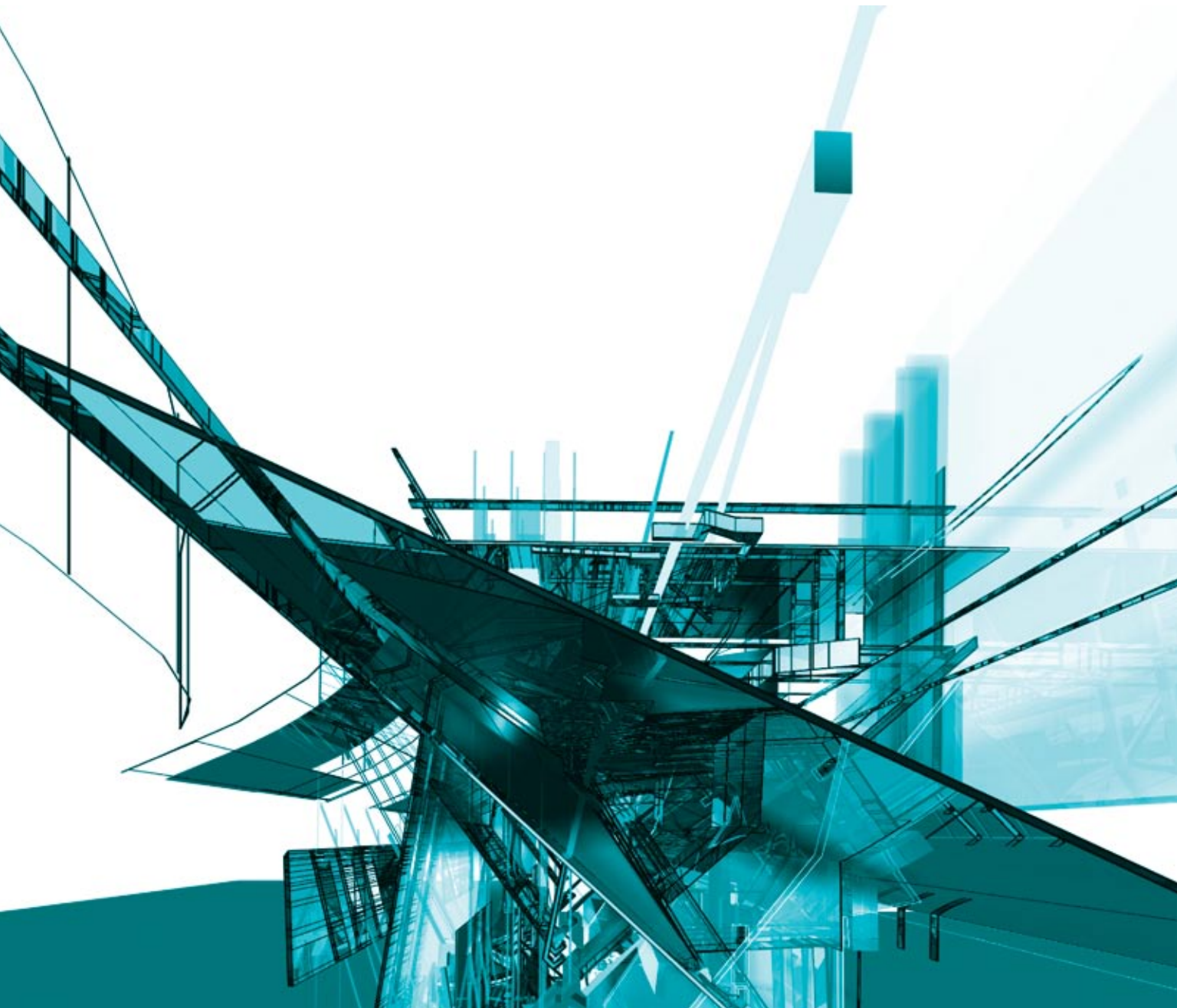


# **Digital Media** and the **Creative Process**

Paper Section



# Animate Topologies: Blending Media and Architecture

by Carl Lostritto and Michael A. Ambrose

The work discussed here is the outcome of a design studio and a complimentary digital media seminar taken simultaneously. Assistant Professor Michael Ambrose teaches both courses. The studio explores a process-oriented design research methodology that examines the design of an international headquarters of a radio network interested in the public service of global news collection and dissemination, made tangible through the vehicle of a new Public Radio International (PRI) facility in Washington, DC. The accompanying seminar promotes a similar open-ended research methodology focused on an exploration of formal and procedural meaning(s) discovered through the process of translating between media. A series of translations between film, drawing, form, space, surface, and animation are the control variables against which students expose, and then design topological constants, revealing and exploiting the nature of media. Both the studio and seminar are dependant upon, and draw inspiration from, the multitude of digital means by which modeling and animation within **form•Z** can enliven architecture and the design process with rigorous investigations into form, space, image and animation.

The two courses were interested in design explorations that challenged the student's preconceptions of digital media. Pedagogically, each exercise was developed to simultaneously conflate and decouple image and idea to explore varied means of representation within the digital design of architecture. The underlying question within both the studio and seminar course asked; is how we make directly related to what we make? Animation was used as a device in both courses to allow the students to realize that potential of change. The change of perspective over time, the change of geometry over time, and ultimately the change of context over time were all used as devices within a design studio to explore and expose the juxtaposition of precisely controlled and loosely found moments within a design process. In the design studio simple aspects of program study, site study, and conceptual study

were imbued with procedural thinking derived from the animation of situational relationships within each study. In the digital media seminar students deconstructed a select scene from a film to better understand the fundamental structure developed by the cinematographer. In both cases it was a highly controlled set of criteria that allowed each system to have its organizational structure. The use of animation as a medium for design exploration offered the students the opportunity to "loosen" the organizational structures in a way that allowed them to discover overlaps and interpenetrations within the representation of intent and interpretation.

The means and methods of a design production within these courses challenge the students to understand the nature of each medium. Every time a model was made, every time an image was made, every time an animation was made, the student had to grapple with the process of that making as a way to challenge the architecture that was being made. The blending of media and architecture within this design research encouraged a broader understanding of animation, topology, and the animate potentials that exist within any design process.

## Media as Program and Method

Designing the headquarters for a world media corporation provides an opportunity for media—that is, design media—to play an active role in the expression of the nature of news media. In a cultural climate where the definition of media, the purpose of media, and the process of broadcasting media is contestable, much less static, the role of architecture carries a mandate to itself to become an animate condition. How then, can architecture express dynamism without being made entirely of moving parts, without being literally animate? The primary agenda of this studio project is to employ animation with a scientific rigor on the design process to investigate that proposition.



**Figure 1:** Primary spatial-formal-program relationships in PRI Headquarters, Studio – Carl Lostritto.

Extending upon the mandate to consider media as design product, media provides content—the complex socially weighted bias fueling the investigation, as well as process—the means by which content, parameters and restrictions can be translated, distorted and distilled through, by and in architectural design. The objective is to allow process to be revealed as traces or trails manifest as interactions of static form and space.

While the studio project, endeavored throughout one semester, sought to use **form•Z**'s animation toolset as a method of design, the parallel seminar explored the implications of animation broadly and conceptually. In the seminar, animate conditions (the movement of an improvisational dancer and cinemagraphic datum in a film) are manually documented as geometric information in the **form•Z** modeling environment. The digital craft afforded to the designer in this step is a direct result of the multitude of modeling tools available in **form•Z**.

As the original clarity of the source material is purposefully diminished, new meaning as well as new spatial and aesthetic effects can be discovered and subsequently harnessed. The recorded geometry, the static capture of motion over time and through shifting perception, has direct roots in the traditions of cubism and purism. Re-animating this geometry using tracked variables, many of which are associated with object or camera parameters in **form•Z**, demands these architectural conditions—frame, section and threshold—shift to become temporal conditions. These conditions emerge out of the process of animating. There exists here an important distinction from animation as a means for thorough capture of modeled conditions. In these cases the conditions are not revealed in an animation. Rather the animation is the condition. It is through this achievement that animation, by converse association, can be expressed in static architectural conditions in the studio project for the design of a building.

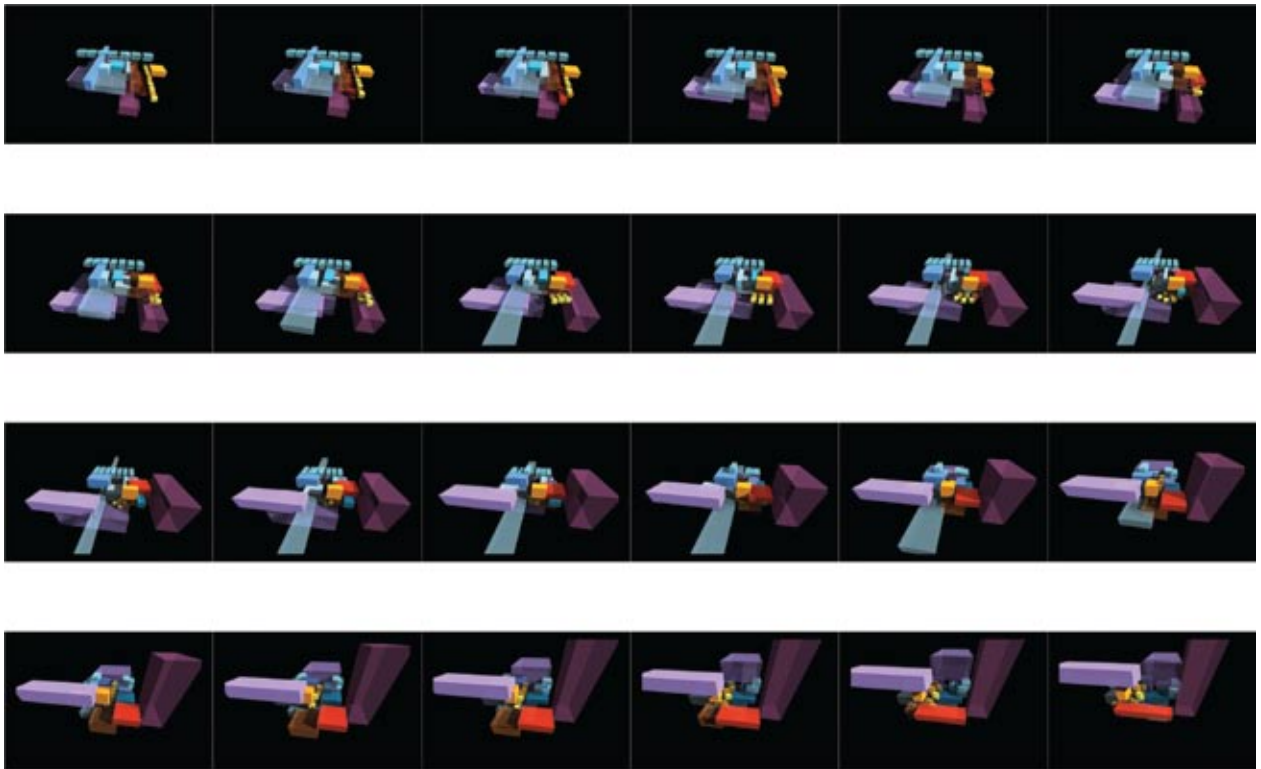


Figure 2: Animation exploring programmatic relationships for PRI Headquarters – Carl Lostritto.

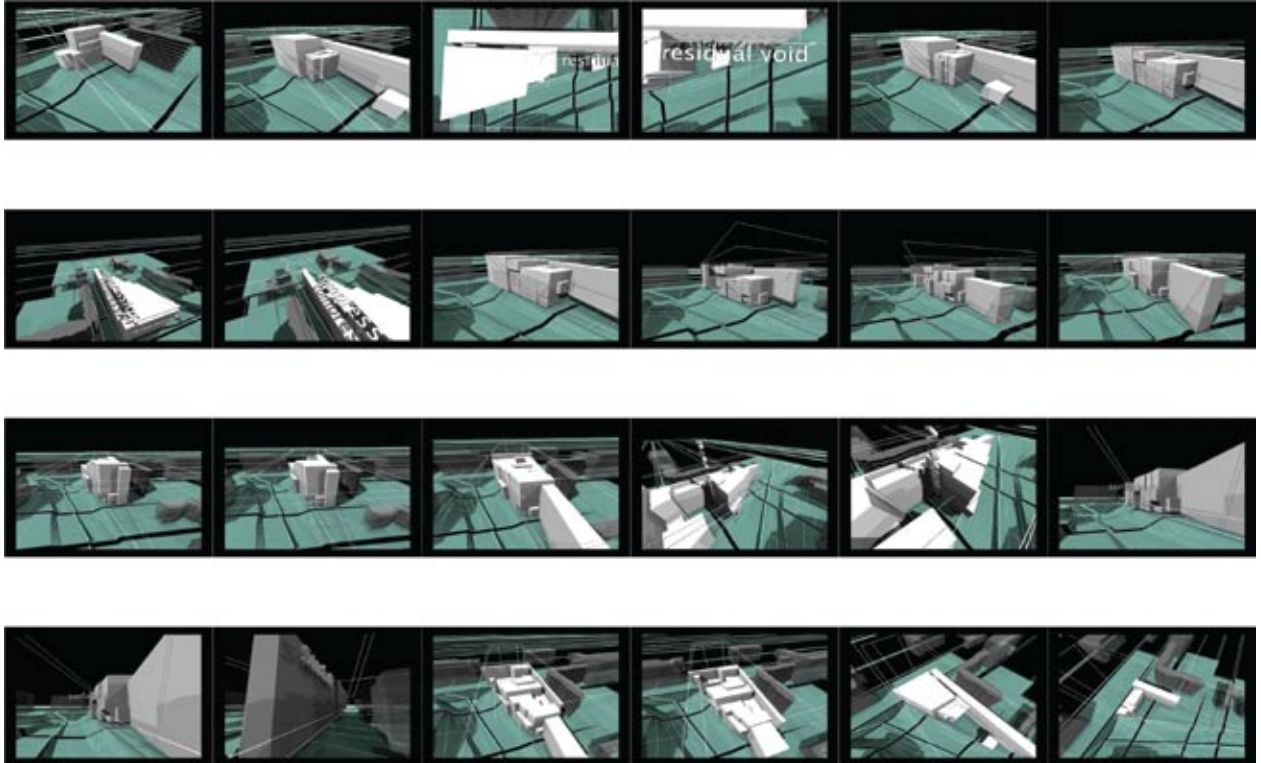
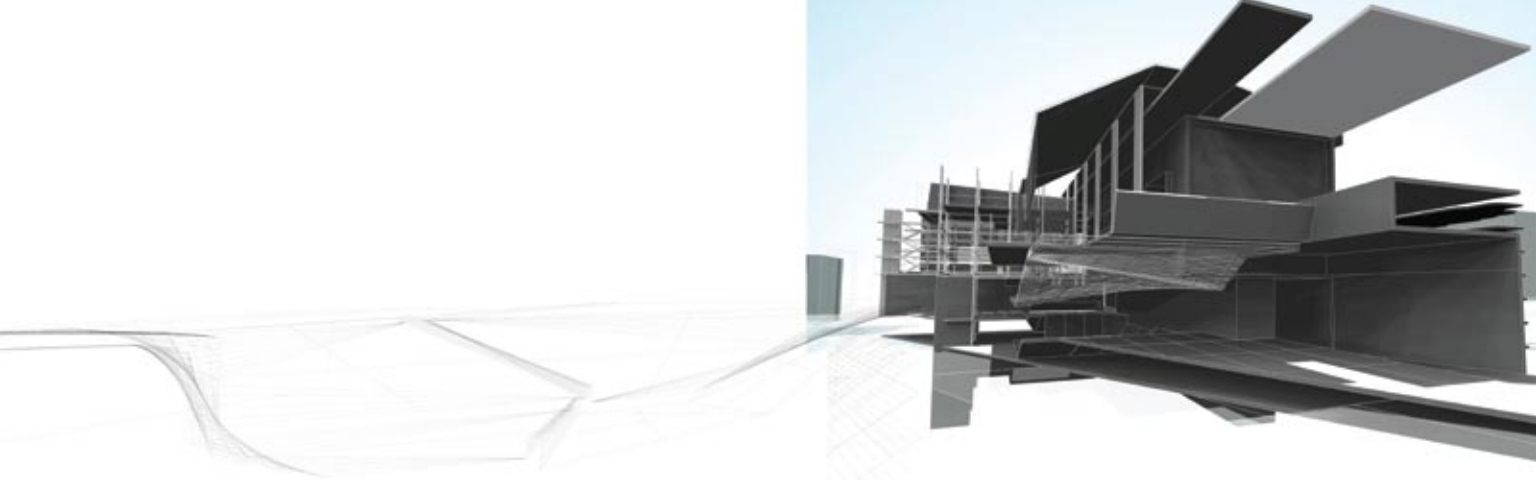
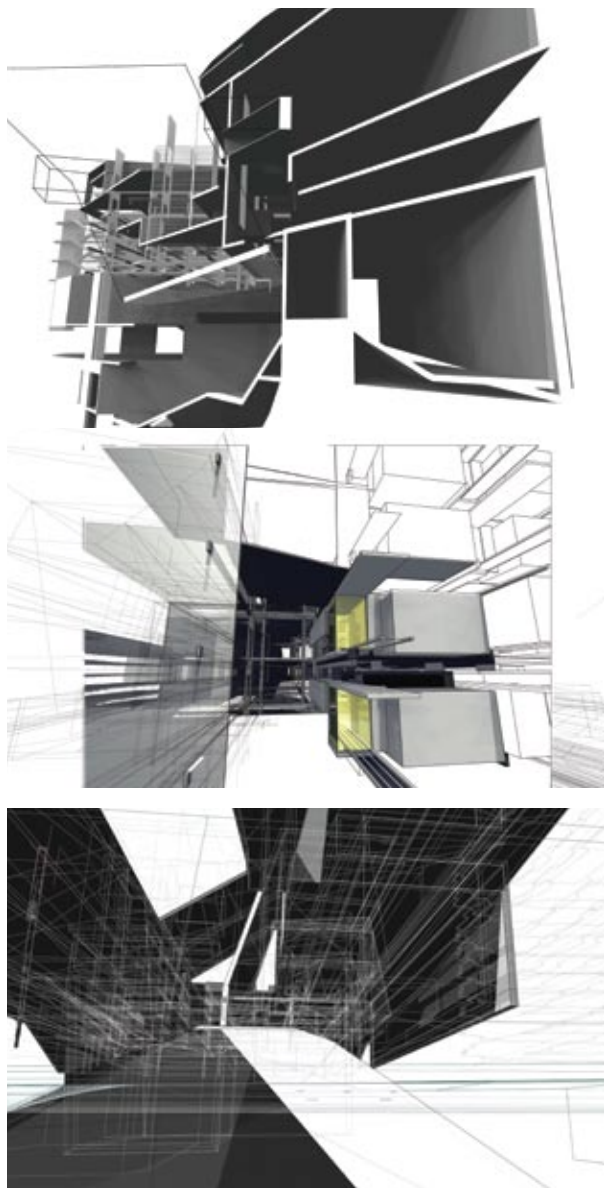


Figure 3: Animation exploring programmatic relationships for PRI Headquarters – Carl Lostritto.



**Figure 4:** Site posture of PRI Headquarters, Studio – Carl Lostritto.



**Figures 5a-c:** Animate conditions in static proposal for PRI Headquarters, Studio – Carl Lostritto.

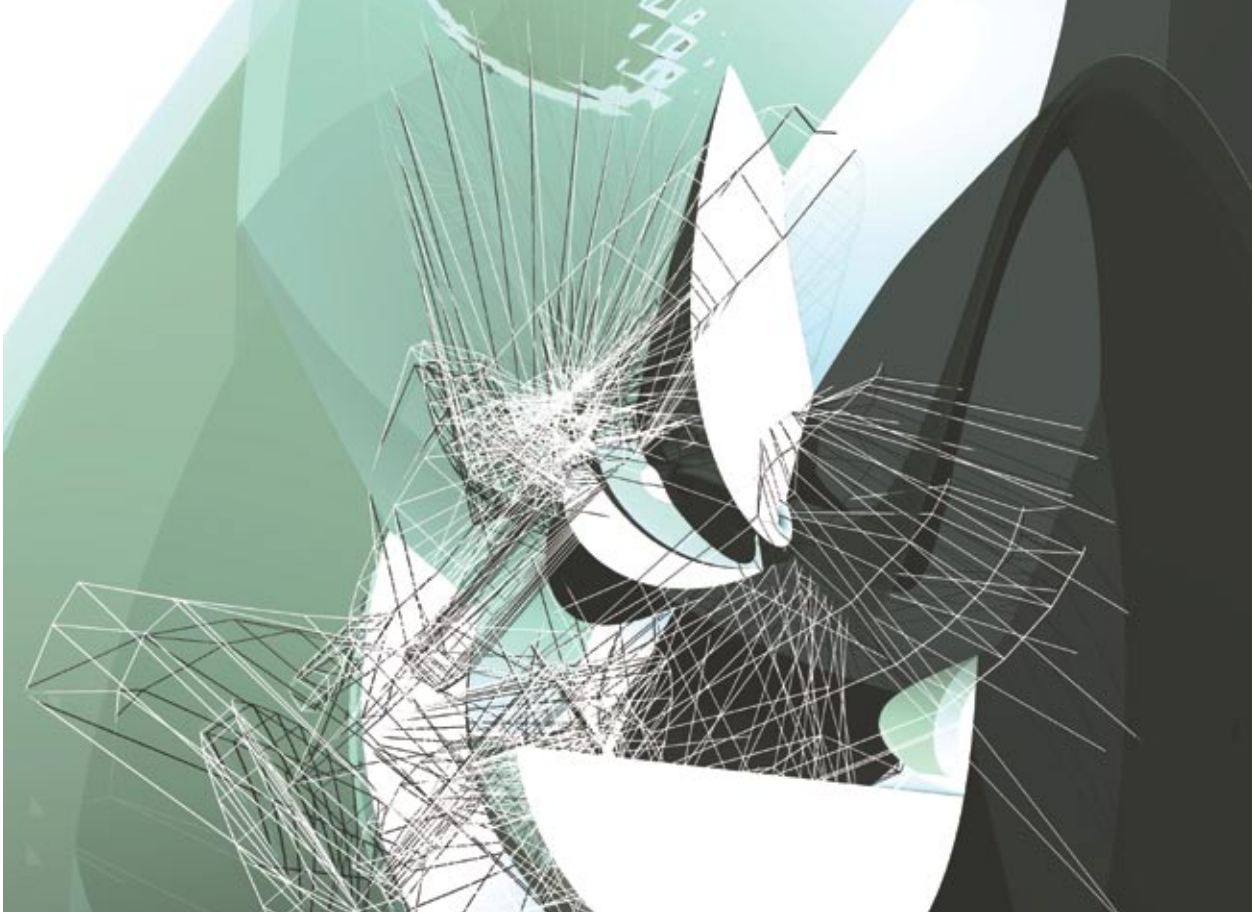
## Animation as Qualitative Design

This research seeks to distinguish between processes that produce a compelling outcome and processes that can be completely designed at all levels of implementation. Qualitative design, like qualitative scientific research, mandates a measurable outcome with a controlled and documented process. In an architectural context, this attitude promises extendibility as the focus is on cause-effect relationships rather than the achievement of a goal. This requires that the experimentation be open-ended; there must not be an assumed, projected or mandated outcome. There is no expectation that animate design will lead to a solution, rather that animation can be a means to translate parameters into relationships.

**form•Z**'s unique ability to model complex, detailed parametric architectural forms as well as the paralleled functionality allowing creation of non-linear animations is essential in infusing architecture with animation, and vice versa and more importantly, both simultaneously. This allows for the transition and overlap of virtual building model and a physical, abstract topological study. Animations created in **form•Z** can reveal nested, interactive, parametric relationships that would otherwise be obscured by the sometimes distractingly formal product. As a design medium, **form•Z** animation can be used to arrive at sets of solutions rather than a single solution. Animation is a medium by which to explore cause and effect relationships also, especially using the powerful Animation Editor palette.

## Animation toward Architecture

Figure 2 represents an investigation demonstrating the application of animation craft gleaned from the seminar. Here, speculation on the potential programmatic requirements for a National Public Radio Headquarters takes place through the language of animation. By modeling opposing extremes of proportion and adjacency and the automatically tweened instances represent plausible programmatic arrangement. Additional key frames were added to adjust and restrict overlap.



**Figure 6:** Growth by exaggeration of motion, seminar – Carl Lostritto.

A single, static program diagram would not only be nearly impossible to achieve but would, in its nature, contribute to a failure of a recursive design strategy. Any “solution” to this complicated program of radio, library, exhibit and building administration must address evolving, nuanced parameters of overlap, adjacency, connection (physical as well as visual), sound isolation, levels of restricted access, frequency of use by various groups, varying density requirements over the course of a day/week/month/year, floor area, wall area, height, volume, light and air. A subtle adjustment to any one of these parameters might affect any or all of the others, potentially drastically.

This investigation makes use of the language of animation to speak about many potential programmatic as well as site (Figure 3) arrangements given aforementioned and additional parameters. While it is acknowledged that there may not be one singular working, perfect solution to this demanding program, it is possible to consider dozens of arrangements made plausible by relinquishing temporal control over some of the variables while monitoring and adjusting others. This type of analysis is made possible given the investigation of program, site and concept in isolation from one another.

In this analysis, geometry of programmatic elements is controlled by tweening. Extremes of proportion

are keyframed. The resultant animation generated by the computer is made up of plausible volumes for that programmatic element at each frame while no frame shows the same volume. Take, for example, the programmatic element of the stacks within the library. At the one keyframe it is modeled as long and narrow as it could possibly be—it is at this point at its extreme limit of reasonability—any narrower and it would be non-functional as storage for media with enough room for people to move freely through. At the other keyframe it is modeled as tall and skinny as stacks could possibly exist. The computer generates the frames and the result is many volumes representing the stacks, each with working volumes. The middle frame generated in this case would be a cube.

As tracked parameters begin to influence each other, the research potential extends exponentially. At this point a control variable becomes essential. Certain key elements of the program is cycled through extremes and offset slightly as to reduce the propensity for temporal overlap of resting states. Then, gradually, more keyframes are added within the animation as other parameters relating to position, orientation and proximity are introduced. Some elements tend to attract others because of a programmatic relationship. Elements must shift laterally or vertically to avoid unacceptable or undesirable overlap or adjacency. The ultimate, ten-second animation that results represents

the many complicated resolutions to the program. Many layered, overlapping chains of events resonate over time as the individual elements all simultaneously cause and respond to programmatic forces. The result embodies interconnectedness of a complicated machine as well as the smooth, evolutionary aspects of an organism. This new tool-artifact in its complete state wholly discovered, its complexity too rich to be particularly foreseen although the program's initial, perceived complexity and simultaneity is manifest exactly.

The animation is then dissected. While each frame represents a valid complete solution to the set of problems, a search for “found frames of interest” begins. Reasonable success in terms of program is a given at each and every frame. Conditions, forms, spaces, patterns relationships based on emergent parameters or established barometers of success can be discovered. Each program instance can be looked at with a fresh eye. These discoveries lie not only in the image, the frame, but in the particular programmatic arrangement communicated by that frame. Evocative, poetic, serendipitous discoveries arise because of this layered approach—some conditions were not even visible in the original found frame of interest but only revealed by framing a different view at the same moment.

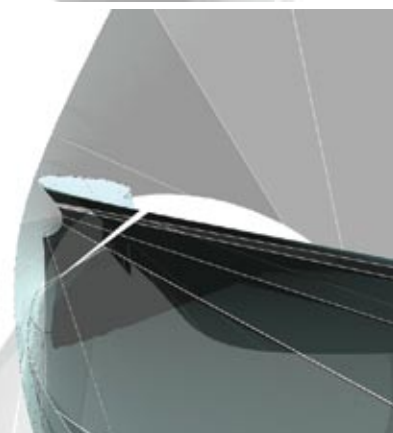
## Architecture in Animation

The structure of the studio has embedded a clear overall expectation: a coherent, singular, physical architectural proposal, with an open-ended process. The parallel seminar allows for a complimentary opportunity: using a rigorously controlled process without any pre-determined resultant outcome. Expectations and agendas dominated any artful whims however. Specifically these pertain to the clarity of process and intention as represented by the output. In an effort to explore meaning in media, source-material is recorded into tangible, literal bits of information within **form•Z** (often employing physical methods of measuring or marking has necessary to obtain precise, although not necessarily accurate, information). The source material is not irrelevant as two instances of events rooted in motion-space were carefully selected for their complexity and irregular order. However, the translation of content into data purposely strips the motion and space from meaning and context. The data become the control variable by which media can be exposed and meaningfully and directly presented.

A dominant theme of this research was that of growth as means of communicating patters embedded in data. **form•Z** tools were used, for example, to extend a NURBS surface (itself a direct manifestation of recorded information from a dancer) from the exterior continuous based on completely preexisting geometries. As exaggeration continues, so does an exponential change



a



b

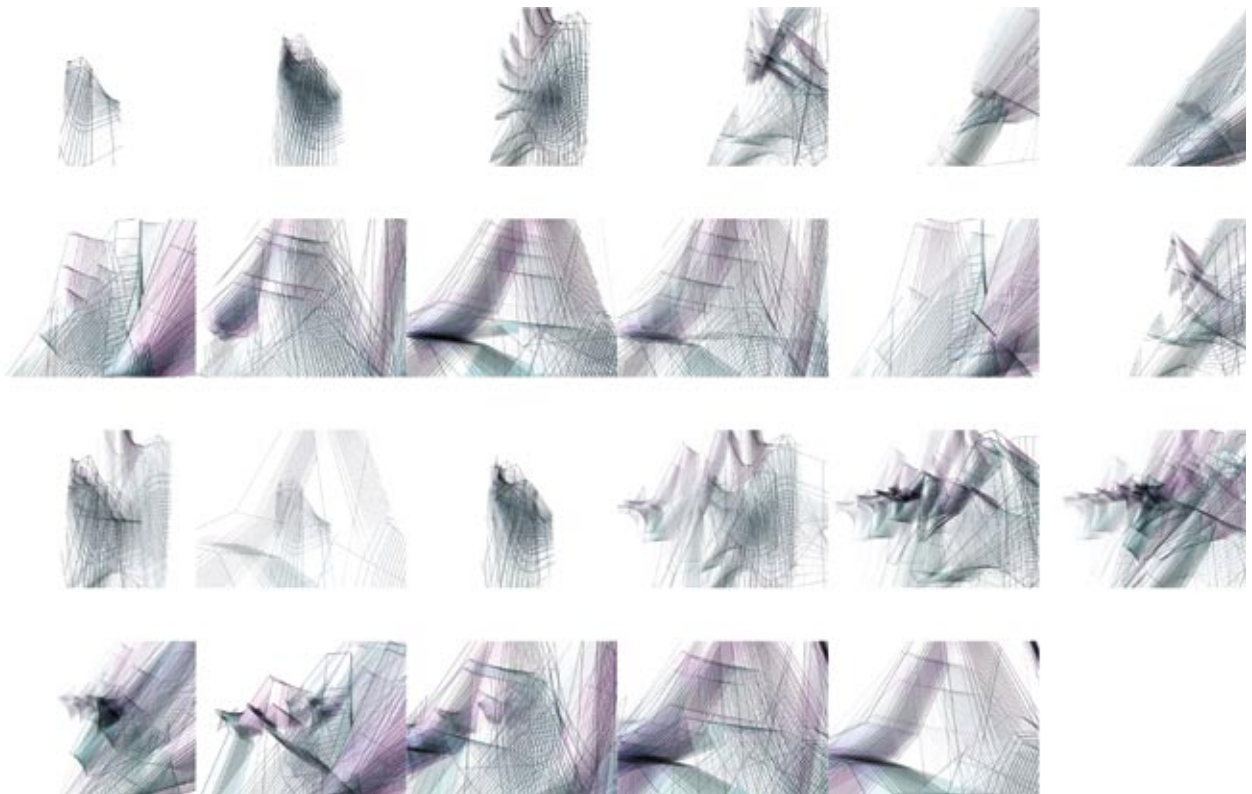


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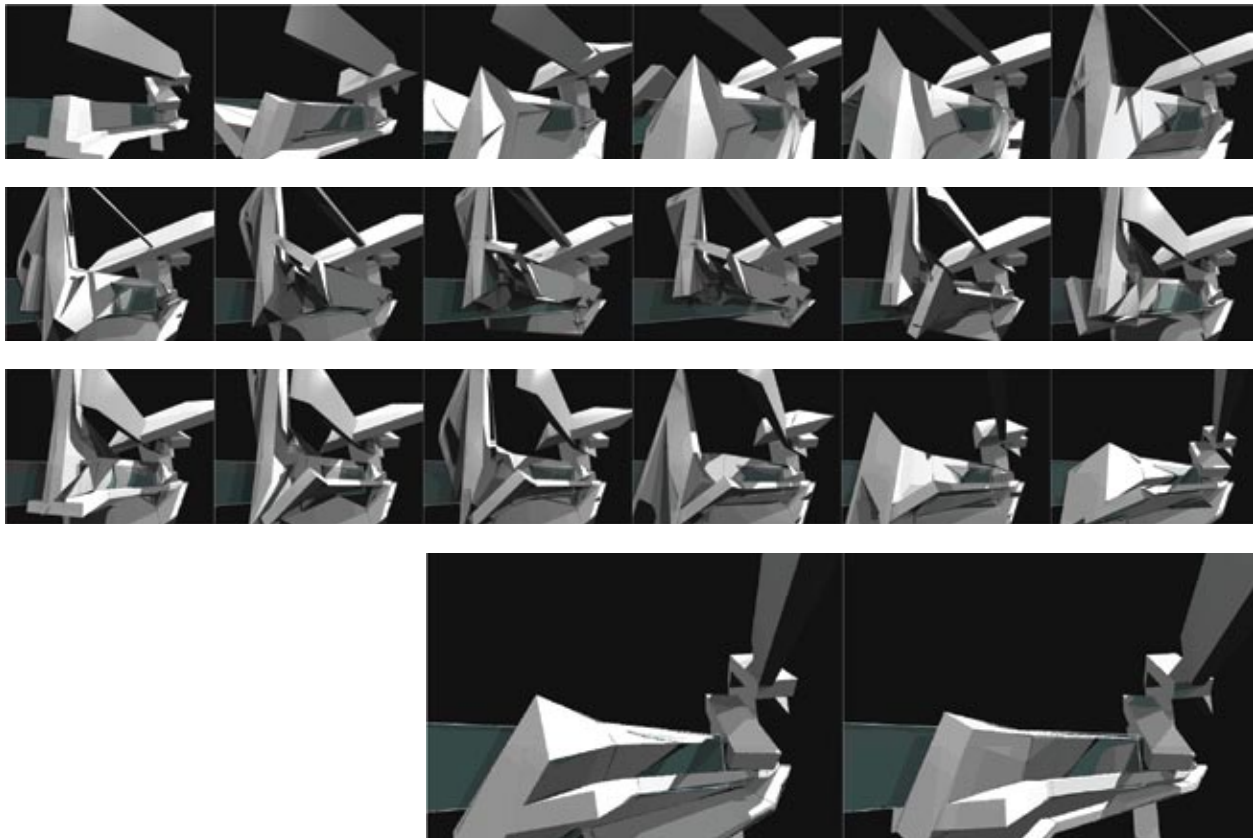


d

Figures 7a-d: Grown artifacts, Seminar – Carl Lostritto.

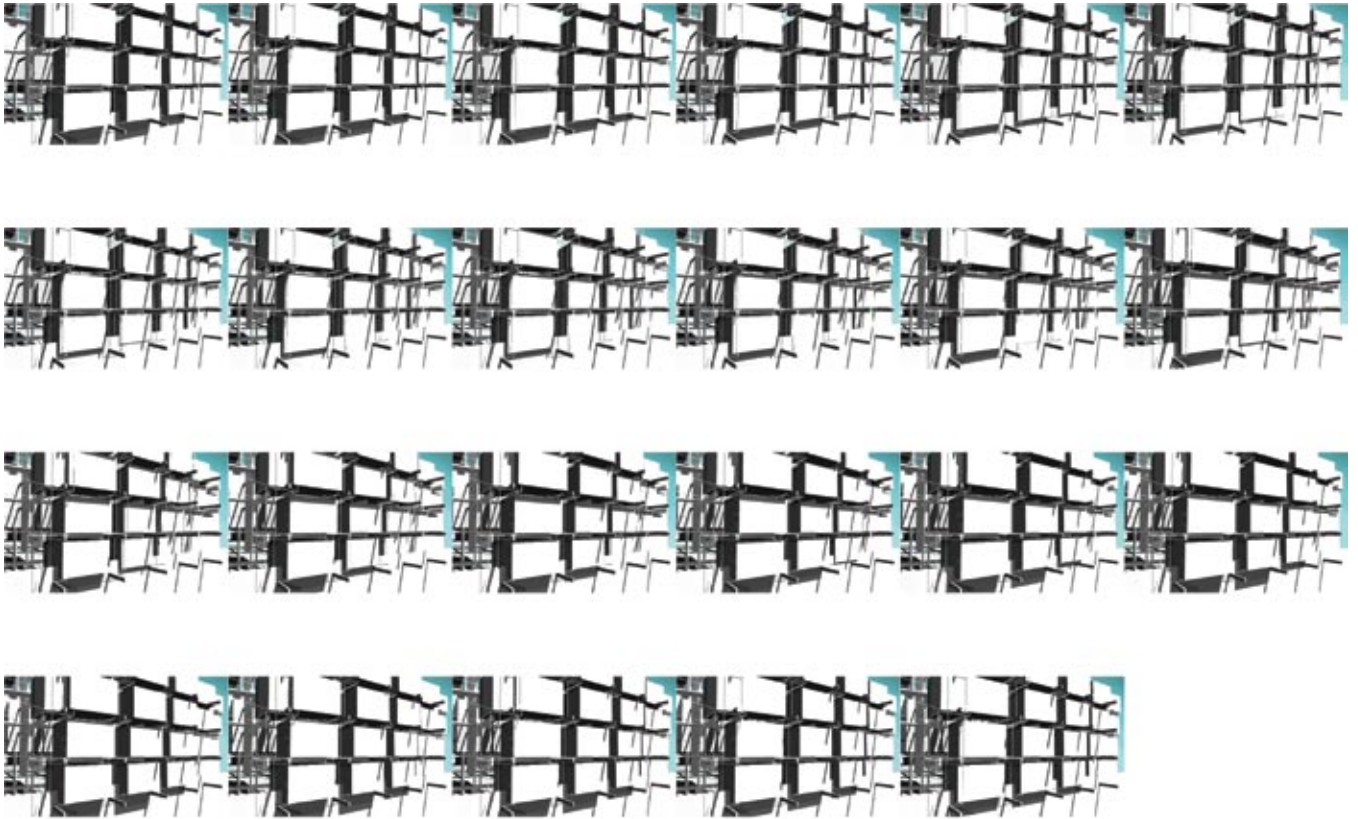


**Figure 8:** Integrated Animation: linking geometric and temporal tracks, Seminar – Carl Lostritto.



**Figure 9:** Documenting Spatial Inversion, Studio – Carl Lostritto.





**Figure 10:** Variable conditions in PR1 Headquarters building proposal, Studio – Carl Lostritto.

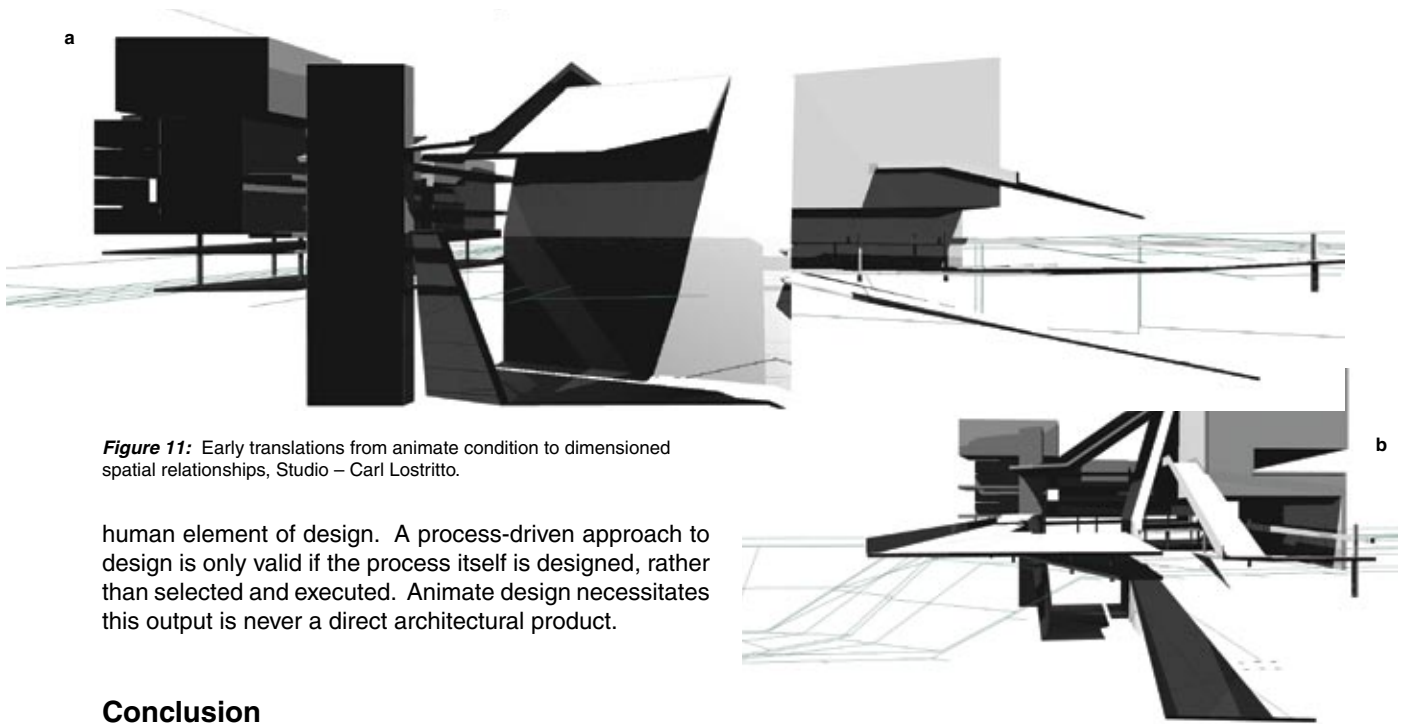
in surface variation from slight and nearly imperceptible to extreme to the point of constantly inverting characteristics (Figure 7(c)). In the other experiment, growth manifests as the integration of largely linear data into surface and subsequently volume (Figure 8). **form•Z**'s generative toolset allowed for this translation to be controlled and meaningful. Since a number of **form•Z**'s generative functions have trackable parameters, these processes of transformation and distortion can be expressed through animation thus allowing for an expression-by-manipulation to occur.

When the linear information from the above mentioned experiment is applied by to the rate of change by manipulating the change graph (**form•Z**'s animation editor palette). This cyclical process is the temporal (as opposed to geometric) integration of the data, literally translating form into time then allowing that time to frame the adjustment of geometric parameters of the original linear condition. The resulting echo reveals as much about the spatial potential of motion graphics as the patterns embedded in the original, recorded data.

## Intersection of Design Process and Media Research

Processes began to overlap and merge in the later portion of the semester as animations from the seminar tended to evolve toward the physical and as the animate diagrams from the studio began themselves to be translated into static manifestations of the numerous temporal conditions. Figures 11(a) and (b) represent one of these critical in-between states. Some animate conditions from the seminar were recreated using architectural elements, as is demonstrated in Figure 10. The final architectural proposal (Figures 4 and 5), and the two constructed animations from the seminar (Figures 6 and 8) are as much varying in their medium as they are conceptually dependant.

Parametric design used to generate a single solution is only as valid as parameters used. An animate design process allows for the exploration of the nature of the impact of parameters in design. In addition to giving an exigency to eventual solutions, this process allows a meta-analysis of the meaning of all solutions and a control of design media. In a process in which computational design is integral, such a freedom is critical if intuition, discovery, and serendipity are allowed to remain as the



**Figure 11:** Early translations from animate condition to dimensioned spatial relationships, Studio – Carl Lostritto.

human element of design. A process-driven approach to design is only valid if the process itself is designed, rather than selected and executed. Animate design necessitates this output is never a direct architectural product.

## Conclusion

As animation capabilities begin to permeate the core of software, moving from where they once resided under the umbrella of virtual movable cameras, this medium becomes viable as a design environment. Animation in and as design can focus digital media toward a reflection of

intent and agenda. Digital models become simultaneously physically inexact and acutely spatial. Modeling craft has always been an acutely intellectual proposition. Now animate architecture can merge process with product to enhance both.



**Carl Lostritto** is a lecturer at the University of Maryland School of Architecture, Planning and Preservation. He teaches an introductory digital media seminar and collaborates in the execution of courses at multiple levels including introductory undergraduate and graduate elective studios. With a methodology influenced by programming cultures, his research investigates animation and computation as mutually informative media. He was awarded the Alpha Rho Chi Medal, thesis prize and distinguished teaching assistant award upon his recent completion of a Master of Architecture Degree in 2008. In addition to teaching, Lostritto practices print, web and architectural design.



**Michael Ambrose** holds a Bachelor of Architecture degree from Temple University where he studied in Philadelphia and Rome on a Temple University Study Grant. He completed his graduate studies in Italy, working in Florence, earning a Master of Architecture degree from Syracuse University through their MArch history/theory program. He teaches architectural design studios at both the graduate and undergraduate levels and an advanced digital media seminar course focused on digital modeling and animation as well as digital design methods and processes. His areas of teaching and professional expertise reside in the design studio and digital media. His research and scholarship examine the value and impact of digital media and computational tools on architectural education and the design process. His teaching crosses many topical areas in architecture, from his digital design media courses, select topic graduate design studios, to his study abroad course titled Visual Analysis: The Building and the City conducted in Rome, Italy. Professionally, Ambrose works in collaboration with Caprioglio Associati of Mestre, Italy. Michael's current speculative design work focuses on issues of media and politics related to individual and collective identity in architecture and the city. Currently he is a Lilly Fellow at the Center for Teaching Excellence at the University of Maryland and design discipline coordinator for the Architecture Program at the University of Maryland.