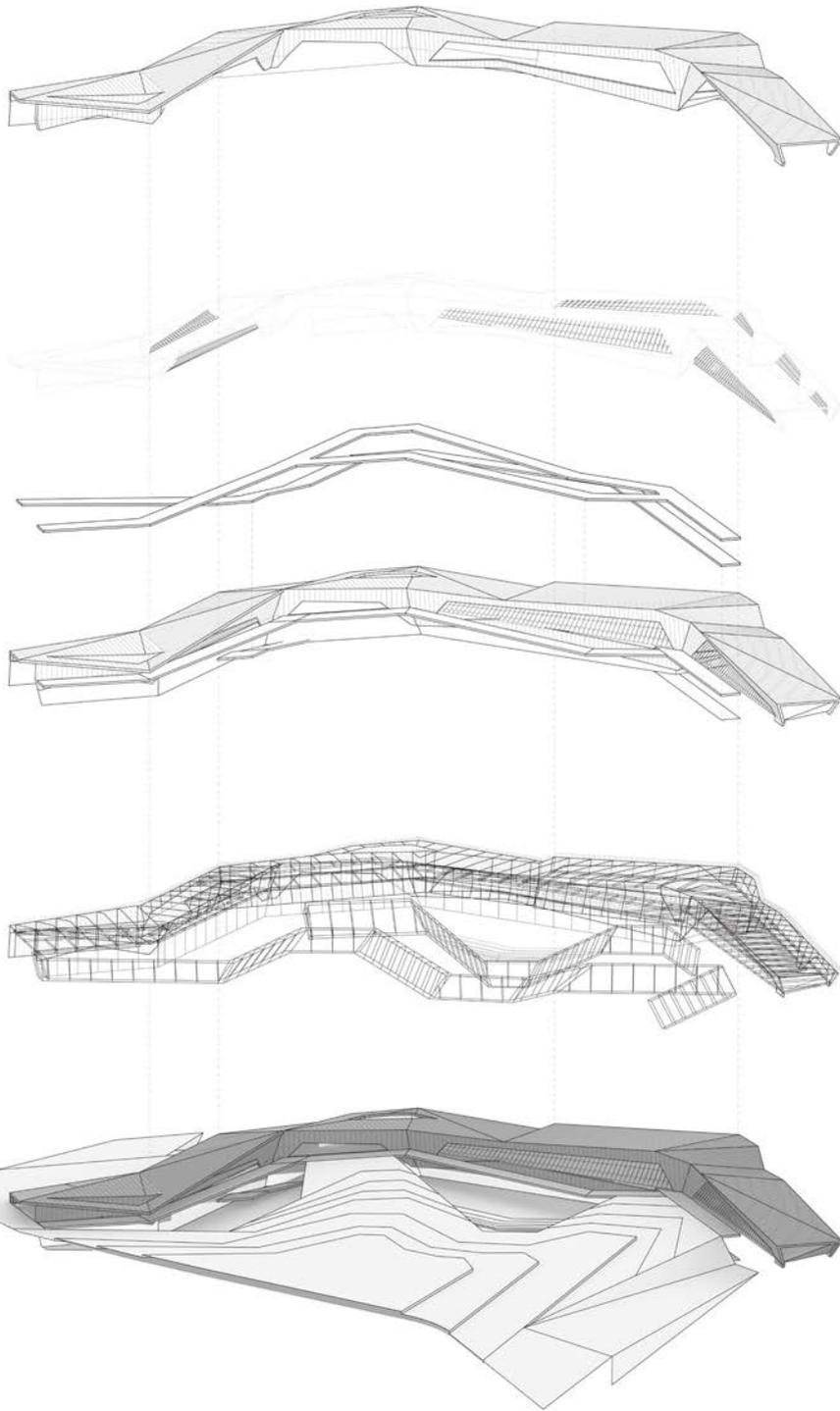


Dillon Pranger

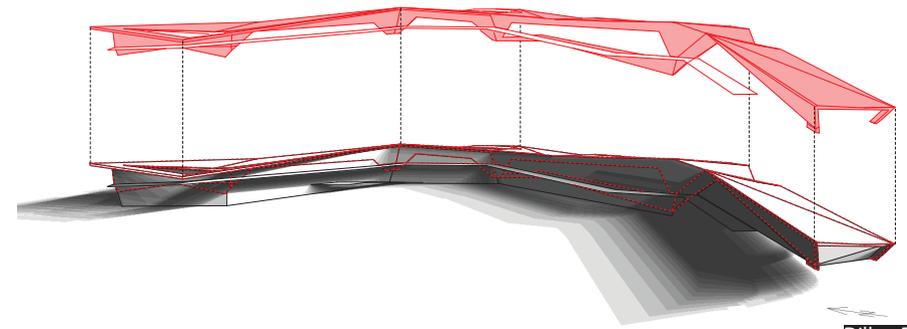


Dillon Pranger

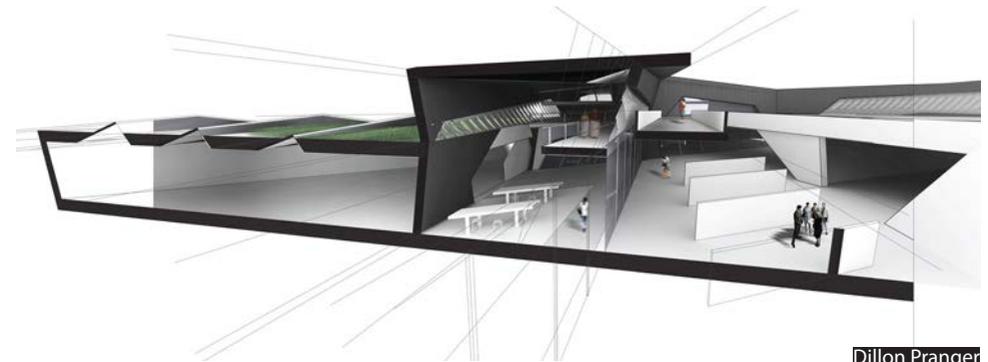
Dillon Pranger



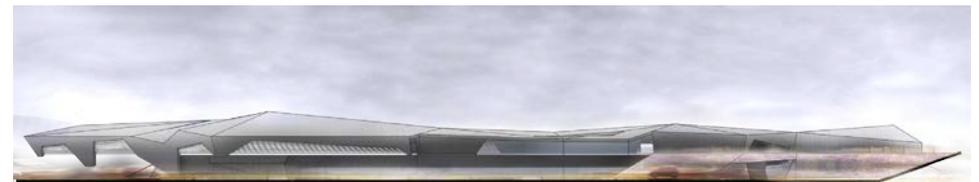
Dillon Pranger



Dillon Pranger



Dillon Pranger



Dillon Pranger

#### METHODOLOGY HARMONY

This medium between parametric thinking and parametric design allows a deeper rationalization for building optimization. Not only does the designer now have the ability to integrate contextual forces through a parametric thinking process, but also the opportunity for further articulation in building performance through parametric design processes. This harmonizing of the two design approaches allows for each design theory to expand its design possibilities while still being governed by the other.

Therefore, instead of forcing one to decide between a parametric thinking or parametric design approach, instead parametricism should be used as a vehicle to facilitate the growth of a city, site, and building through certain parameters, while giving way to others. This approach to parametricism allows for the successful achievement of an overall form that is responsive to itself and its current contextual environment, as seen in The Art Center In Pendleton.  
—Dillon Pranger

The studio investigated emerging digital techniques with great intensity, but traditional sculpting techniques offered some parallels in thinking methodology. By applying parametric rationale in analogue form, the

## EXPLORATION of MATERIALS

provided new insight for the ongoing digital modeling process. —Hans Koesters



# [ ANALOGUE ] PROTOTYPING

Traditional sculpture casting techniques were utilized for conceptualization as a part of a non-linear design process: the material properties informed the fluid expression once translated back into a digital format.

—Hans Koesters



Plaster



Wax



Wax + Paint



Silicon



Plaster + Silicon

## PROTOTYPING PROCESS

Rapid prototyping has been used increasingly in academia and practice in order to represent an iteration of a design in physical form. As the design continuum progresses, new prototypes are generated, providing continual tactile and three dimensional feedback.

By applying traditional sculpting and casting techniques to this aspect of the design process, a designer can follow methods similar to those used in modelling programs such as Maya or T-Splines, while also creating a physical object.

There are several benefits of using wax over clay, foam, or other modelling materials: it allows the designer to model using both an additive and subtractive process; it has the structural stability of a rigid material such as foam, but retains the additive capabilities of clay; it can be melted and formed into a smooth block or sheet and cut into any primitive or organic form without unwanted deformation. Additionally, it can be preserved, painted, and used to create a mold.

By producing a mold and casting a plaster copy, the original is preserved. This preservation allows a designer to continue where they left off so they don't have to start over, while also minimizing material waste. Since it never dries out, any material that was pared away can be melted down and reused.

—Hans Koesters, Student/Editor

Microcrystalline sculpting wax provided a tactile medium for exploring a formal shift from orthogonal to fluid. The material's **FLUID** and **RIGID** capabilities shared a relationship with the established formal and spatial dynamics of the interior and exterior programmatic functions. —Hans Koesters



Hans Koesters



Hans Koesters

# A PLACE TO PRODUCE



Pouring Plaster Mold



Removing Crucible



Casting with spill cup & air vents



Post Grinding



Finished Piece

Study of relationship between architecture and choreographed entrance and landscape deformations. Hans Koesters, Student/ Editor

## BRONZE CASTINGS

The earlier volumetric exercises done in wax were cast in metal as a means to abstractly study the dynamic elements of the project. The process itself also offered a rare insight into the arduous labor involved in casting and the extensive facilities necessary for a sculpture foundry. The experience provided a much more comprehensive understanding of the programmatic requirements for a sculpture studio. As a result of such first-hand observations, a design could be formulated in a way that could streamline the mold-making and casting procedures.

Extrapolations of the resultant castings were achieved in the computer to further analyze programmatic typology and its relationship to formal topological characteristics.

—Hans Koesters, Student/ Editor

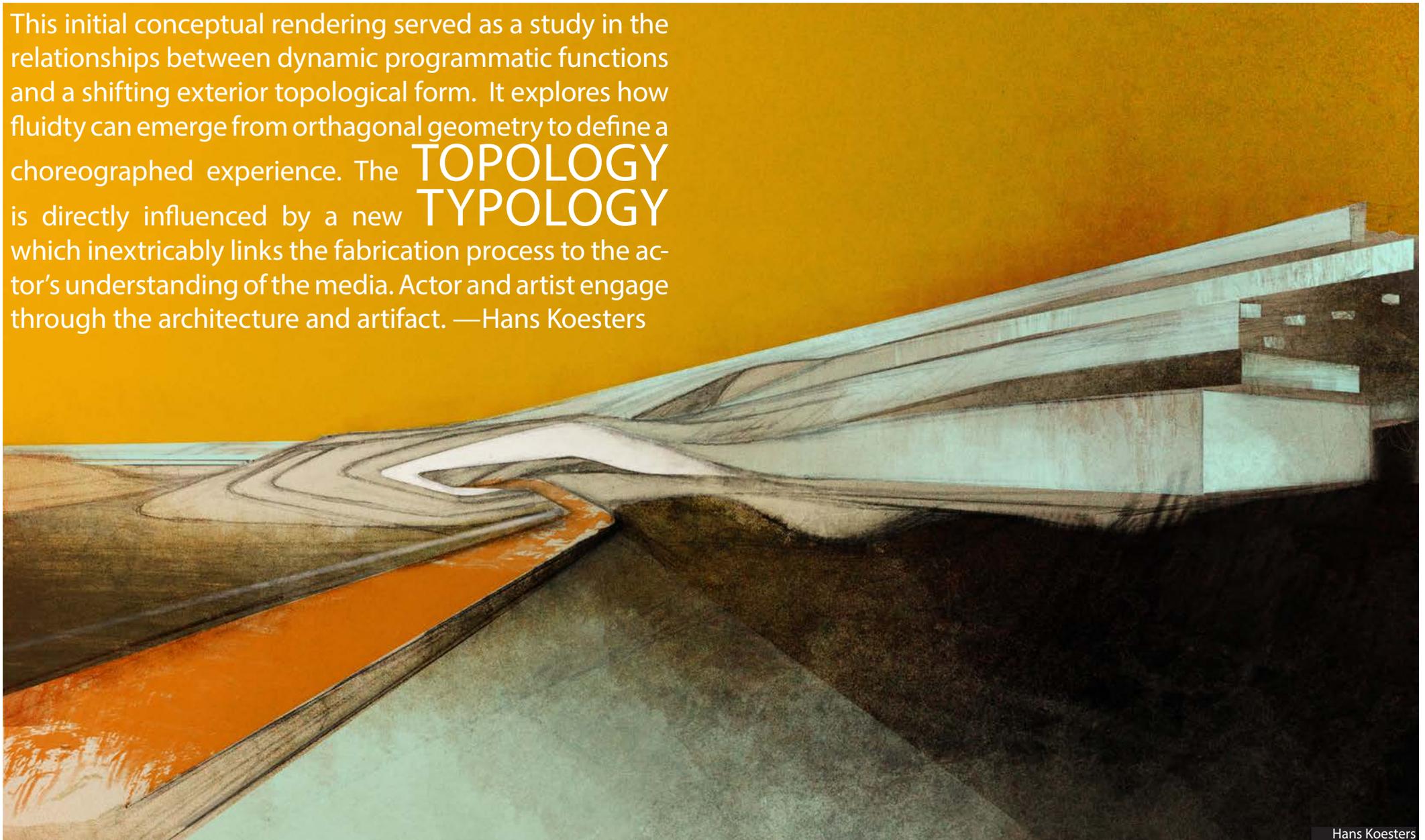


Finished Piece



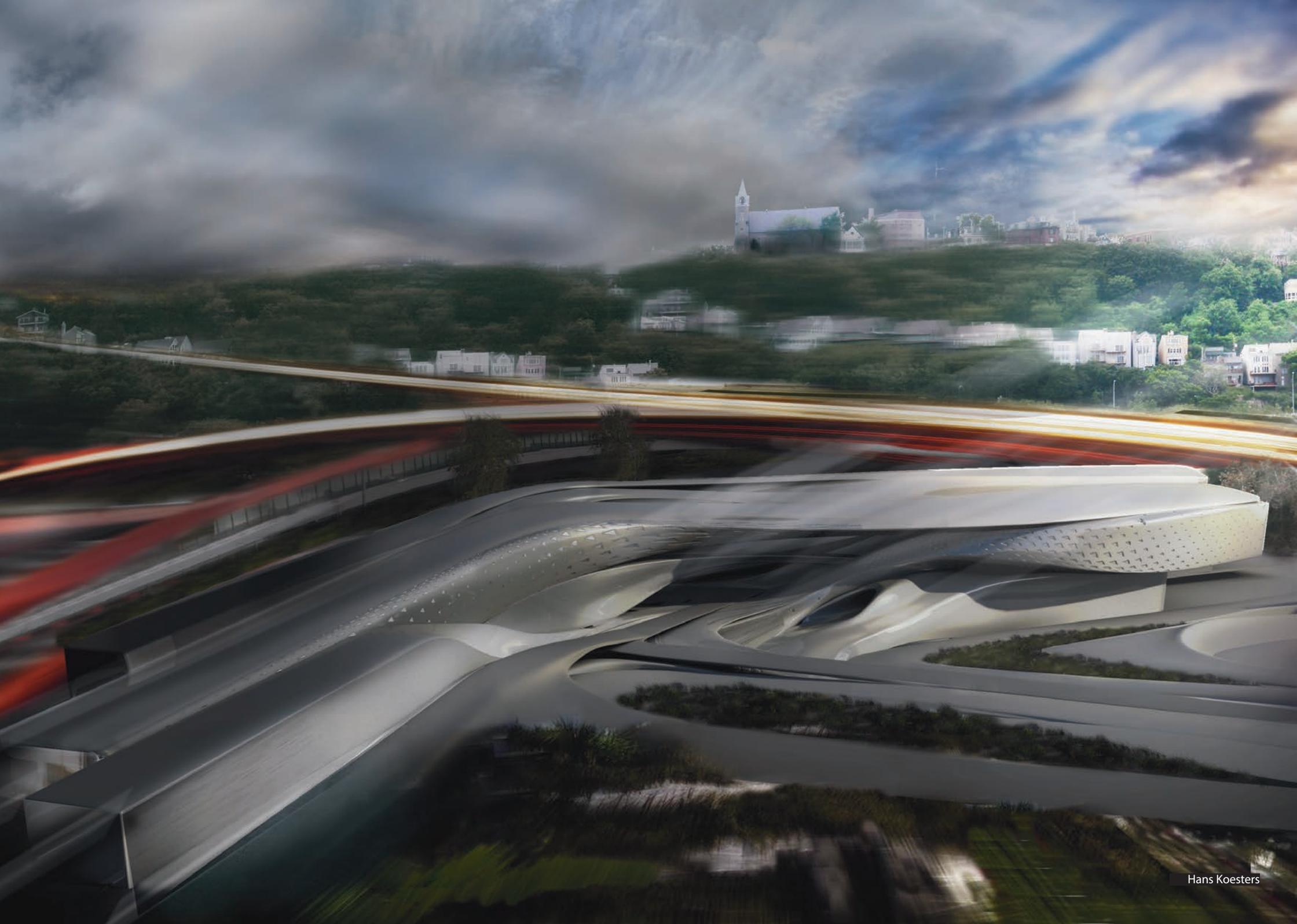
Hans Koesters

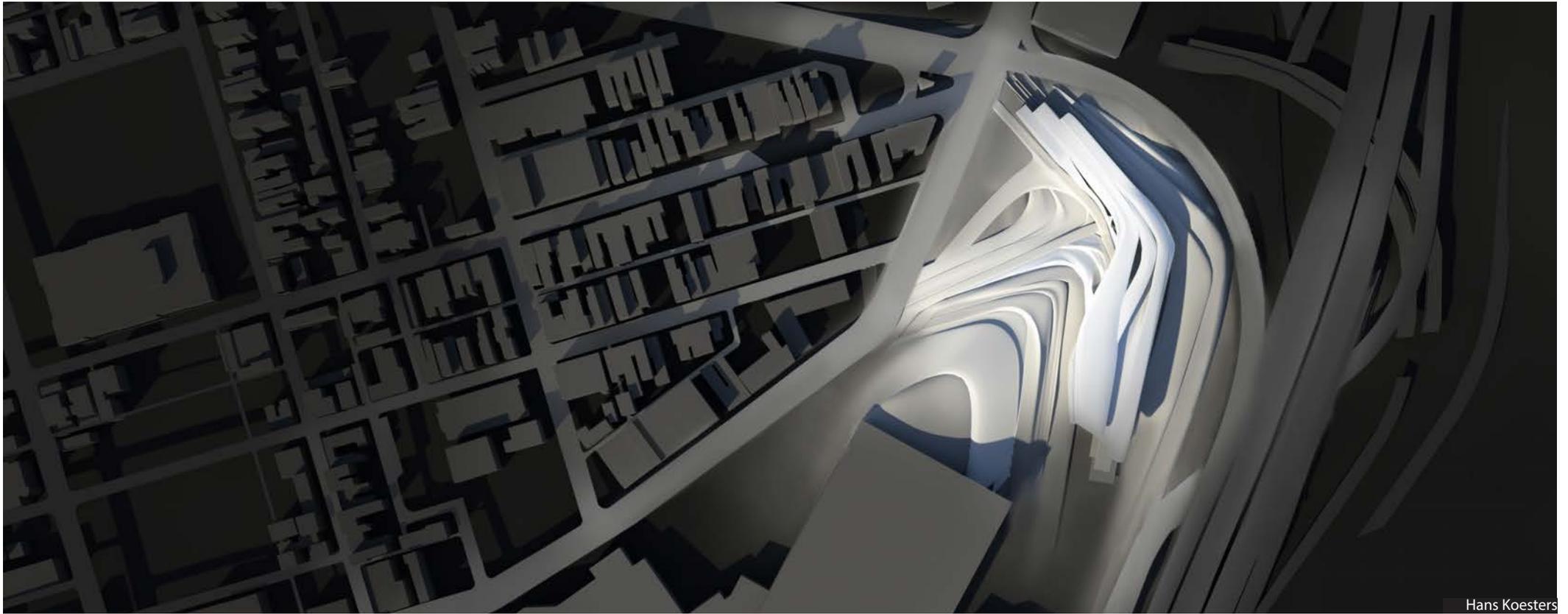
This initial conceptual rendering served as a study in the relationships between dynamic programmatic functions and a shifting exterior topological form. It explores how fluidity can emerge from orthogonal geometry to define a choreographed experience. The **TOPOLOGY** is directly influenced by a new **TYPOLGY** which inextricably links the fabrication process to the actor's understanding of the media. Actor and artist engage through the architecture and artifact. —Hans Koesters



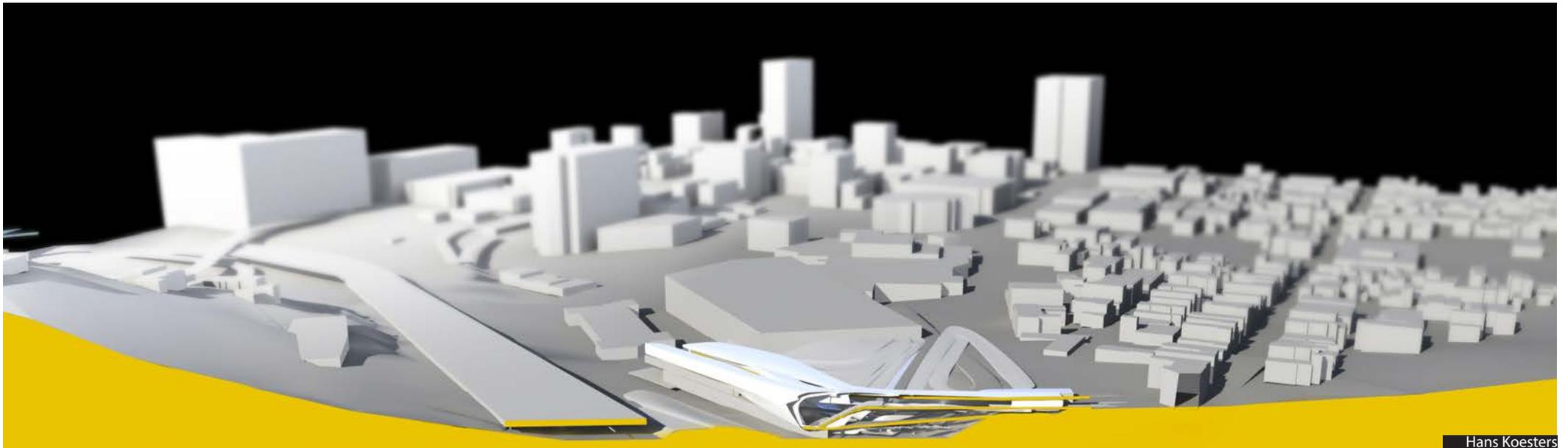
Hans Koesters

Homeomorphic: a topological space is a geometric object, and the homeomorphism is a continuous stretching and bending of the object into a new shape.

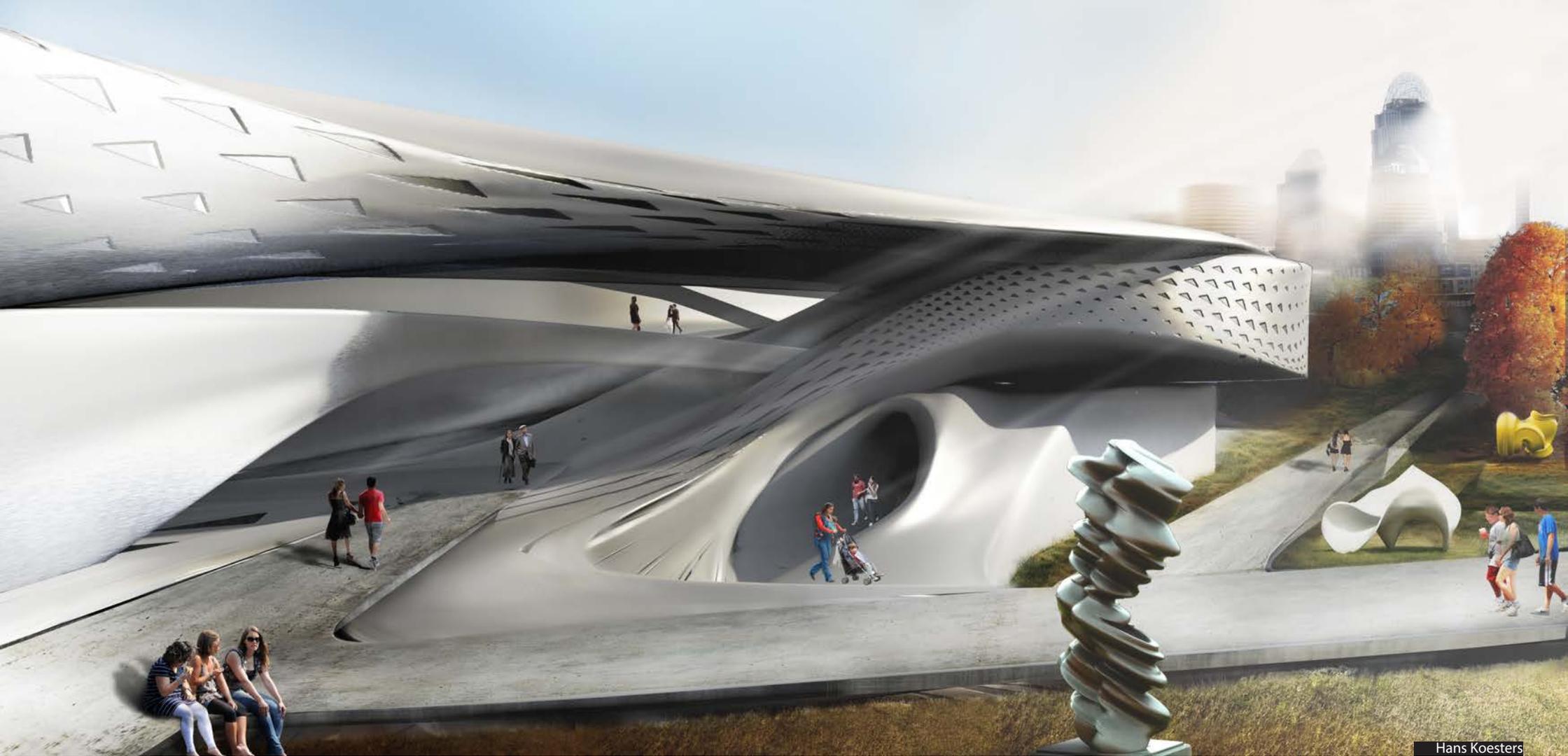




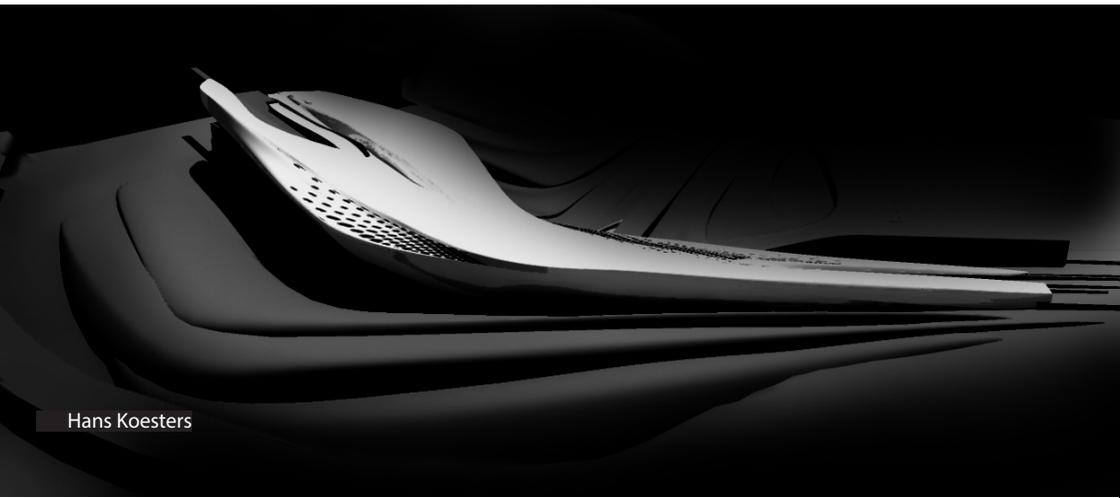
Hans Koesters



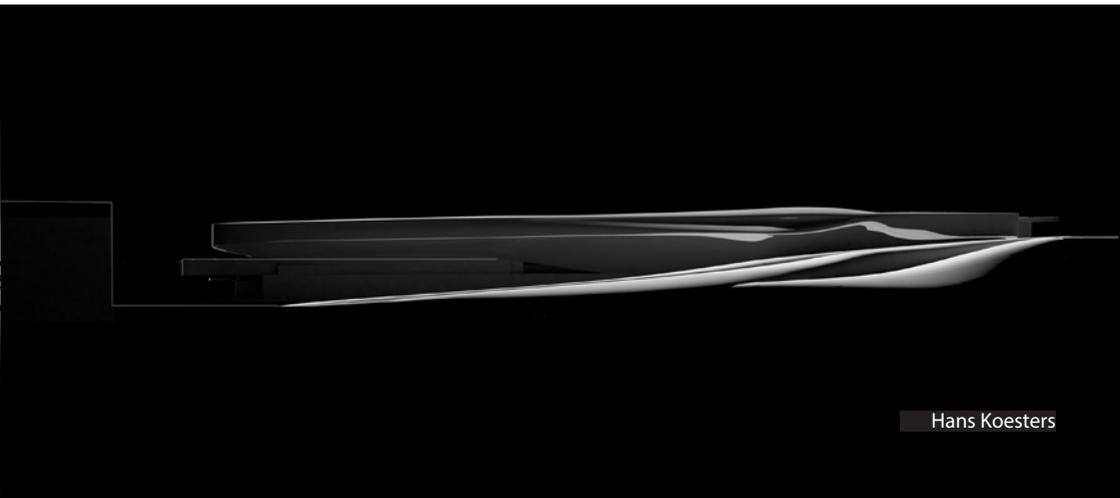
Hans Koesters



Hans Koesters

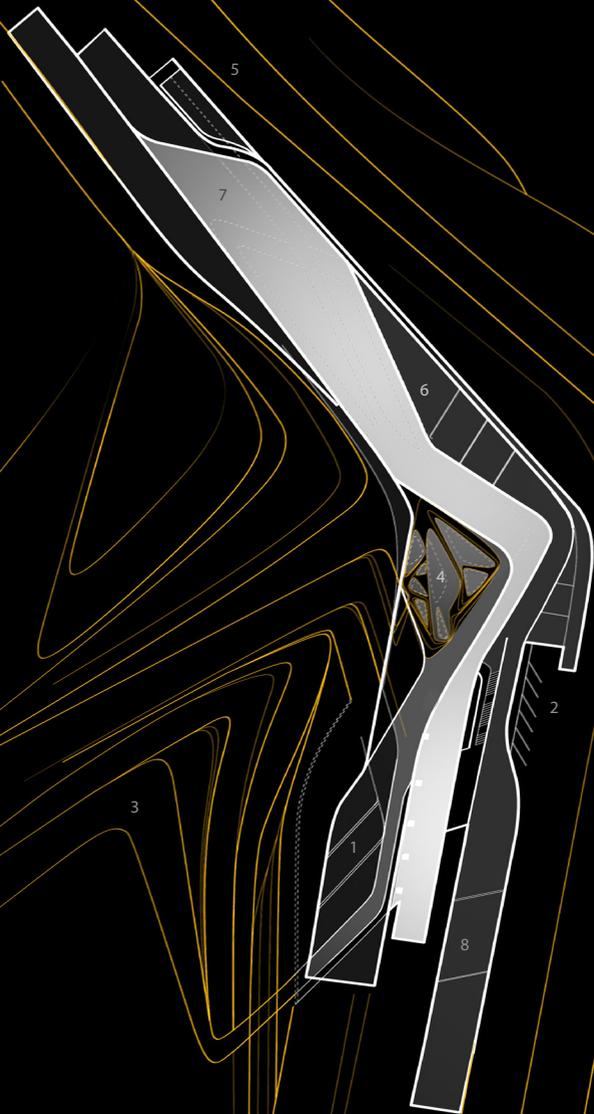


Hans Koesters



Hans Koesters

- 1 RETAIL SHOP
- 2 PARKING
- 3 PUBLIC GATHERING PLAZA
- 4 WORKSPACE
- 5 LOADING DOCK
- 6 METAL SHOP
- 7 WOOD SHOP
- 8 STUDIOS



L1

SCALE 1:50



- 1 MAIN LOBBY
- 2 ADMINISTRATION OFFICE
- 3 MULTI-FUNCTION ROOM
- 4 REST ROOM
- 5 RETAIL SHOP
- 6 ELEVATOR
- 7 LIBRARY
- 8 COMPUTER LAB
- 9 DIRECTOR'S OFFICE
- 10 SECRETARY OFFICE
- 11 CLASSROOM
- 12 FINAL GALLERY
- 13 WORKSPACE
- 14 GALLERY + WORKSPACE

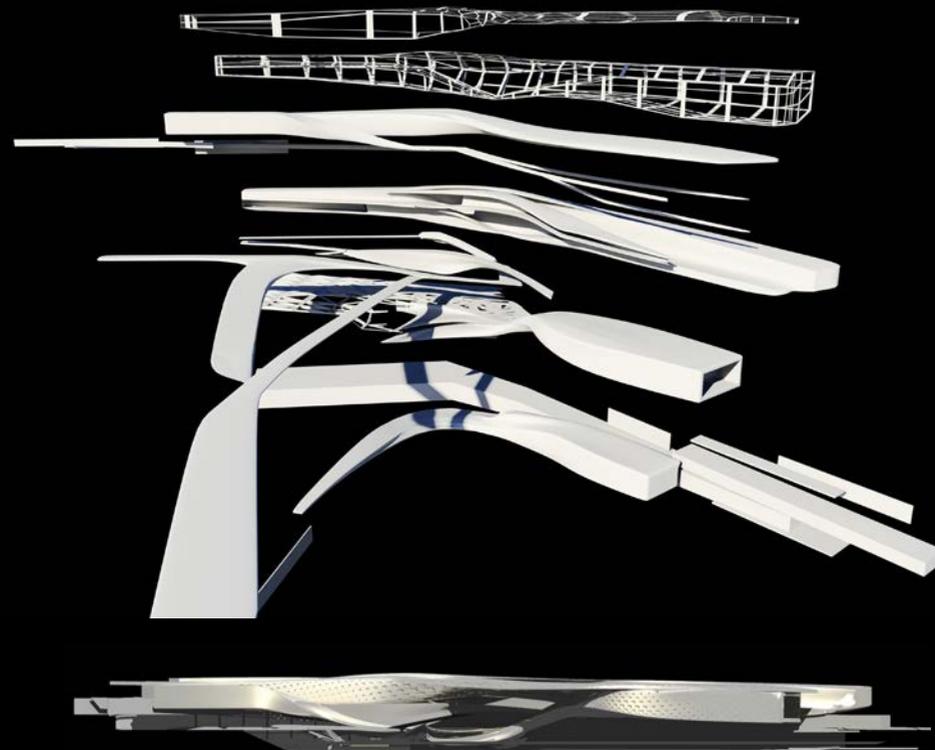


L2

SCALE 1:50



- 1 MAIN LOBBY
- 2 CONFERENCE ROOM
- 3 MULTI-FUNCTION ROOM
- 4 REST ROOM
- 5 ELEVATOR
- 6 SMALL STUDIOS
- 7 FINAL GALLERY
- 8 WORKSPACE
- 9 CAFE



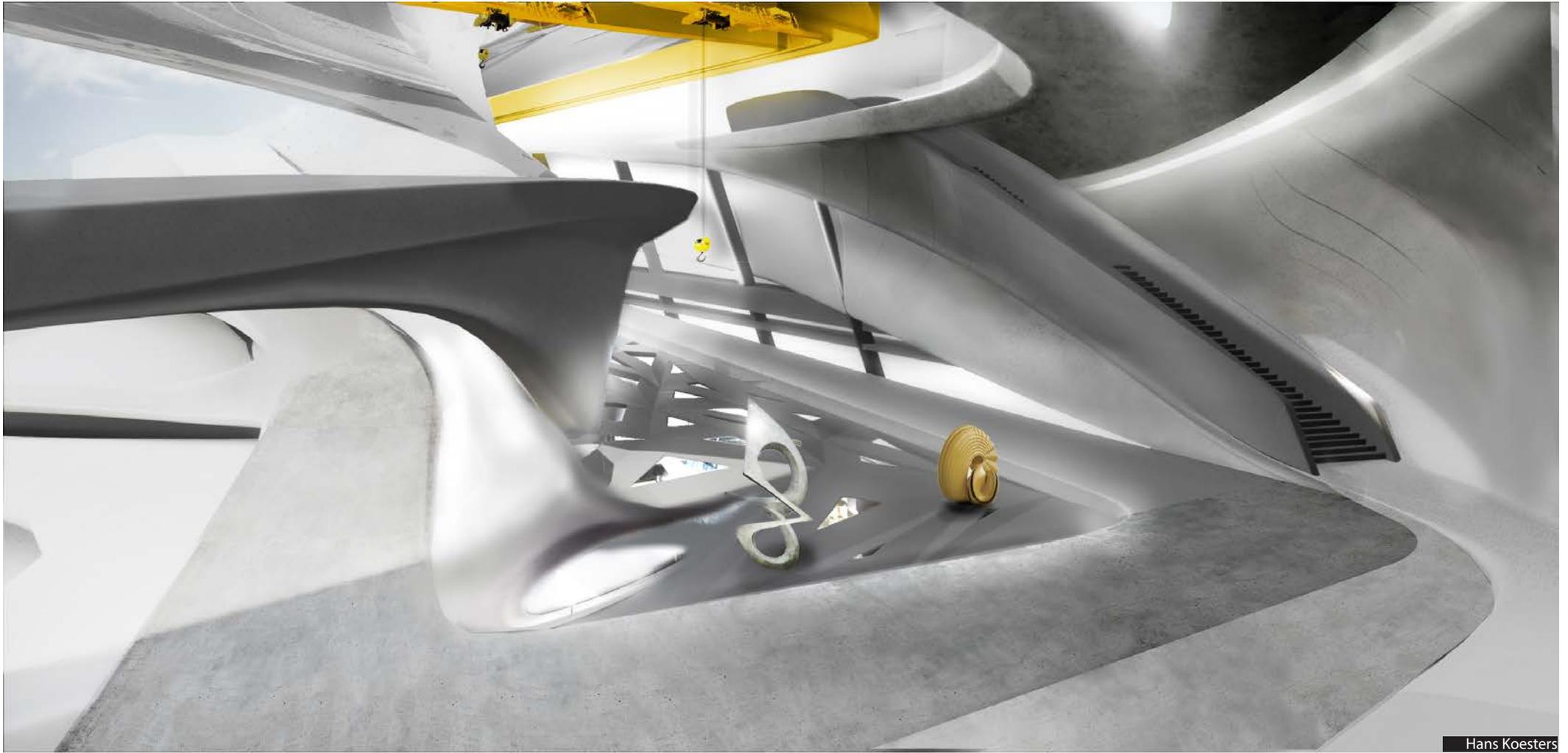
Hans Koesters

## TPOLOGY

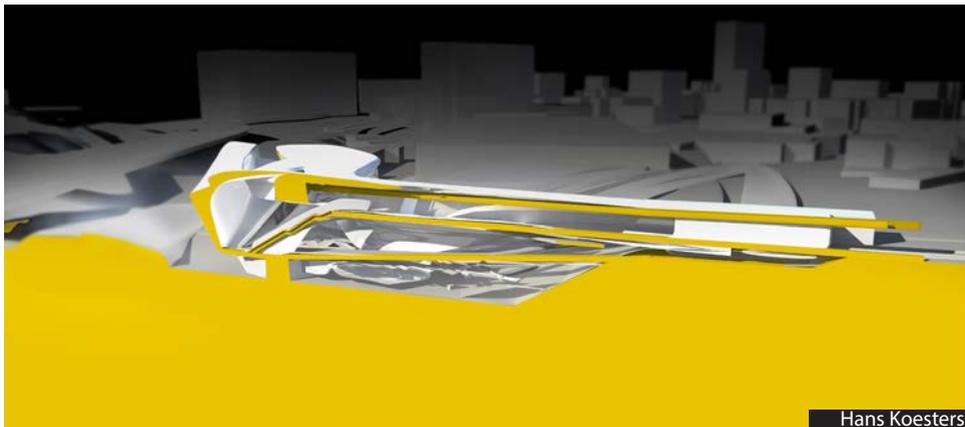
The design intent for my project is to supplant the traditionally binary relationship between the architecture and the artifact with a highly variegated network logic that inextricably links the fabrication process to the actor's understanding of the content. Production and display spaces accordingly bifurcate into choreographed linear strands and versatile nonlinear clusters. Creative, social, and visual interaction is enhanced through the simultaneity of multiple audiences of user groups; these experiential parameters can be realized in congruence within the construct of a dynamic field of programmatic spaces. This hybridization of public functions and circulation elements are formed through multi-axial structures that are neither rigidly straight nor horizontal.

The traditional straight and horizontal topology restricts the actor's views to front, back, and peripheral. This new topology activates the vertical and creates accelerated perspectival glimpses of what is to come, while providing the actor with opportunities for reflection and views looking back to what was just experienced. These visual and physical connections across variegated activity zones, coupled with the homeomorphic building language, facilitate the inter-user experience, which at once unites the collective impetus and deepens the users' understanding and appreciation for the artifact.

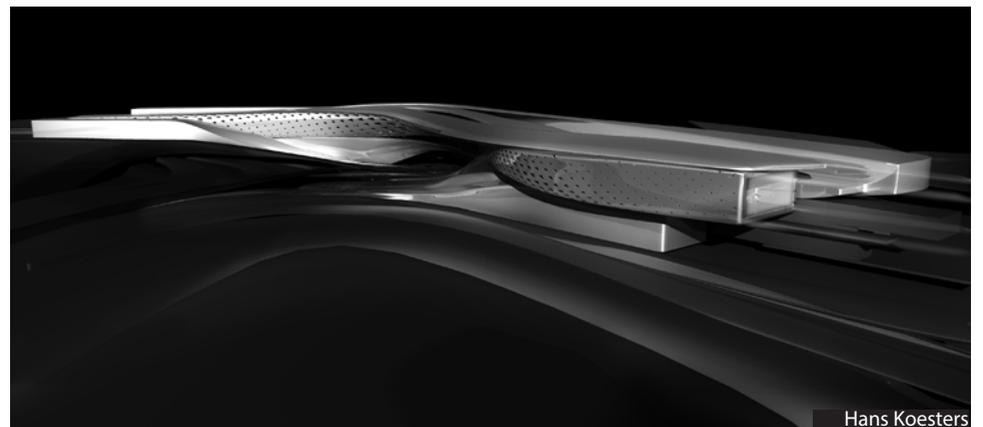
—Hans Koesters, Student



Hans Koesters



Hans Koesters



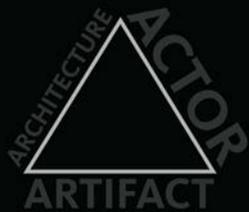
Hans Koesters





Eric Barr

ARCHITECTURE  
ARTIFACT



Eric Barr / Hans Koesters

*architecture binds*

*artist energized*

*architecture binds*

*artifact emerges*

*actor energizes*

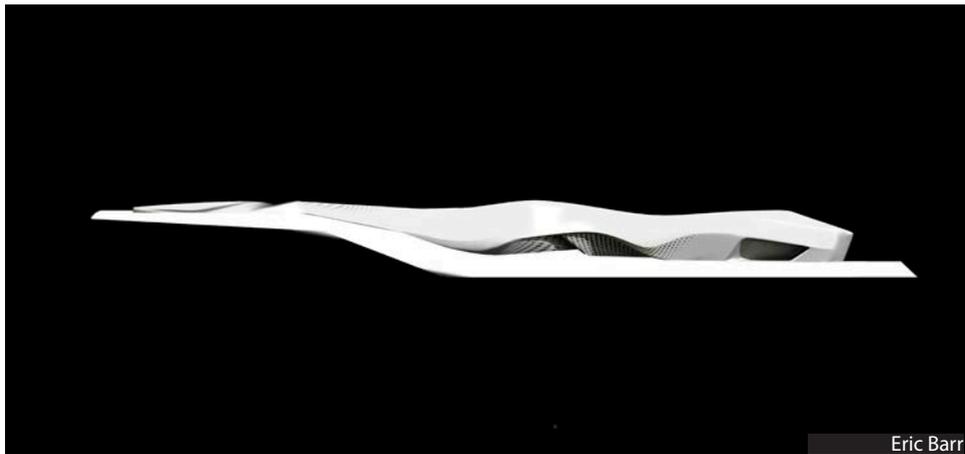
TYPOLGY

So, the museum's specific program and site conditions have informed the orientation, and the orientation has consequently informed the architectural typology, which all goes back to reinforce the idea of a homeomorphic inter-user experience. Essentially, the context has intensified the genotype to produce a, hopefully, elegantly dynamic phenotype and experience.

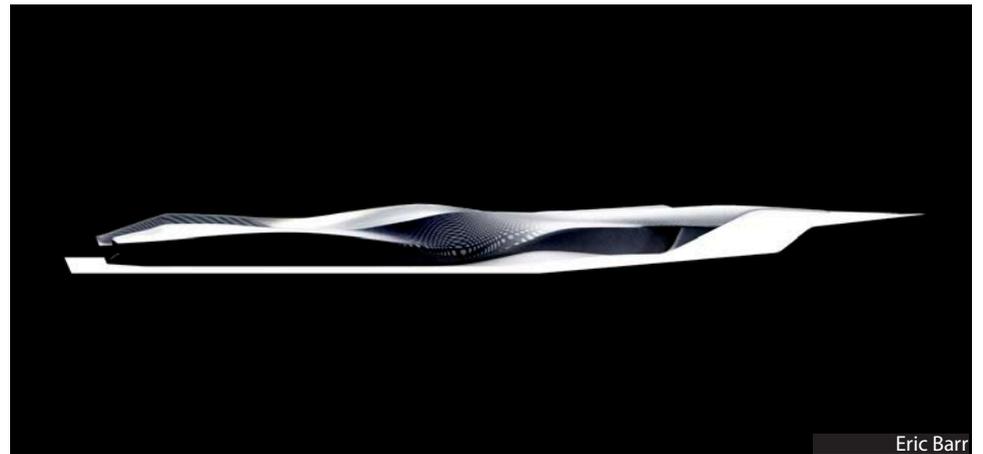
[PAC] breaks this praxis in order to diminish the sacred elevation of the finished artifact and expose the stages of fabrication; the process of creation is just as important as the final product for both artist and actor. [PAC] fuses workspace with gallery space along gradated stratum of permeability within the built structure, maintaining a physical separation when function imposes sensory limitations. —Eric Barr



Eric Barr



Eric Barr

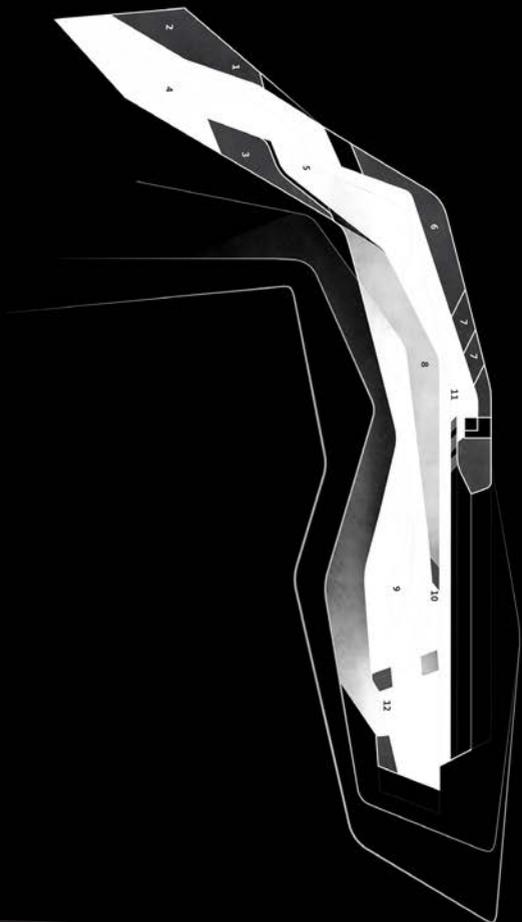


Eric Barr



- 1. LOADING DOCK
- 2. STORAGE GARAGE
- 3. COMPUTER LAB
- 4. SHOP
- 5. WORK DESKS
- 6. CONFERENCE
- 7. RESTROOM
- 8. OPEN STUDIO
- 9. CLOSED STUDIO
- 10. CONNECTOR
- 11. CONNECTOR
- 12. EXTERIOR CONNECTOR

## LOWER FLOOR



Eric Barr

### PROGRAM

A place to produce; a place to display. [PAC] uniquely hosts both artist and actor, both studio and gallery. These typically separated functions operating under one roof presents the perfect opportunity of a programmatic merger. This is an art center that unites Actor to Artist through Architecture and Artifact. The amalgamation of workspace with gallery space facilitates an inter-user relationship by exposing the fabrication processes and deepening the Actor's understanding and appreciation for the Artifact.

In an attempt to harmonize this dual-user artistic relationship, the physical structure's interior topology and typology ought to flow continuously from space to space, interior to exterior, floor to ceiling. The exterior typology conforms to the same logic. By harmonizing an external homeomorphic language with an internal homeomorphic language, the building form reinforces the dual-user's inter-proximity and thus enhances the individual and collective output.

—Eric Barr / Hans Koesters, Collaboration



- 1. COMPUTER LAB
- 2. OPEN TO INDUSTRIAL STUDIO BELOW
- 3. DIRECTOR'S OFFICE
- 4. SECRETARY'S OFFICE
- 5. RECEPTION DESK + ADMIN
- 6. GRADIENT PERFORATIONS
- 7. RESTROOM
- 8. ELEVATOR + SERVICE
- 9. THEATRE
- 10. LOBBY EXPANSE
- 11. RETAIL 1
- 12. CONNECTOR
- 13. CONNECTOR
- 14. RETAIL 2
- 15. OPEN TO STUDIO BELOW

## MIDDLE FLOOR



Eric Barr

### INTERIOR TYPOLOGY

As to specific sequencing of the interior spaces, a major parameter was set: the programmatic layout would organize along a spectral gradient of function. [PAC] would host a linear experience from north to south, literally ordered from raw to finished and from studio to gallery. The final art gallery is intended to be the pinnacle of the museum's experience, appropriately gesturing toward downtown with its views and orientation. In order to do so, [PAC] needs to be located beyond the 50-foot wall of the casino's parking garage.

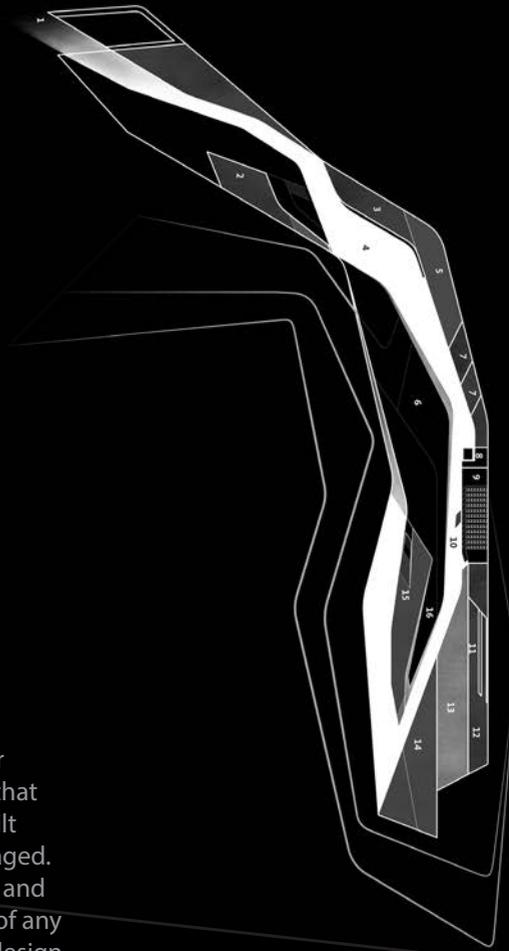
This requirement brings the building extremely close to the highway and all its accompanying modernity. In turn, the building's formal typology absorbs the highway's speed and energy, deforming along strong, yet refined, lines that are appreciable even at high speeds from the exterior. This orientation also desirably opens up and cups the center of the site and buffers the users' outside experience from the highway's aural/visual pollution.

—Eric Barr, Student



1. RAMP / PENDELTON ACCESS
2. CONNECTOR / LOBBY - CAFE
3. CAFE
4. CAFE EATING
5. TERRACE
6. VIEWS TO LOWER LEVELS
7. RESTROOM
8. ELEVATOR + SERVICE
9. THEATRE
10. CONNECTOR / LOBBY - GALLERY
11. BAR KITCHEN
12. LOUNGE
13. ROOF TERRACE
14. FINAL GALLERY
15. CONNECTOR / GALLERY - RETAIL
16. OPEN TO STUDIO BELOW

## UPPER FLOOR



Eric Barr

### EXPERIENCE

Architecture is ultimately experience. Design must construct experience for the user, experience at the eye-level that converges the way users perceive built form with how that built form is engaged. Qualitative criteria like aesthetic flow and spatial feeling ought to be the focus of any inhabitable space. In the simplest of design equations, the phenotype "Y" is the product, the genotype "X" is the multiplicand, and the environment "K" is the multiplier.  $K \times X = Y$ . Without "K", which is the variable influence of the environment in this equation, the genotype "X" will never fail to produce the exact same phenotype,  $X = X$ . And this is bad design. This is Modernism. While it is certainly foundational to internalize the integrals of the genotype and their behavioral effects, known in ecology as the norms of reaction, spatial designers ought to pursue the phenotype, via these integrals, because it constitutes the experience; this summates the "top down" approach taken in this project, the [PAC].



N  
SITE PLAN

Eric Barr

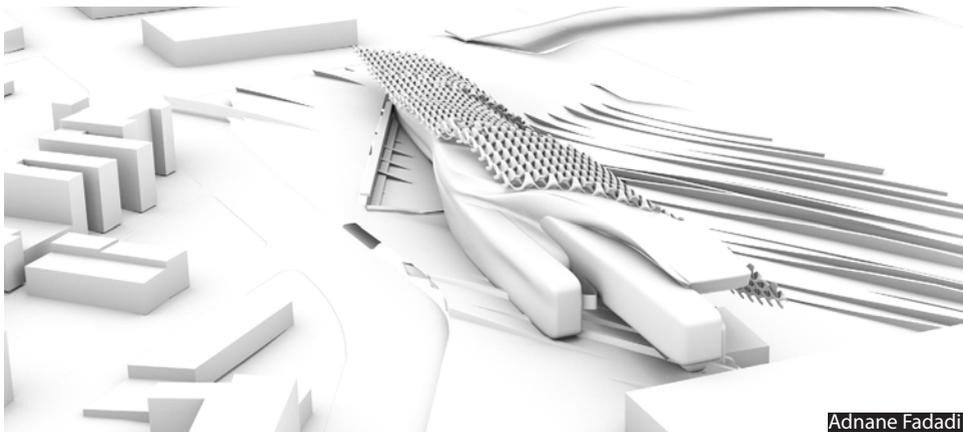
### PARAMETRIC MENTALITY

Parametricism is just a formula, a set of rules, a mentality adopted of a designer that considers the function, the surroundings, and the users. It is not a form language in and of itself. Schumacher asserts that Parametricism stands so universal as to mimic the cosmic model itself. In a very literal sense, he is right. But this novel idea is too often aberrantly misappropriated. It's a matter of balance. In regards to a multiplex organism, proportions must be accurately attuned to produce elegance. When we see a plant, do we notice and celebrate its cytoplasm or its cell walls? When we see a tree, are the fibers of the bark the focus of its beauty?

Rather, we see an aggregate form defined by its characteristic genotype and rooted by its site-specific conditions. We see elegance, and that is a very hard thing to achieve, because the scale of the integral must compliment its resulting form. If we truly want to mimic nature, as designers, we need to stop focusing macroscopically on the simple component, as if under 1000x zoom, and begin focusing on the aggregate product— the phenotype.  
—Eric Barr, Student



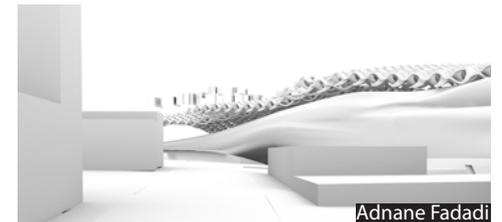
Adnane Fadadi



Adnane Fadadi

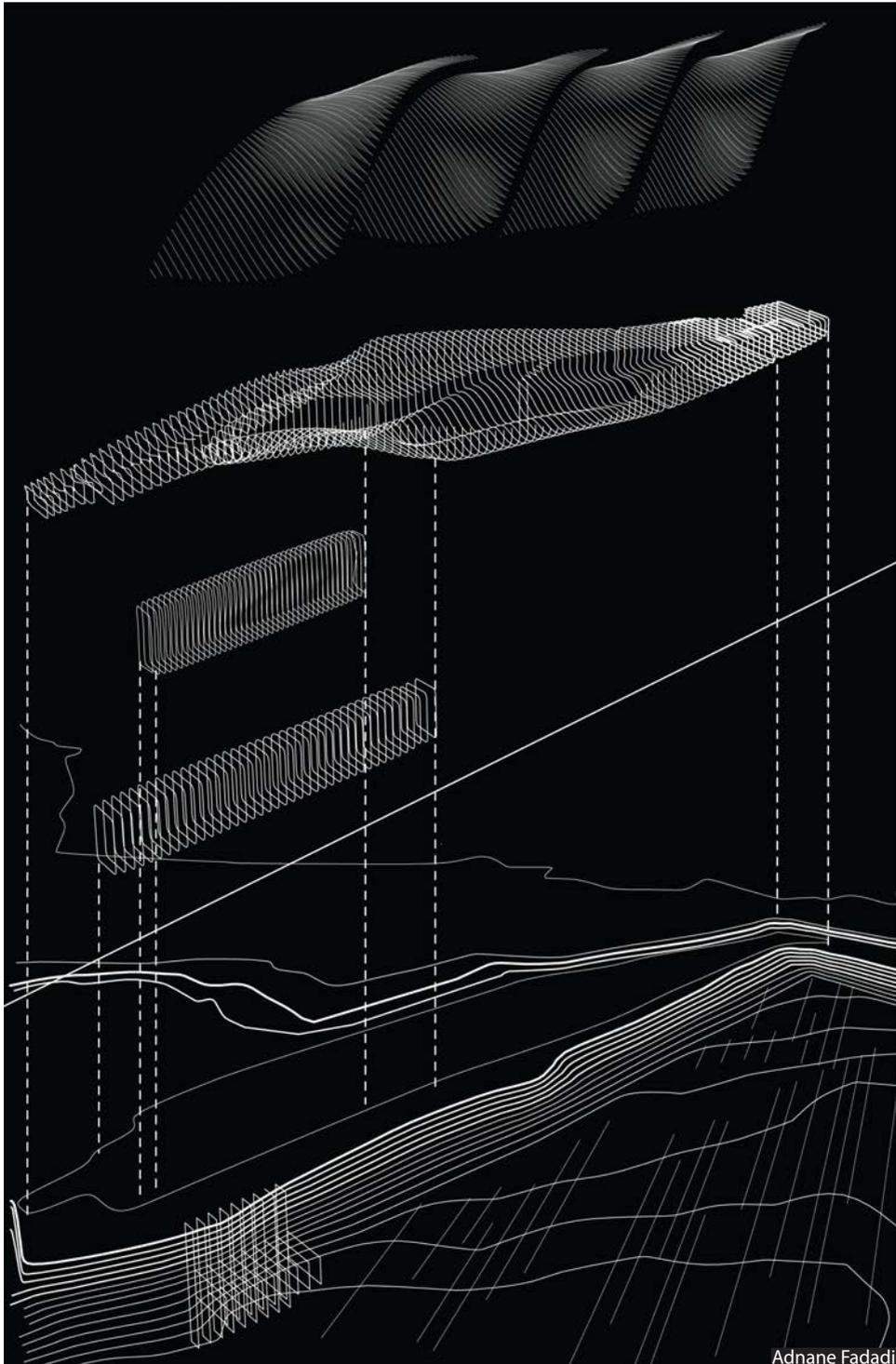
### AIKIDO

This project focuses on independent variables that adapt to local conditions. The essence of the concept is to use the existing forces and energy to create a harmonic and self-sustained system. My inspiration came from nature where different elements are balanced and create optimal condition for human survival. As I was investigation this concept, I came across the art of Aikido. This sport is based on utilizing the existing energy and force for your own advantage. Nature in general and our site in specific have a tremendous amount of energy; Views, streets, topography and climate forces.

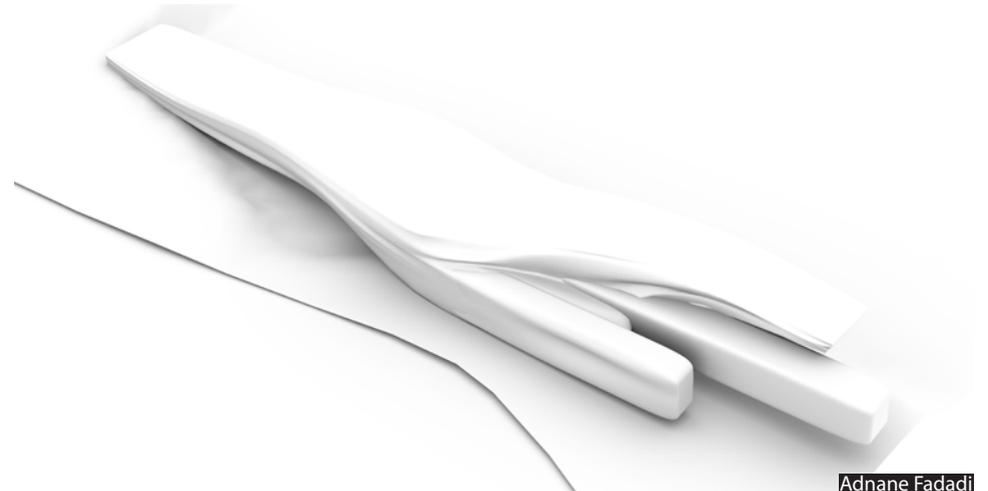
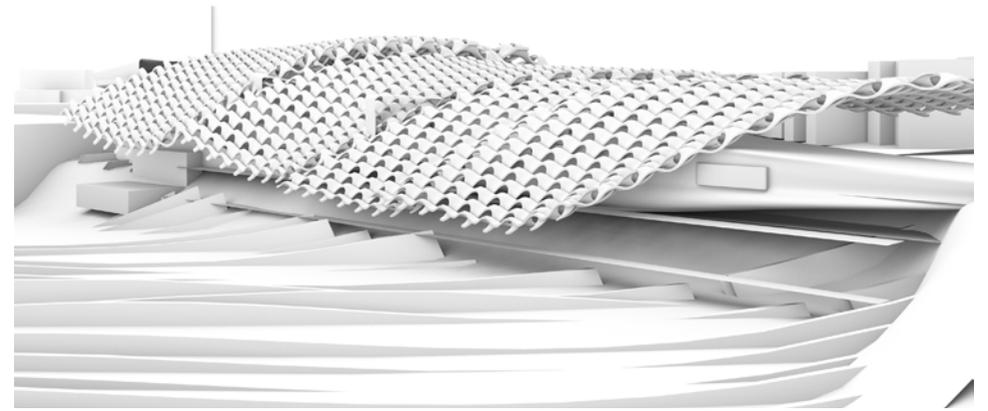
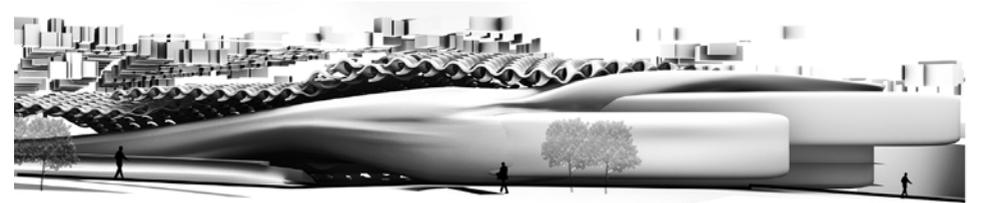


Adnane Fadadi

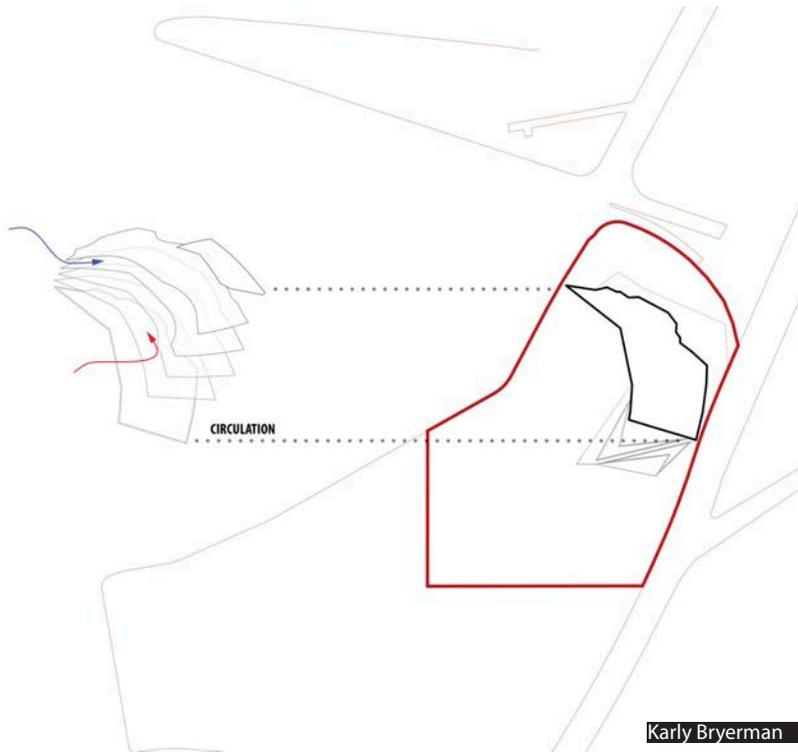
When I quantified those forces, using grasshopper, it became clear to me a great potential for utilizing that energies to generate and enhance the design and performance of the building.  
—Adnane Fadadi, Student



Adnane Fadadi



Adnane Fadadi



Karly Bryerman

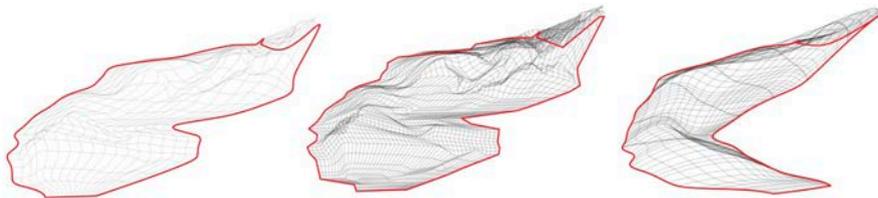
## DATA MANAGEMENT

Through the analysis of my own project, the use of site factors such as noise, pollution, and overall site focus drove much of the design of the geometry. The parametric approach taken was used on a much smaller scale; through the use of fins as a solar shading device, the use of data to drive the design was implemented. As the main façade is composed of mostly glazing, the amount of sun hitting this southern front is fairly significant. By altering the fins to open and close based on the amount of solar radiation hitting the surface, the use of data is extremely important to understand and create a successful system.

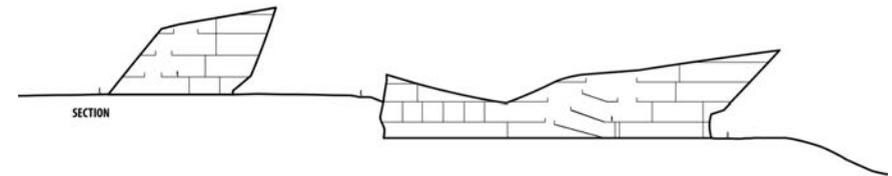
The use of data to articulate built form wasn't clear enough to define the use of parametricism as a unique style. After spending the last few weeks struggling with this concept, I have come to define parametricism as a thought process rather than a definitive architectural style.

At the beginning of the quarter, it was easy to pull data from many different sources and start to piece together a concept that made some sort of analytical sense; that usage of points to define relationships and layers of information to promote hierarchy within a system was possible. The next step in this design process, the jump from loosely made associations of numerical, analytical data to built form, was an arduous task. I was lost between how to translate this into three-dimensional form and how to use the data as a driving force for geometry. From this realization, it was hard to define the use of parametricism as a unique style.

—Karly Bryerman, Student



Karly Bryerman



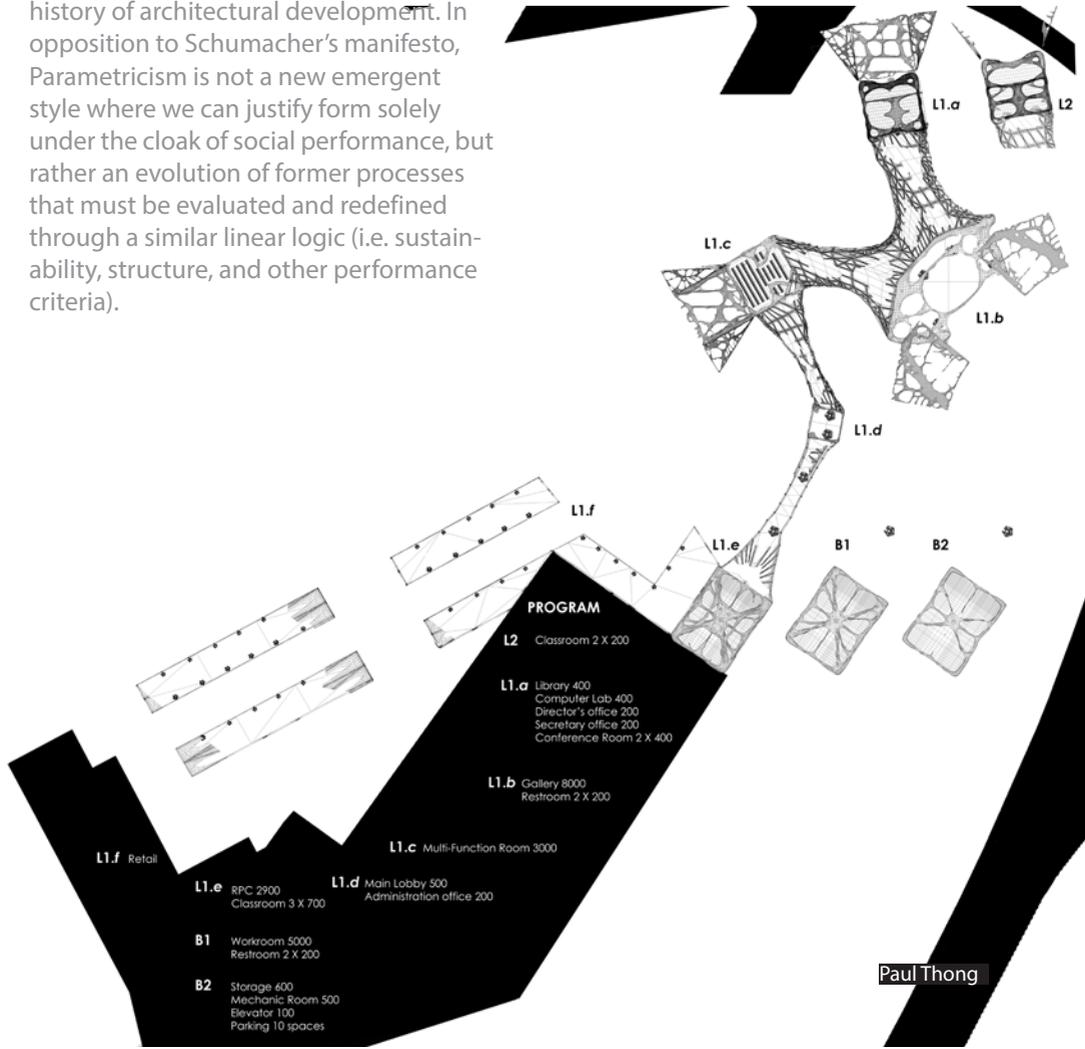
Karly Bryerman

## GENERATIVE MODELING

Has Parametricism become the byproduct of new tools and software being introduced into the field of architecture or is it our new zeitgeist (spirit/style of our times) based on the Darwinist evolution of avant-garde collective design research? Analyzing the benefits and shortcomings of Parametricism, I would argue in favor of the later. As an evolutionary process from basic geometric primitives (square, circle, triangle) to the new vocabulary of Parametricism (nurbs, splines, blobs), there is a certain logic that Parametricism must address that can be traced in the history of architectural development. In opposition to Schumacher's manifesto, Parametricism is not a new emergent style where we can justify form solely under the cloak of social performance, but rather an evolution of former processes that must be evaluated and redefined through a similar linear logic (i.e. sustainability, structure, and other performance criteria).

Architecture encompasses more than just form and spatial design; it has socio-economic and geopolitical implications as well and must take into account several factors beyond basic form generators. There is no script that circumvents the intervention that is required by an architect in new and innovative design solutions. This intervention requires an understanding of past and present design criteria, social responses, and a host of other factors that we may not be able to quantify.

—Paul Thong, Student



Paul Thong

## PROCESS

Programming the Sweet Spot



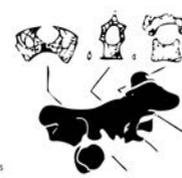
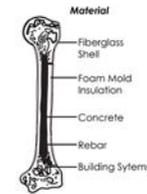
Node-FEA bone growth algorithm



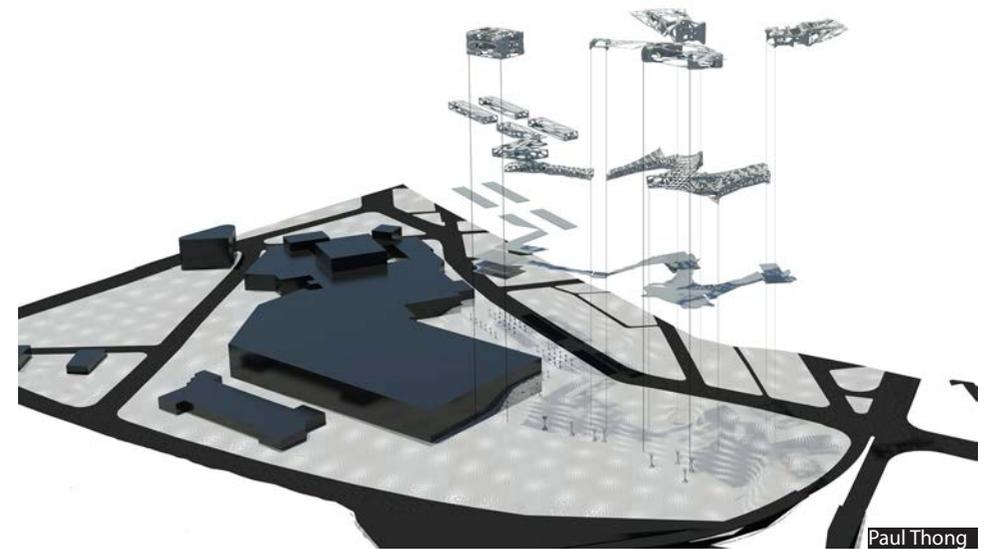
Circulation-Kangaroo physics modeling



## CONSTRUCTION



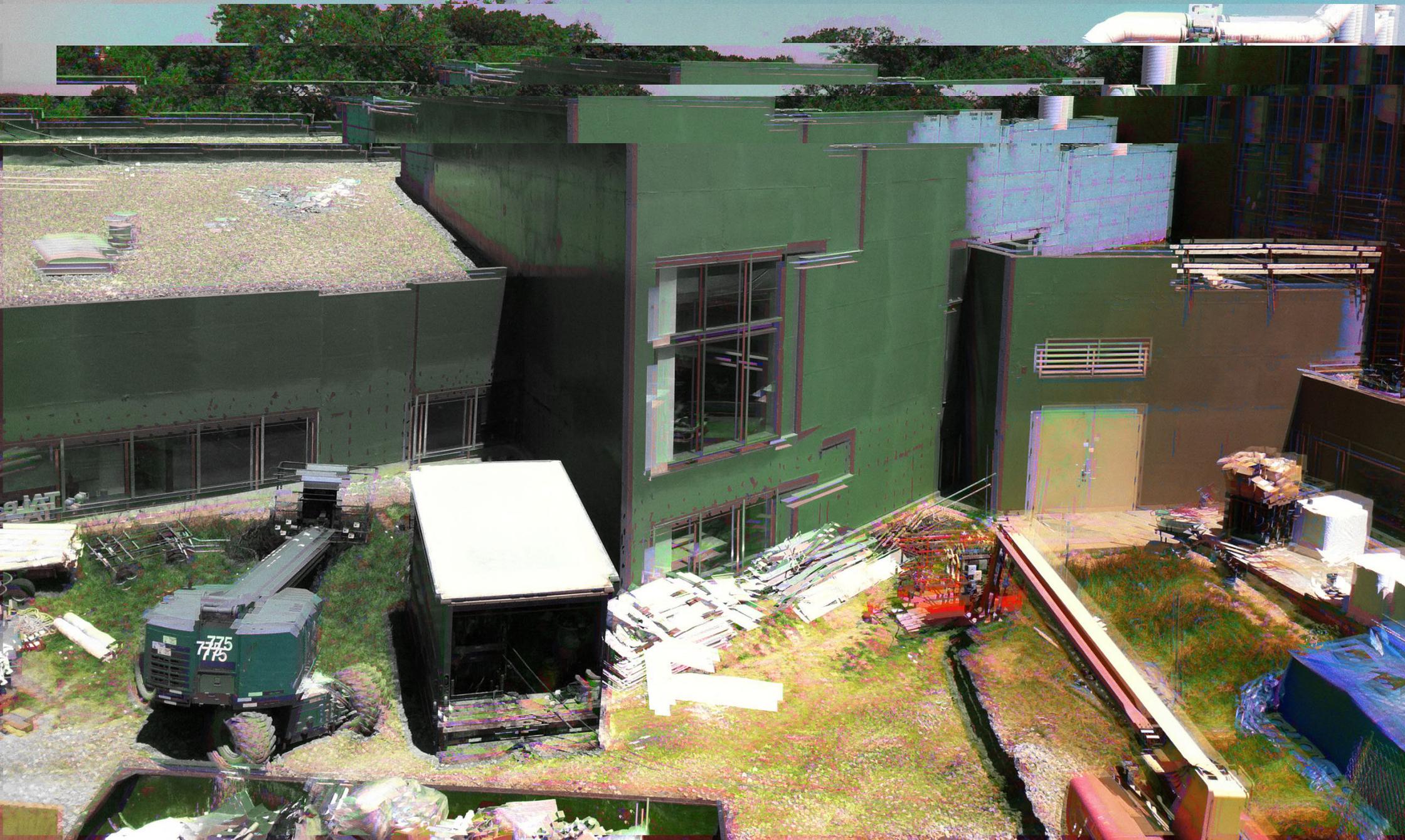
Pneumatic bone (hollow) contains building systems (HVAC, etc.)



Paul Thong

# FOUR. PARAMETRIC TOOLS

TOOLS & TECHNIQUES  
EVOLUTIONARY DESIGN  
MORPHOGENESIS  
PERFORMATIVE DESIGN  
HYBRIDIZED METHODOLOGY





# TOOLS / TECHNIQUES

```
float $scale = `textField -q -text escale` ;  
float $edist = `textField -q -text edist` ;  
proc extrudepoly()  
//poker face to add details. It is a better way than triangulate  
//polyPoke -ws 1 -tx 0 -ty 0 -tz 0 -ltx 0 -lty 0 -ltz 0 -ch 1 $myob-  
ject[0];  
select -r $item;  
//extrude by scale  
//select -r $myobject[0].f[0:9999] ;  
polyExtrudeFacet -ch 1 -kft 0 -lsx $scale -lsy $scale -lsz  
$scale;  
doDelete;  
//extrude again  
select -r $item ;  
polyExtrudeFacet -ch 1 -kft 1 -ltz $edist;  
//-----create UI window  
global proc extrudewin ()  
if ( `window -exists extrudeWindow` ) { deleteUI extrudeWin-  
dow; }  
window  
-widthHeight 300 300  
-title "super extrude"  
-sizeable true  
extrudeWindow;  
//-----two values  
columnLayout  
-rowColumnLayout -number 2  
-width 1 120  
-spacing 1 20  
-width 2 120  
-spacing 2 20;  
extrude scale  
-d -bc 0.9 escale  
extrude height  
-d -tx 0.1 edist
```

## PARAMETRIC BEAUTY

Interestingly some parametricists themselves are somewhat less passionate, if not completely indifferent, about the aesthetic aspect of their works; formative expressions seem to be merely a visual interpretation of the logic and algorithm that operates the generative process. In a way very much analogous to the polystyrene chips that visualizes the magnetic fields, the perceivable forms visualize the complex interactions of architecture factors, in form of statistics. Strictly speaking, however visually a viewer might perceive it, the beauty of rule-driven forms lies not in the form itself, but in the codes—which indicates the notion of beauty here does not refer to its common aesthetic connotation as coding is usually excluded from aesthetic experience; rather, it alludes inevitably to something broader: meaning.

## ALGORITHMS AND MEANING

Can parameters have meaning? Can the algorithm convey meaning beyond mathematical deductions? Statistics can have meanings, but to have architectural meaning a piece of architecture work needs to convey meanings that state not facts, but ideas. Emphasizing architectural correlation with existing built fabric can be an idea, assigning impact values to each street based on amount of traffic flow is a coding language to translate the idea of establishing correlation. Algorithm processing the values is a methodology to interpret the interaction between street traffic and project site—to transform abstract data into perceivable forms that visually communicate the idea. Yet neither the values nor the algorithm itself was the idea.

## EMOTIONAL PARAMETERS

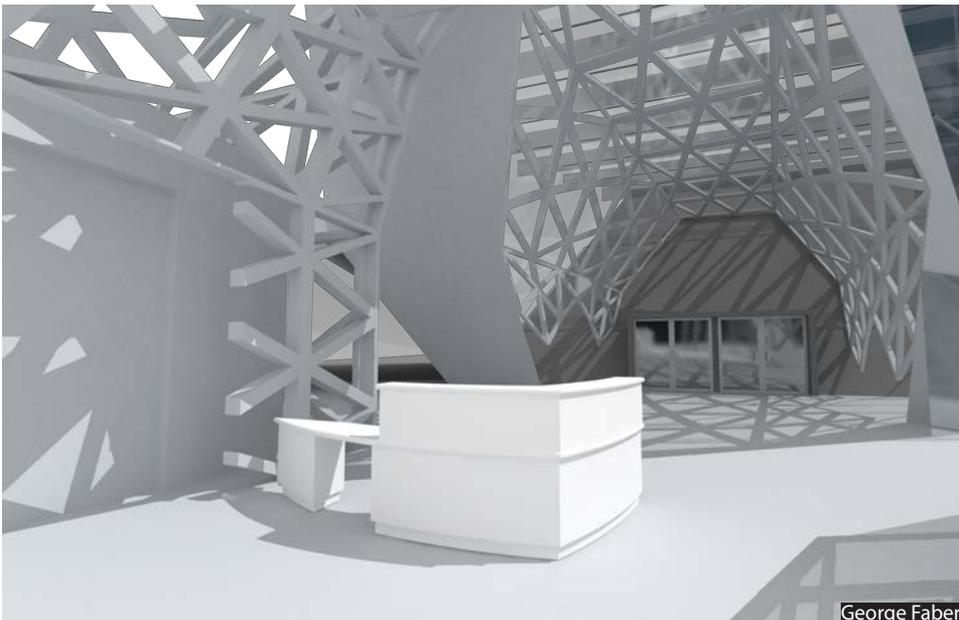
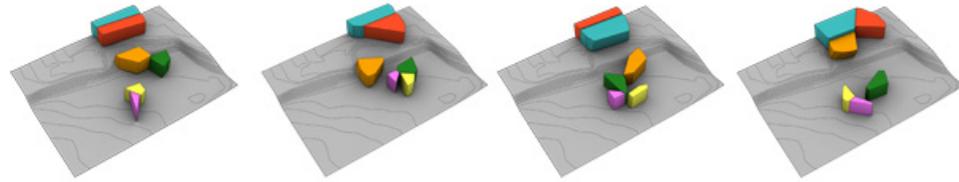
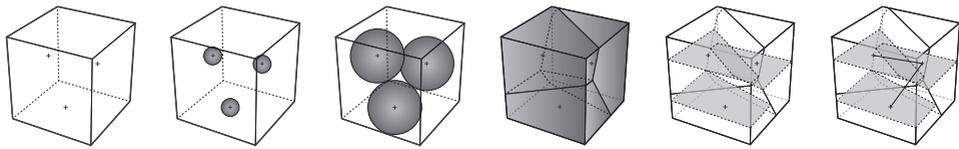
Ideas that gather around a far more complex theme—human emotions—are even harder to parameterize: what value should one assign to represent the expected sacred quality in designing a church? And what kind of algorithm can be applied to interpret this quantity of sacredness into a drastic contrast of light and shade, volume and void? Let alone the more profoundly implanted subconscious and collective unconscious that are not fully understood even by us ourselves.

—Liu Liu, Student

**EVOLUTIONARY DESIGN** is an inherent element in the process of design wither it is realized or not. Everything from idea sketches to initial parti's are chosen and advanced through similar rules to biological evolution. George Faber, Student

This project chooses to glorify this concept by using evolutionary solvers such as Galapagos, a tool in Grasshopper, to drive elements of the entire design. Floor plans and massing models are generated through a series of rules such as required square footage programmatic relationships and then analyzed by the designer to choose which results are able to live on the next generation. The process becomes very linear, similar to a reversed family tree, where the end building is a direct result of the fittest versions that were produced earlier in the design process.  
—George Faber, Student



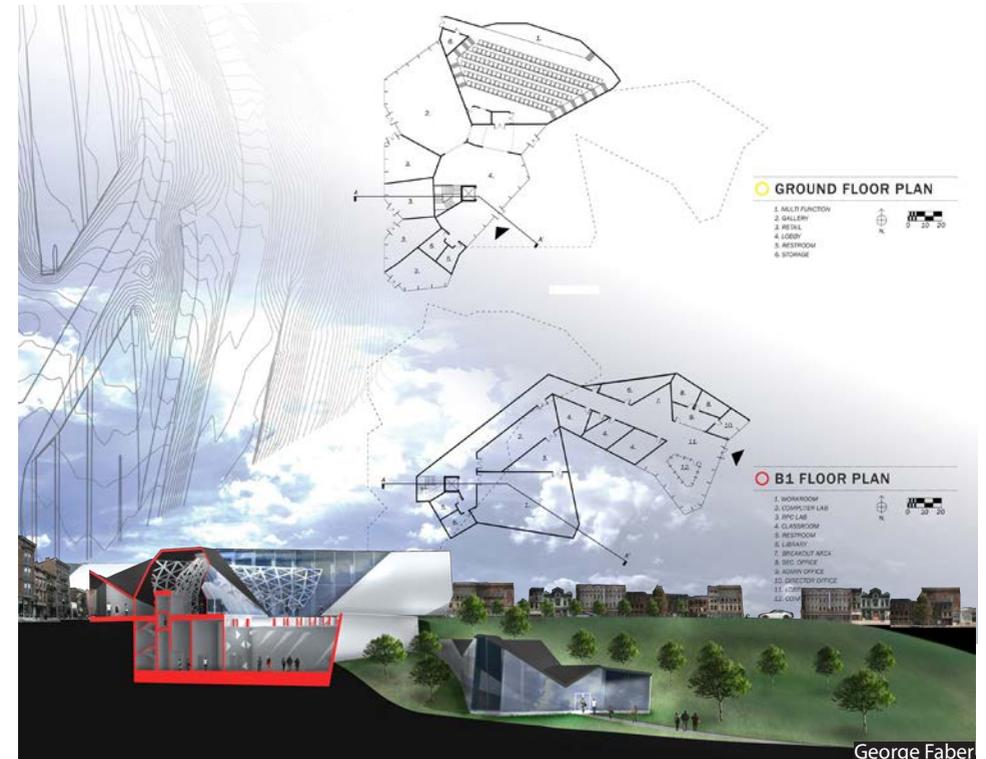


George Faber

## NATURAL SELECTION

Natural selection is the phrase coined by Charles Darwin that explains the process in which biological traits become either more or less common in a given population. It is the theory that justifies why dogs do not have wings and Michael does not need his appendix. It states that not the strongest or fastest but it is the "fittest" that survive. In biology, fitness is seen over generations, a slow process that changes over time. The classic image of the evolution of man displays the gradual change from the hunched over primate to the upright modern man. Although the driving factors are commonly debated, this transition to a more vertical posture is seen to be more "fit" in terms of survival.

—George Faber, Student

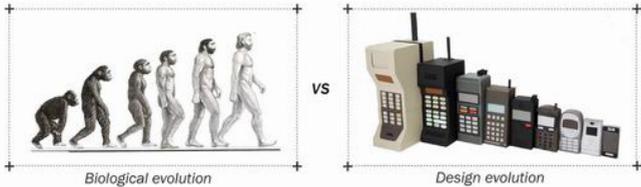


George Faber

## EVOLUTIONARY DESIGN

### BIOLOGICAL EVOLUTION

Natural selection is the phrase coined by Charles Darwin that explains the process in which biological traits become more or less common in a given population. It is the theory that justifies why pigs do not have wings and humans no longer need the appendix. It states that not the strongest or fastest but it is the "fittest" that survive. In biology, fitness changes over generations. The classic image of the evolution of man displays the gradual change from the hunched over primate to the upright modern man. Although the driving factors are commonly debated, this transition to a more vertical posture is seen to be more "fit" in terms of survival.



NO RELATIONSHIP      LINEAR      SUB-DIVIDE      SHORTEST PATH  
**GEN A**      **GEN B**      **GEN C**      **GEN D**

In generation A the only genotype to satisfy is the programmed square footage. Programs are free to move within the given boundary area.

In generation B each program now contains two constraints that must be met. Galapagos positions each program with the minimal distance to its neighboring program.

In generation C each program area is now broken down into the smaller components that make up the space. Similar to how Gen B is developed. Galapagos positions rooms based on a distance.

In generation D control points are given for primary and secondary circulation nodes. Generation D produces the shortest path through these nodes.

DIAGRAM

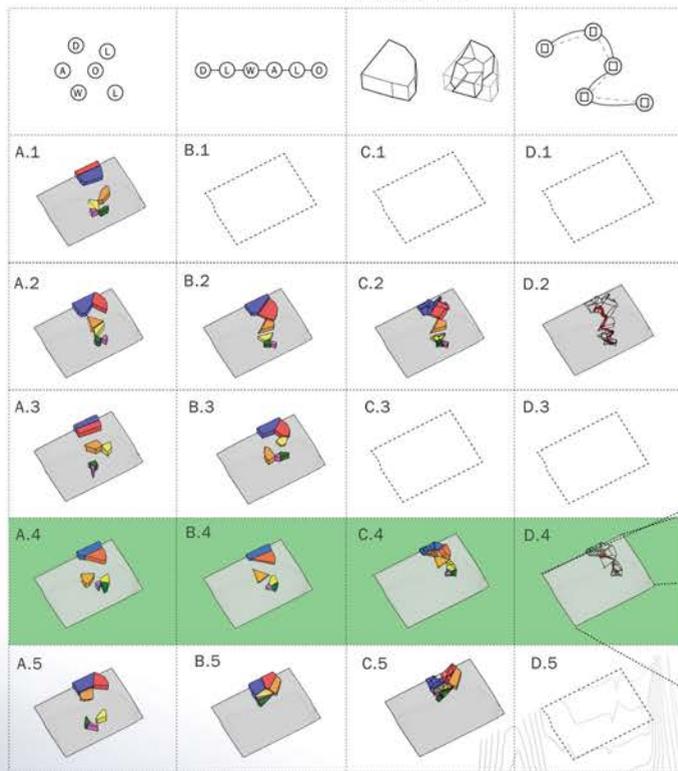
1

2

3

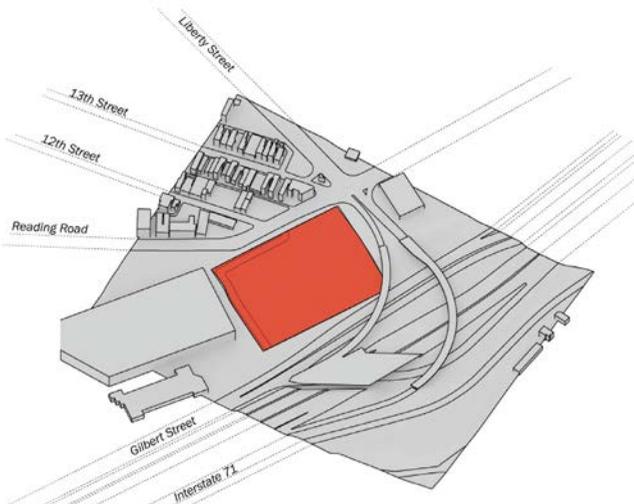
4

5



## SITE CONDITIONS

NEIGHBORHOOD OF PENDELTON, CASINO, INTERSTATE 71



### DESIGNER INTERVENTION

At a point in the processes it is necessary to step away from the evolutionary tools and advance the building with a more traditional approach. After generation D it becomes the role of the designer to distinguish architectural elements such as doors, windows, and interior partitions. A future approach could be to use the evolutionary tools to define these elements (retail must maintain 80% opacity, or using solar analysis to position glazing, etc.).

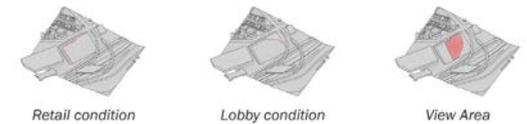
### DESIGN EVOLUTION

Design is very similar to this process. In the design profession this is often referred to as prototyping. Cell phones, clunky and large at first, have changed to become sleeker and more portable devices. This can be seen as a direct result of technological advances, designer aesthetics and user preferences. None the less, the cell phone has had qualities that have lived on through multiple generations, such as the key pad for dialing numbers, and others that have died off, such as external antennas.

## GENERATIONS

### BASE CONDITIONS

The base generation must have its origin established within the project guild lines. Elements such as site orientation, programmatic breakdown, and social context are addressed at this stage. Constraints are put into place such as the display/sell program must hold the street edge to promote a healthy retail environment. The main lobby program must fall as an extension of 12th street to expand upon the existing neighborhood grid. The remaining program must fall within an area of the site with views to key landmarks in the area. This area was determined by calculating shadows onto the site by boarding elements such as the casino parking lot, interstate 71, and the elevation change along the northern edge.



**DISPLAY/SELL: 10,600 SF**  
 Gallery - 8,000 s.f.  
 Storage - 600 s.f.  
 Retail - 500 s.f.  
 Retail - 500 s.f.  
 Retail - 500 s.f.

**MAIN LOBBY: 6,500 SF**  
 Lobby - 500 s.f.  
 Public Gathering - 3,000 s.f.  
 Multi Function - 3,000 s.f.

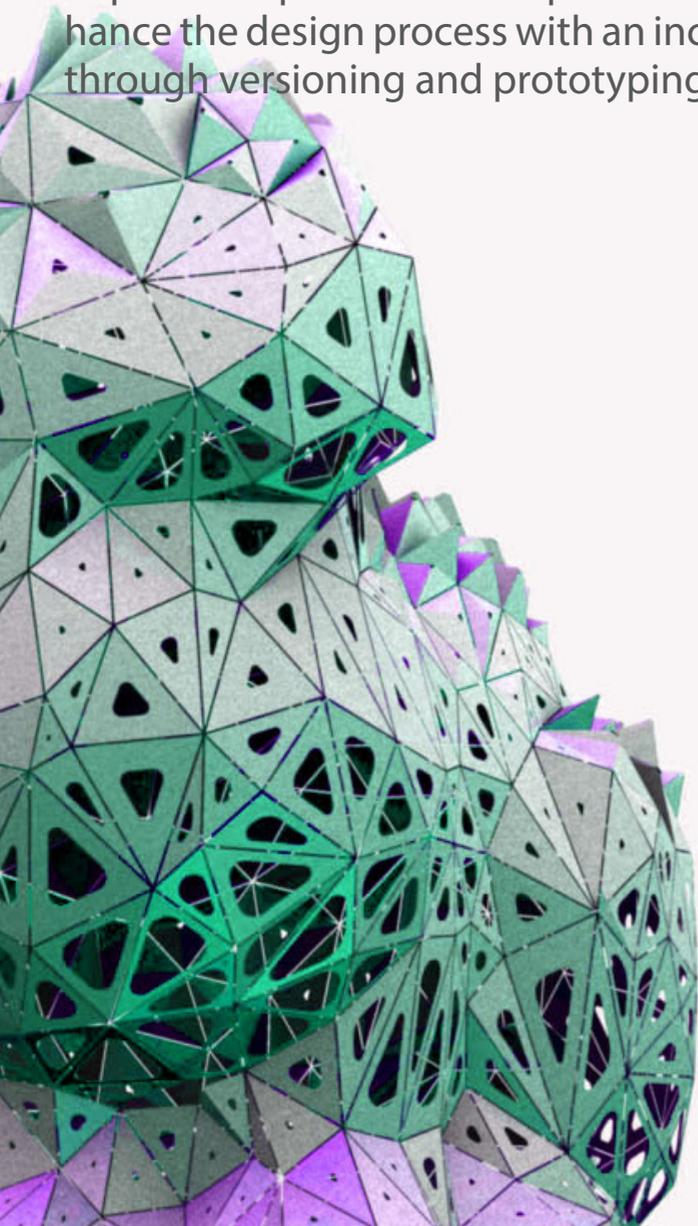
**WORK: 5,000 SF**  
 Workroom - 5,000 s.f.

**LEARN: 2,900 SF**  
 Library - 400 s.f.  
 Computer Lab - 400 s.f.  
 Classroom - 400 s.f.  
 Classroom - 400 s.f.  
 Classroom - 400 s.f.

**ADMIN: 1,400 SF**  
 Admin - 200 s.f.  
 Dir. Office - 200 s.f.  
 Sec. Office - 200 s.f.  
 Conference - 400 s.f.  
 Conference - 400 s.f.

**OTHER: 900 SF**  
 Rest room - 200 s.f.  
 Mechanical - 500 s.f.

**MORPHOGENESIS**, a term imported to architecture from the field of biology, seeks to reconcile challenges previously resolved by nature through the utilization of biological parallels such as growth and adaptation. In architecture, the term implies computational and procedural modelling to enhance the design process with an increasing complexity through versioning and prototyping. —Hans Koesters



#### PERFORMATIVE MORPHOGENESIS

Morphogenesis is an interesting branch of digital design that offers several opportunities in the way of “form generation.” Although it has been stated that “performative morphogenesis as a theory produces a transition from a design paradigm of form making to one of form finding,” I see an opportunity for play between both these processes within the branch. With advanced work by Peter Macapia and Mercedes Benz labs, just to name a few, we are seeing how the application of stresses can help reduce structure and allow for the digital redesign of form.

This is particularly important in that one of the structural goals of an architect is to reduce material usage in structure for maximized performance. We are also seeing how this is starting to form a whole new branch of structural rationalism that allows these structure based forms to be expressed as art. I can see several opportunities for this coupled with the work of Steven Holl and his work in porosity. Environmental applications could work in conjunction with solar geometry and wind pattern studies with a goal of alternative energy to fuel buildings. —Paul Thong, Student

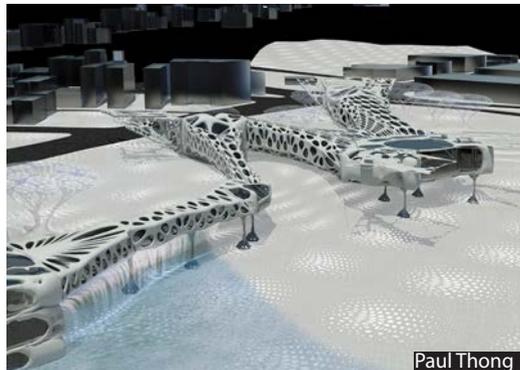
## COMPLEX NETWORKS

Within the discourse of Parametricism, Manuel DeLanda has raised a great question with his philosophy of emergent behavior or random unexplained phenomena within a city system. In response to this, the butterfly effect attempts to explain what is perceived as random emergent behavior as a set of scripted actions and reactions that is in fact not random, but the result of an incredibly complex network of interactions beyond the limits of our comprehension. Rooted in the chaos theory, the butterfly effect has a sensitive dependence on initial conditions, where a small change on one end of a nonlinear system can result in large differences to a later outcome. It is at this point that the architectural intervention is initiated in programming and prioritization of design factors in an attempt to create a structure that mitigates the plane between art, artist, and the community.

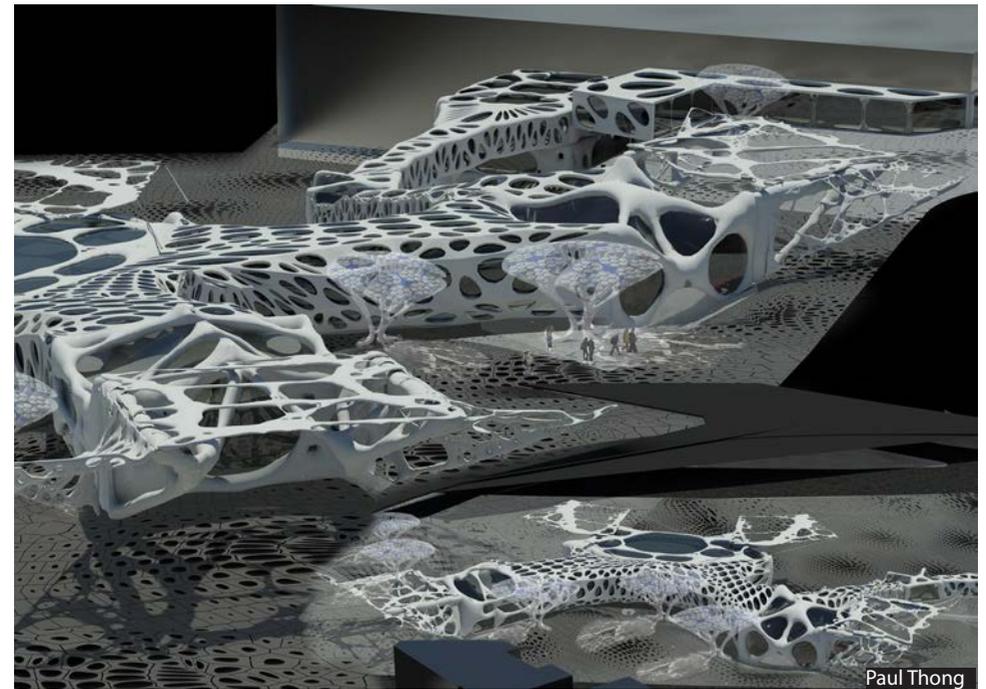
This idea of a complex network of life's interactions is embedded in methodological naturalism. Methodological naturalism is the idea that all scientific endeavors (hypotheses and events) are to be explained and tested by reference to natural causes and events in an attempt to explain what nature is. Using the natural universe as a driver, Biomimicry (innovation inspired by nature) and its 3.8 billion years of research and development offer imaginative solutions to many of the problems that we are dealing with as designers.



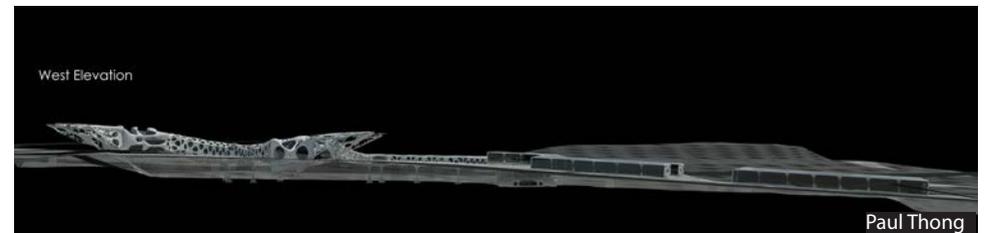
Paul Thong



Paul Thong



Paul Thong



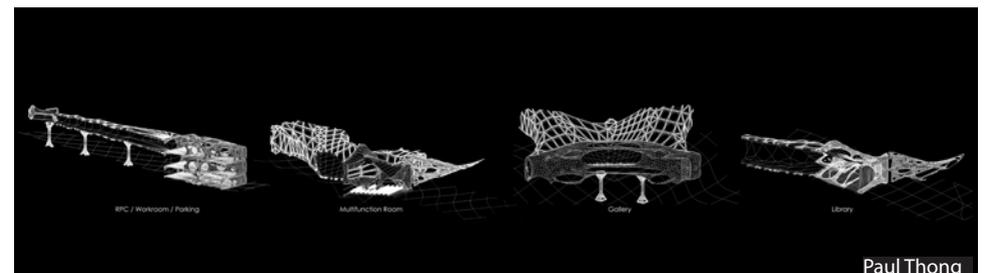
West Elevation

Paul Thong



East Elevation

Paul Thong



RPC / Warehouse / Parking

Multifunction Room

Gallery

Library

Paul Thong

## MODELLING METHODS

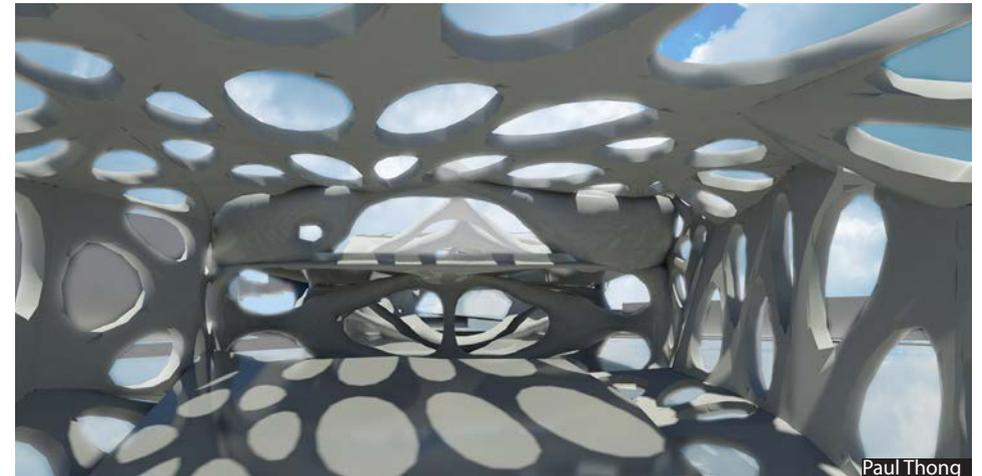
Nature interacts and reacts as DeLanda has stated in his theoretical discussions of algorithmic modeling. Man has an action and reaction with the natural environment; it has an action and reaction to other environmental conditions. I see performative architecture and kinetics as an evolution and monumental shift in the world of architecture.

So what is Parametric thinking and how can we begin to utilize its genius into our architectural mentality. One answer is stated within the documentary "Between the Folds" by Vanessa Gould on advanced origami. The rules of origami are simple: one sheet, no cutting, no pasting. Every action within this art is neither additive nor subtractive, but rather a morphing and form-changing of an element (paper) "muscle" memory. In the film you will see the correlation between mathematics and origami and how this discipline is neither art nor science, but a combination of both. A portion of the movie touches on Erik Demaine, a young professor at MIT, who has proposed that by learning the way proteins unfold (an origami solution) we can advance genetic engineered medicine to possibly cure some of the most prevalent diseases and viruses of our time. I particularly found interesting his solution to a 30 year old problem of "what shapes can you form with multiple folds and one cut." The answer is anything and everything. Origami has become a mathematical art that, through a new level of complexity, can find solutions to questions we never saw. I see Parametricism and these new branches of digital design in the same light for architecture.

This project intends to solve the parametric criteria of our studio using morphogenesis and FEA (finite element analysis) to evolve primitive geometries into complex nature based structure. Using a bone growth algorithm, this process adds information to matter as a new typology of structural rationalism.  
—Paul Thong, Student

## PERFORMANCE & STRUCTURE

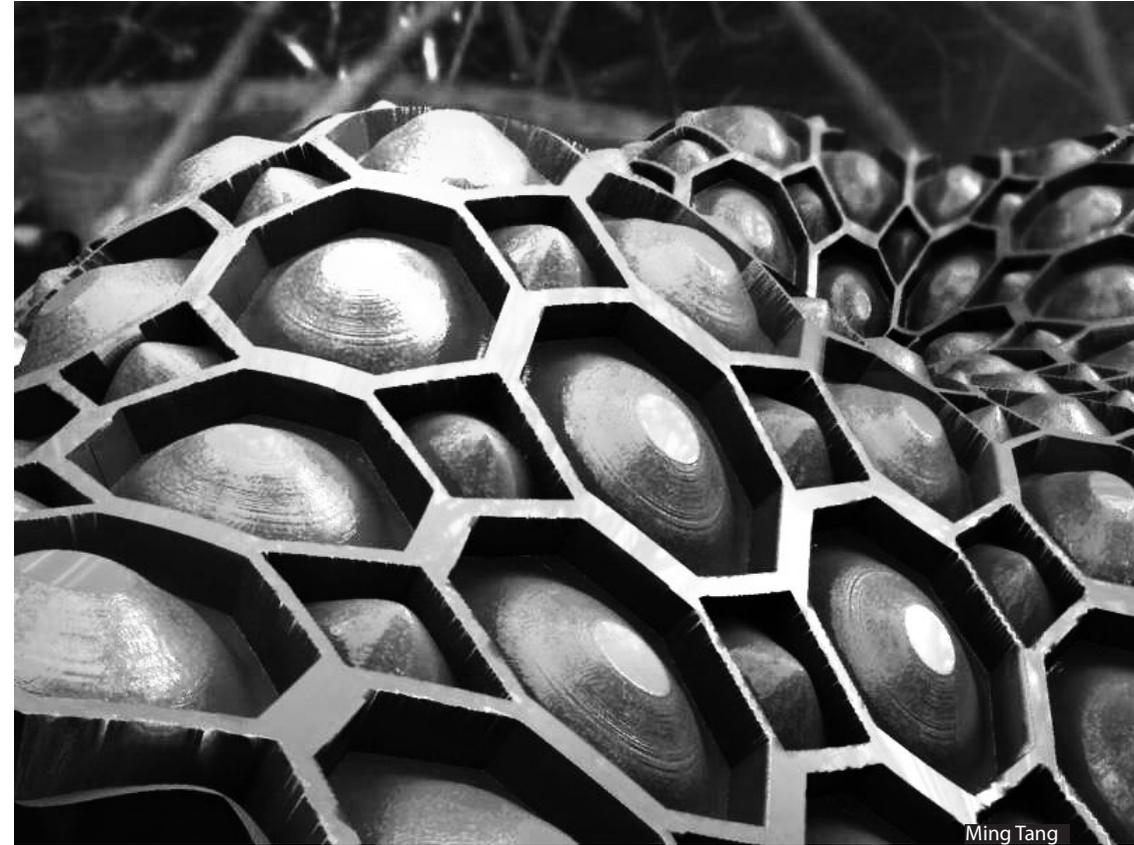
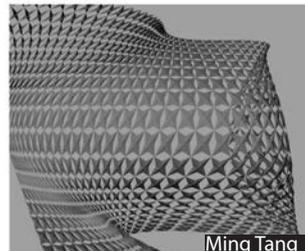
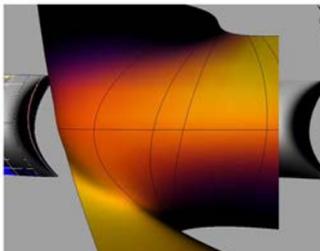
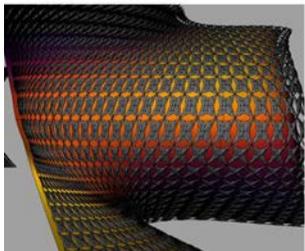
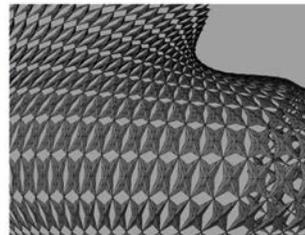
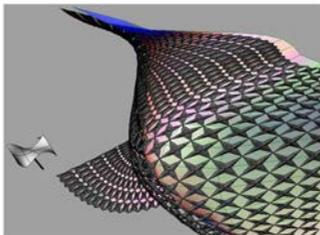
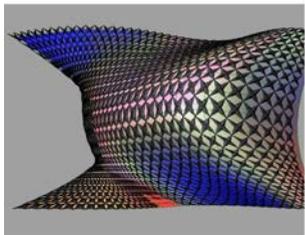
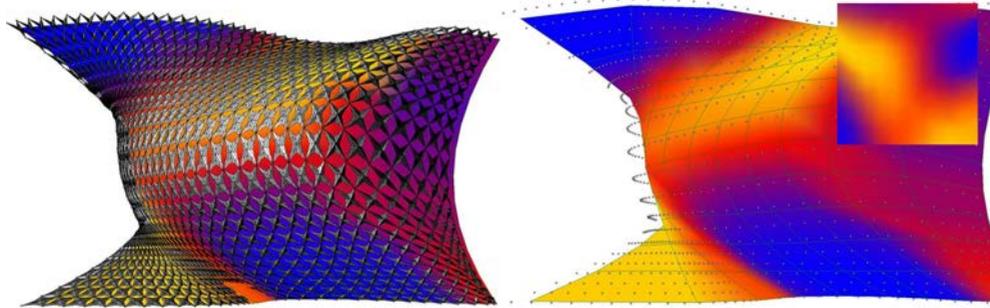
Within the discovery of form and use of performance-based design, I engaged in a deliberate design process that maintains dynamic yet controlled complexity. By setting parameters within both analog and digital processes, I attempted to avoid arbitrary or isolated decisions and create a sense of varied order. Within the design of the building envelope, the structural system sets up the first level of order; after establishing a semi-regular column bay, I used a modified diagrid system with a range of optimal column angles and points of connection to create controlled variation. Within the triangulated surfaces determined by the structural system, controlled geometric subdivisions and varying sizes of openings based on solar simulations create a secondary level of order within this dynamic hierarchy. These systems carry into the overall site layout, landscape, and circulation, establishing a correlation of building systems within a unified whole. The folding concept and resulting triangulated forms, spaces, or patterns translate readily across all of these systems in both plan and section and at varying scales. This contemporary application of gesamtkunstwerk intensifies the relationship between systems, lending greater meaning to their design and making the strongest argument for Parametricism. —Jennifer Colley, Student



# PERFORMATIVE DESIGN

is not only economically and environmentally imperative for our future as architects, but it will provide the impetus for new forms more suitable to a digital age. Forms will not only be a manifestation of our continued exploration of natural systems, but also a self-reinforcing design that can dynamically respond to environmental conditions. Static formalism and functionalism will, by necessity, become a thing of the past.

—Hans Koesters, Student



Ming Tang

## SUSTAINING DESIGN

Exploration of natural systems from the microscopic to the universal unearths vast design potential for overlaying cultural, ecological, and life cycle flows toward determining new architectonic strategies. Concurrent with sustainable thought, architecture must not simply define form, but rather perform various functions beyond those conventionally associated with buildings. Designs should strive to be environmentally responsible while advancing inventive conceptual solutions. Although proposals should be technologically feasible, they may suggest fantastical architectural visions of a sustainable global future.

—Ming Tang, Professor

## KINETICS

Performative architecture and kinetics is a promising branch of the profession that provides creative answers to timeless problems. While performative architecture has a plethora of possible solutions to problems such as heat gain, aerodynamics, alternative energy, and so on, I also see solutions for what Schumacher would term as the social performance of space. Performative architecture, particularly kinetics architecture, offers the possibility of movement and animations to spaces—the ability to turn what was one static forms into a ballet of movement and interaction. This key component offers an essential answer to search for “nature” within the field.

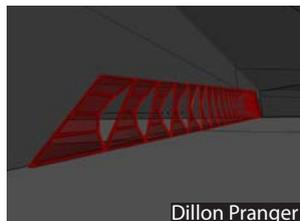
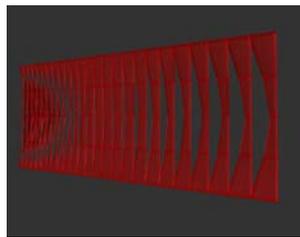
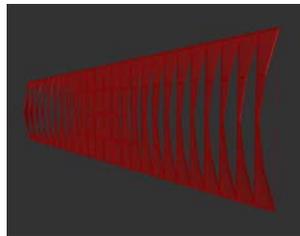
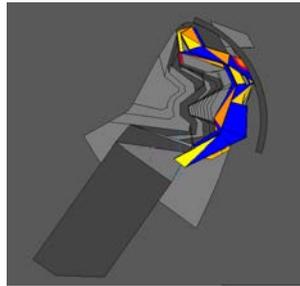
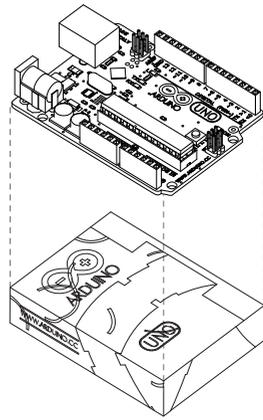
—Paul Thong, Student

## AUGMENTED MEMBRANE

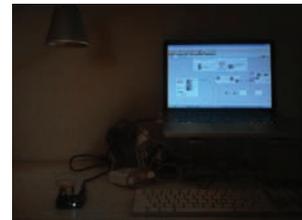
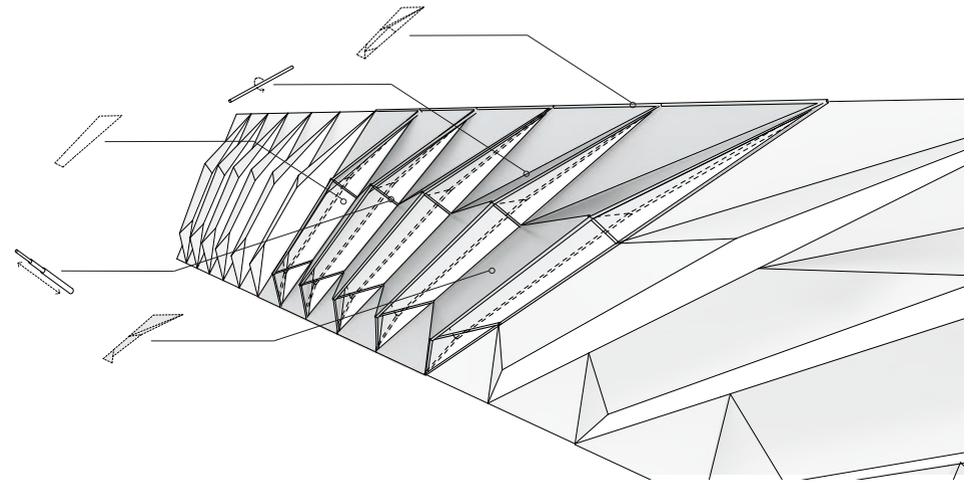
In order to successfully create a system that responds at both the urban and local scale, one must also consider a bottom-up design philosophy in conjunction with the previous top-down design approach. This bottom-up approach is better defined within the building's performance and system optimization, rather than formal assemblages. In this renewed framework, The Art Center in Pendleton is now able to incorporate the concurrent constitution of a medium that consistently produces appropriate responses out of a multitude of stimuli. Using microcontrollers, as well as predefined programmatic data, The Art Center in Pendleton's aperture system collects and responds to environmental data thus allowing the building skin to continually evolve and update. Being a truly bottom-up design approach, the system's outcome is completely defined by live data, which cannot be fully realized until its translation onto the building's skin.

This medium between parametric thinking and parametric design allows a deeper rationalization for building optimization. Not only does the designer now have the ability to integrate contextual forces through a parametric thinking process, but also the opportunity for further articulation in building performance through parametric design processes. This harmonizing of the two design approaches allows for each design theory to expand its design possibilities while still being governed by the other. Therefore, instead of forcing one to decide between a parametric thinking or parametric design approach, instead parametricism should be used as a vehicle to facilitate the growth of a city, site, and building through certain parameters, while giving way to others. This approach to parametricism allows for the successful achievement of an overall form that is responsive to itself and its current contextual environment, as seen in The Art Center In Pendleton.

—Dillon Pranger, Student

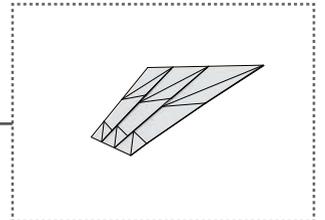


Dillon Pranger



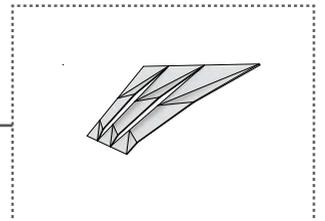
Read Sensor Values

67



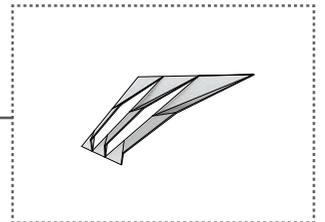
Read Sensor Values

486



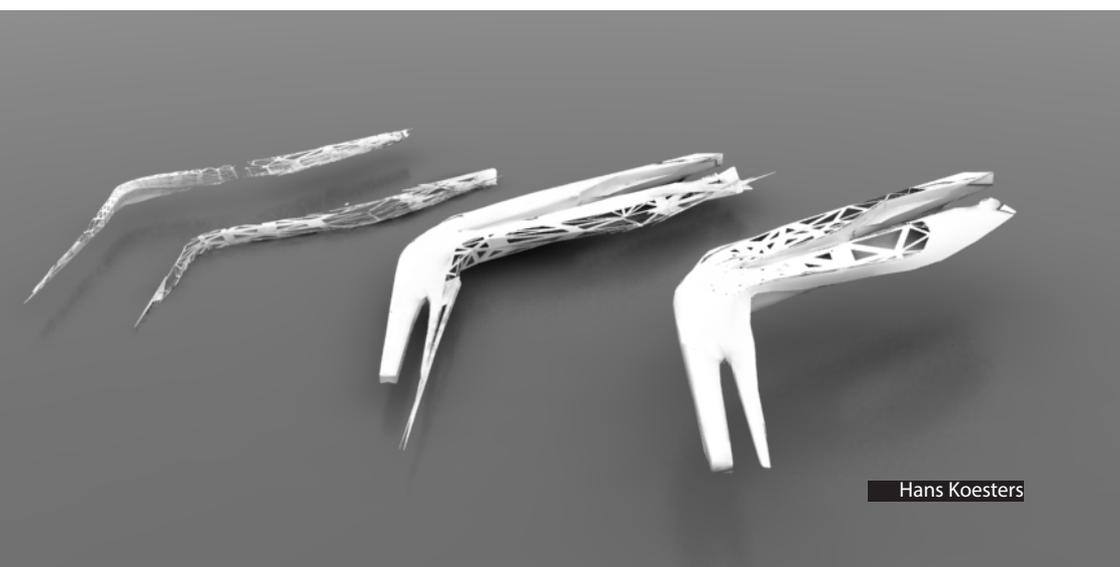
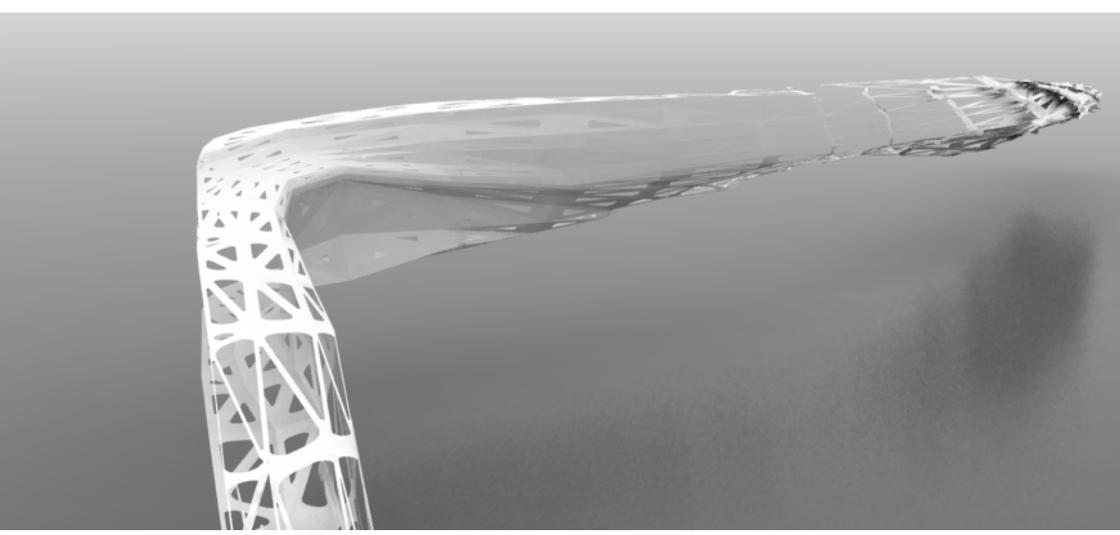
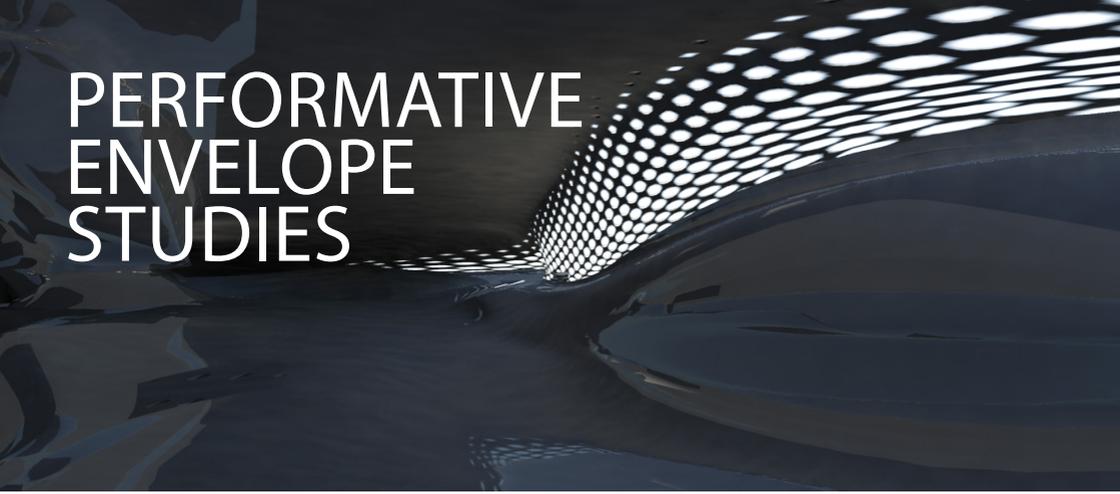
Read Sensor Values

990

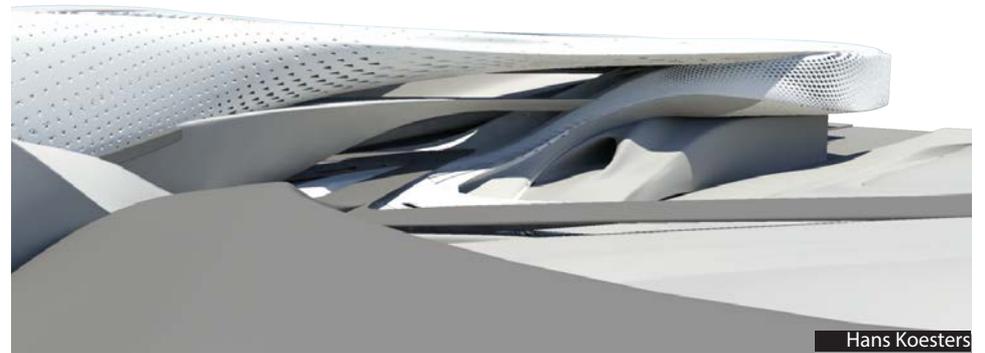
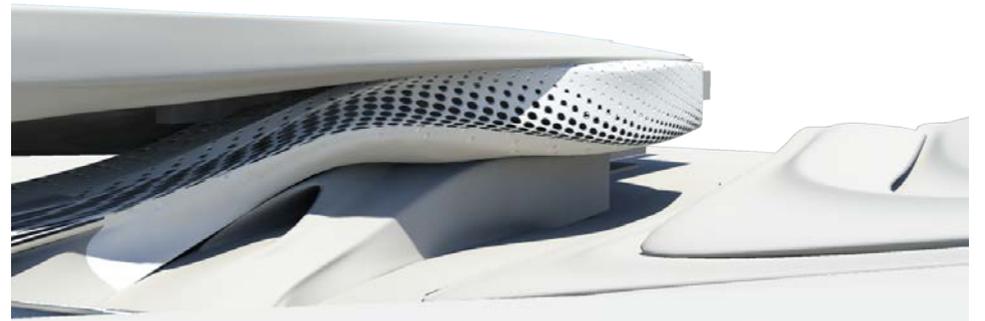
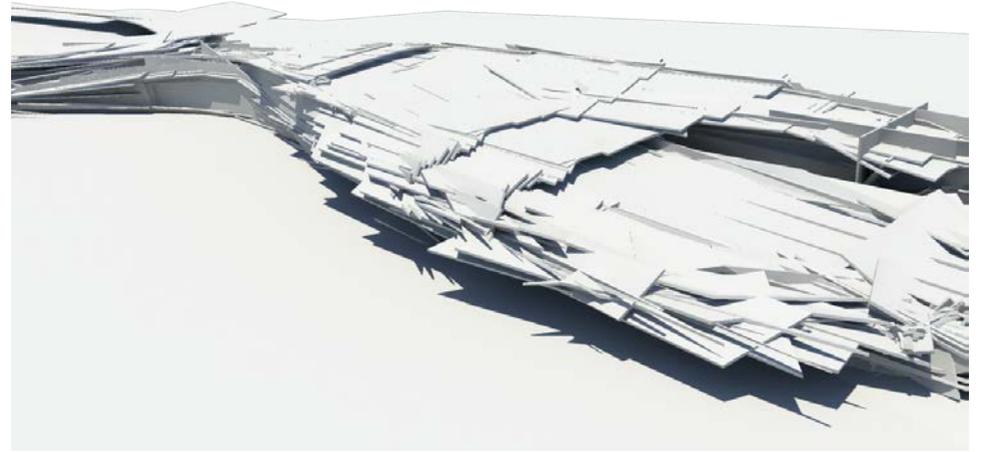


Dillon Pranger

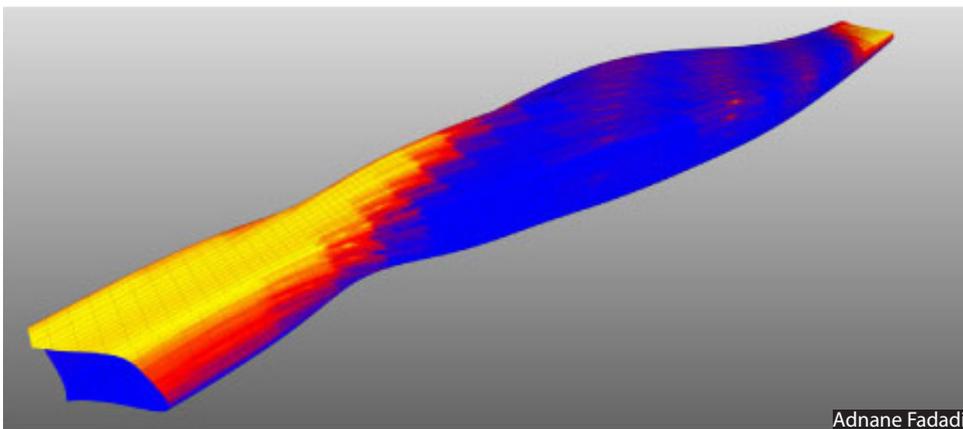
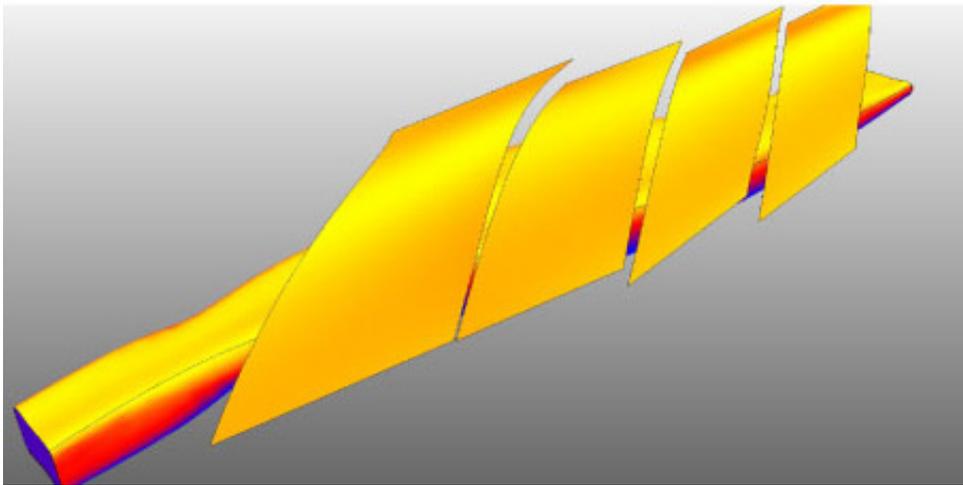
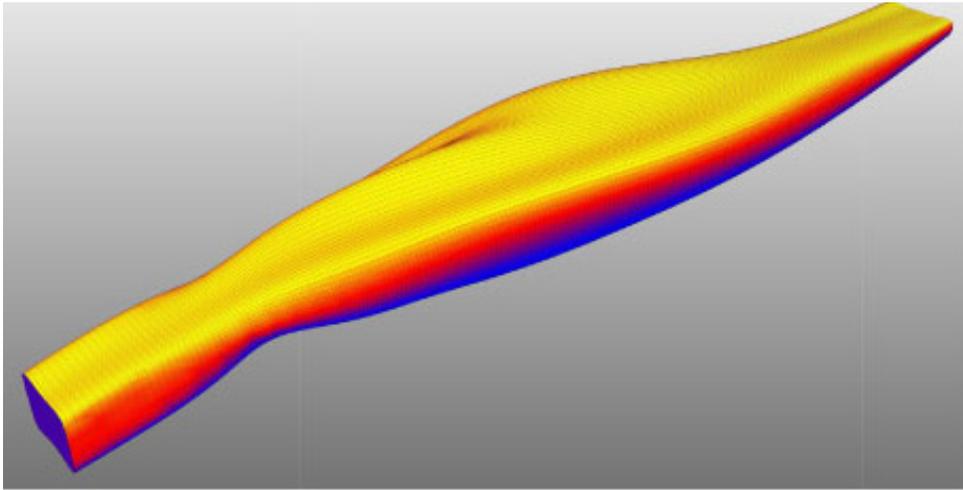
# PERFORMATIVE ENVELOPE STUDIES



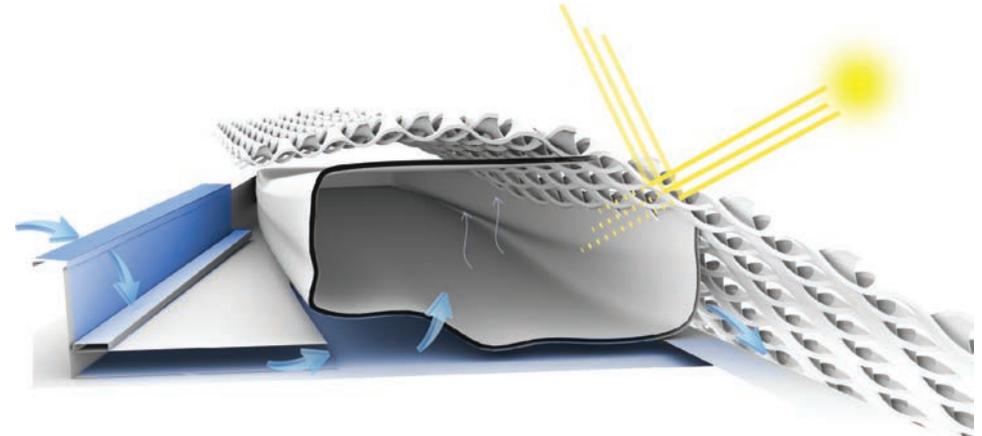
Hans Koesters



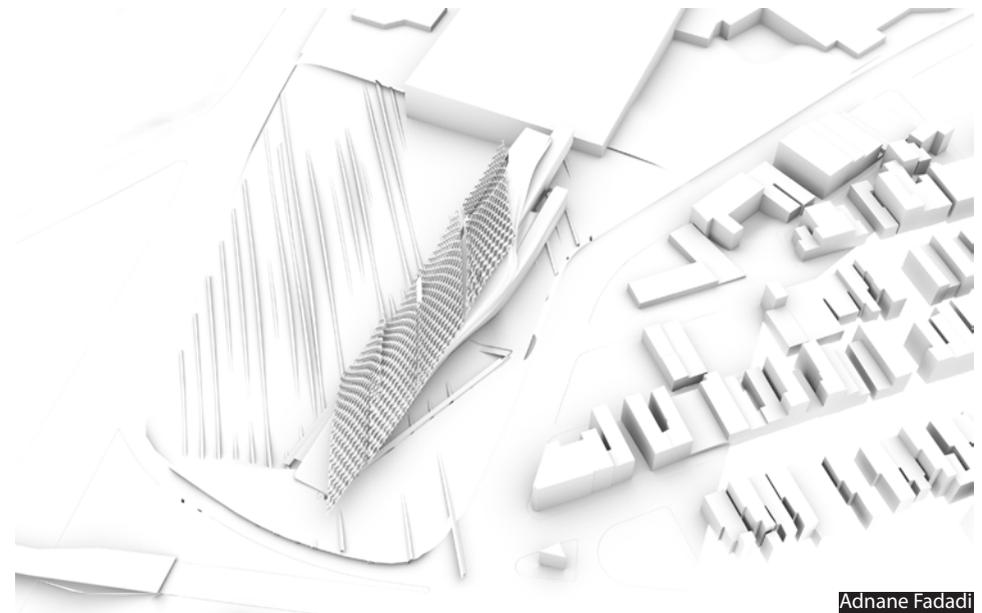
Hans Koesters



Adnane Fadadi



Adnane Fadadi

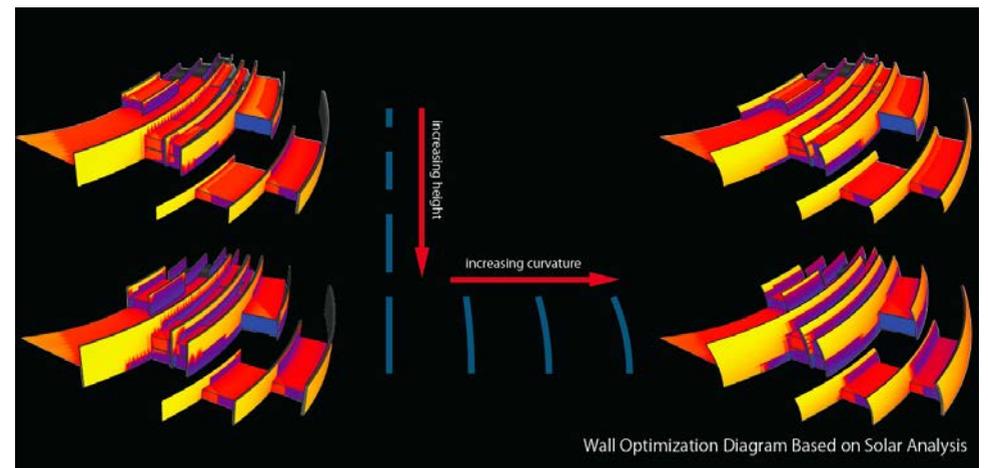
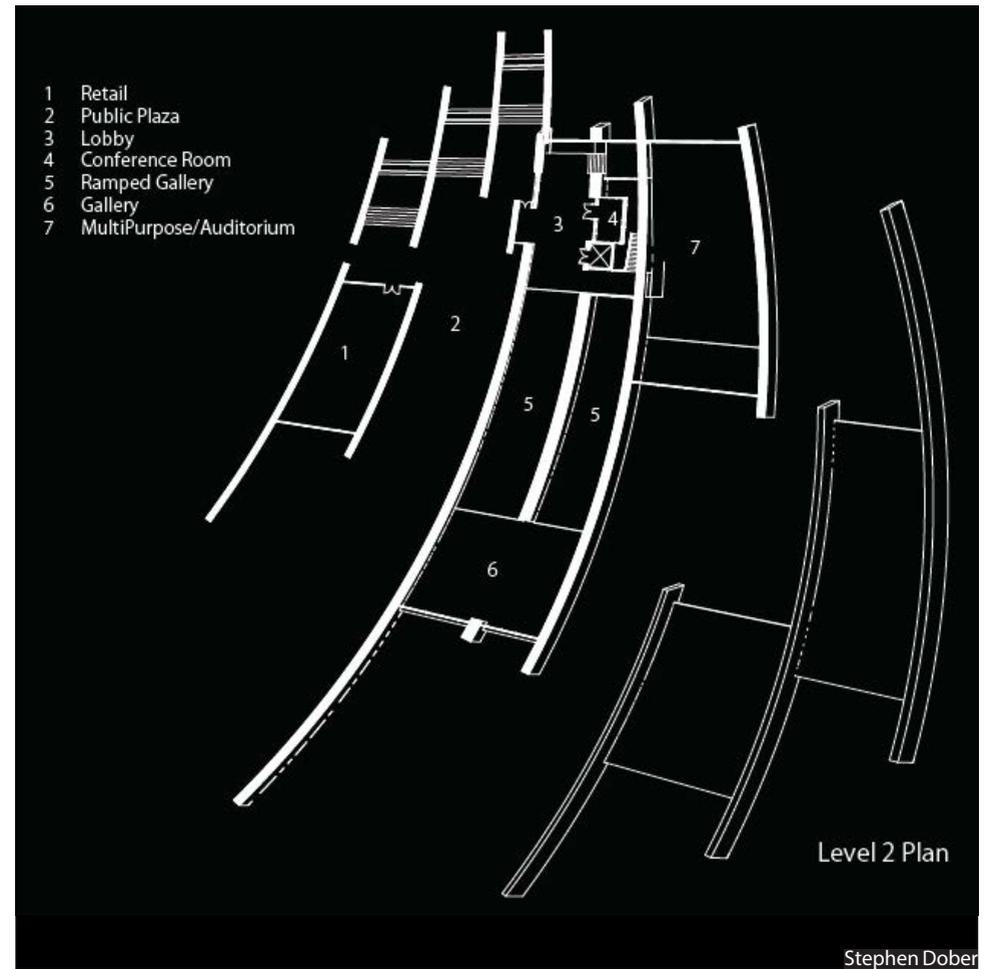
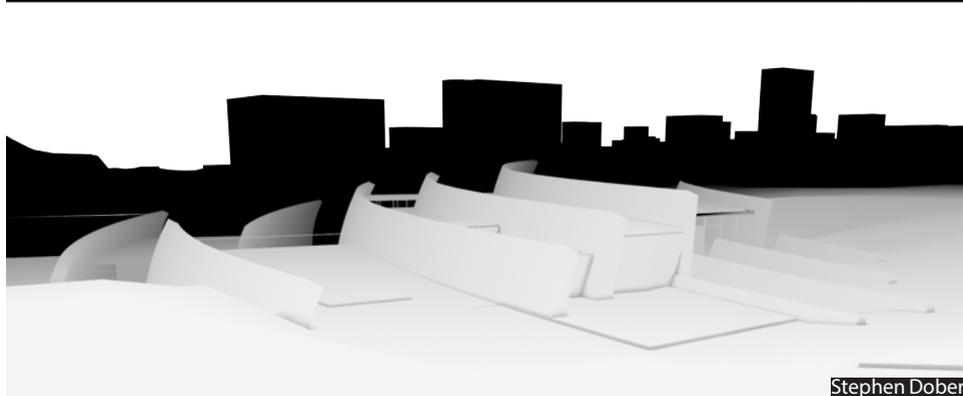
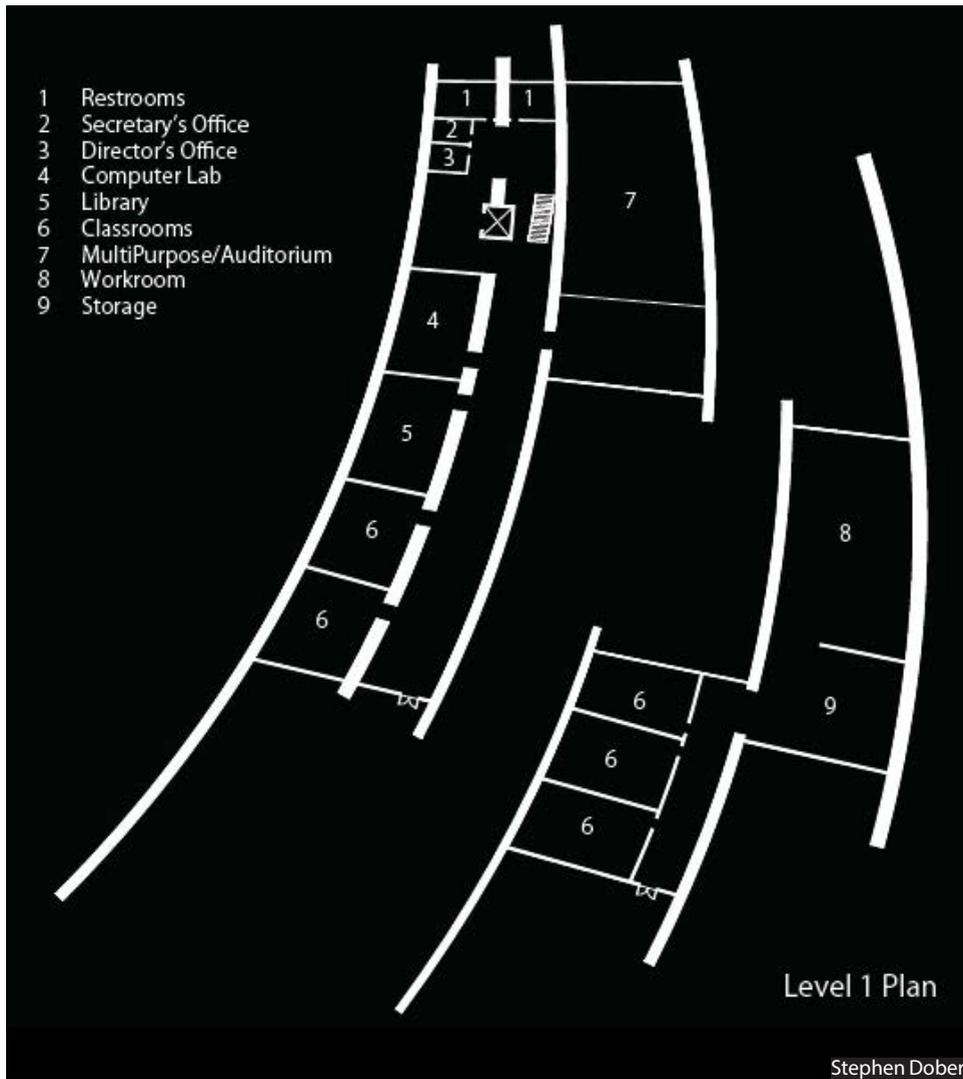


Adnane Fadadi

#### PERFORMATIVE SKIN

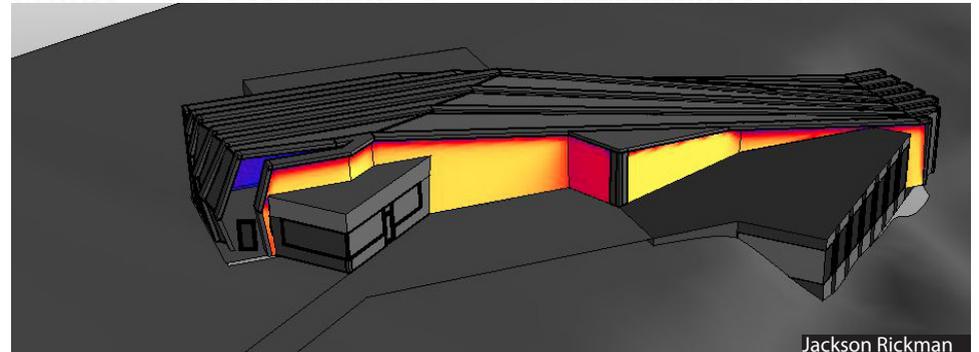
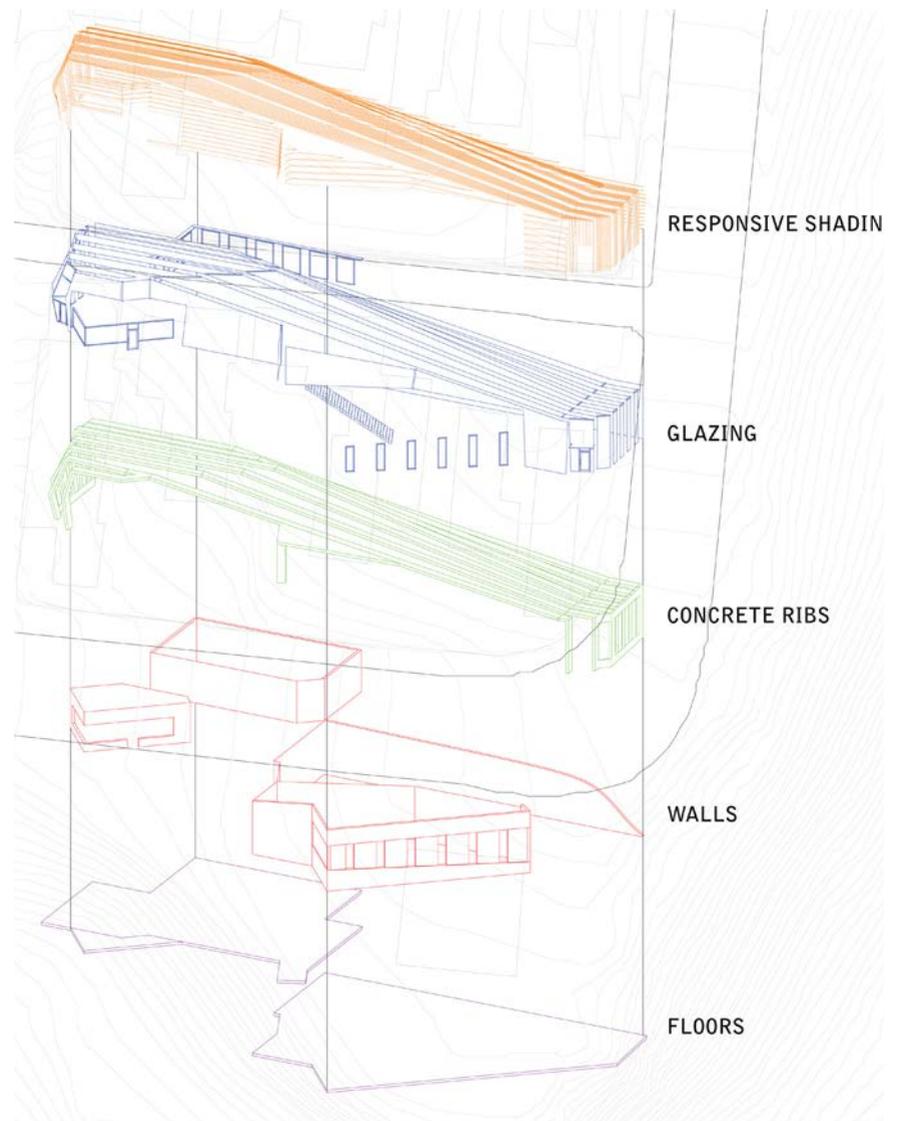
As far as the façade of the building goes, a system of interwoven structure was adopted. Interwoven surfaces are structurally made. The other reason was to further extend the capabilities of creating generative surface components housing various forms of information and functionality resulting in a responsive building skin.

My ultimate goal was to improve the light conditions and creating different micro climate areas inside the facility. Those structures will be also are engineered for water collection during heavy rain storm.  
—Adnane Fadadi





Jackson Rickman



Jackson Rickman





# HYBRIDIZED PROCESSES

allowed students to explore parametric formalism while working within the extents of familiar design methodologies. Parametric tools were exploited as a means to define more dynamic building skins. —Hans Koesters

## HYBRIDIZED PROCESS

With an understanding of the limitations of parametrics to effectively replace the conventions of architectural analysis and site design I set out to develop a building that merged traditional techniques with those of the parametric process. As a result I found myself designing a modern building influenced and modulated by a set of parametric tools to create something that does not adhere strictly to the canons of modernism or any yet established rule of parametric design. This forced me to realize that parametric design is not inherently one style or another. Many of the forms commonly associated with the design process are more a product of the tool in use than the expression of data. Plug information into any parametric tool set and the resulting geometry will be within the geometric language that the tool best understands and as such will be an expression of that language. In many ways the focus on absolute rationalism as understood through numerical expression does not seem so distant from the conventions of modernism that dictate a similar degree of rationality.

In a sense a pure expression of parametric design would adhere rather closely to modern cannon. The largest divide then occurs with modernism on aesthetic preferences more than any mandate for order.

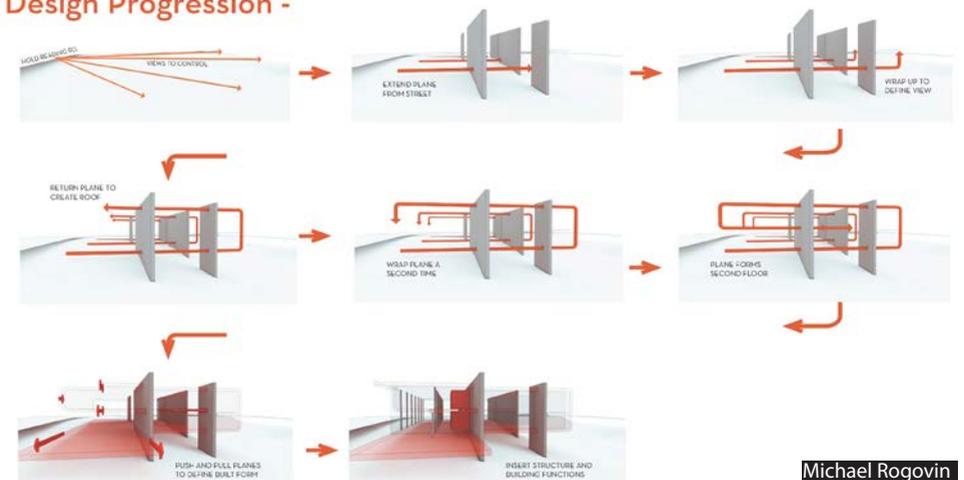
—Michael Rogovin, Student

## Magnetic displacement -

Magnetic displacement is a tool used to manipulate a grid parametrically, based on a set of control points determined by the design needs.



## Design Progression -



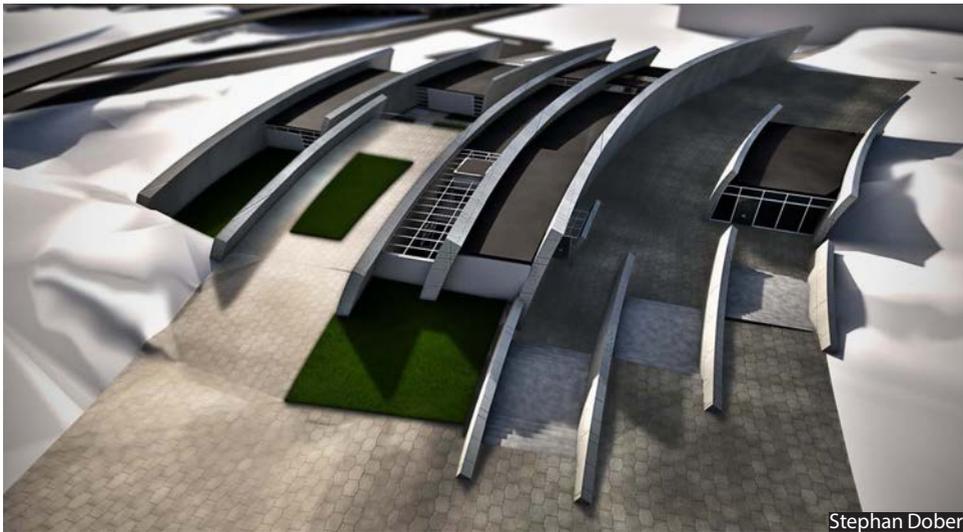
Michael Rogovin



Stephan Dober



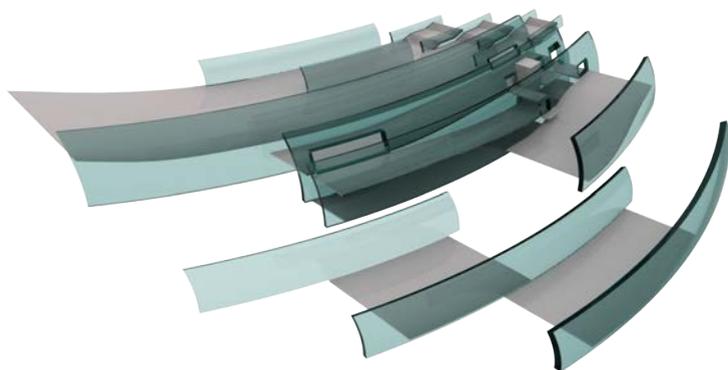
Michael Rogovin



Stephan Dober

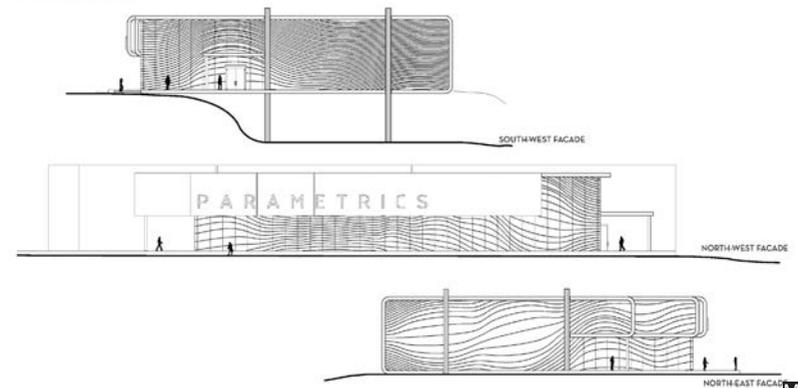


Michael Rogovin



Stephan Dober

ELEVATIONS -



Michael Rogovin



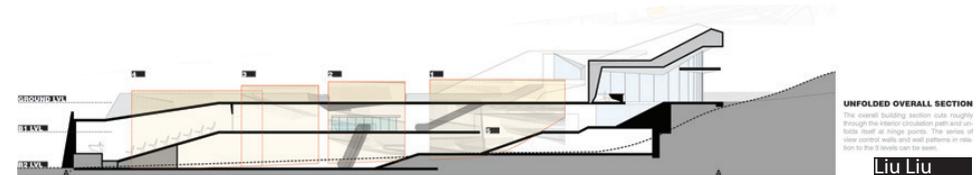
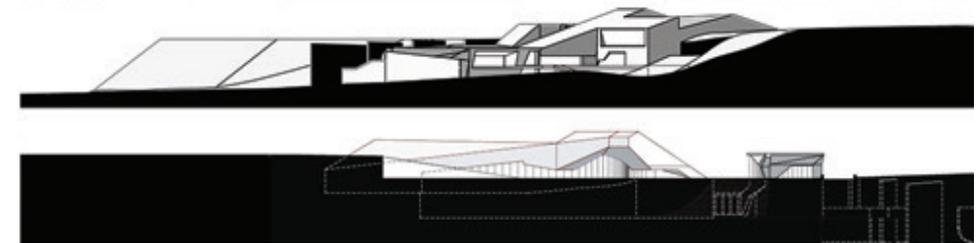
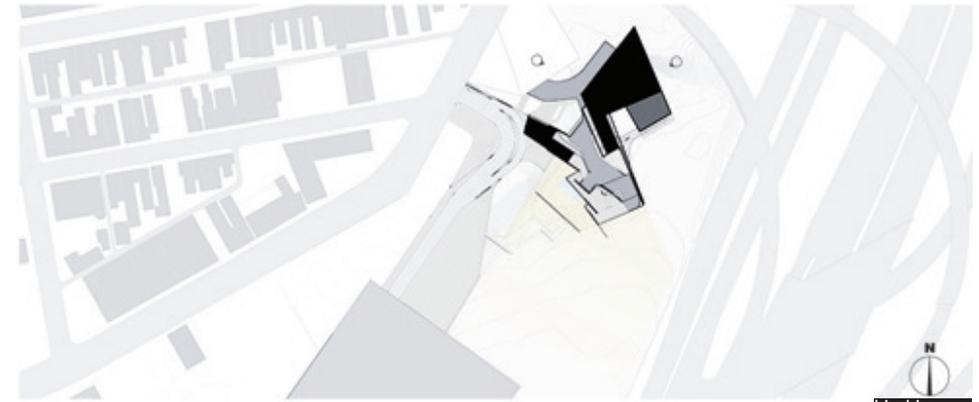
### VIEW & AESTHETIC EXPERIENCE

To control the view from the building and provide a pure aesthetic experience while negotiating with solar performance, the view control walls are intended to be translucent based on view derived patterns.

The wall pattern is generated through the analysis of view conditions along both the exterior and the interior path by evenly collecting sample points along the paths and finding out the corresponding projection of the garage facade on specific view control walls. The resulting pattern reflects the efficiency of different portions of the wall surface in blocking the undesired view by its varying density due to overlaying. The top portion of the pattern is produced by the exterior path, along which negotiation between view control and solar/daylight intake is unnecessary, because the wall can be fully opaque to achieve maximum view control effect, whereas the lower portion would need to be translucent to allow southern light to pass through. Subdividing the interior path into 4 zones to group with the nearest two of the 5 view control walls has simplified the sampling process while also contributing to the complexity of the pattern. The vertical coordinate of the sample points has also affected the form of the wall.

Notice that the fifth wall is significantly lower in height and further from the array of other 4 walls. The rationale behind this is that the fifth wall is specifically responding to the path within zone 4, which is located only at level B2. Lower vertical coordinates allow the view control walls to be lower in height and further away from the view path. The space between the fifth wall and the building facade can be then turned into an outdoor plaza in which view at the parking garage will still be well controlled.

An art center always has to play a dual role both as an art piece itself and a canvas for the art works it contains. The latter is particularly important for the design of Pendleton art center due to the location of the site: it is close enough to downtown Cincinnati to enjoy the undulant skyline, while its visual connection with downtown Cincinnati is interrupted by the parking structure of the neighbouring casino. Given its prominent height and close proximity to the site, the parking structure is visible nearly anywhere in the site.



### OBSTRUCTED VIEW

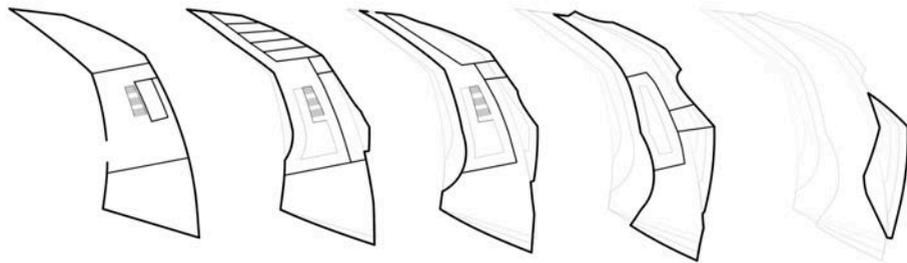
To make the situation even more challenging, the parking structure is to the south of the site, thus blocking the undesired view by closing up the south facade will also block the sunlight. My main design focus, therefore, has become to control the view from the building to provide a pure aesthetic experience and to negotiate with solar performance of the building.

The wall pattern is generated through the analysis of view conditions along both the exterior and the interior path by evenly collecting sample points along the paths and finding out the corresponding projection of the garage facade on specific view control walls.

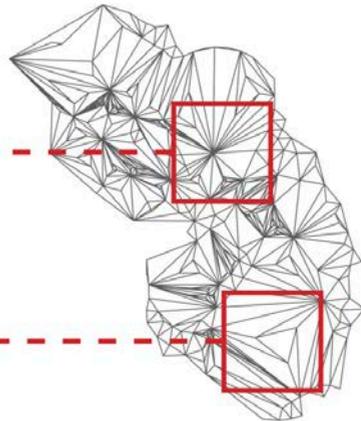
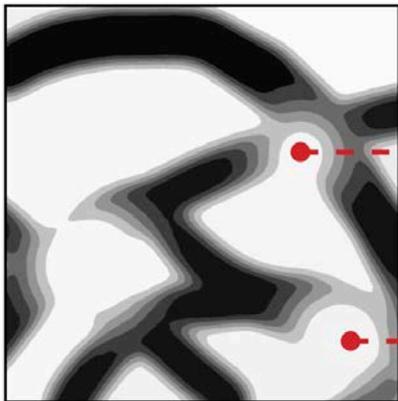
—Liu Liu, Student



Karly Bryerman



FIRST FLOOR



Karly Bryerman

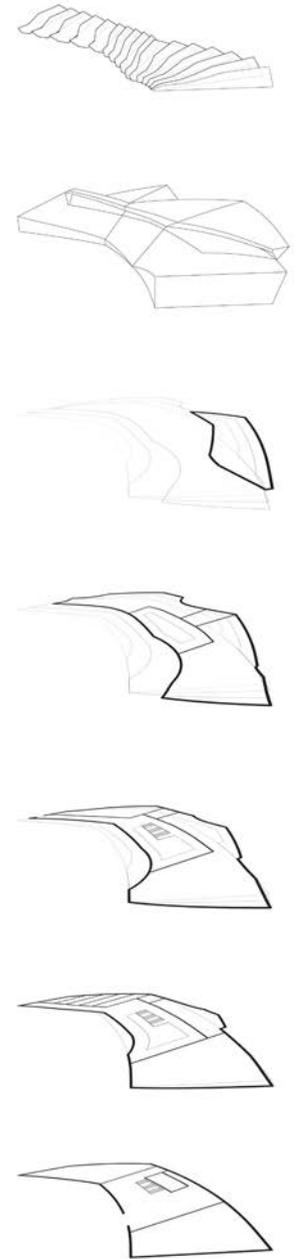
### MULTIFARIOUS STRATEGY

STRETCH is redefining the image of the Pendleton Arts Center; this vital connection between the Pendleton neighborhood and the site can be used not only as a Rapid Prototyping Center, but also a destination for visitors. Sweeping down the Northern hill of the site, this structure is meant to act a bridge for students and the community.

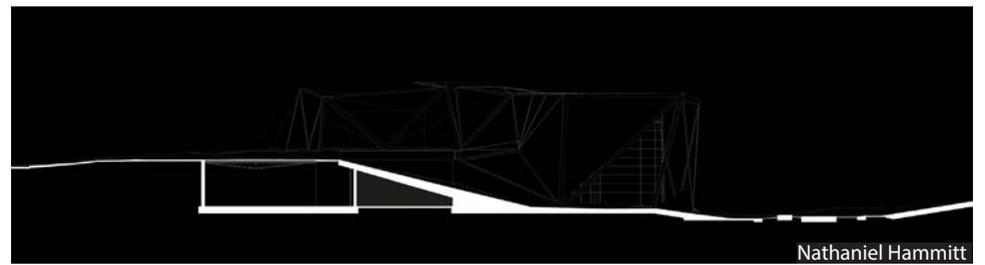
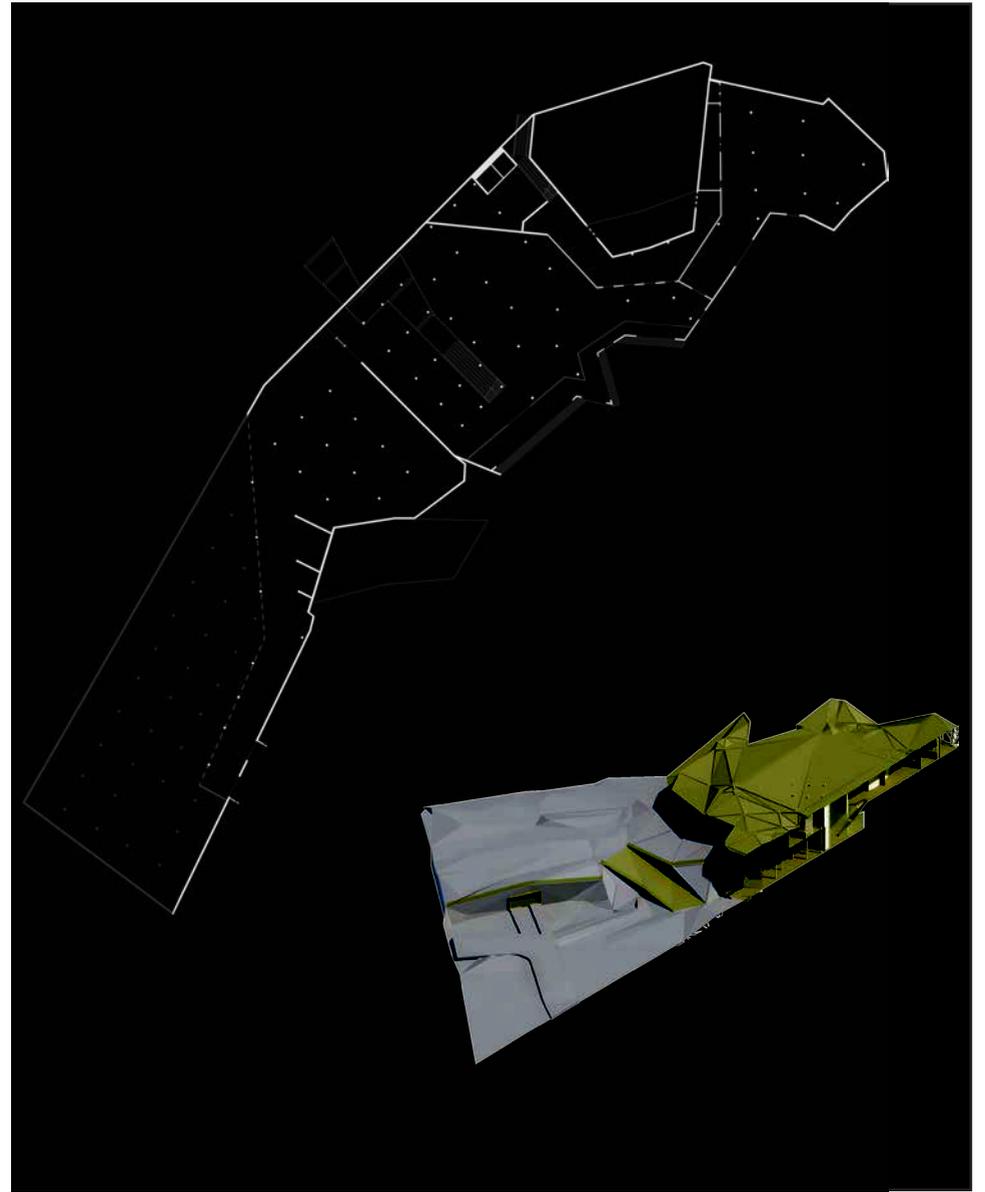
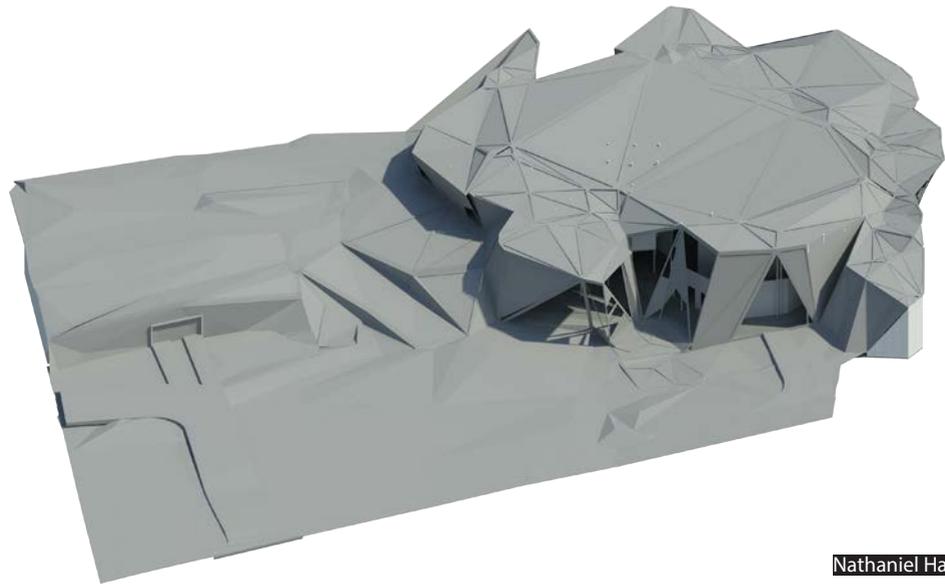
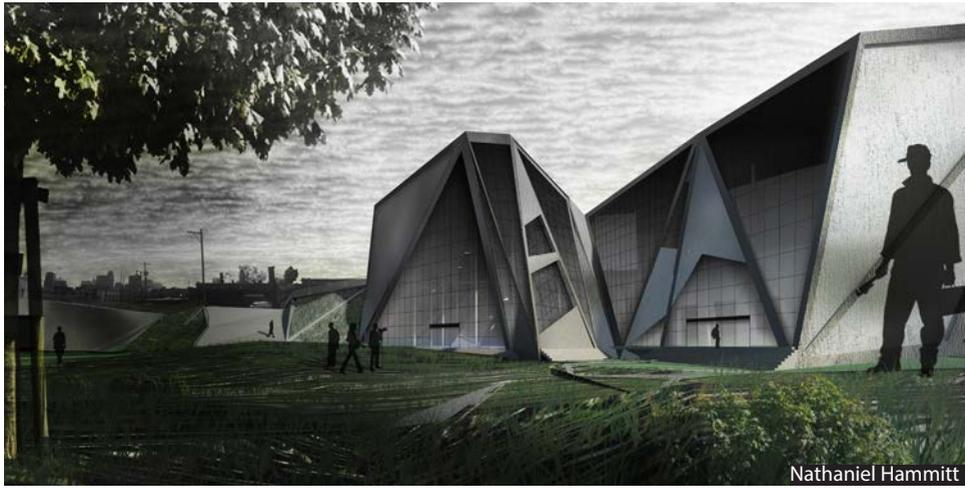
Based on site factors including noise, movement, and solar radiation, the geometry of the building responds to the curve of the highway. As the eye is focused on the momentum created by the turn of the pavement, the form created reacts likewise. Additionally, the outer shell of the form shields the site and the structure from the noise and pollution created from the traffic on the highway, and the inner shell opens up to the site below.

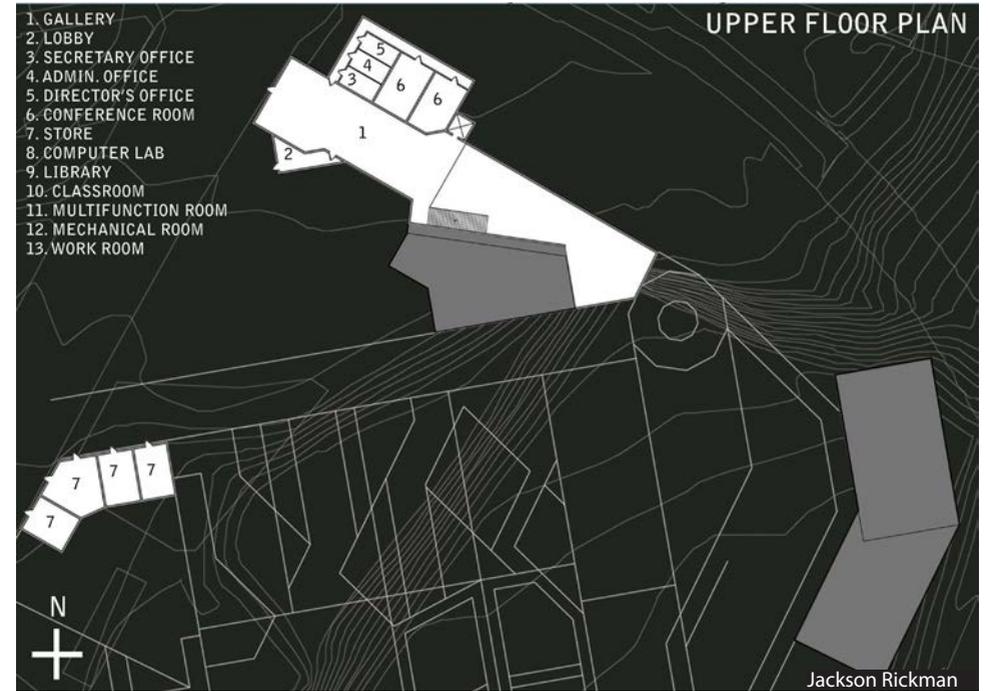
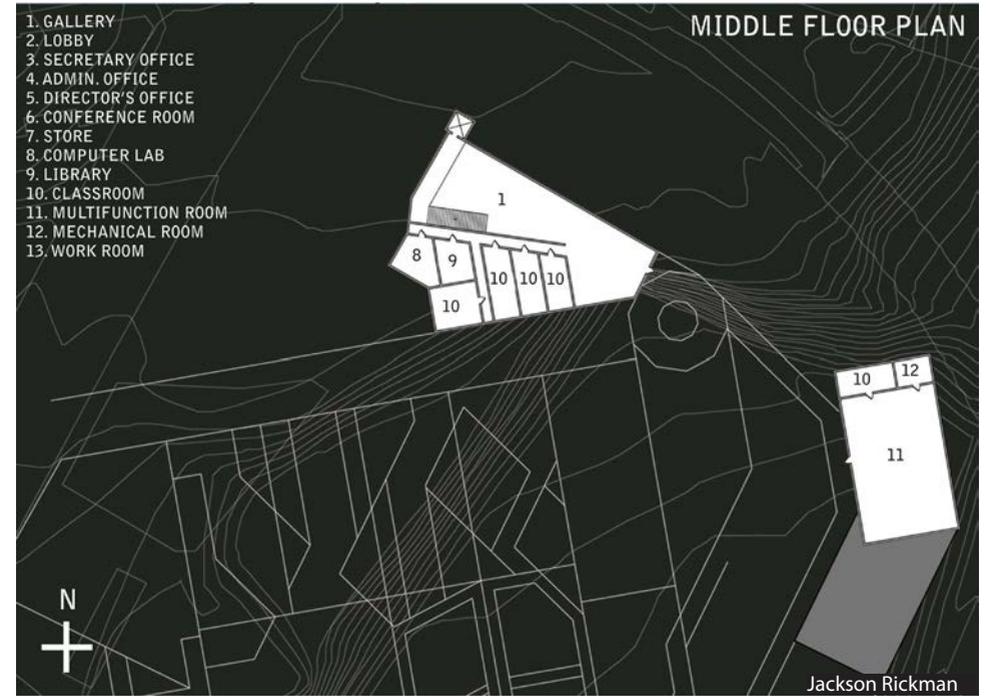
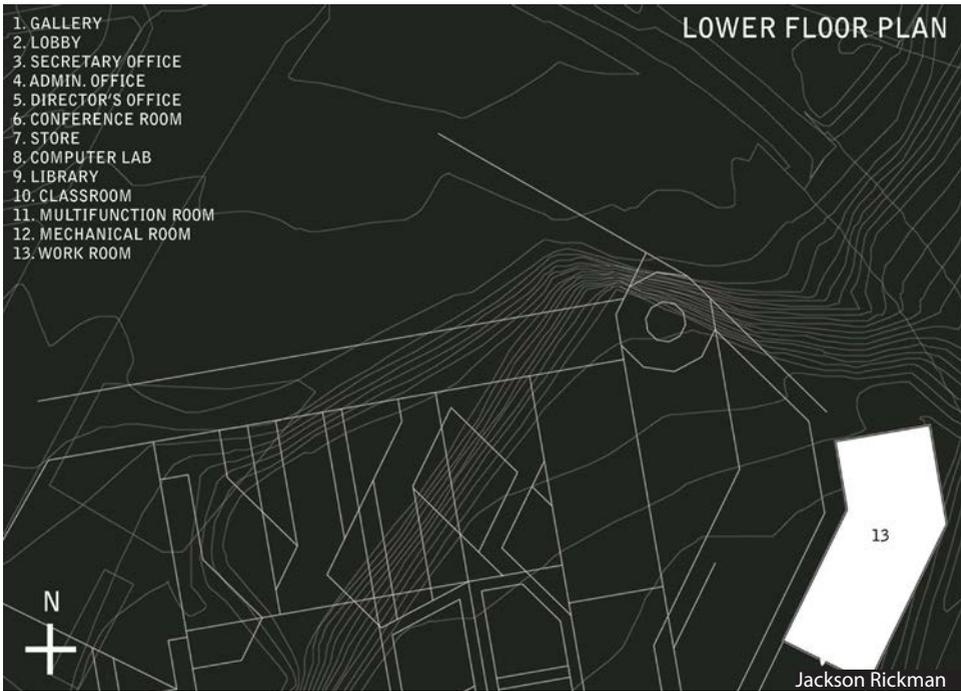
By creating this link to the neighborhood, the structure addresses the topography of the site by providing an entrance at ground level, and an additional entrance from the top of the slope. The main circulation within the structure is centered in the core of the building; an atrium opening all floors to the lobby/retail space.

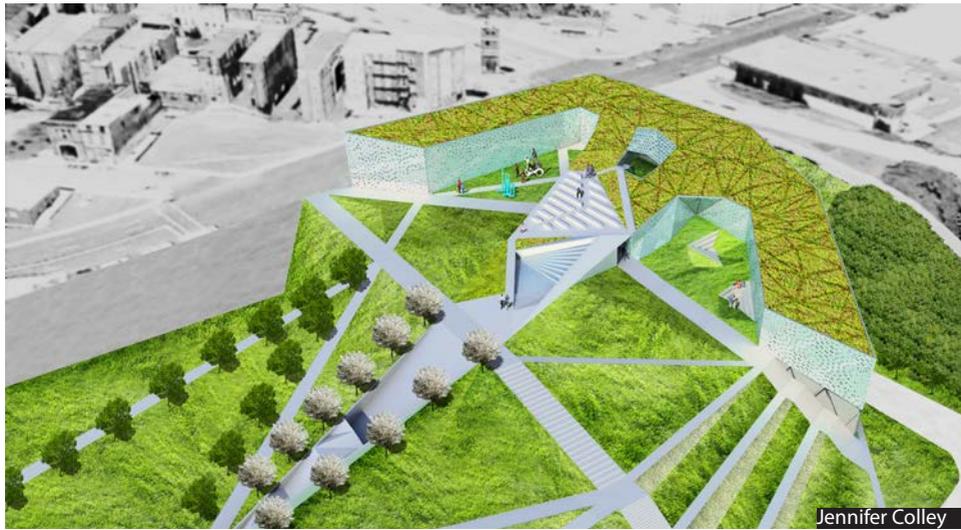
In response to the extreme amount of solar gain on the front façade, or inner shell, of the building, a series of fins dilute the amount of radiation entering the building. Parametrically designed, these louvers are geometrically formed based on the solar patterns of the site, creating an opportunity to shield the occupant from the sun. —Karly Bryerman



Karly Bryerman







Jennifer Colley



Jennifer Colley

Within the discovery of form and use of performance-based design, I engaged in a deliberate design process that maintains dynamic yet controlled complexity. By setting parameters within both analog and digital processes, I attempted to avoid arbitrary or isolated decisions and create a sense of varied order.

Within the design of the building envelope, the structural system sets up the first level of order; after establishing a semi-regular column bay, I used a modified diagrid system with a range of optimal column angles and points of connection to create controlled variation.  
—Jennifer Colley, Student



Nicholas Schoeppner

## ITERATIVE MASSING

The design of this arts center in Pendleton seeks to use parametric thinking at multiple scales and a combination of analog processes and digital optimization to create a unified proposal from a simple concept. Relating to its program, the form of the fabrication center emerges from one of the most elemental forms of making: folding. Within the realization of this concept, the design incorporates the strongest formal strategies of Parametricism, intelligent system differentiation and correlation.

The parametric design of the site and building mass began with a response to the existing urban condition in both plan and section. At the highly visible northwest corner of the site, the building responds to the height of surrounding structures while folding inward to create a public space for pedestrians. Continuing the social and economic conditions of the Over the Rhine arts district, the gallery holds the street edge along Reading Road. The site continues pedestrian traffic paths from 12th Street, while the building and landscape meet to create a unique visual terminus for the street corridor. The folding of the building in plan creates public courtyards and exposed single-loaded corridors that direct sight lines to favorable downtown views.

The process of parametric thinking in this project facilitated a method of design centered on discovery rather than creation. Within the parameters of site layout and building massing established from existing urban conditions, I focused on an iterative, analog process of folding the building form – overall masses and individual faces – to respond to views and perceived site forces.

This process delivered unexpected iterations that I might not have otherwise developed if not for strict adherence to experimentation within defined parameters, thus expanding the design possibilities.

While the overall building massing was largely a result of these iterations related to site parameters and the process of folding, the envelope design engages performance-based design. This digitally driven process serves as a basis for developing a pattern of openings based on solar radiation simulations, but I was careful to introduce a human dimension to this scientific approach. Rivka Oxman comments on this evolving issue within performance-based design, questioning “where, at what point, and how should the designer intervene in the digital process.” Taking away a designer’s ability to make decisions by steadfastly accepting an unmodified result of a digital process devalues the core of the architecture profession, which should reward creative, human-centric problem solving. Parametric modeling software certainly proves useful, but it must remain a starting point from which the designer makes adjustments based on other considerations, especially those that are unquantifiable.

—Jennifer Colley, Student



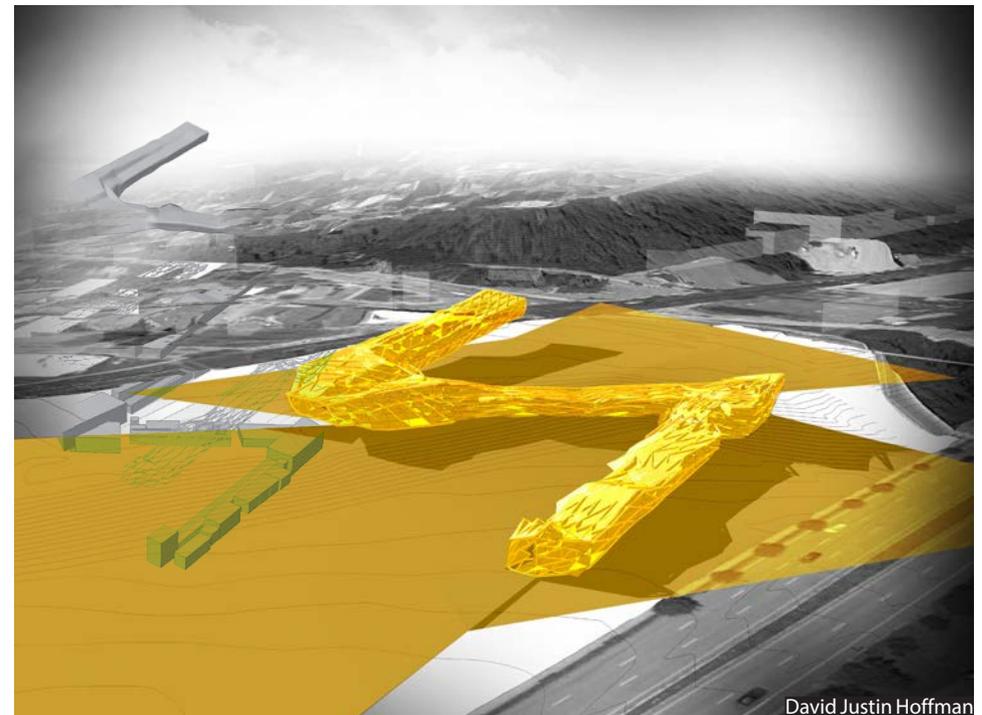
### GRASPING PARAMETRIC CONTROL

All elements of architecture have become parametrically malleable. One can design any component and system to fit any parameter and have it made to exact standards. In the past and present skilled craftsmen were required to bring a project to reality. Talents of the mason, plumber, electrician, etc could construct a building from a set of plans. Parametric designs require data sets, processors, and 3d printers. The art of craft now lies with the programmer, the one who writes the code to set the parameters of the design. Parametricism will change everything about the building industry that we have come to know. With the tools now available to create complex forms there needs to be an equally revolutionary advancement in habitability systems, construction, transportation, and maintenance.

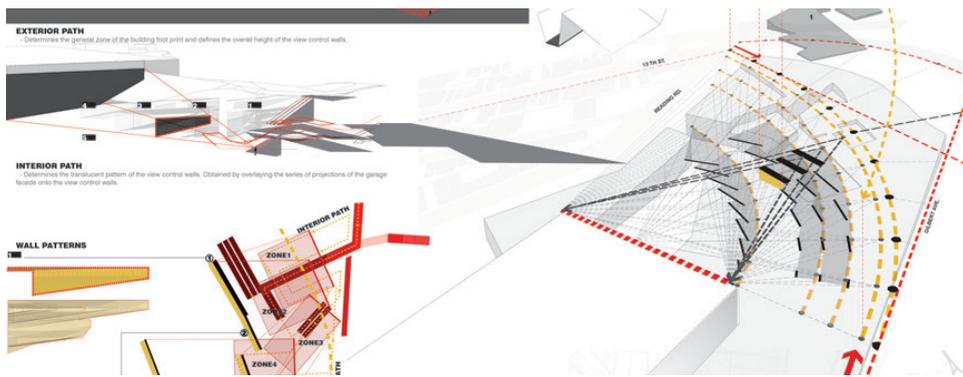
Architecture is beginning to embrace the possibilities afforded by rapid prototyping yet there are still many lessons to hold on to. Complex 3d modeling and CNC machines are as much tools as pencils, rulers, and, physical models. Respect the usefulness of tools without becoming dependent on them. The thoughtful way of crafting space has not changed, nor has the way people experience space. —Justin Hoffman, Student



David Justin Hoffman

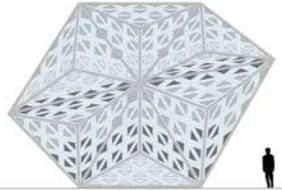


David Justin Hoffman

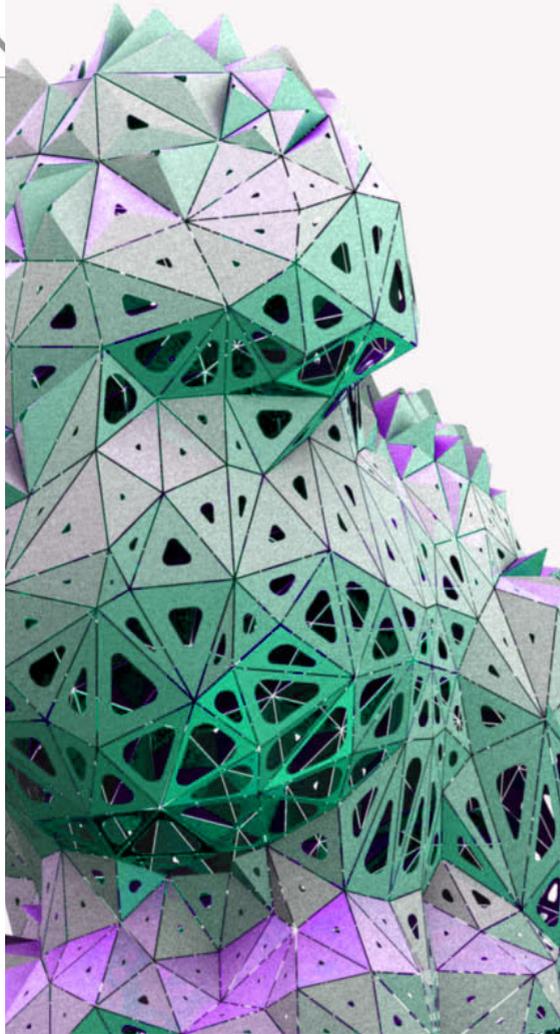
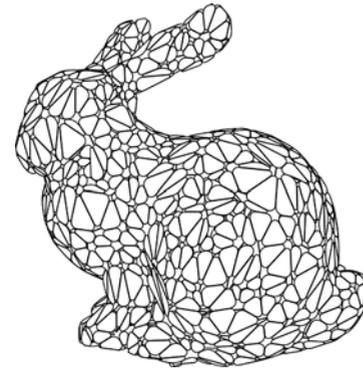


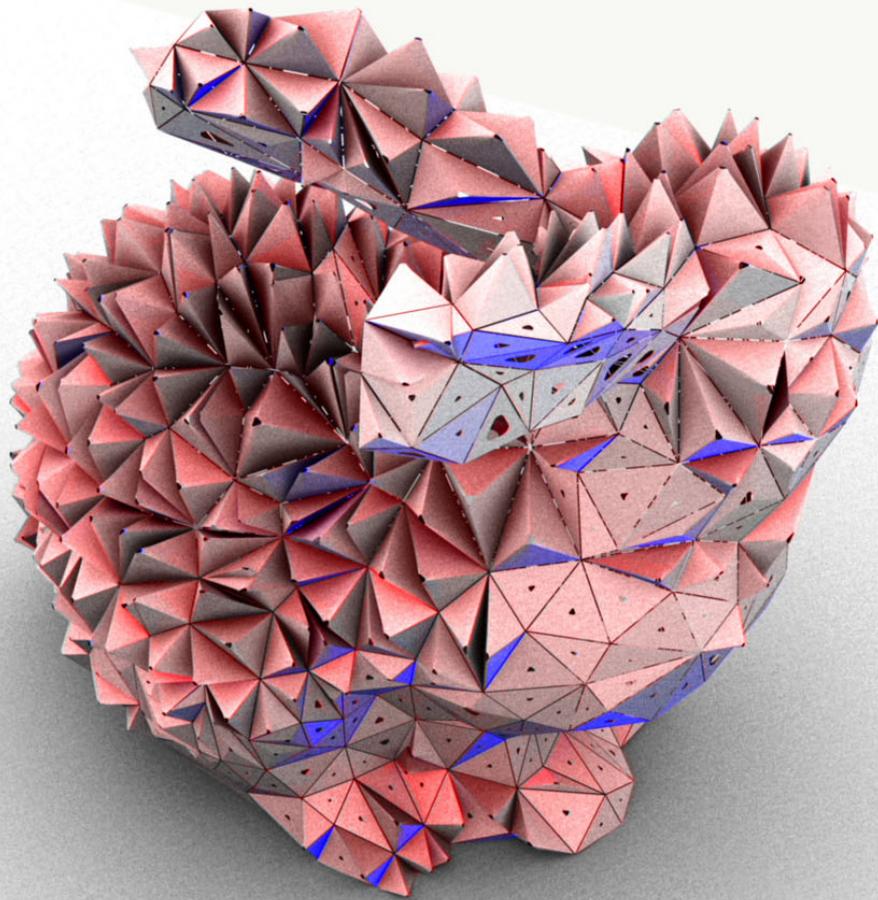
Within the discovery of form and use of performance-based design, I engaged in a deliberate design process that maintains dynamic yet controlled complexity. By setting parameters within both analog and digital processes, I attempted to avoid arbitrary or isolated decisions and create a sense of varied order. Within the design of the building envelope, the structural system sets up the first level of order; after establishing a semi-regular column bay, I used a modified diagrid system with a range of optimal column angles and points of connection to create controlled variation. Within the triangulated surfaces determined by the structural system, controlled geometric subdivisions and varying sizes of openings based on solar simulations create a secondary level of order within this dynamic hierarchy. These systems carry into the overall site layout, landscape, and circulation, establishing a correlation of building systems within a unified whole. The folding concept and resulting triangulated forms, spaces, or patterns translate readily across all of these systems in both plan and section and at varying scales. This contemporary application of *gesamtkunstwerk* intensifies the relationship between systems, lending greater meaning to their design and making the strongest argument for Parametricism.

Jennifer Colley, Student



OPENINGS





Innovation in architecture advances via the progression of styles; the fluxes between periods of stable, cumulative advancement within an architectural style and revolutionary periods of unstable transition between styles represent cycles of innovation. Stable self-identity within an architectural style is as much a fundamental prerequisite of evolution as it is for Life itself.



## MODERNIST PRELUDE

Since the crisis and demise of the last stable architectural style, Modernism, 35 years ago, the discipline has been led by the transitional styles of Postmodernism and Deconstructivism for nearly a decade each. Modernism, the global style genial to Fordist mass society, perpetuated the immense materialist mentality enabled by the industrialization and mechanization of all aspects of life during that era. But Modernism found its limits here. The next level of architectural progress calling for greater social diversity and individuality, more rapid innovation, to support a richer and more complex social life process, was no longer supported by the minimalistic Modernist principles of zoning, specialization, and standardized repetition (Shcumacher 2012).

## ENTER POSTMODERNISM.

Picking up on these needs of the maturing Baby Boomers, Postmodernist sought to inject greater variation into the monotonously minimalist environments of the Modernist era by referring back to a vast collection of historical styles and motifs. Of course, insatiable for long, the very Baby Boomer generation who craved diversity and individuality grew impatient with this regressive architectural style that they had evolved, and the style progression evolved further.

## ENTER DECONSTRUCTIVISM

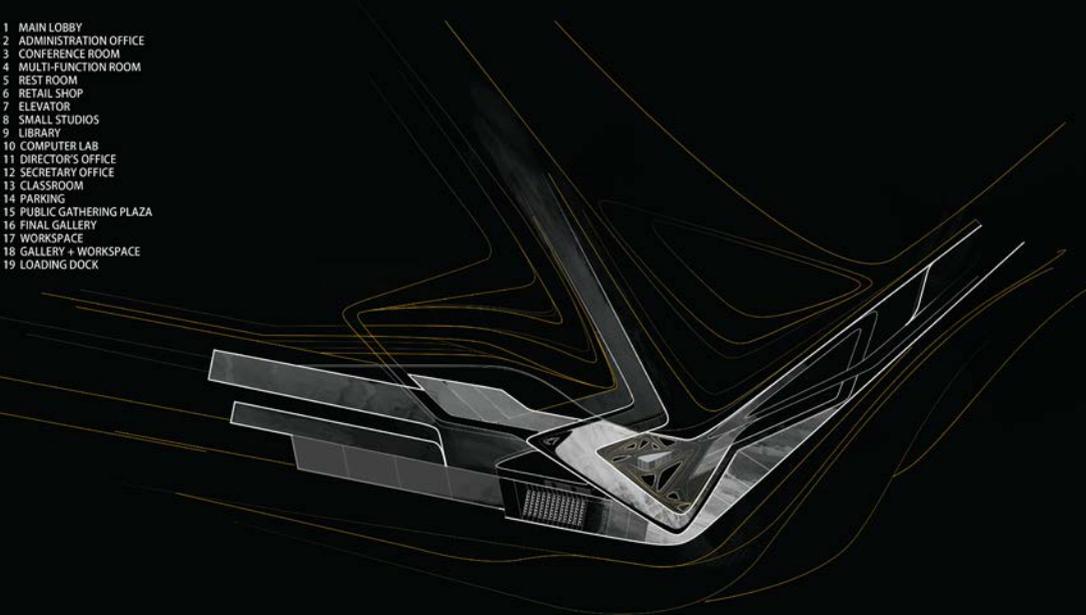
This style stifled the Postmodernist ideas of diversity and collaged complexity and turned them into abstract principles, ousting the ultimately extraneous historical references that had driven the Postmodernist collage ideology. Advancing beyond Deconstructivism, a new stable style evolved, shifting the instated emphasis from the mere clustering of differences to the organization and articulation of a complex, variegated order.

## EMERGE PARAMETRICISM

In contrast to the previous transitional styles of Postmodernism and Deconstructivism, Parametricism has the self-reinforcing rationality and constructive capacity to permeate mainstream world architecture as the dominant design ideology. It is both open-ended and ultra adaptive to the world's diverse cultures and climates of contemporary society because it does not impose a direct international form language. It is a framework, a set of rules, a way of thinking, amped by the computational power of technology. It is not, in and of itself, a form language. It is design dogmas, to increase adaptive variability, differentiation, correlation, stand abstract enough to become universal without any sense of closure. There is permanence in the style. In fact, these dogmas stand so universal as to mimic the cosmic model itself. Just as in Nature, there exists infinitely myriad ways to differentiate, to correlate, and adapt variegated parametric connections. Parametricism opens to floor up to an inexhaustible supply of design solutions.

LEVEL ONE

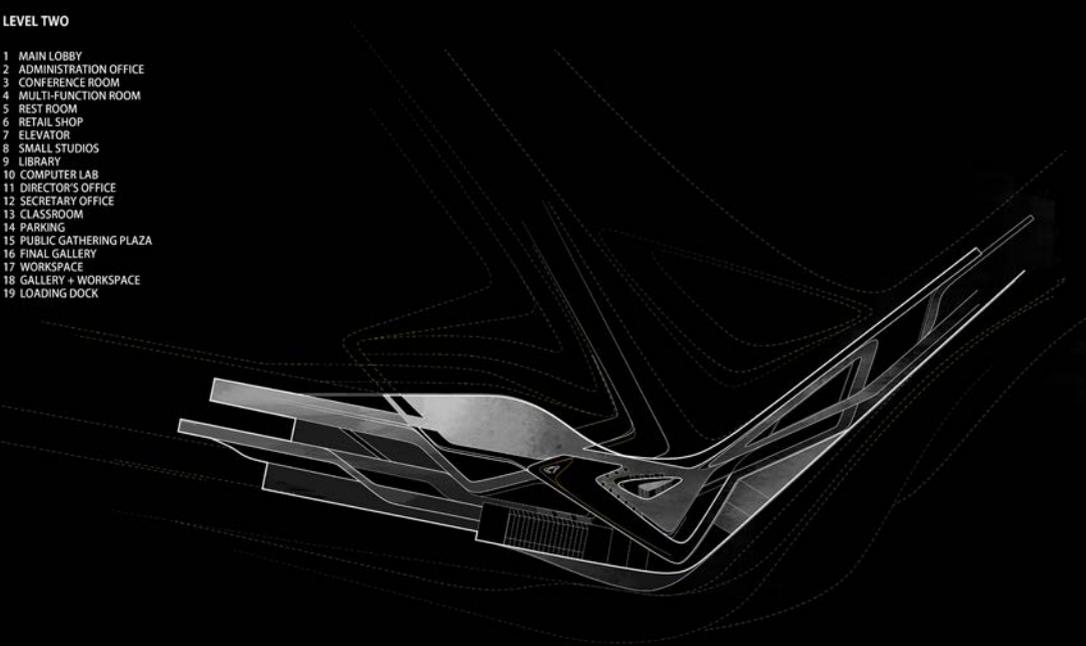
- 1 MAIN LOBBY
- 2 ADMINISTRATION OFFICE
- 3 CONFERENCE ROOM
- 4 MULTI-FUNCTION ROOM
- 5 REST ROOM
- 6 RETAIL SHOP
- 7 ELEVATOR
- 8 SMALL STUDIOS
- 9 LIBRARY
- 10 COMPUTER LAB
- 11 DIRECTOR'S OFFICE
- 12 SECRETARY OFFICE
- 13 CLASSROOM
- 14 PARKING
- 15 PUBLIC GATHERING PLAZA
- 16 FINAL GALLERY
- 17 WORKSPACE
- 18 GALLERY + WORKSPACE
- 19 LOADING DOCK



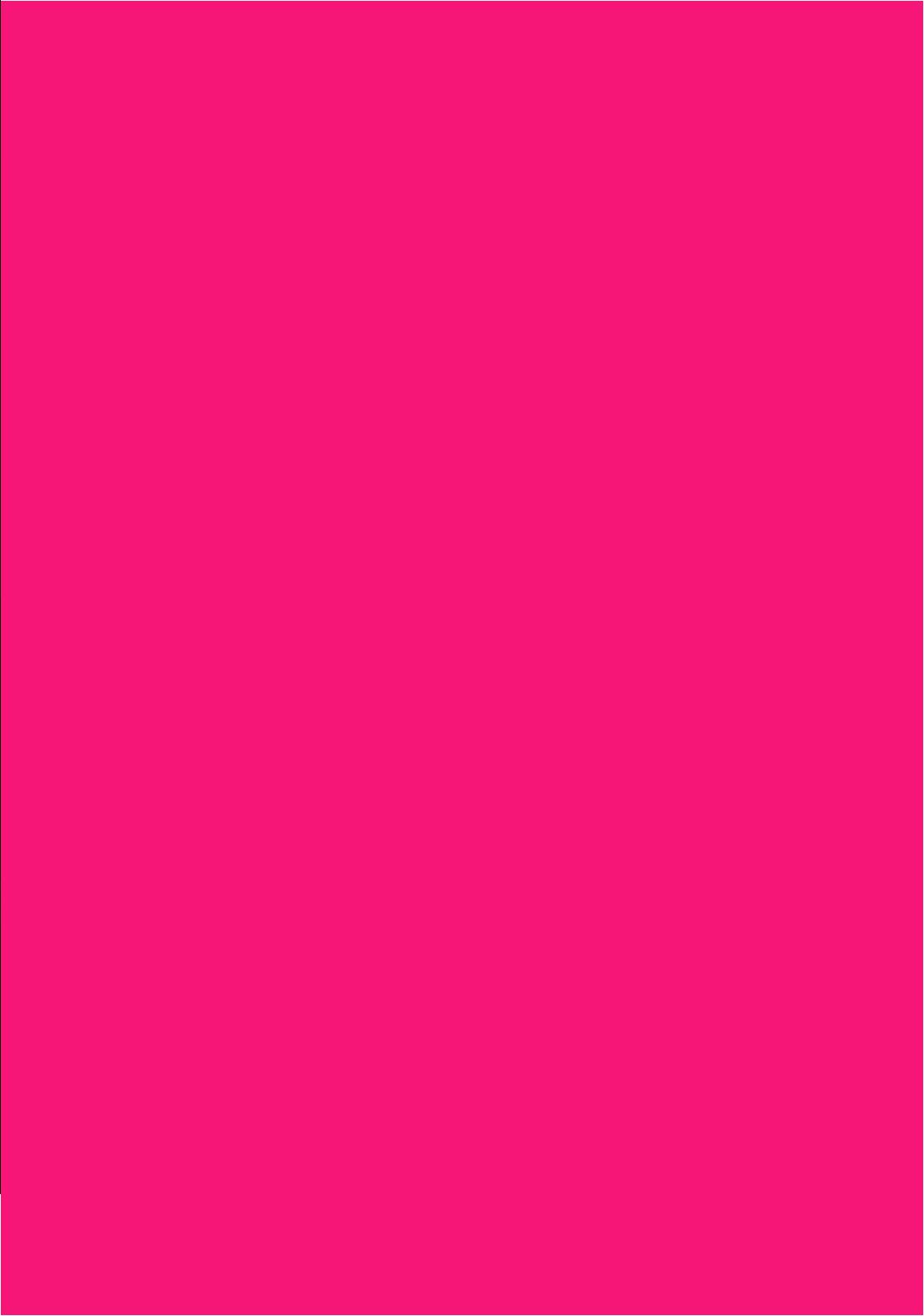
PENDELTON ART CENTER [HANS KOESTERS]

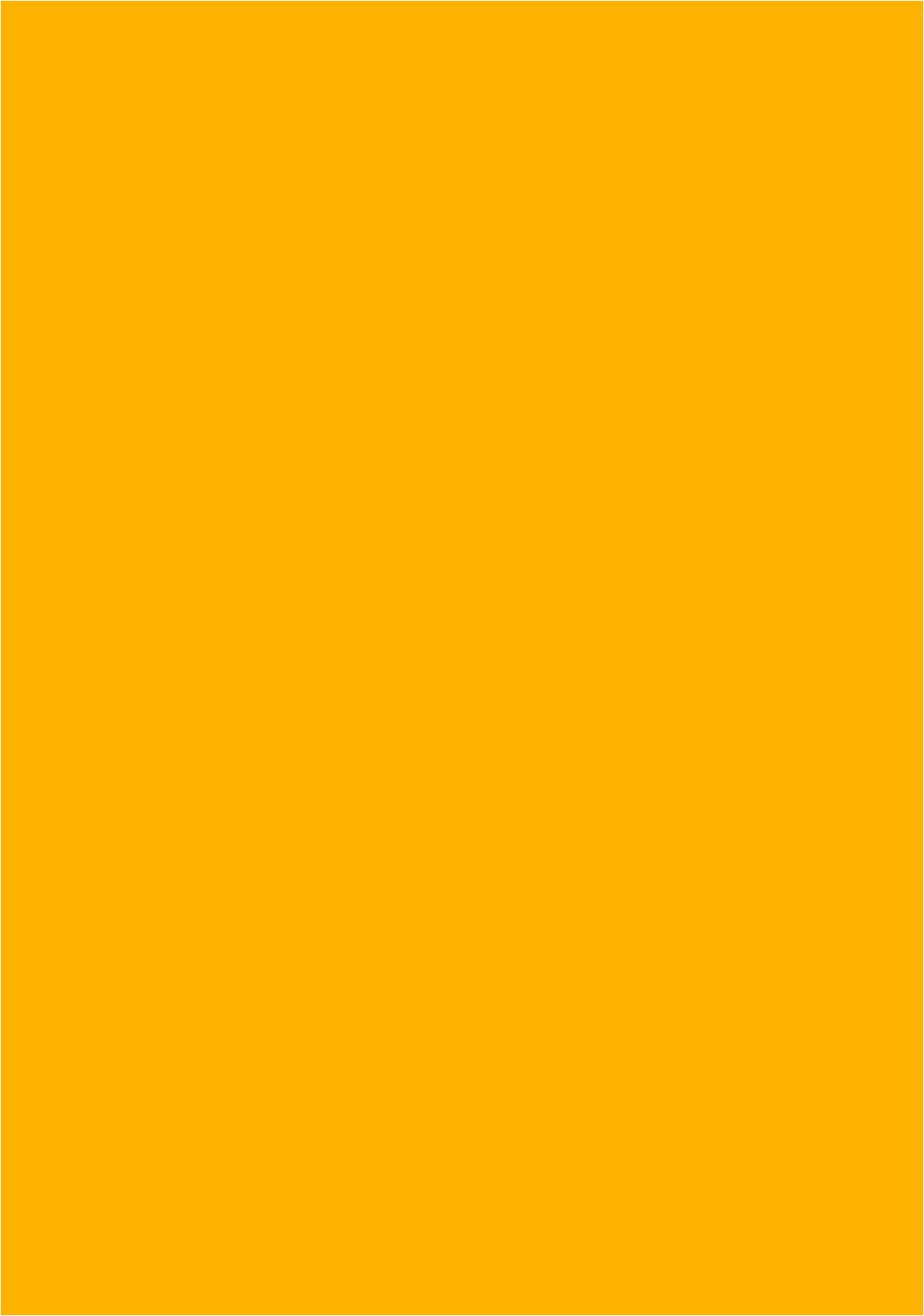
LEVEL TWO

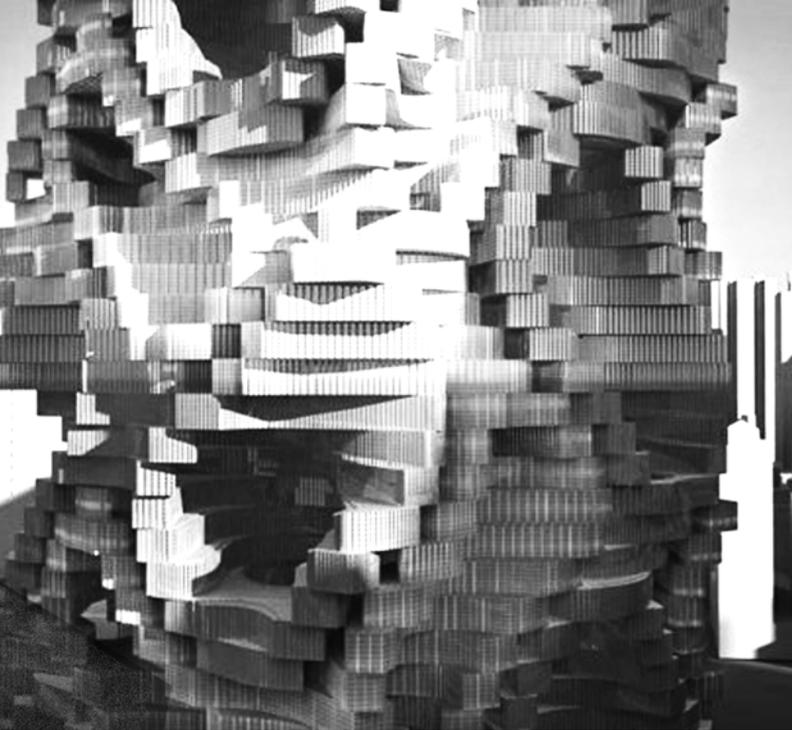
- 1 MAIN LOBBY
- 2 ADMINISTRATION OFFICE
- 3 CONFERENCE ROOM
- 4 MULTI-FUNCTION ROOM
- 5 REST ROOM
- 6 RETAIL SHOP
- 7 ELEVATOR
- 8 SMALL STUDIOS
- 9 LIBRARY
- 10 COMPUTER LAB
- 11 DIRECTOR'S OFFICE
- 12 SECRETARY OFFICE
- 13 CLASSROOM
- 14 PARKING
- 15 PUBLIC GATHERING PLAZA
- 16 FINAL GALLERY
- 17 WORKSPACE
- 18 GALLERY + WORKSPACE
- 19 LOADING DOCK



PENDELTON ART CENTER [HANS KOESTERS]



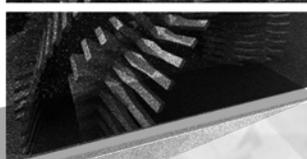
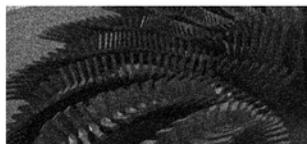




AUTHOR | ARCHITECT | PROFESSOR

As a researcher, educator, designer, and founder of Tang & Yang Architects, he has won numerous international awards and published his projects and research in many books and papers. His projects have been exhibited in China, Mexico, Italy, Spain and United States. More detail about his teaching and research is available at <http://ming3d.com>

# MING TANG





## FORWARD

Parametric Urbanism, pioneered by Zaha Hadid & Patrik Schumacher Architects with support coming from advanced computational technology, has been the interest of architects and urban designers in recent years. This new design thinking has been used in projects ranging from large scale urban development to building façade/surface design. The studio presents a study investigating the information processing of Parametric Urbanism and describe a new procedure coined -Information Urbanism. Compared with parametric urbanism, Information Urbanism emphasis cultural cues and demographics as input parameters. Information urbanism is defined as a hybrid method which seeks logical urban forms and analyzes its' importance through architecture & urban design education. The studio extended this method by exploring, collecting, analyzing, and visualizing urban information and physically representing the information through various computational technologies.

This studio will investigate how to use the geospatial database to provide a rich resource and optimize urban forms with respect to ecological performance criteria. The demographic, traffic, economic data from GIS provides the trace of activity and event parameters of the urban life process. As Schumacher described in the parametric city, "parametricist continuation is always possible in myriad, unpredictable, and qualitatively diverse ways, but it is never random" (Schumacher, 2010). Different from traditional urban design process, the information urbanism provides us a range of abstracted urban diagram, rather than a particular design solution. In another word, the outcome of information urbanism is the consistently morphing forms driven by the changing relationship of information, which can be interpolated into physical landscape features.



The studio investigation is intended to realize the potential of quantifying demographic, social, and cultural data into a parametric equation. In the experiments, the integration of non-geometrical parameters within the form seeking and performance evaluation process resulted in a series of conceptual make-ups of city. The projects will be developed by manipulating zoning, transportation network, city block and various building types. Ultimately, Information Urbanism looks to build upon the strengths pre-defined in the Parametric Urbanism method and capture the benefits of Geographic Information System (GIS) by seamlessly integrating vital geo-spatial components in the equation and altering the way people explore the possible design solutions in order to generate the ideal urban forms

Using a real urban site in Cincinnati, students will learn the architecture / urban design logic and generative processes, as well as the potential of parametric thinking as a resourceful tool for achieving diversity and complexity in urban form generation. With a minimum input and knowledge of details of all the individual professions, the parametric model becomes one that allows an individual to seek novel and buildable designs. It is the seamless transition between the human brain and the computer processes that allows the design field to reach new innovations. By utilizing parametric thinking and non-linear design pipeline, an individual is realizing the marriage of the dynamic digital and static physical world through an interdisciplinary collaboration that emerges in the design field.

—Ming Tang, Professor

## FORWARD

Parametric Urbanism, pioneered by Zaha Hadid & Patrik Schumacher Architects with support coming from advanced computational technology, has been the interest of architects and urban designers in recent years. This new design thinking has been used in projects ranging from large scale urban development to building façade/surface design.

The studio presents a study investigating the information processing of Parametric Urbanism and describe a new procedure coined -Information Urbanism. Compare with parametric urbanism, Information Urbanism emphasis cultural cues and demographics as input parameters. Information urbanism is defined as a hybrid method which seeks logical urban forms and analyzes its' importance through architecture & urban design education. The studio extended this method by exploring, collecting, analyzing, and visualizing urban information and physically representing the information through various computational technologies.

The studio investigation is intended to realize the potential of quantifying demographic, social, and cultural data into a parametric equation. In the experiments, the integration of non-geometrical parameters within the form seeking and performance evaluation process resulted in a series of conceptual make-ups of city. The projects will be developed by manipulating zoning, transportation network, city block and various building types. Ultimately, Information Urbanism looks to build upon the strengths pre-defined in the Parametric Urbanism method and capture the ben-

This studio will investigate how to use the geospatial database to provide a rich resource and optimize urban forms with respect to ecological performance criteria. The demographic, traffic, economic data from GIS provides the trace of activity and event parameters of the urban life process. As Schumacher described in the parametric city, "parametricist continuation is always possible in myriad, unpredictable, and qualitatively diverse ways, but it is never random" (Schumacher, 2010). Different from traditional urban design process, the information urbanism provides us a range of abstracted urban diagram, rather than a particular design solution. In another word, the outcome of information urbanism is the consistently morphing forms driven by the changing relationship of information, which can be interpolated into physical landscape features.

Using a real urban site in Cincinnati, students will learn the architecture / urban design logic and generative processes, as well as the potential of parametric thinking as a resourceful tool for achieving diversity and complexity in urban form generation. With a minimum input and knowledge of details of all the individual professions, the parametric model becomes one that allows an individual to seek novel and buildable designs. It is the seamless transition between the human brain and the computer processes that allows the design field to reach new innovations. By utilizing parametric thinking and non-linear design pipeline, an individual is realizing the marriage of the dynamic digital and static physical world through an interdisciplinary collaboration that emerges in the design field.

—Ming Tang, Professor

## INTRODUCITON

At the 2009 Intensive Fields Conference, Patrik Schumacher stated that philosophy consumes architecture at moments of crisis; it only recedes once we know what we are doing. He proclaims that Parametricism is the answer to the ontological shift in primitives as the profession struggles to distance itself from the residual fragments of modernist ideologies. This crisis is evident in the architectural discourse of the previous two decades following the end of post-modernism, minimalism and deconstructivism. In the last 10-15 years, Parametricism appears to be the most salient of the design research programmes and has played a fundamental role in the collective cycles of innovation and theory that have included Swarm Intelligence, Morphogenetic Urbanism, and the multiplicities of Rhizomatic Urbanism. Although the fundamental principles in the parametricist manifesto have been gaining traction in recent years, the plausibility of this approach has been hindered by its inability to realize truly performative design in which the style could develop as the paragon for a sustainable future. The manifesto explicitly proclaims many sensible positive and negative logics, but requires a further investigation in relation to the aforementioned, emerging associative methodologies and theories.

In Schumacher's dissection of the heuristics of parametric design, he declares, "Strategically constraining the solution space: we know we are only going to solve problems with parametric solutions." It is imperative that these problems are not solved merely with parametric solutions as a resultant of parametric tools and techniques, but also dependent upon a parametric thinking as a means of translating this variegated and complex, but meaningful data sets into parameters as an integral part of a derivative design process.

Schumacher argues that the advent of parametricism dictates that new forms follow new functions. surely displace the relevant and interpretative value that only architects can provide. It is clear that the rigid, repetitive forms of Fordist modernism no longer have the complexity or capacity to relate to our digital society: but to what degree does parametric complexity of form result in the visual chaos that Schumacher describes as anathema to the skylines, streets, and formal massing that plagues our cities. Although he claims that visual order and aesthetics remain paramount in the final conceptual design (Schumacher explicitly affirms that "we are not engineers"), the rhetoric he uses to describe "gradient fields of activity" can perceptibly give rise to a somewhat chaotic formal expression that has not been rationalized given the lack of definitive programming of spaces. What is most critical to the future of parametricism is the de-emphasis on the parametric tools that have become inherent and reinforcing in this methodology. The tools and techniques we gain from the software, are already dated by the time we discover the means to effectively utilize them. An increasing dependence on the techniques, without an equal focus on parametric thought, will surely displace the relevant and interpretative value that only architects can provide.

In Schumacher's positive functional heuristics of parametricism, he asserts, "Function, rather than being only considered in relation to a predetermined purpose, might be understood as capacity or affordance that opens itself up for an evolutionary formation of new purposes." Consequently, it is possible that in trying to formulate all substantial functional accommodations through such an ephemeral set of social scenarios, that any form of pragmatic functionality will have been subsumed by the digital tools and parameters used to articulate a parametric building envelope. Although I am cautious of this principle, I do agree that there should be some allowance for the simultaneity of multiple audiences of user groups, for that is a parameter that can be achieved in congruence with a variegated field of programmatic spaces. These programmatic elements should become parameters in the "inter-articulation" of multiple sub-systems that can correlate climactic elements with envelop, structure and context at their respective scales. In this re-alignment of Patrik's manifesto, some of the basic conjectures should be re-evaluated according to the tactile realities of our physical environments and localized sensory thresholds.

The success and proliferation of Parametricism will be tied to its integration into architecture pedagogy for young design students as a means of thinking and problem solving. The techniques and tools that generate current aesthetic of parametric design will rapidly evolve; we will become less enamored by the animation-derived methods of form finding. Perhaps the style will transition into a performative-based conceptualization that can actually embody the environmental benefits of the nature that the present geometries resemble. Regardless of the multitude of shared concepts, formal repertoires, and computational techniques that have formulated a contemporary hegemonic paradigm, the future of architecture should bridge the looming disconnect between the built environment and the human experience.

—Hans Koesters, Student/Editor





Project Summary  
Site Overview  
Site Conditions  
Programme

# ONE. PROGRAMME AND OVERVIEW



Project Summary  
Site Overview  
Site Conditions  
Programme

TWO.

# CONTEXTUAL AND CULTURAL



Styles  
Popular Culture / Parametricism  
Geospatial Information  
Museum Typology

TWO.  
CONTEXTUAL  
AND  
CULTURAL



Styles  
Popular Culture / Parametricism  
Geospatial Information  
Museum Typology

# TWO. CONTEXTUAL AND CULTURAL



Styles  
Popular Culture / Parametricism  
Geospatial Information  
Museum Typology

THREE.

PARAMETRIC THINKING



Top Down versus Bottom Up  
Material Exploration  
Analogue Prototyping  
Field Parametrics



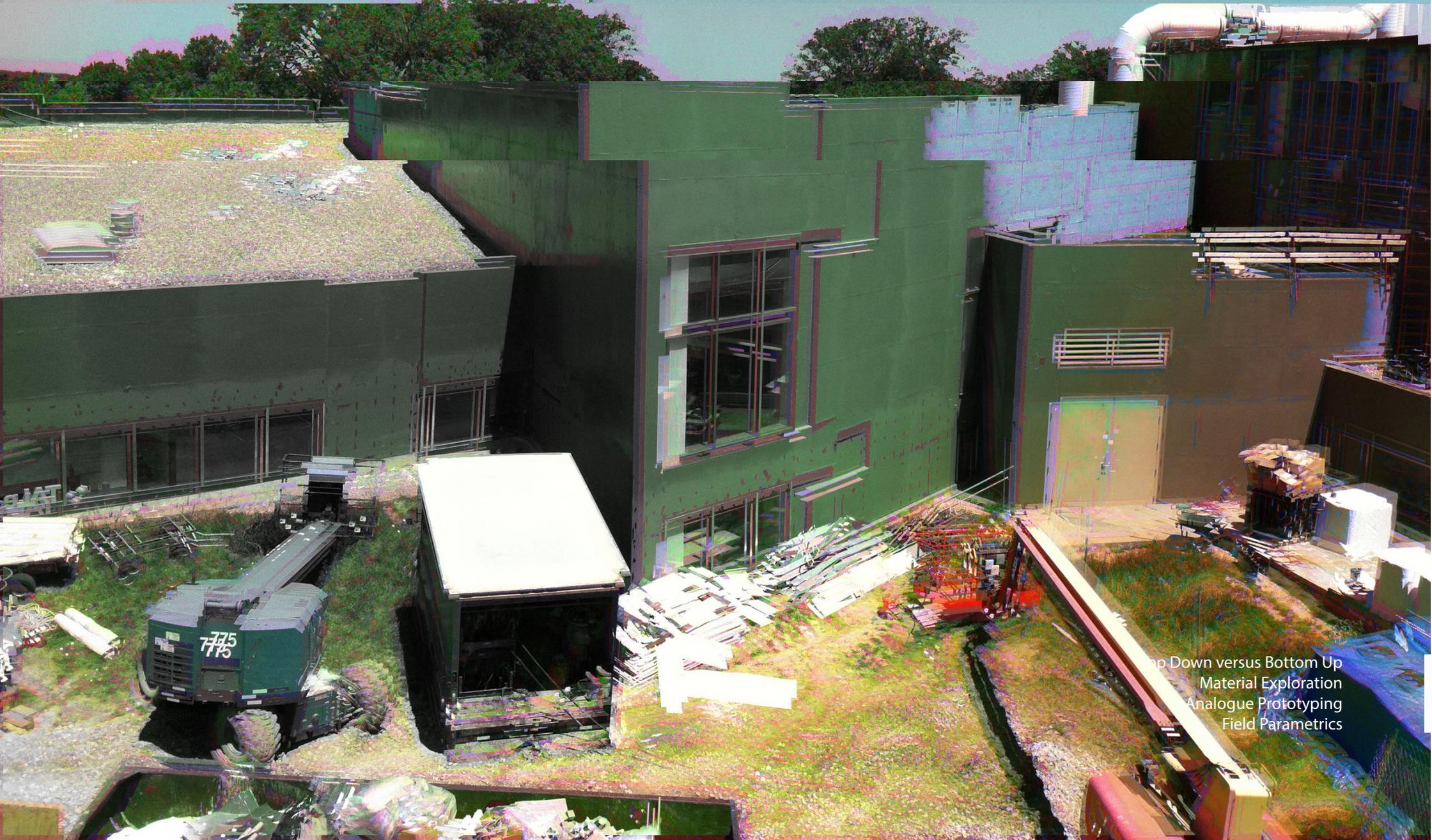
THREE.  
PARAMETRIC  
THINKING

Top Down versus Bottom Up  
Material Exploration  
Analogue Prototyping  
Field Parametrics



Top Down versus Bottom Up  
Material Exploration  
Analogue Prototyping  
Field Parametrics

# FOUR. PARAMETRIC TOOLS



Top Down versus Bottom Up  
Material Exploration  
Analogue Prototyping  
Field Parametrics





## PREFACE

This book includes a collection of work completed by undergraduate students of architecture within the school of Design, Architecture, Art, and Planning at the University of Cincinnati. The work is limited to a single capstone studio section taught by professor Ming Tang; it investigated the role of Parametricism within the current discourse of architecture. A panoply of responses and criticisms were generated during the quarter and were manifested in numerous writings and designs. This book serves as a record of the intensity and scope of research that is essential for the final studio. Equipped with the experience of seven design studios and nearly a year of professional employment, it was time to challenge design intent, methodology, theory, materiality, technique, and program. Although this studio provided a general program for an Art Center, it was imperative to re-examine everything considered to be standard or traditional for an artist studio or gallery.

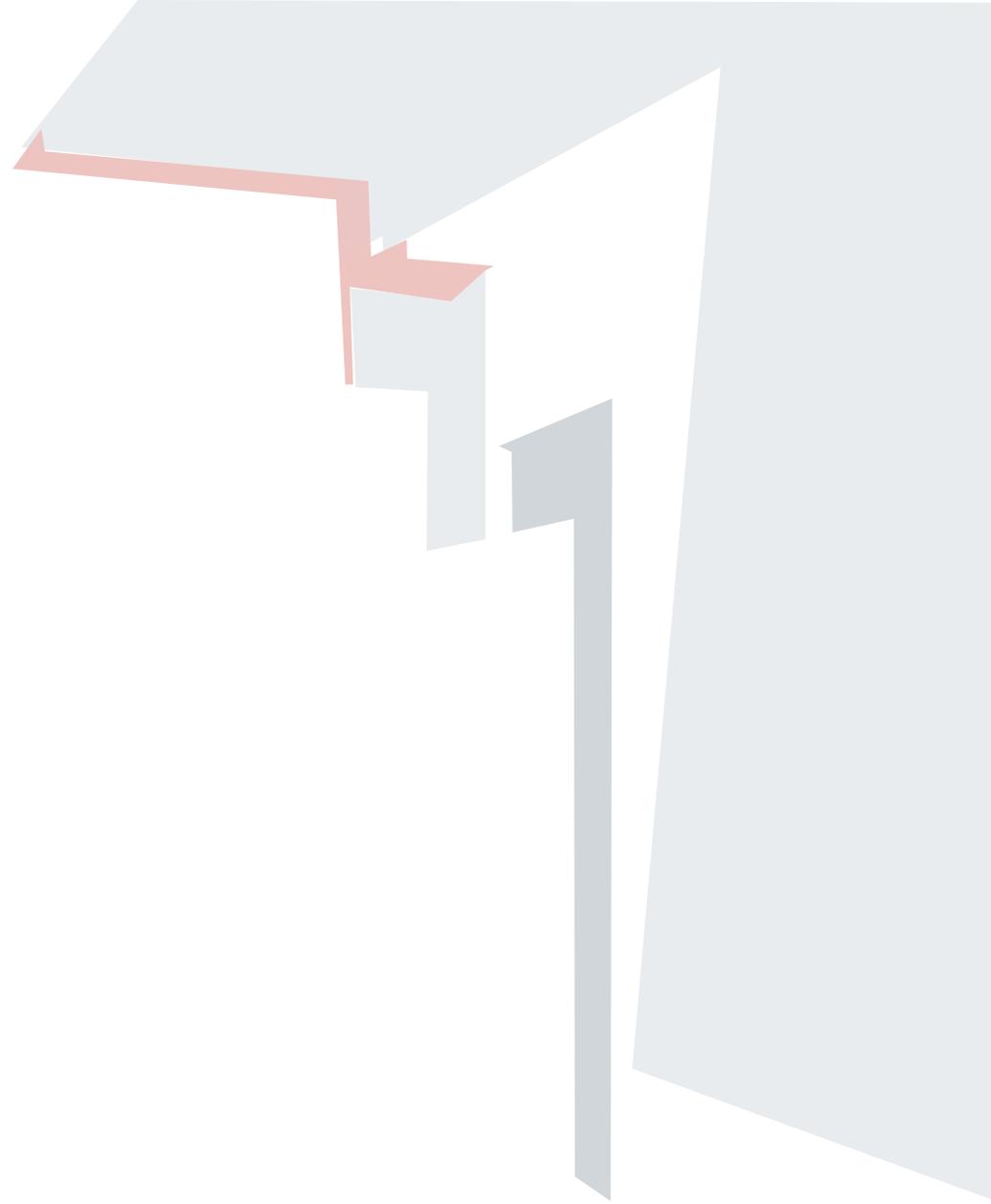
In catechizing some of the basic conjectures of designing art galleries, studios, workshops, and museums, several conflicts arise within the attention framework; our parameters should be re-evaluated according to the tactile realities of our physical environments and localized sensory thresholds within the context of the contemporary hegemonic paradigm. The emerging associative methodologies and theories inspire more than simply a fascination with the techniques of a digital age; it is imperative that we develop a strong grasp of the complex thinking necessary to achieve truly parametric design. We are members of a generation that knows how to use technology to do things unimaginable 10 years ago, yet we have no concept of how any of it truly works. We don't understand the complexity and thought behind its development. Understandably, we have grown accustomed to learning and adapting to any new technology that emerges, without inquiry. In order to maximize the full potential of these parametric technologies, it is paramount for us to question, understand, and think through solutions parametrically so that we can meaningfully and successfully execute the design.  
—Hans Koesters, Student/Editor

COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

capstone  
STUDIO

4four 0zero 2two

UNIVERSITY OF CINCINNATI



## INTRODUCTION

At the 2009 Intensive Fields Conference, Patrik Schumacher stated that philosophy consumes architecture at moments of crisis; it only recedes once we know what we are doing. He proclaims that Parametricism is the answer to the ontological shift in primitives as the profession struggles to distance itself from the residual fragments of modernist ideologies. This crisis is evident in the architectural discourse of the previous two decades following the end of post-modernism, minimalism and deconstructivism. In the last 10-15 years, Parametricism appears to be the most salient of the design research programmes and has played a fundamental role in the collective cycles of innovation and theory that have included Swarm Intelligence, Morphogenetic Urbanism, and the multiplicities of Rhizomatic Urbanism. Although the fundamental principles in the parametricist manifesto have been gaining traction in recent years, the plausibility of this approach has been hindered by its inability to realize truly performative design in which the style could develop as the paragon for a sustainable future. The manifesto explicitly proclaims many sensible positive and negative logics, but requires a further investigation in relation to the aforementioned, emerging associative methodologies and theories.

In Schumacher's dissection of the heuristics of parametric design, he declares, "Strategically constraining the solution space: we know we are only going to solve problems with parametric solutions." It is imperative that these problems are not solved merely with parametric solutions as a resultant of parametric tools and techniques, but also dependent upon a parametric thinking as a means of translating this variegated and complex, but meaningful data sets into parameters as an integral part of a derivative design process.

Schumacher argues that the advent of parametricism dictates that new forms follow new functions. surely displace the relevant and interpretative value that only architects can provide. It is clear that the rigid, repetitive forms of Fordist modernism no longer have the complexity or capacity to relate to our digital society: but to what degree does parametric complexity of form result in the visual chaos that Schumacher describes as anathema to the skylines, streets, and formal massing that plagues our cities. Although he claims that visual order and aesthetics remain paramount in the final conceptual design (Schumacher explicitly affirms that "we are not engineers"), the rhetoric he uses to describe "gradient fields of activity" can perceptibly give rise to a somewhat chaotic formal expression that has not been rationalized given the lack of definitive programming of spaces. What is most critical to the future of parametricism is the de-emphasis on the parametric tools that have become inherent and reinforcing in this methodology. The tools and techniques we gain from the software, are already dated by the time we discover the means to effectively utilize them. An increasing dependence on the techniques, without an equal focus on parametric thought, will surely displace the relevant and interpretative value that only architects can provide.

**STUDIO**  
FOUR ZERO TWO  
COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

**STUDIO**  
FOUR ZERO TWO  
COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

capstone studio | university of cincinnati | hans koesters | professor ming tang | class of 2012

**STUDIO**  
FOUR ZERO TWO

COLLEGE OF  
DESIGN  
ART  
ARCHITECTURE  
PLANNING

capstone studio | university of cincinnati | hans koesters | professor ming tang | class of 2012

**four zero two**

capstone studio | university of cincinnati | college of architecture | hans koesters