TEL AVIV MUSEUM OF ART עודיאון תל אביב לאמנות

Tel Aviv Museum of Art
Director and Chief Curator: Prof. Mordechai Omer

PERFORMALISM: FORM AND PERFORMANCE IN DIGITAL ARCHITECTURE
27 June – 13 September 2008
Helena Rubinstein Pavilion for Contemporary Art

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Printing: A.R. Printing Ltd.

WEBSITE OF THE EXHIBITION
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www.performalism.com

THANKS:
Israel Aharoni, Tula Amir, Avner Bernheimer, Tal Blumenkrantz, Guedi Capeluto, Alycia Degen, Koray Duman, Pablo Lorenzo-Eiroa, Natanel Elfassy, Rose Feldman, Ruth Feldmann, Avigail Ferdman, Helene Furján, Amit Gilat, Shaul Goldklang, Avital Gourary, Roy Gordon, Lati Grobman, Oded Haas, Dikla Hamo, Tzvi Harel, Devis Iosifzon, Paul Kalnitz, Yaron Kanor, Ofer Korin, Yitzhak Laiwand, Edna Langenthal, Tamir Lavi, Maya Levy, Osnat Linder-Assouline, Dafna Matok, Dana Mor, Hannah Naveh, Ruth Palmon, Ludmila Petlitski, Neriya Ravid, Ayala Ronel, Slavik Rotenberg, Hillel Schocken, Naomi Simhony, Anna Shifman, Shira Sprecher, Irit Tal, Efrat Vertes, Sarit Waingarten, Ditza Wieler, Leslie Wootton, Abraham Yezioro, Daniel Zarhy, Nimrod Ziv

The exhibition and the catalogue courtesy of

AZRIELI GROUP

and with the assistance of an anonymous donation

ISBN 978-965-7161-73-9

The interview with Frank Gehry, screened at the exhibition, is an excerpt taken from videos produced by the Danish Architecture Center, Copenhagen, for the exhibition *Digital Project —Frank Gehry's Vision*, a collaboration between Frank Gehry, Gehry Technologies, Curator Kirsten Kiser and DAC | Danish Architecture Center, financed by Realdania.

The interview with Lord Norman Foster, *The Making of Architecture* (2001), screened at the exhibition, was conducted by Dayan Sudjic, in collaboration with Bentley.

The Franken Architekten *Homecouture* model shipping was sponsored by Evonik Röhm GmbH transport.

PERFORMALISM

FORM AND PERFORMANCE IN DIGITAL ARCHITECTURE

Yasha Grobman, Eran Neuman

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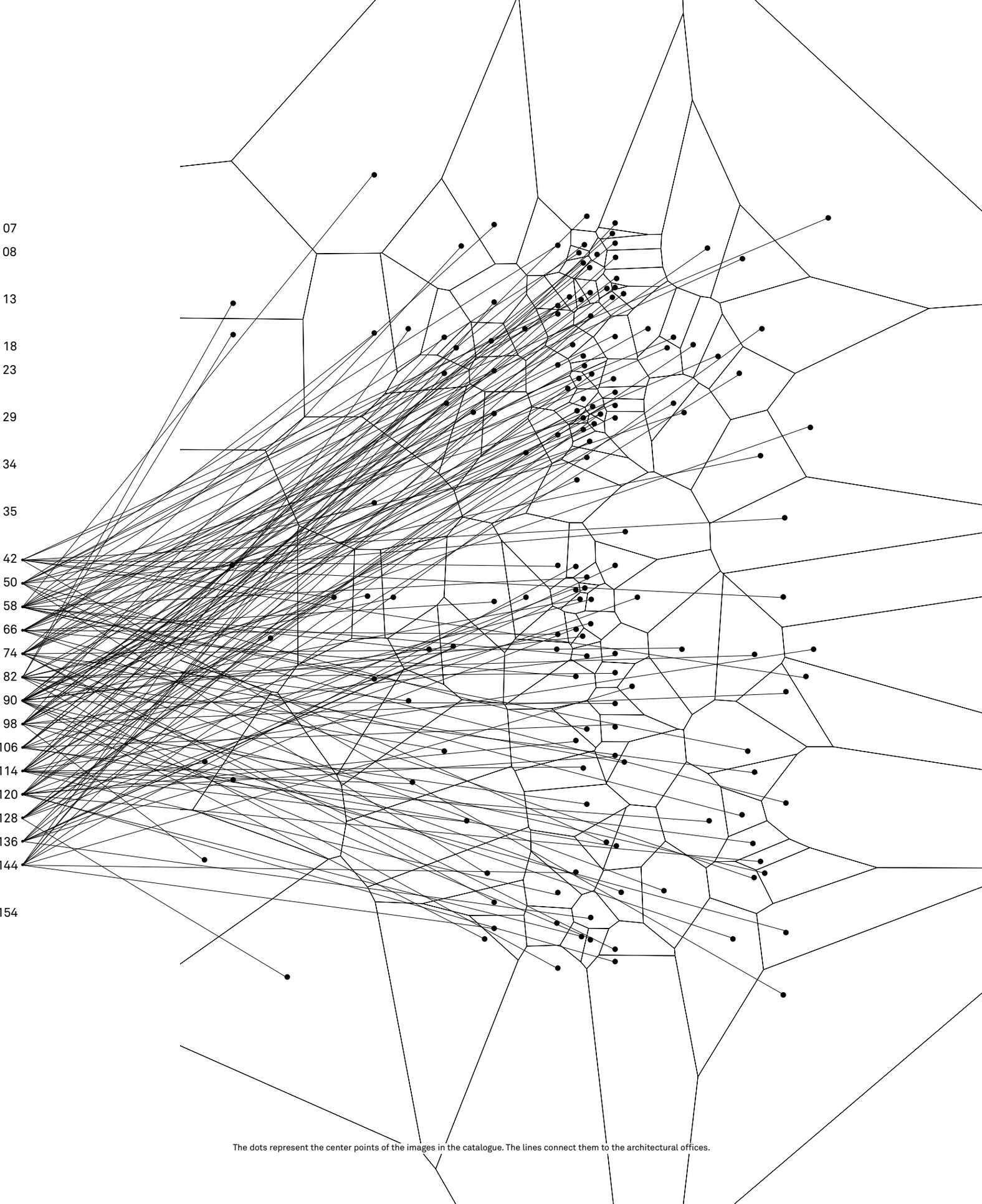


The dots represent the center points of the images in the catalogue. The lines connect them to the architectural offices.

REFLECTIONS ON THE GENERATION OF THE EXHIBITION DESIGN

1. Forms of Prediction

Aaron Sprecher

» On 24 January 2008, the world financial market woke up with a hang-over. News rapidly spread that a French trader, Jérôme Kerviel, had operated fraudulent transactions during the past year leading his financial institution to a historical loss of 7.1 billion dollars. In the following hours, from Paris to New York, Tokyo, Shanghai and London, worldwide trading markets recorded hysterical movements as if their nervous systems got affected by an uncontrollable virus.

Often portrayed as an echo of human multilayered activities, financial markets act within highly meshed networks that are responsive to a wide range of parameters such as production rates, human conflicts and levels of available natural resources. While these parameters are predictable, the French trader Kerviel had in fact revealed a symptomatic notion inherent to systemic organization: the likelihood for a parasitic[1] event to disturb the fragile equilibrium that may occur in a regulated system.

The notion of parasitic system has received many definitions in architecture during the past decennia. From Andrew Benjamin's "architectural parasitism"[2] to Paul Virilio's "accidentology,"[3] architects and theorists have developed a perception of the architectural system as an *ensemble* of recognizable agents that sometimes induce the emergence of unpredictable events.

Today, the fascination for such architectural systems is essentially triggered by the possibility of modeling the dynamics of our reality using fast-computing processes. It is here suggested that such an interest is intimately linked with a model of reality as an ensemble of nonlinear events that are perceived as predictable of unprecedented scale phenomena.

Climatic mutations, deregulated urban sprawls and even terrorist activities represent as many phenomena that form, or should we say *in-form*, nonlinear architectural systems. Here, the notion of nonlinearity refers to the idea that the architectural form is now replaced by a formation composed of entities. Each of these entities continuously collects, treats and resamples information that is subsequently communicated to the overall system. Similarly to a cellular automaton or a beehive, this bottom-up organization is by definition nonlinear because it induces the possibility for various agents to act and influence their environment simultaneously. The nonlinear model therefore reflects a degree of performance that is a function of agents connecting, reacting to and transforming a wide range of influential forces across the system.

Considering system as formation, the perception of reality in terms of agent-based organizations has tremendous implications in architecture. Most importantly, it considers the architectural formation as a responsive organism that transforms according to the activities of a multitude of decentralized and intricate agents. Curiously rhizomatic as well as hierarchical,[4] this model implies a mode of organization that relies on a finite set of operations that are distributed across a myriad of self-generating nodes. The architectural organism is here no longer conceived out of a predefined set of decisions but instead emanates from the multiple delocalized agents that are designed to operate on the organism.

Contained by these notions of nonlinearity and intricacy, architectural performance is therefore about a disposition to predict the event. An architecture that is in state of *becoming* rather than *being* is here seen as the utmost form of architectural performance. Such architecture would be about its own disappearance. It would be an architecture where the formation is never fixed but always evolving, never defined but always latent.
Performance as prediction is what constitutes the essence of *Performalism*.

[1] Its executive chairman Daniel Bouton describes the technique used by Kerviel as a "mutating virus" in which hundreds of thousands of trades were hidden behind offsetting faked hedge trades, in "French police question rogue trader Kerviel," *Reuters, National Post* (26 January 2008).
[2] Andrew Benjamin, "Parasitism in Architecture," in *Ephemeral Structures in the City of Athens* (2002), 55-61.
[3] Eran Neuman refers to this notion of accidentology in his article "Kidnap Accident" in reference to Paul Virilio, "L'invention des accident," in *Ce qui arrive* (Paris: Fondation Cartier pour l'art contemporain, 2003), 24.

2. aGENts

Yasha Grobman

Extracted from the theoretical discourse on the interrelation between systems, computer agents and designer, the exhibition's design method and process of creation reflects a critical attempt to redefine these relations from a performative point of view.

The method used for the exhibition design employed computer-controlled intelligent agents. The agents simulated movements throughout the gallery spaces and were exploited as the source of information for an evolutionary form generation process. This process determined the formal expression of the exhibition's overall layout and the particular location of the various exhibits.

During the simulation runs the location of the agents was continuously traced and connected to a spatial tessellation algorithm that dynamically formed phenotypical patterns in the gallery space. Thus, in every moment of the agents' movement in the exhibition space a different pattern was generated. A set of visual fitness criteria controlled by the designer examined the density of the patterns created and identified specific key frames in the process where the generated pattern cells, their dimensions and distribution had a potential to be used as a form for an architectural project's display.

As an evolutionary process, it relied on an initial genotypic description of a set of parameters that defined each agent's movement in space and the interaction rules with other agents and objects. The data from the movement was thus used to generate the phenotypic expression of the initial set of parameters as a dynamic pattern.

Tracing movements as the basis for a form generation method had already

[4] See Manuel de Landa, *Meshworks, Hierarchies and Interfaces*, online at http://www.t0.or.at/delanda/meshwork.htm
[5] Greg Lynn and Hani Rashid, *Architectural Laboratories* (Rotterdam, 2002), 100-107.
[6] Greg Lynn, *Animate Form* (New York, 1999), 103-119.

been used by such architects as Asymptote (Broadcast Architecture[5]) and Greg Lynn (Port Authority Bridge competition[6]). The difference between these two precedents rests in the source of information that was used to generate the movement. In the case of Asymptote the human movement was traced directly, while in Lynn's case the movement was traced from balls controlled by a negotiation of external forces. The current exhibition's design sought to advance this idea, replacing the inert balls with intelligent computer agents.

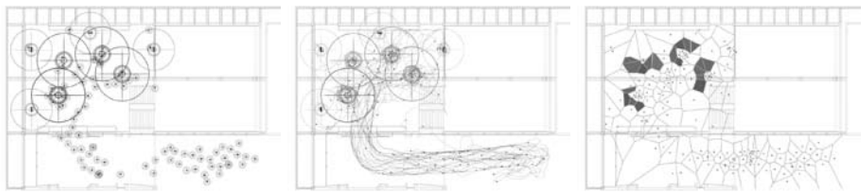


Fig.1 Exhibition display layout generation stages:
stage 1: defining the mutual position and influence of the contextual points of interest and the behavior of the agents
stage 2: tracing the movement of the agents in the gallery space and examining the numerous pattern it generates
stage 3: the chosen pattern and definition of the exhibit clusters

The first scenario of the agents' coded genotypes regarded the agents as the exhibits. In this scenario, the agents were free to wander in the exhibition space, influenced by attraction and repulsion forces that were designated to contextual points of interest/objects such as video projections and screens that were positioned according to technical constraints. The agents' movement was driven by a constant negotiation between the forces of the external, contextual points and the internal, genotypic coded set of forces, which defined the basic movement parameters and the way agents react to each other.

Since a pattern that was generated by a singular key frame represents a local position of agents, it was decided to use in the generation process a compilation of several key frames which represent the agents' positions (regarded in this context as phenotypes) in a sequence of frames within the simulation run. Thus, the generated pattern represents the entire movement rather than a singular moment in time. The patterns most fitted in the population of the generated solutions in terms of cell density and dimensions were chosen as a basis for additional fine tuning runs. These simulation/generation runs were performed until the distribution and dimensions of all the cells in the patterns were satisfactory.

The strategy for determining the elevation of the generated cells derived from the nature of the exhibits presented in each cell. A set of sequential cell heights was defined in a way that an exhibit that needs to be examined from a closer distance, i.e., architectural details or small images, would be positioned closer to the viewer than large images that can be viewed from a greater distance.

The second scenario that was examined saw the agents as the exhibition's future visitors. In this scenario the agents were released to wander in the exhibition spaces according to a different set of genotypic parameters that defined their movement in terms of the mutual influence and the interrelations with the forces that were designated to the other objects in the exhibition space. The idea behind this modus operandi stemmed from an assumption that visitors' movement could be simulated and controlled to optimize their exposure to the exhibits. Reductive by nature, the possibility of parameterizing the future

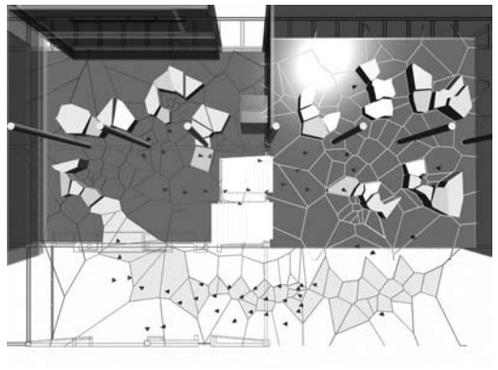


Fig.2 Exhibition gallery, perspectival view of the gallery space

visitor's movement as part of the exhibition's design was also found to be self-reflective since it suggested using visitors to define the position of exhibits according to a future simulated visitor's movement.

The combination of forces negotiation with visual pattern examination by the designer that was employed for the exhibition design combined ideas based on conventional agent-based design approaches, in which there is no centralized system control structure (see aforementioned precedents and those described by Hong et all 2002,[7] Kalay 2004[8]), with traditional design approaches that emphasize the centrality of the designer.

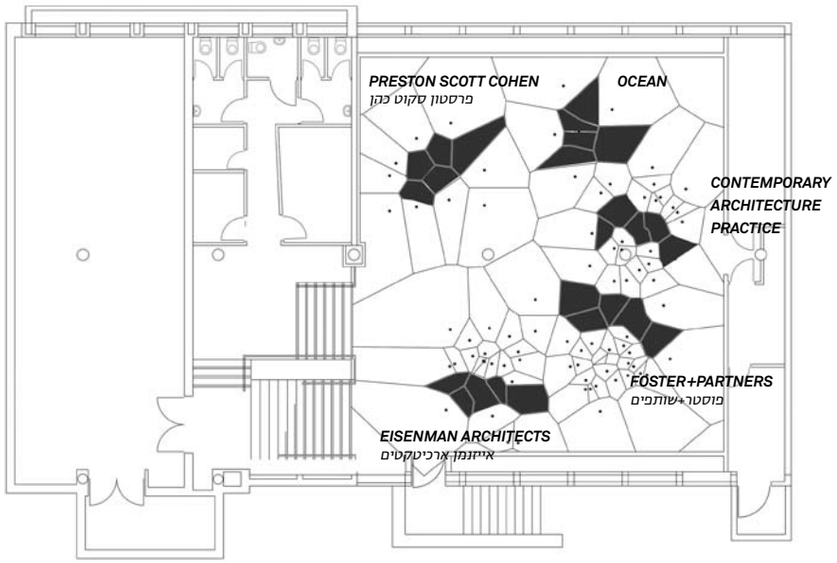
Derived from the logic of agent-based design, the exhibition design suggests a parametric performative approach to the generation of an initial exhibition plan. As a counter-reaction to the often inert position of the designer in this type of design processes, the suggested approach combines the possibility of the designer's intervation in the generation process with the advantage of unpredictable forms generated by agent information inputs. The used approach also suggests a method to simultaneously combine various formal information inputs from different points in time into a single animated, dynamic form. The multifaceted reflection of the idea of performance in architectural design which is an important part of the exhibition's concept is therefore manifested also in the way its display was generated.

Aaron Sprecher is a cofounder of and partner in Open Source Architecture and Assistant Professor in the School of Architecture at McGill University, Montreal. He is a recipient of numerous awards, including Fellow of Syracuse University's Center of Excellence.

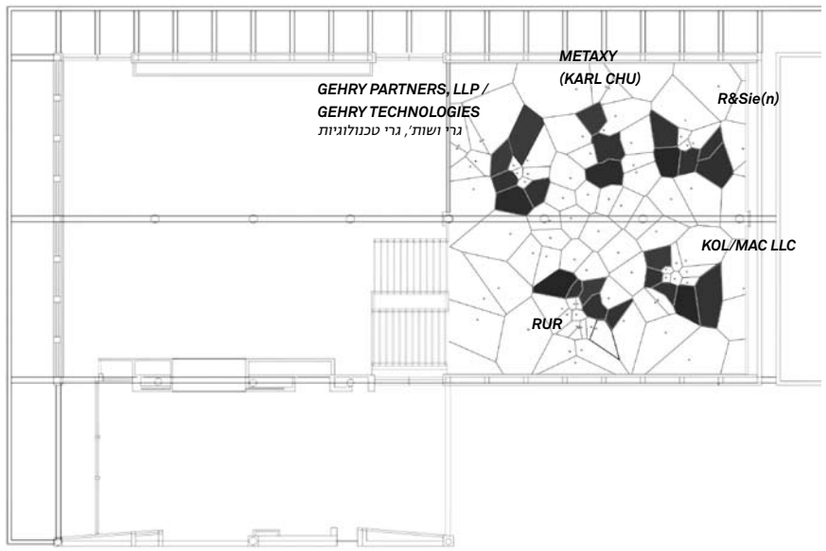
[7] Hong Liu, Mingxi Tanga, John Hamilton Frazer, "Supporting Evolution in a Multi-Agent Cooperative Design Environment," *Advances in Engineering Software* 33 (2002), 319–328.
[8] Y. Kalay, *Architect's New Media: Principles, Theories and Methods of Computer-Aided Design* (Cambridge, Mass., and London: MIT Press, 2004).

Exhibition Layout

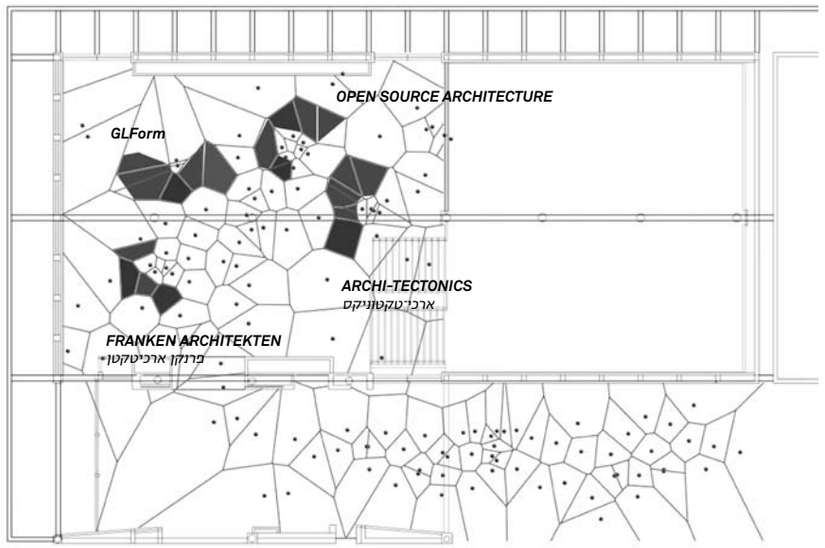
תוכנית התערוכה



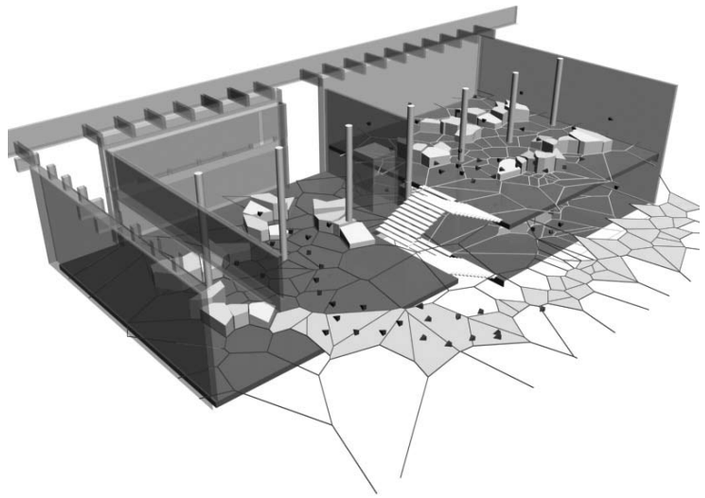
lower level / תוכנית הקומה התחתונה



upper level / תוכנית הקומה העליונה



ground level / תוכנית קומת הקרקע



Exhibition gallery, perspectival view of the gallery space /
אולם תצוגה במבט פרספקטיבי

computer modeling and rendering, pp. 36-39: Yaron Kanor
מידול ממוחשב והדמיה עמ' 36-39: ירון קנור