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Mapping relations as a design strategy, physical attraction forces correlation for design thinking

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Abstract

Architectural design is an iterative research and discovery process. The architect learns through investigation and experimentally develops his/her ideas, builds and evaluates the space, and continuously reforms it. Although this is a subjective process, there are design tools and methods that provide objective criteria for evaluating potentials of the designed space and iterating with feedback. Tools for measuring space in network thinking allow visualization of architectural decisions and developing potentials for architectural programming and restructuring design scenarios. This study evaluates the use of graph theory-based thinking and Space Syntax in architectural design, emphasizes the experimental and cognitive qualities of the design process, and investigates how scientific data and processes can be transferred into design. In other words, it explores the potentials for using Space Syntax related methods that provide real-time information in the design process. The argument is exemplified with the design strategies of the project "Login Park" for International Bandırma Park Competition. By utilizing an 'animated relational mapping' as a generative tool during the site-plan investigations, the designer could iteratively assess potential relations and their metric ranges between the required buildings and programs and examine various scenarios through the graph theory-based tools. The authors suggest that these dynamic tools and thinking lead to powerful instigation, management and assessment of configured spaces. By providing an evidence based design environment this is very much similar to the design processes of the landscape architect and urban designer.

Keywords

Algorithmic design, Creative design process, Design thinking, Relational mapping, Space syntax.

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1. Introduction: Designerly thinking with spatial relation mapping

The origins of deploying network thinking and graph-theoretical tools in architectural design date back to the 1960s. C. Alexander (1964) in his pioneering book, *Notes* on the S*ynthesis of Form*, is talking about the complexity of the design problem and reveals some notes that deal with the "process of design; the process of inventing physical things which display new physical order, organization, form, in response to function". He indicates that in dealing with the design problem, we have to meet a set of complex and interrelated requirements. As these set of relations become too complex, they are difficult to grasp intuitively. Alexander (1964) states that we need a way of setting out the problem which makes it perspicuous. By doing this, he tries to understand the process of design analytically and reveals some notes to describe a way of representing design problems which make them easier to solve (Alexander, 1964).

In the process of representing design brief, Alexander's main interest lies in the search for a kind of *"logic"* which is concerned with the form of abstract structures. According to him these abstract structures "involve the moment we make pictures of reality and seek to manipulate these pictures so that we may look further into reality itself" (Alexander, 1964). He points out the use of this logic as a tool to explore the architectural form rather than as a tool to describe the form directly.

Based on this theoretical understanding he tries to make this logic visible and discussible by using the idea of diagram, or *"pattern"*. Here, he talks about an abstract *"pattern of physical relationships"* which resolves "a small system of interacting and conflicting forces" (Alexander, 1964). In his following book, A Pattern Language, he presents a language for buildings and cities which is derived from the collection of these patterns. These patterns are ordered, each pattern connected to other patterns, one can grasp the collection of patterns as a whole, as a language which one can create an infinite variety of combinations (Alexander, 1977). In the article this pattern is treated as the logic behind spatial configuration settings.

Essentially, Alexander presents a kind of design and problem-solving strategy/logic in order to organize and coordinate design in a way to adapt to the present and future situations based on the relationships between design variables. Relationships form a design language through different patterns. Bringing together endless patterns, networks of patterns with his/her priorities, the designer can create an infinite number of combinations. Thinking with relations, making the design problem and solution visible analytically capacitates to evaluate and to restructure the whole design process. The intellectual features of the designer are emphasized in this statement rather than a mechanical-systematic process (Alexander, 1964). Therefore, completely intuitive design strategies and tactics give way to reasonable and debatable design operations.

Hungarian-American physicist Barabasi (2016), in his book *Network Science,* mentions the existence of complex network structures in many areas, from the social structures we live in to the communication infrastructure of computers, from the working principles of the nerves in our brain to biological and metabolic processes. Barabasi (2016) states that "it is difficult to derive collective behavior of complex systems from a knowledge of the system's components". According to him "behind each complex system there is an intricate network that encodes the interactions between the system's components" (Barabasi, 2016). Barabasi mentions that in order to understand complex systems, we need to analyze the network-like structures behind them and he introduces the mathematical tools that can be used to measure these network structures.

Latour (2005) adds another layer to the idea of network. In the theory of the Actor Network, structure is defined as an open system which is dynamic, unfinished, and constantly deteriorated. Latour (2010) uses the word network "not simply to designate things in the world that have the shape of a net but mainly to designate a mode of inquiry that learns to list, at the occasion of a trial, the unexpected beings necessary for any entity to exist." Latour's network concept differs from Barabasi's concept

of network built with real actors. He mentions a conceptual network concept in which non-human beings can become actors (Latour, 2005). According to Latour "whenever you wish to define an entity (an agent, an actant, an actor) you have to deploy its attributes, that is, its network. Here, network is the concept that helps you redistribute and relocate action" (Latour, 2010). In fact, this conceptual structure can be considered as an approach not to look for what is existing but to search for what might be. It shows dynamic, transformable features based on exploration: "Network is a concept, not a thing out there. It is a tool to help describe something, not what is being described" (Latour, 2005).

The design method as a model described in this paper is to question how each and every element in the design domain is positioned in relation to one another. This relation may also be from an element to a group, to the whole or between groups. "Position" on the other hand is initially physical in reference to anthropometric data such as how many steps away, or how far in terms of visibility. Furthermore, positioning may instigate virtual positioning in terms of the qualities that the designer attributes to the elements: secure, cozy, etc. This a semantic and syntactic mode of design, that is very much linked to the network thinking and pattern based design.

2. Architectural design in network thinking mode

Architectural design is a complex, cognitive, intellectual process that progresses by making, architects mainly learn from what they do (Cross, 2001, 2007). It includes a kind of discovery, research, probing, learning process which is practiced by doing (Dursun, 2007). It aims not to find an optimal one-off solution (Simon, 1996), but a spatial meaning by interpreting many variables by interconnecting the data, reinterpreting and interpreting them, and looking for possible spatial solutions. In this sense, dynamic, non-linear, complex relationships derived from "action in reflection" (Schön, 1987) involve a performative process. The architect, who thinks with different design tools (Dursun Çebi and Kozikoğlu, 2017), develops a distinctive approach, a designerly way of knowing, thinking, and acting (Cross, 2001, 2007). In other words, the architect is an intellectual person who can masterly utilize different design tools and information sources and can produce new design concepts by gathering and interpreting different data and information in relation to one another (Dursun, 2007).

Alexander's language based on patterns is about the relationships between variables. He uses a mathematical and graphical language to understand the complex relational structures and tries to design the built environment with this language. Barabasi also discusses the complex structures around us and the network-like structures behind them, refers to a common set of fundamental laws, common organizing principles in the process of analysis, and expresses them in numerical, mathematical measures. The dynamics qualities of the networks can be discussed through these data. These approaches are important when the design is purely conceptualized as a practice of making configurations. The ability to grasp the spatial meaning of the network-like patterns mentioned by Alexander and Barabasi, and the ability to speak clearly about these patterns with mathematical, graphical tools allow us to see what kind of social results such spatial networks produce. As Dade-Robertson (2011) indicates that topological description of space can account for aspects of architectural experience by constraining or generating the possibility of human social interaction (Dade-Robertson, 2011). Patterns in spatial configurations constitute the potentials of encounters for the users through connections and borders. They are decisive in defining both "active and latent functional routes and indicating spatial proximities and neighbors" (Kozikoglu and Dursun Cebi, 2015). To deploy relational design thinking in architecture and to explicitly represent and engage with that mode of thinking open new horizons for architects.

Latour's description of the network as an unfinished, dynamic, open system with heterogeneous (human, non-human) actors is valuable for the practice of architecture in the act of setting up spatial configuration in multi-relation-

al dynamic disposition. To read and engage with the dynamics of the context, and the needs, and possible new scenarios mean a complex and individual process which is non- systematized. Similar to Latour, it is crucial to understand, explore and design the space through the interrelated components, the influencing components - actors such as function, distance, direction, size, quality of light, way of life, user profile, etc. and the variable relations between them.

This study focuses on relational thinking and mapping in the design process as one of the tools used by architects in the phase of discovery. This paper instigates from the assumption that tools for building and measuring space via network thinking allow visualization of and provide structure to architectural decisions and developing potentials for architectural programming and restructuring design scenarios. This study treats architectural design as a research process and searches the potentials of analytic, scientific, graph-theoretical tools in design not only for determining the problem and evaluating the space, but also exploring the problem and generating the spatial set-up. In doing so, it focuses on Space Syntax as a graphical-theoretical approach and explores deployment of network thinking as a productive design tool providing real-time information in the design process. Thus, the study questions how scientific data and processes can be used in the design process as a creative and informative tool that enriches design thinking.

The Space Syntax theory is based on the following argument underlined by Alexander and Barabasi as well: "The built environment functions as a spatial / social network. In this network the main interest is about relational characteristics of spaces rather than individual ones. Space is experienced through these spatial networks or relations. Spatial networks also create potentials of movement and describe a living pattern. Based on this network structure spatial configurations embody social or cultural meanings and generate or inhibit social interactions, movement patterns in built environments" (Dursun, 2012; Kozikoğlu and Dursun Çebi, 2015).

To explore the idea of network in architectural design, to talk about the logic of this network in scientific ways cannot reduce the architect's intuition. It makes it reasonable, questionable, and searchable. The Space Syntax theory (Hillier, 1996), which focuses on network thinking in architecture, demonstrates that the way in which spaces are brought together and put forward a specific interaction model among users, demonstrates certain social-cultural meanings (Hillier, 1996). "Space Syntax research is reason based, and more rigorous than most, but it has effectively led to the study of architectural intuition through its creations. In practice, design proceeds by mixing intuition and reason. Space syntax makes the deployment of non-discursive intuition more rational and therefore more discursive." (Hillier and Hanson, 1997).

Recent research and experiments on linking metric data to position elements in a syntactic manner have been evolving with the advance of coding in the architectural design platforms such as Rhinoceros Grasshopper. The work of architect Frano Bazalo and Tane J. Moleta (2015) are one such example where they investigate the early computational processes in architectural design and they argue that complexity in design problems can be addressed simultaneously through algorithmic methods. Bazalo and Moleta suggest that computational design provides the power of iteration and has the potential to capture the subjective input of the designer. The Plugin Syntactic developed by Nourian (2016) and his colleagues on the other hand have presented a relational design tool and measurable space syntax methodology. These design models differ in terms of what they refer to as "early stage design" whether it is a conceptual model or a schematic design, they all deploy a network based understanding.

3. Case study: Bandırma design park competition project

"Relation" is not only of the physical that is metric but can refer to subjective measures like private/public, and have gradiencies of interactivity and security qualities that the architect may require. Therefore, the design approach needs to handle the multiplicity of design in-

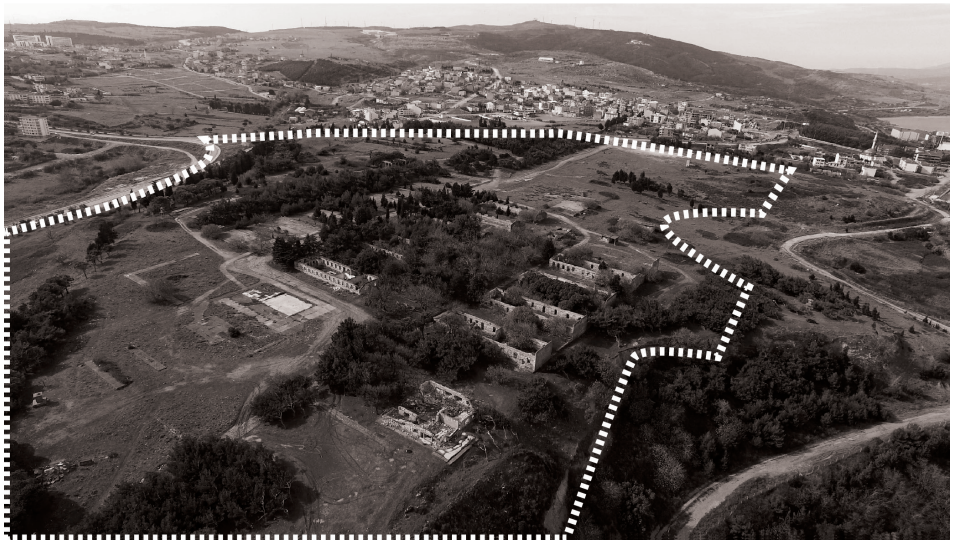

Figure 1. *Aerial photo of the existing site.*

put, some of which may be conflicting, simultaneously and provide the potential for permutation and iteration. The design approach in the prize winner project in the International Bandırma Design Park illustrates the nested relational incorporation in the process explicitly. Project space is a dynamic canvas of relations in and in between scales and design takes place in that multi-scalar order of potential pairwise relations; building, invigorating, mitigating or breaking them.

The brief for the competition is deliberated by the international jury members, Odile Decq, Louis Becker, C. Abdi Güzer, Martin Rein-Cano, and Günther Vogt administered the re-design of a 25 hectares military base in the Bandırma Port City of Marmara Sea into a new genre of public park cultivating the notion of spatial design and planning as well as creating a recreational center at the regional scale (Kozikoglu et al., 2017). The program included a design institute, curatorial voids, a 4-star, and a 5-star hotel as well as a convention center and a retail space, major emphasis being on the design facility and the general quality of "park" as a design space. The existing ruins from the military and the existing fabric of the flora, the picturesque pine and olive trees, would all be preserved as the historical identity of the place (Figure 1).

The competition clearly addressed the quest for solutions that interconnected the site to its history and its environs both spatially and socially to the port and enacted as an integrator for the city in its links to the hinterland, the large Marmara area and beyond (Figure 2). Three disciplines needed to work in collaboration: architect, planner and

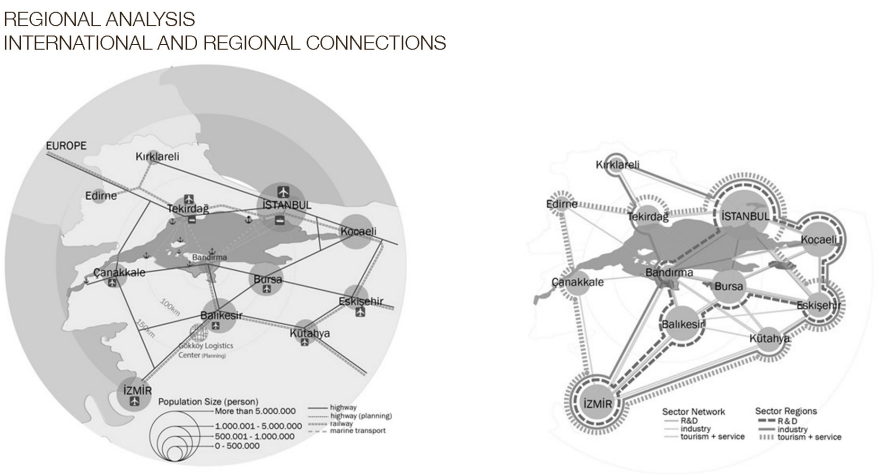

Figure 2. *Connectivity maps in regional and city scale created by the project group.*

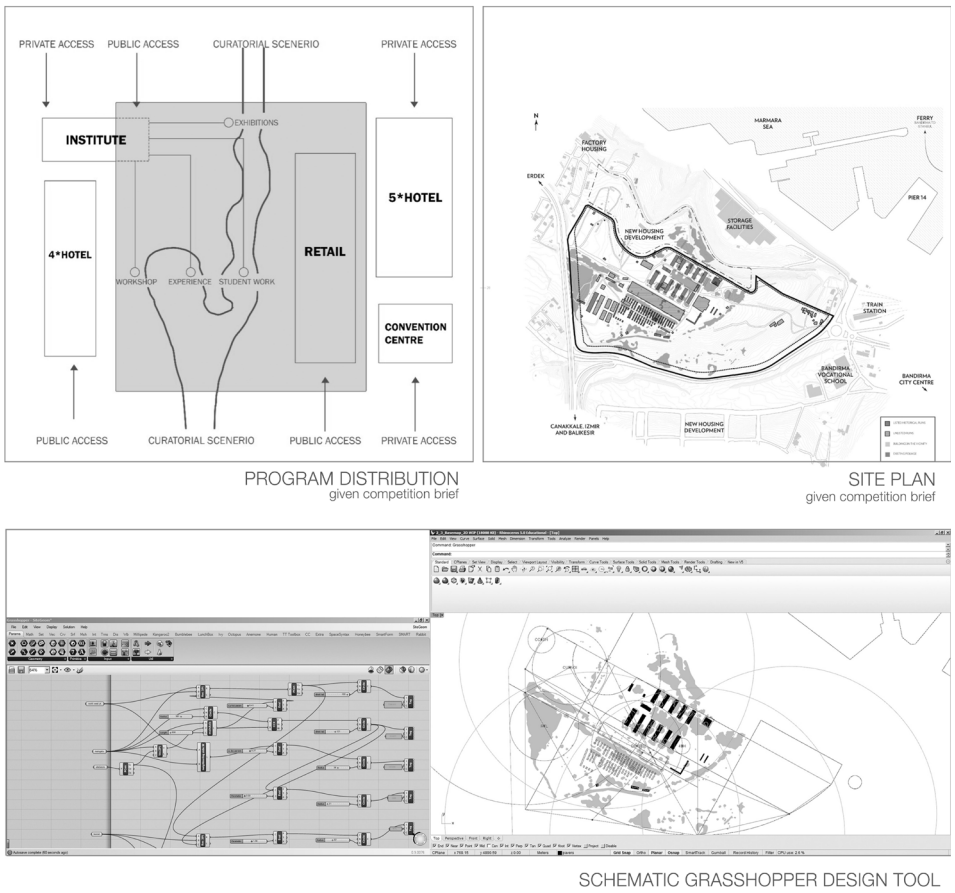

Figure 3. *Grasshopper design tool for schematic design.*

landscape designer. Major interconnector in terms of program as well as spatial elements revolved around the concept of logistics in all three disciplines. Therefore, the movement of people and goods as well as information and processes constituted the major design guidelines for existing and potential relational mapping of prevalent networks (Figure 3).

The schematics of the diagram presented by the competition brief is translated into a dynamic model for the replay of potential layouts mapping into the axis and access nodes of the site (Figure 3). The coded schema interpreted the rationale of the competition requirements and the design motives as a syntactic model for iterative design exercises. Certain programs were modeled as clusters interacting with the other programs as one body rather than individual. Intrinsic qualities and added qualities as well as introduced programs and contextual inferences like main road, view, central axis etc., are also inserted to the dynamic design model.

The solution promoted the retail space to be close to the major possible access points, and the 5-star hotel-convention center pair intermediating between the port and the retail. Among the possible solutions, access closer to the city center was favored for its relation in terms of the city dweller in favor of the retail cluster. On the other hand, the design institute orbited by the 4-star hotel in its close relation to the curatorial voids anchored to the axis that connected the city to the park and the suburb (Figure 4). An overall connectivity to the university, the city bus terminal and the neighboring residences were sketched out with varying qualities of vehicle and pedestrian access routes. Apart from the contextual and programmatic connections intangible constituents such as the web application augmented the connectivity among and outside role players of the project.

The major overriding principle was to leave most of the land to open-air park, therefore to build minimally and to enable the park form in a self-organized manner as is possible, outdoor

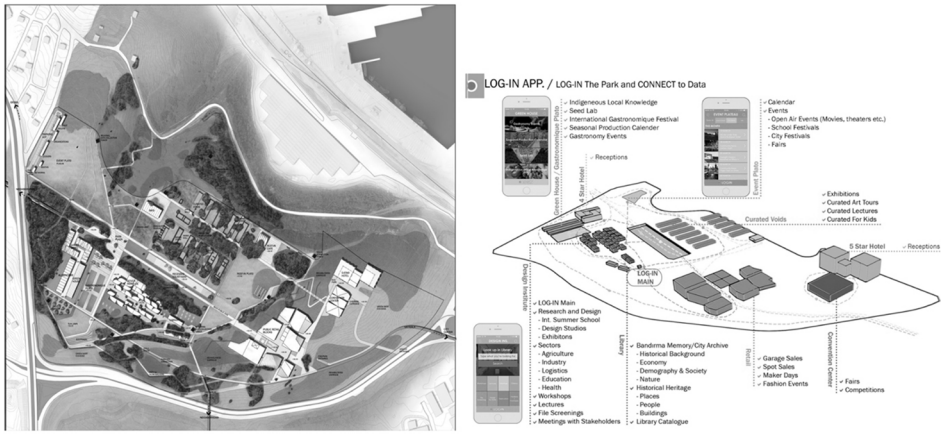

Figure 4. *Project site layout and the web application diagram with programmatic distribution.*

areas like plazas, terraces, resting and exhibition spaces, festive areas interconnected with the closed spaces were also introduced to the dynamic syntactic tool to allocate them on the footpaths between the network of buildings and attractions points (Figure 5).

The design methodology describes two major questions answered by the designer. What are the differentiable spatial constituents of the project including the context? And secondly, how are they linked? These spatial constituents were not limited by the architectural programs i.e. buildings but also spatial organizers such as the existing axis, the view represented as the port. And moreover, temporal activity areas were introduced like an event plateau and the web application was considered as a social space that served as a connection and represented as a node itself.

Both of the questions required the mapping of the network specifically elaborated with the design criteria of the designer that overlap and surpass the requirements of the brief. This criteria involves metric as well as non-metric qualities, in both the prerequisites of the jury as well as the designers own agenda.

To further illustrate the following is an excerpt from the brief of the competition:

Figure 5. *Rendered scenarios. From left to bottom: event plateau with existing watchtower and vegetation, curatorial space with remnant military barracks, a visitor with proposed application on hand-held device, retail space for local production as well as brands, cafe with bay view.*

"The jury will be looking for creative solutions which are based on integrative, coherent and rich design proposals that will stimulate a new focal area accommodating a diverse set of activities and uses (i.e. recreation, retail and accommodation) in the service of the city and the region. With this regard, the major concerns of the jury are, ensuring the integration of the project site with the city, creating a focal area to act as the generator of the future transformation, developing a sensitive approach to existing landscape context; site ecology, historical and cultural heritage and devising spatially open, publicly accessible and socially inclusive organization on the site" (Bandirma Park Competition).

The given scheme of programs, accorded with the above set of conceptual criteria are interpreted by the design team as connectivity, temporality and multiplicity. This conceptual framework corresponds to various added programs in the proposal as well as the non-metric event/phenomena constituents that are spatially viable. Such constituents are for example the web application that is considered as a social space, as well as zones that are mapped to a physical space for allocation to temporary events or weekly and yearly activities for example, the set of event based programs defined under ecological interventions: a temporal spatial element like organic food bazaar from the environs, walks and bicycle paths that trace the trails of the conservation of the phrygana (garrigue) family and the calligraphic coniferous tree groups, following the effects of the wind and time, watching the passage of the seasons.

Metric relationships between programs are defined by distance especially by foot, but also by bicycle. For example, the distance between the 4-star hotel and the design institute is coded as approximately 50-100 meters, this made them a couple, where the 4-star hotel is orbiting the institute. Whereas the retail is distanced to the 4-star and institute couple around 300m (10 minutes walking distance). This is a scenario playing method: In the given distances for example the institute is a center that invites experts, artists and

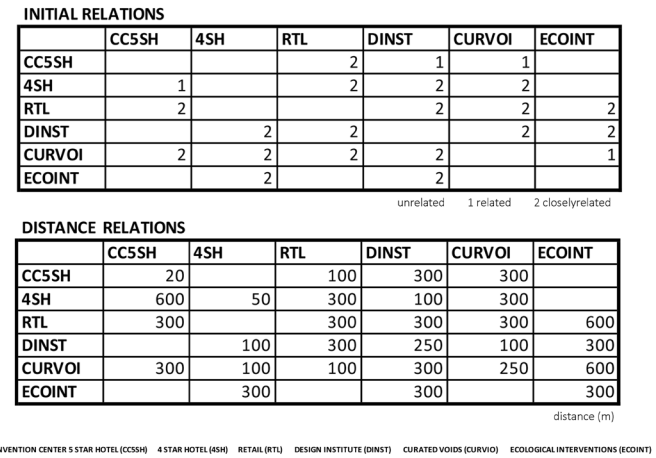

Figure 6. *Matrix used for laying unsymmetrical relationships between the required programs.*

tutors from around the world, student groups visiting for events and workshops, all staying in the 4-star hotel denotes the distance prescribed. Similarly, the convention center and the 5-star hotel are thought to be adjacent sharing facilities like parking, shuttle, etc. The model is then coded with scenarios on how the whole group gets configured: The retail is in walking distance to the 5-star hotel, and the curatorial voids. People who visit the curated areas or stay in the hotel will show up in retail areas. An added scenography is that not only the convention center (a showcase for the industry in the region) and the curatorial spaces (a showcase for the innovative and the artistic world) but also retail becomes a showcase for the design institute, an instant arena to share and voice design.

Furthermore, relational mapping is schematized between elements of the site and constituents of the program, and the added programs. For example, the potential access points and the route as an axis become a node that is linked by distance to the retail and the design institute. The fact that the retail has to have direct relation to automobile access gets played out as options in the modeling scenarios. The existing remnants of the military base is closely linked to the curatorial voids mapped directly on them. An added event plateau is linked directly to automobile access; this is then attached to vista points, etc.

This is similar to a game of linking, unlinking, re-linking and even defining the links as nodes between the

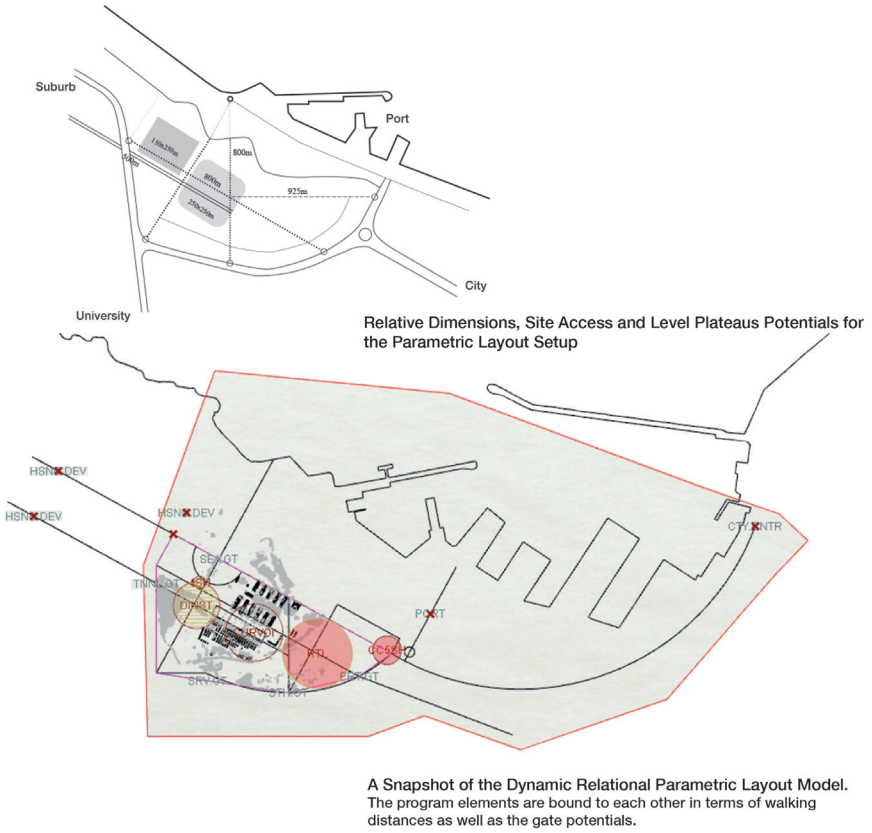

Figure 7. *Algorithmic modelling.*

role players of the project (Figure 6). When the designer links the program elements, the links have specific qualities that correspond to the immediacy in terms of proximity. The links may refer to being adjacent, or being in a 10 minute walking distance, being in a visibility range, or being in a wireless bluetooth connectivity. These links are not symmetric, when considering the relation of a mall to hotel, or a convention center to a hotel they are not symmetrical. A hotel may be preferably close to park but a park does not need to be close to a hotel. The coded digital model plays out these scenarios on the site model similar to the designer black box, correlating the relations between design elements as pull and push springs. (Figure 7).

4. Syntactic analysis and interpretations

Space Syntax is a graph theory-based approach which is developed to decode and talk about architectural space with its mathematical, graphical and scientific tools. Space Syntax instigates from the assumption that the built environment works as a spatial / social network and these spatial networks create potentials of movement and describe a "living pattern" (Dursun, 2012). Here, space is treated as a configurational whole that is constructed by mutual, complex relations. It aims to clarify a kind of "logic" or "pattern" hidden in that spatial network. Decoding characteristic properties of these spatial networks is valuable both to talk about existing living patterns in that particular space and to restructure the possible future scenarios.

In this study, the architectural design process is regarded as a process of probing, exploring that an architect internalizes with his / her own interpretations, feeding back data and information. Here, the main intention is to search about potentials of Space Syntax as "a tool to think with" during this process.

Syntactic analyses are used in the case of an "urban park" design in three steps:

1. Discussions on the "requirement of the jury" as a network visualization that

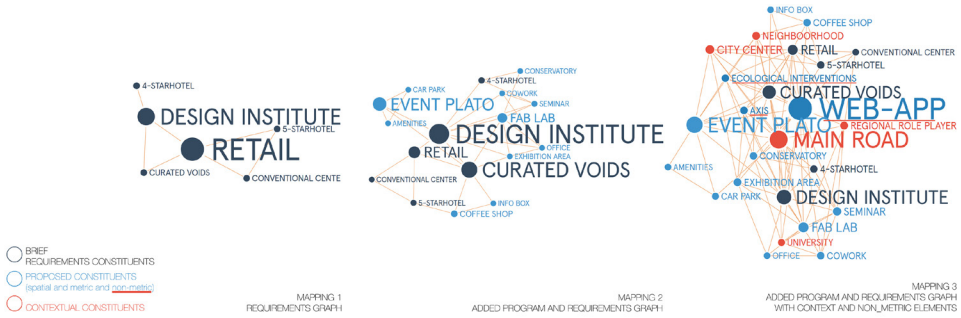

Figure 8. *Mappings various scenarios of the competition project.*

is constructed by the architect based on the given requirements list and diagram (Figure 3 and 8).

2. Examinations on the "solution spatial set network" which is developed by new scenarios and additional spatial qualities (Figure 6 and 8).

3. Readings on the "augmented spatial networks" which reflected the notion of Latour with its non-spatial ingredients such as regional role player, neighborhood, web and mobile application, ecological interventions, city center, pedestrian axis, university, main road (Figure 8).

The logic of these network visualizations that are constructed as outcomes of three steps is analyzed in mathematical, graphical syntactic metrics utilizing Syntactic (Nourian, 2013a; Nourian, 2013b; Nourian 2016), which is a Space Syntax tool. Here, spatial networks or configurations are examined based on four main syntactic measurements: Measure of "control" which discusses the networks mainly by their local properties, measure of "entropy", "choice" and "integration" which investigate the networks mainly by their global properties.

Integration value aims to measure the degree of depth of structures and quantifies the pattern of depth in a system (Hanson, 1998; Hillier and Hanson, 1984). Entropy is a measure of dispersion (Mohajeri, et al., 2013), "a measure of the distribution of locations of spaces in terms of their depth from a space" and "can give an insight into how ordered the system is from a location" (Turner, 2001). Measure of control deals with the relations between a space and its immediate neighbors and expresses "what degree of choice does each space represent its immediate neighbors as a space to move to" (Hillier et al., 1987). Finally, "the degree of choice each space represents how likely it is to be passed through on all shortest routes from all spaces to all other spaces in the system." (Hillier et al., 1987).

The initial setup which was constructed for the competition's requirement network can be seen in Figure 8. Here, the six program components: convention center, 4- star hotel, 5-star hotel, curated voids, design institute and retail, are linked in a simple network pattern. In this elementary pattern, most distinctive spatial components are retail and design institute. Retail and design institute appear as most integrated spaces in the whole with the values of 3.49 and 1.745 respectively. These spaces are followed by curated voids (1.163). These integrated spaces tend to draw the entire configuration towards the root with shallow justified graphs (Figure 10). At the same time, retail and design institute are strong control spaces. Their entropy values are low (retail: 0.821, design institute = curated voids: 1.028). This means that many locations are close to these spaces. In terms of choice, they have the highest values, retail (23), design institute (19). This means that these spaces have the highest total values of accumulated flow.

In the second network visualized for an augmented scenario solution set, the number of spatial components increases to 17 (Figure 8 and 9). Here, most distinctive spaces are design institute and curated voids. Design institute and curated voids are most integrated spaces with the values of 4.181 and 3.252 respectively. These spaces are followed by the fab-lab

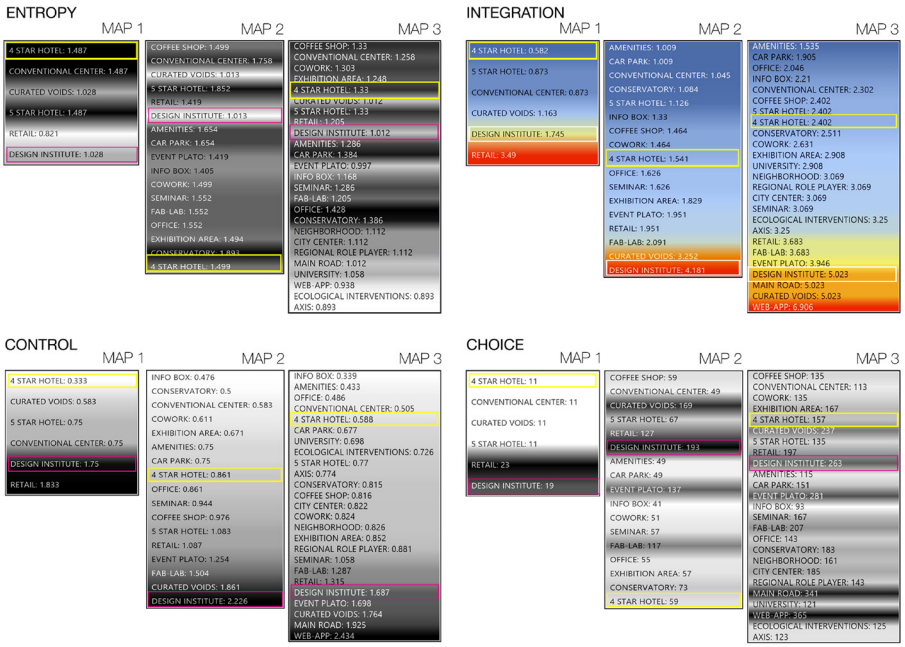

Figure 9. *Syntactic values of the scenarios mapping of the competition project.*

(2.091) and retail and event plateau (1.951). On the other hand, amenities (1.009), car park (1.009), conventional center (1.045), conservatory (1.084), 5-star hotel (1.126) are the most segregated spaces. It is suggested that justified graphs from these segregated spaces tend to have considerably deeper structures (Figure 10). At the same time, the design institute, curated voids and fab-lab are strong control spaces with the values of 2.226, 1.861, 1.504 respectively. With their low entropy values, design institute and curated voids get close to the many locations in the spatial whole. Conversely, many locations are far from the conservatory (1.893), 5-star hotel (1.852), conventional center (1.758), with their high entropy values. In terms of choice, the design institute, curated voids, event plateau and retail have the highest values, 193, 169, 137, 127 respectively. These are spaces with the highest total values of accumulated flow.

In the third network model the scenario is boosted, number of nodes increases to 25, including both spatial and certain non-spatial components. Here, the striking point is that the most distinctive node appears as the mobile application, a non-spatial node, which is developed as a part of the design concept (Figure 4). This node is the most integrated node in the spatial whole (6.906). Among the other nodes curated voids, design institute, event plateau, fab lab and retail take the values above the mean, once again they appear as the most integrated nodes. The node named as "main road" represents the connection to the city center, a link which is considered as a zone and appears more as a concept rather than an exact architectural program denoting space is also one of the most integrated nodes in the whole (5.023). On the other hand, the most segregated node is amenities (1.535). This is followed by the carpark, office, info box, conventional center, coffee shop, 5 and 4-star hotels and conservatory. Web application together with main road, curated voids, event plateau and design institute are strong control nodes. They take the values of 2.434, 1.925, 1.764, 1.698, 1.687 respectively. These nodes have significant potentials in terms of their presented modes of movement and their strong relations with their neighbors. The nodes such as info-box, amenities, office and convention center are weak spaces in terms of presented modes of movement and they don't have strong relations with their neighbors. They also appear as weak control nodes with the values of 0.339, 0.443, 0.486, 0.505 re-

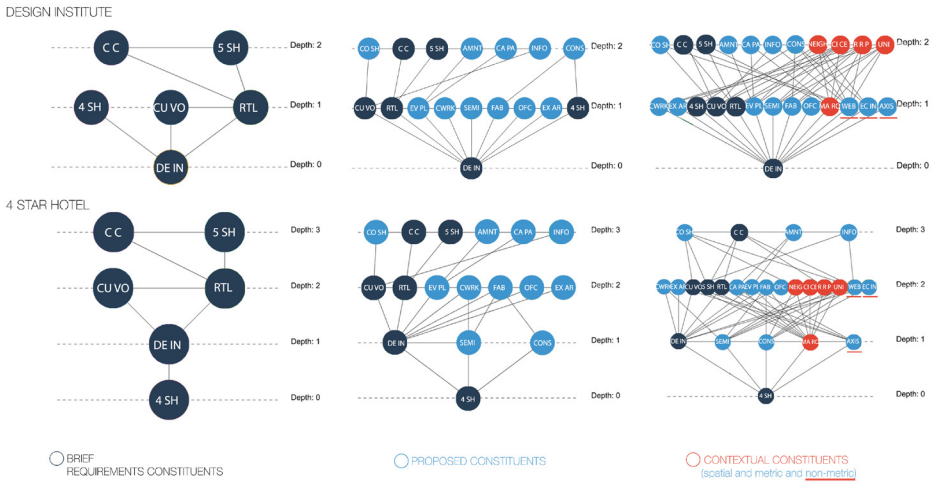

Figure 10. *Justified graphs for various constituents of the competition project.*

spectively. Entropy values support this finding. Many locations in the system are close to "axis" that represents the pedestrian link as a node, the "ecological interventions" which is a time and zone based events platform, and "web application" which is a web platform for research and sharing as well as activity media platform, "main road" that represents site connection to the city, "curated voids" and "design institute" having the lowest values for the entropy. On the other hand, the locations in the system mostly tend to be far away from the office, car park, coffee shop, 4 and 5-star hotels. Similarly, web application, main road, event plateau, design institute and curated voids are the most visited nodes with their high values of choice. They take the values of 365, 341, 281, 263, 237 respectively.

Figure 10 summarizes the justified graphs from one of the most integrated spaces, design institute and the most segregated spaces, 4-star hotel. Although the total depth changes from 3 to 4 for the second case, justified graphs for the two cases preserve their compact forms in their three like formations with many branches.

5. Conclusions: Projecting as mapping the domain

The project and the thinking in the article imply designerly thinking as a triaxial mode of operandi, playful and malleable on one axis, moldable and adaptable in the other, strict and regulated at the final. The paper suggests that mapping and animating a domain that communicates the existing and the promoted relationships in both iterative and variating design paths serve to evolve a sense of place with active scenarios. Active scenarios are played out to create the domain of the project on the design platform of the architect for negotiating criteria and the constituting elements. A domain is referred to as all those criteria that relate to the realization of a scenario (scenarios of existence).

This is understood as a design role of interpretation and propositions as opposed to a deterministic design role. The technique is of course presented without any bias on which relationship is to be favored, however as a communicative tool for the designer and other role-players it provides a consistency check diagram as well as a tool for sheer simplicity.

"Mapping is the point in the decision process where divergence and diversity are key. You are not looking for consensus in this phase; you are looking to expand the range of possible factors (and, ultimately, decision paths). The challenge of mapping is getting outside our intuitive sense of the situation in front of us" (Johnson, 2018).

The paper lays out the design methodology used to explore the potentials in a masterplan for a competition project in Turkey and investigates the resulting set of relationships between spaces and elements of design in terms of Space Syntax criteria. This is not only to understand how close the requirements fall in with the solution set, but

also to try out the possibility of mapping relational metric and non-metric elements in one graph. Systems thinking and mapping and simulation tools already exist such as Vensim where scientists can assess values to intangible and subjective concepts together with physical elements. The role of the designer is essential in these generative diagrammatic tools in the assessment of the existence (is there a relation or not) and the effectual outcomes of the relationship (how much and in which trajectory). This vision requires a strong reading into the program, the site and the society's tendencies. The paper suggests that graphing the relationships are significant in the assessment of the potential scenarios.

Design is an individual process, each instance is unique, no two buildings or master plans are or can be exactly the same. Therefore, as a decision making process the tools correspond to this particular uniqueness of project domain. Mapping relationships allow the designer to understand, interpret and reevaluate uniqueness during the process and relate to the context in a particular manner.

It should also be emphasized that this study, which unusually incorporates non-metric contextual components into spatial analyzes, draws inspiration from Latour's Actor Network Theory and thus presents an experimental work on Space Syntax.

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Azime Tezer, Urban Planner, Leader of Urban Planning and Design Team

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Relational mapping as a design tool has been part of the practice at Agency for Architectural Design, NK Tuspa since 2008. It was first utilized at Bakırköy Psychiatric Hospital master plan design by Nilüfer Kozikoğlu, generated with TopSolid by Gözde Küçükoğlu in 2008.

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