

# **Architecture as Power: Dynamics of Spatial Configuration**

by

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Dedication:

For my Grandfather, John, who  
has shown me the value of  
curiosity and lifelong learning.  
Thank you for instilling in me an  
insatiable thirst for knowledge.

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## **ABSTRACT**

This thesis investigates the concept of power in architecture.

The system of 'Space Syntax' is utilized to describe the configurational properties of spatial networks for an understanding of spatial political economy—how certain spaces have power based on their configuration and level of connectivity within a network. The result is an analytical language of architectural methods and techniques which explain power.

The typology of the company town is used as a point of reference to understand the intersection of economic, technological, and social factors, their corresponding influence on spatial configurations, and the resulting power dynamics. Technological communication and social connectivity are abstracted to architectural elements of light and glass, and open or closed situations. These elements are employed in a series of site-less and scale-less studies to develop social constructs as architectural spaces.

This thesis shows the role of architecture in networks of power and the resulting socio-spatial relationships through the development of a robust framework. It provides a clear design methodology for the explanation of how spatial configurations manifest power in architecture.

## ACKNOWLEDGEMENTS

"I did not apply to friend school." Words I uttered in the first semester of Architecture School will forever echo throughout the studio. I thank all my colleagues and faculty for their unwillingness to let me live by that statement. As it turns out this may in fact be friend school.

My supervisor James, I asked for the *Whiplash* (movie) treatment. You never did throw a chair at me even though I know it must have been tempting to at points. Still, the support coupled with the demand that I reevaluate my relationship with architecture is more than I ever expected or could have asked for.

My advisor Ted, your wealth of knowledge constantly humbled me but in turn gives me something to strive for. Thank you for adding tangents of excitement to every conversation or critique.

Diogo Burnay you have inspired me for how to engage the field of architecture: unreservedly and with absolute passion.

To 'Team 10x' – support is one thing; help in production is another; counselling service is yet another. As a team you did it all and more.

My parents, the foundation of my opportunity to chase my dreams, none of this would have been possible without you.

Kayla, there are no words, I am coming home to you.

## CHAPTER 1: INTRODUCTION

### Architecture as Production

Power may be defined as the production of intended effects. It is thus a quantitative concept.<sup>1</sup>

Architecture has often been utilized as a symbol of power. Instances such as monuments, cathedrals, factories, legislative buildings, skyscrapers or even cities all seek to present a physical embodiment of power. These symbols represent power derived from other sources such as economic, coercive force, or political. Architects, builders, and clients inherently transmit their values and beliefs of power situations into physical form. These vestiges of power can be considered symbols and may imply a power, however the true effect of architecture is the space which people occupy and live. That is to say: "the chief way in which power and bond relations are made concrete is through bodies in space; in the space of buildings and towns"<sup>2</sup> and even more, that "the means by which interior structures carry more social information than exterior relations."<sup>3</sup> Thus power in architecture becomes something more than a symbol.

How is it that architecture acts as a producer then? It provides space for interaction between people. In fact as Bill Hillier states: "The ordering of space in buildings is really about the ordering of relations between people."<sup>4</sup> This is one of the primary intended effects. Thus, an important form of power in architecture is how space is configured to

1. Bertrand Russell, *Power, a New Social Analysis* (New York: W.W. Norton, 1938), 23.
2. Thomas A. Markus, *Buildings & Power: Freedom and Control in the Origin of Modern Building Types* (London: Routledge, 1993), 25.
3. Bill Hillier and Julienne Hanson, *The Social Logic of Space* (New York: Cambridge University Press, 1984), 154.
4. *Ibid.*, 2.

produce different interactions between inhabitants.

It is seemingly impossible to discuss socio-spatial configurations as every building differs in location, inhabitants, and program. As Thomas Markus, author of *Buildings and Power: Freedom and Control in the Origin of Modern Building Types*, suggests, “we need to be able to place each unique experience into some kind of framework, a structure which makes sense at a more general level.”<sup>5</sup> By describing spaces syntactically it is possible to distill and compare configurational properties between projects. The system of Space Syntax developed by Bill Hillier and Julienne Hanson allows for exactly this. By abstracting buildings to the spaces and the connections between them, it is possible to classify architecture under a number of different values, each which can then be developed and used to identify the interrelationship of social and spatial factors.

### **Identifying a Type**

Power relationships are exceptionally evident in company towns. The social and architecture relationships in company towns provide a focused typology for studying the production of effects. Company towns were organized socially through a system of moral guidelines and company hierarchy—so too were the spatial configurations emblematic of such ideals. Predominantly, the objective was for optimal production in an industrial setting but as will be shown, the networks of power have shifted to accommodate a new economic system, that of the information and creative era.

What is more, given the mono-industry focus of many com-

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5. Markus, *Buildings & Power*, 33.



pany towns it is more achievable to identify the systems which influence spatial relationships. Specifically, how economic and technological systems are implemented in company towns give insight as to the structuring of networks of power.

These concepts can be discussed over time to understand the changes in objectives of company towns (both in terms of aligning with economic systems, also how technology is implemented). What is evident is that spatial structures evolve to match advents of technology. When architecture is considered to be a producer of social relations then we see how technology is reinforced through spatial constructs.

Through this analysis it is possible to attribute a level of spatial political economy, which is the power of a space within a network, based on what the spatial configuration is attempting to achieve. More importantly though is how spatial configurations adapt to embody the changing forms of power and intended effects. These dynamics of spatial power can be best understood as abstract models, developed through a framework, to generate comparative analysis.

**Thesis Question:**

How are networks of power developed through architectural spatial configurations?

## CHAPTER 2: TYPOLOGICAL CONTEXT

### The Utopia Understudy - The Company Town

An often overlooked form of settlement is the company town. For much of the nineteenth and twentieth century company towns provided not only architects, but many people, with opportunities to design communities from their inception, in totality, to develop theories of inhabitation. Inherent in the description of company town lineages is the definition of such based on their economic interests as reactions to technological advancements.

The design of a city is something that captivates architects. In many cases cities evolve from an informal precursor but in other cases there were intentional design considerations which informed the development. Yet the concept of communal life has continually been a focus of study for not just architects but a plethora of other academic fields. The question remains, what were and are the goals of society when informing the inception of communities?

Throughout history, architects and planners have dreamed of “better” and different cities—more flexible, more controllable, more defensible, more efficient, more monumental, more organic, taller, denser, sparser or greener. With every plan, radical visions were proposed, ones that embodied not only the desires but also, and more often, the fears and anxieties of their time.<sup>6</sup>

Many architects have proposed communities, cities, and utopias as commentaries on how they interpreted society's desires; how those desires were then translated into urban design and architecture often faced much criticism. De-

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6. Amale Andraos, *49 Cities: WORKac* (New York: Storefront for Art and Architecture, 2009), 14.

signs such as Howard's Garden City, Wright's Broadacre, Corbusier's Radiant City and Constant's New Babylon are paramount examples of architects speculating as to what a 'new city' could and should be. The designs are zeitgeist and anti-zeitgeist at the same time as they exist as proponents, reactions and predictions of society. All such designs were intended to inch closer to utopias.

Although we think of such famous proposals as unimaginable projects, many cities were designed and constructed in entirety under a singular vision. The company town typology shares many of the same factors as military and educational developments. Numerous approaches exist as to the development of new communities and towns. Military settlements still have a large influence on the development of cities, formally designed or informally evolved for the purpose of defense. Another study could investigate university campuses and their strong concepts of developing focused academic communities.

When studying the development of North America both geographically and economically it is difficult to do so without encountering an instance of the Company Town. From the Hudson's Bay fur trading posts, to the textile mills of the Eastern seaboard, to the pockets of railroad towns which also spawned the lumber and mining towns of the West, the company town typology has had a massive impact on development across the continent. What is evident in these instances is the impact of the economy and technology on the development of company towns.

Many towns also sought to understand and solve social problems of the day through the inception of completely

new communities. New social and spatial relationships were implemented in attempts to form better communities.

The social and spatial dynamics of power within company towns can be thought of as networks – networks of power as described by Grewal and Castells. How these systems are manifested physically can be analyzed as to their configurations through a system of spatial syntax.

Syntactical spatial analysis, a system developed by Bill Hillier and Julienne Hanson, makes it possible, through abstraction, to understand and compare the configurational properties of company towns for an understanding not only what they were trying to accomplish socially but how those objectives were impacted by economic and technological factors.

Company towns are the ultimate intersection of economic, technological, and social issues. This intersection allows for insights as to the values of society at the time, and the interrelationship between those factors and architecture.

### **Defining the Company Town Typology**

Two reasons for defining the company town stringently: first, many people confuse a single industry town with a company town, they are similar but not exactly the same, as the scope of ownership varies between the two as do the motivations and goals; second, the term company town conveys a charged meaning, and it is not helpful to have an incorrect description.

What is a Company town: a community inhabited chiefly by the employees of a single company or group of companies which also owns a sub-

stantial part of the real estate and houses.<sup>7</sup>

This is an apt definition, although, the provision of amenities varies from case to case. Many companies went beyond just a workplace and included such amenities as schools, hospitals, and commercial areas. Arguably, this definition could be amended or adjusted to account for recent developments and this thesis seeks to promote a new definition of company town.

## **Motivations and Goals - Factors Leading to Company Towns**

### **Economics and Technology - Driving Forces**

The first company towns, textile mills of the Eastern United States, were developed out of political pressures and economic necessity. The relatively new United States independence generated a desire and opportunity for economic independence as well. "As a direct result of Jefferson's trade embargo against England (1807-1809), textile manufacturers gained a foothold in a very competitive market," and without established competition new producers were required to meet the needs of the new market.<sup>8</sup>

Furthermore, there were fears of dependency or a nation-level 'keeping up with the Jones'— "that a purely agrarian America... would always remain subordinate to Europe, easy prey for Continental bullying and manipulation."<sup>9</sup> This promoted a sense of technological determinism that

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7. Horace P. Davis, "Company Towns," in the *Encyclopedia of the Social Sciences*, vol. 4 (New York: The Macmillan Co. 1930), 119.

8. John S. Garner, *The Company Town: Architecture and Society in the Early Industrial Age* (New York: Oxford University Press, 1992), 11.

9. Hardy Green, *The Company Town: The Industrial Edens and Satanic Mills that Shaped the American Economy* (New York: Basic Books, 2010), 11.

required large settlements. However, there remained proponents for smaller developments. New industries were to be carefully adopted and the projects scaled to match the “existing markets and available waterpower;” it was important that “existing conditions shaped the developing industry”(the Slater System)<sup>10</sup> What is evident is that there were political and economic fears of both being subordinate and of over development. Political economy informed a demand for intervention which in turn, required new architectural solutions. Even in the initial stages of company towns there were struggles with technology, the level to which it was a motivating force and how it influenced spatial relationships.

For instance, Pomfret, Connecticut, based on the Slater Mill System was an evolution of planning based on proximity to water and was more informal as to its growth and evolution. Defined as ‘picturesque villages,’ mills, houses and other amenities were added as growth occurred, although seemingly uninformed.<sup>11</sup> The necessity that the mills were located near water had spatial implications for further development.<sup>12</sup> “The haphazard order of the mill village underlined the absence of a fully industrialized social order” with “the settlement clustered around the mill” but the “surrounding village, an informal mix of buildings, pastures, and garden plots.”<sup>13</sup>

The physical community organization was simply an adap-

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10. Margaret Crawford, *Building the Workingman's Paradise: The Design of American Company Towns* (London; New York: Verso, 1995), 18.

11. *Ibid.*, 19.

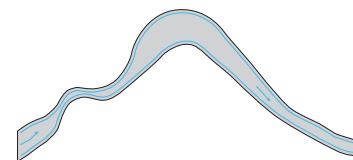
12. *Ibid.*

13. *Ibid.*, 20.

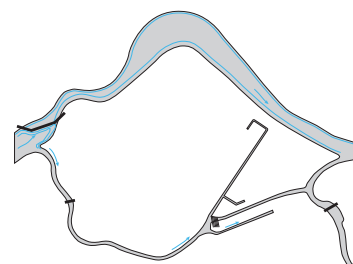
tation to a new technological system, wherein one can speculate as to the evaluation of worker's importance. Spatial hierarchies were less developed as settlements were still adapting to the new technologies. It was a micro-centralization of the agrarian tradition which could be considered to be the Jeffersonian ideal—it was also the limit of said ideal. As the technology of the waterwheel was further developed and expanded so too was the impact on socio-spatial configurations.<sup>14</sup>

Evolution of the technology of the waterwheel led to communities that were of larger scales—the ability to harness the mechanical power of water led to larger developments. A touchstone of company towns, Lowell, Massachusetts, was located and built solely on its requirement for access to river ways for increased mechanical power. The Waltham/Lowell mill system was utilizing technology to drive multiple textile looms from a single source of mechanical power, the water wheel. In Lowell, the engineers who planned the town developed it primarily around the ability to harness the power from water which even included terraforming and re-routing the river network. Rather than just situate near waterfalls for power, community plans created canals to divert the water and actively control it for maximum efficiency of the Mills.<sup>15</sup>

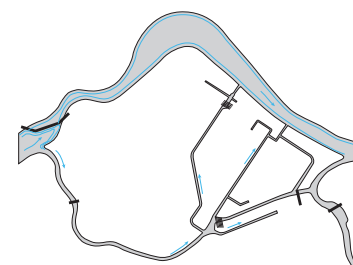
Another example, Pullman, Illinois, was based around technological development. George Pullman invented the Pullman Palace sleeping passenger rail car which changed



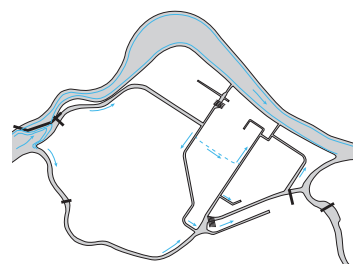
existing river



channelized waterway for textile mill industry



channels added for additional mills



new channels change the flow of water

The Evolution of Lowell; data from Mark Howland, Lowell Canal System, Merrimack & Concord Rivers, Lowell, Middlesex County, MA; from The Library of Congress.

14. As Crawford goes on to say, future mill villages did indeed begin to have more formally organized settlements with housing provided to employees.

15. Further studies of Lowell are included in the Chapter 4 - Case Studies.

the railway industry. His new technology then required a new place of production which, when tied to the network of distribution, proximity became immensely important. As such, the new town of Pullman was located near Chicago, a hub of the rail network in North America at the time which also was tied to a well developed system of canals.

Other examples of company towns can be understood in geographic dependency. Other, more well known, company towns: Morenci, Arizona; Port Gamble, Washington; Scotia, California; were all largely dependent on proximity to resources and distribution networks. This is different from the situation of Pullman in that physical resources were the initial factor, but still, the ability to distribute those resources remained important. In all cases, as Allen states, “a typical company town would have its layout determined largely by its geographic location.”<sup>16</sup>

Furthermore, the architectural expression of company towns was often informed by the industry it facilitated. “The production processes and labor force in each region interacted to produce distinct industrial typologies,” and made company towns quite distinctive.<sup>17</sup> The images of Morenci and Scotia show how the technologies and resources of the industries were adapted to fulfill urban and architectural needs.

What was evident was that the company town was a reaction to unprecedented economic and technological advancements. In an almost immediate feedback, private capital is quick to react and more willing to shoulder risk



Terraforming and Land Terracing in Morenci Arizona, 1910. from Lee Allison, *Ups and Downs of the Copper Industry*.



Museum at Scotia California. Neoclassical architecture adapted with materials and technology of the company town, 2010; image from Pedaling and Pedaling and Pedaling.

16. James B. Allen, *The Company Town in the American West* (Norman: University of Oklahoma Press, 1966), 80.

17. Crawford, *Building the Workingman's Paradise*, 29.



associated with reacting to these advancements. Whereas most well established communities and cities are the product of slow evolution, company towns were fast reactions to ever-changing markets. Additionally, location depended on infrastructural elements to enable technological advancements and distribution of products.

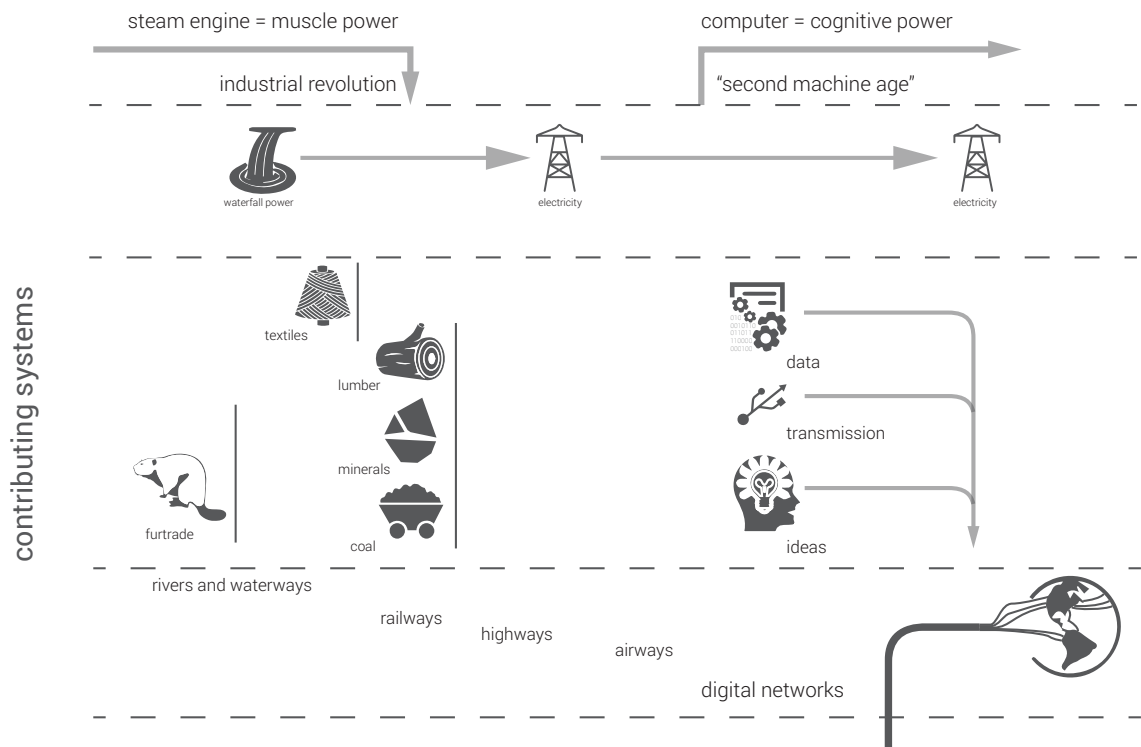
### **New Economy Equals New Company Towns**

The factors which contribute to the inception of a new company town can be translated from historic to contemporary. The resources of today have and will continue to shift to match the new economic markets. And not surprisingly, with the advent of massive economic and technological shifts, the term 'Company Town' is again being used in describing technology campuses.

To try to quantify the reemergence of the company town it is useful to recall the factors that precipitated their origins—unprecedented economic and technological advancements. What is happening now, according to Erik Brynjolfsson and Andrew McAfee, economic theorists from MIT, is: "we're at an inflection point—a point where the curve starts to bend a lot—because of computers. We are entering a second machine age."<sup>18</sup> They go on to explain that the industrial revolution, through its development of machines, was the invention of 'muscle power' for humankind. Now however, with the advent of current technologies and computing power, we are supplementing and increasing our cognitive power. Industrial revolution = muscle power, 'Second Machine Age' = brain power.

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18. Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (New York: W.W. Norton & Company, 2014), 19.



Evolution of resources; data from Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age*.

Even though the concept of a computer has been around for decades, there is a lag between the beginning of a revolution and the developments realized therein as is stated by Brynjolfsson: “But just as it took generations to improve the steam engine to the point that it could power the Industrial Revolution, it’s also taken time to refine our digital engines.”<sup>19</sup> Similar to how the initial company towns were agrarian villages that adopted waterwheels, so too may the corporate tech campuses be precursors to an evolution of working conditions and settlement patterns in the near future.

So what is happening? What changes are leading to shifts in the economic, technological and social realms?

19. Brynjolfsson and McAfee, *The Second Machine Age*, 19.

Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate. Something interesting is happening.<sup>20</sup>

As Brynjolfsson and McAfee argue we are headed towards a new economy, not founded on scarcity but rather, abundance of goods and limited supply of services. "Digital goods capacity constraints become increasingly irrelevant," and that three factors which are promoting this shift are:

- a) the digitization of more and more information, goods and services,
- b) the vast improvements in telecommunications and, to a lesser extent, transportation, and
- c) the increased importance of networks and standards<sup>21</sup>

Information, its delivery, and a single idea, are now the economic drivers. As such, the requirements for supply— the ability to farm ideas, mine and store data, and distribute the information, are of key importance. These are the resources and infrastructural-equivalent requirements and they dictate the factors critical for the inception of an informational company town.

Is the company town 'dead'? Many assume they are a dated form, often disappearing as the resources they sought were exhausted or the demand for the goods they supply decreased. In fact, many company towns throughout North America still exist. Some have switched to a new industry, some are still functioning in association with their

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20. Tom Goodwin, *The Battle Is For The Customer Interface* (2015), accessed 10 October 2015, <http://techcrunch.com/2015/03/03/in-the-age-of-disintermediation-the-battle-is-all-for-the-customer-interface/#.oxym01s:0sCd>.

21. Brynjolfsson and McAfee, *The Second Machine Age*, 165.

original industry, it is entirely case dependant. A brief analysis shows the number of inceptions of company towns occurring shortly after the industrial revolution and tapering off into the mid-twentieth century. The advent of machine power necessitated new means of developing industries to accommodate both the new technology as well as the increasing demand for goods.

No, the company town is not dead. In Fact, we are seeing a resurgence in the use of the term to describe technology companies. Specifically, many technology related corporate locations are being dubbed 'company towns' given their omnipotence, amenity provision and level of control. As one author puts quite elegantly: "while we think of company towns in sepia tones, they're also in digital blue."<sup>22</sup>

### **Digital Blues - Corporate Tech Campuses as Company Towns**

The similarity between corporate tech campuses and company towns has been referenced numerous times. The level of amenity provision in some tech campuses is similar to company towns. Cafeterias, recreational services, transportation systems, sleeping areas (not dwellings), are all elements often found in tech companies. These types of amenities typically would be outside the mandate of a company but in the case of tech companies, the competition for talent is seen as paramount and having the ability to attract workers is then just as important. Similar to the elements of traditional company towns, such amenities will be further analyzed later in this document.

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22. Michele Lent Hirsch, "America's Company Towns, Then and Now," *Smithsonian*, last modified September 4, 2015, <http://www.smithsonianmag.com/travel/americas-company-towns-then-and-now-180956382/?no-ist>.

Technology headquarters and campuses are commonplace throughout the world's cities now, with many adapting existing buildings or 'business parks' to suite their needs. However, recently major technology companies have begun to construct new monumental campuses to accommodate their growing and adapting workforce. They are monumental insofar as their scale, architectural style, and attempts to redefine the workplace in the informational era. Specifically, the bay area, between San Francisco and San Jose is experiencing a construction boom in credit to the new company towns. Of particular interest are the new constructions of Samsung in San Jose, Facebook Building 20 in Menlo Park and The Apple Campus in Cupertino. The campuses are designed by NBBJ Architects, Frank Gehry Architects, and Foster and Partners respectively. The new company towns will be analyzed in subsequent chapters.

Other companies are proposing additional developments, Google and LinkedIn are in the process of expanding in the Mountainview area. Until recently, the new company towns 'did not' include housing. Facebook however is currently in the process of constructing a four hundred unit apartment complex for employees in close proximity to their recently constructed Building 20 Complex.<sup>23</sup>

The examples go even further, Google, is rapidly acquiring more property in Mountainview, leasing a former federal airport and proposing a new campus designed by Heatherwick and BIG Architects in collaboration. Both that proposal and one for five thousand units of housing were

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23. Dan Bates, *"Inside Facebookville: Employees to Get Their Own Housing in \$120m Town Zuckerberg Built,"* Associated Newspapers, last modified October 4, 2013, <http://www.dailymail.co.uk/news/article-2442852/Town-Mark-Zuckerberg-built-Facebook-employees-dorm-style-housing.html>.

denied by city council.<sup>24</sup>

The lag period which Brynjolfsson and McAfee suggested takes place with economic and technological shifts is coming to an end and we are seeing the re-emergence of the company town typology as a method of accommodating these massive shifts in economics and technology. And, as was the case with the historic company towns, we will again see the social effects of these evolutions in the developing communities that embody these new frontiers.

It must be kept in mind however, just as company towns appear to repeat, the effects of such may repeat as well. As author David Grewal discusses in his theory of network power:

People with the practical skills to participate in the vanguard form of production of their age, whether industrial laborers in the past or computer programmers in the present, often feel empowered and deeply involved in what they experience as a new age of emancipated work—at least, that is, until this kind of work, too, becomes routinized and alienated.<sup>25</sup>

### **Social Control - Reactionary and Imposed Forces**

If company towns were to be analyzed only as economic entities it would certainly simplify the discussion surrounding them. Perhaps the most contentious issues of company towns are the social. Many company towns extended the control of the workplace into the everyday lives of em-

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24. Christopher Beanland, *"Facebook is planning a new company town - but would you want to live so near work?"* The Independent, last modified March 11, 2015, <http://www.independent.co.uk/life-style/gadgets-and-tech/features/facebook-is-planning-a-new-company-town-but-would-you-want-to-live-so-near-work-10101888.html>.

25. David Grewal, *Network Power: The Social Dynamics of Globalization* (Ann Arbor: Sheridan Books, 2008), 220.

ployees. As Carlson argues: “Whether people lived in relative comfort and security or struggled to survive was determined by the company...A job in a company town was more than employment, it was a way of life—the boss’s way”<sup>26</sup> The true difficulty is attempting to understand the motivations of those making the decisions in company towns. Perhaps as Allen argues, “owners of many company towns actually had the interests of their employees at heart in the operation of company houses, company stores, and other economic activities.”<sup>27</sup>

So what then were the social goals? In some of the first instances, company towns were again reactionary (similar to reacting to economic conditions). Many town founders believed they could design to solve the problems experienced in established industrial towns of Europe. To further the point, in the case of Humpreysville,

Determined to avoid the “demoralizing” effects of factory labor and maintain what he regarded as adequate moral standards, Humphreys created the first system of industrial labor management in America, an ideology of control based on moral guardianship imposed both in and out of the factory.<sup>28</sup>

This is the beginning of conversations that have defined company towns since.

There is no question that historic company town owners overtly controlled the employees in company towns. The most important question, albeit obvious, is why? Quite simply, production. The industrial nature of company towns

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26. Linda Carlson. *Company Towns of the Pacific Northwest* (Seattle: University of Washington Press, 2003), 198.

27. Allen, *The Company Town in the American West*, x.

28. Crawford, *Building the Workingman’s Paradise*, 16.

was intrinsically tied to human output. Every control mechanism was designed to maximize production. Employee health and well being—predicted to be achieved through regimented schedules (sleeping and waking times, as well as mandatory working schedules), provided meals, and extra-curricular activities that minimized opportunities to partake in unsanctioned activities, were all methods to maintain employee production.



## CHAPTER 3: THEORETICAL FRAMEWORK

### Power and Control

When discussing the social issues of Company Towns, power and control are at the forefront. More often than not the discussion of control is met with vociferous discontent. Even given the top down approach of social relationships in company towns it is still important to understand that unilateral decisions were informed and justified for many reasons. Furthermore such decisions cannot be viewed as a zero sum, levels of power and control must be considered as a scale. An exchange was always taking place, a job was at times considered as a benefit as was company provided housing. But strict schedules, mandated activities and poor working conditions could be unbalanced situations as well. The scale of relationships in company towns can best be described by the title of Hardy Green's study of said topic: "The Company Town: The Industrial Edens and Satanic Mills That Shaped the American Economy."<sup>29</sup> Power relationships were readily apparent and the social and spatial implications of such relations become more accessible as a result.

Foucault states: 'power is a fact and a reality.'<sup>30</sup> To understand it in such a manner aids in understanding why things are the way they are. Disdain of control is in fact naivety, acknowledging such realities aids in our understanding of not only what exists, but the way in which to approach architectural design.

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29. Green, *The Company Town*.

30. Michel Foucault, *Discipline and Punish: The Birth of the Prison* (New York: Pantheon Books, 1977), 194.

We must cease once and for all to describe the effects of power in negative terms: it 'excludes', it 'represses', it 'censors', it 'abstracts', it 'masks', it 'conceals'. In fact power produces; it produces reality; it produces domains of objects and rituals of truth. The individual and the knowledge that may be gained of him belong to this production.<sup>31</sup>

Whether described as strict paternalism, or acts of benevolence, the intentions of corporate owners are quite often scrutinized. Yet, depending on the industry and [time] of individual company towns the power often shifted to the employees as the demand for labour increased. It is not necessarily in support of these reasons, arguing for some type of Orwellian state, but only in understanding how power was manifested through architecture in historic company towns that they can then be designed into or designed out of a new model of company town. Architects must be cognizant of the power and control relationships as they design. It is a scale that can vary in either direction but to understand the implications of control in architecture is implicit in understanding the typology of the company town.

### **Architecture is Control**

Is architecture capital 'C' control? Just as Foucault discusses power as a tool of production, so to is control in architecture. Control can be exhibited in many ways. Architecture can be utilized to control people, control nature, control environmental elements. Statements such as the previous typically result in an eruption of dissidence. Though similar to Foucault, it is just as important to discuss control relationships in architecture to understand how they produce.

The discussion could be framed as "how would one learn

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31. Foucault, *Discipline and Punish*, 194.

from living in a company town,” or “how do buildings influence our lives.” Winston Churchill is quoted as saying “we shape our buildings, and afterwards our buildings shape us.”<sup>32,33</sup> It becomes a semantic discussion wherein the term ‘control’ implies an absolute when in fact it can only ever be an attempt to achieve effects.

For example, to follow are a few seemingly rudimentary examples. The placement of a window controls what an inhabitant sees or doesn’t see, or again, who sees in and who sees out. Additionally, windows and lighting play a large part in who is seen and how—the relationship between the inhabitant and architecture can be defined through spatial orientation and organization around a window and the light it permits. In the same way that one would put flashing around a window to divert and channel water in a specific manner, it is not in fact control but an attempt at directing inhabitants.

The term directing is an excellent descriptor if architecture is thought of as scene for actors. For instance, the manner in which Adolph Loos orchestrates his raumplan and ‘theatre box’ in the Moller House, as discussed by Beatriz Colomina, intentionally amplifies the relationships between spaces with power through the method of the ‘gaze.’ What

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32. This was Winston Churchill's response when discussions regarding rebuilding the UK Parliament were attempting to resolve the formal qualities for the Legislative house. It was decided that the original rectangular format, which promoted confrontation, led to the development of the two party system. As such the decision was to return to that rather than select a different internal configuration such as a circular or horseshoe form.

33. UK Parliament: Living Heritage, *Churchill and the Commons Chamber*, accessed January 16, 2016, <http://www.parliament.uk/about/living-heritage/building/palace/architecture/palacestructure/churchill/>.

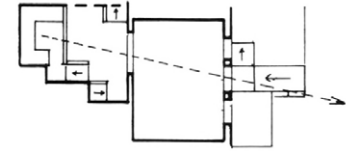
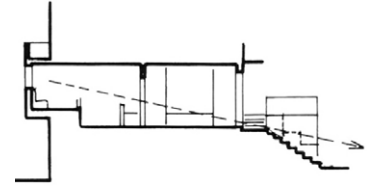
is more, she suggests:

Architecture is not simply a platform that accommodates the viewing subject. It is a viewing mechanism that produces the subject. It precedes and frames its occupant.<sup>34</sup>

Through tactics of light and shadow, line of sight, and movement, according to Colomina, Loos scripts interactions within the domestic realm that have inherent power and control qualities. Moreover, the concept of “object and subject becomes convoluted” through the architecture.<sup>35</sup> Understanding the outcomes of Loos strategies provides some insight into how such methods may be applied beyond the domestic scale to change relationships in workplaces or the contemporary company towns. Although architects may not entirely control the actors, they have the ability to set the stage for the performance of everyday life.

Design decisions quite literally dictate what people will be allowed to see and how they interact with each other and architecture on a daily basis. Determining what/who is seen and not seen in the discussion of architecture is often placed under the umbrella of observation but arguably it is more than that. Every design decision is packed with a designer’s intentions and to reveal the intentions of designers of company towns and workplaces is crucial. Foucault’s discussion regarding the panopticon exemplifies the possibilities, an analytical perspective from which to approach architectural design of company towns:

A whole problematic then develops: that of an architecture that is no longer built simply to be seen (as with the ostentation of palaces), or to observe the external space (cf. the geometry



Beatriz Colomina, section of Moller House; from Colomina and Bloomer, *Sexuality & Space*.

Section showing the ‘theatre box’ which overlooks the space of the house and the window which provides backlighting. The backlighting results in the people in the other space unable to identify the person in the theatre box but well aware of the gaze which they are subject to.

34. Beatriz Colomina, and Jennifer Bloomer, *Sexuality & Space* (New York: Princeton Architectural), 83.

35. *Ibid.*, 80.

of fortresses), but to permit an internal, articulated and detailed control — to render visible those who are inside it; in more general terms, an architecture that would operate to transform individuals: to act on those it shelters, to provide a hold on their conduct, to carry the effects of power right to them, to make it possible to know them, to alter them. Stones can make people docile and knowable. The old simple schema of confinement and enclosure — thick walls, a heavy gate that prevents entering or leaving — began to be replaced by the calculation of openings, of filled and empty spaces, passages and transparencies.<sup>36</sup>

To use Foucault's words, the 'old simple schema' is a surface level understanding when associating power relationships with architecture. We see now, architects and companies dedicated to, again as Foucault stated, 'the calculation of openings, of filled and empty spaces, passages and transparencies.' However, where Foucault suggested this was applicable to prisons, the concepts are being applied to workplaces. To refer back, 'power produces,' in fact architecture has the ability to produce social interaction and relationships through spatial configurations.

### **New Economy — New Power — New Control**

As identified previously, ideas are the resource of the day for companies engaged in the information economy. Instead of maximizing productivity, companies are now focussed on maximizing creativity and employing architectural methods to achieve these goals.

The main justification of this is tied to the information economy itself. The accumulation and ability to analyze massive amounts of data has allowed for the development of the field: People Analytics.

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36. Foucault, *Discipline and Punish*, 172.

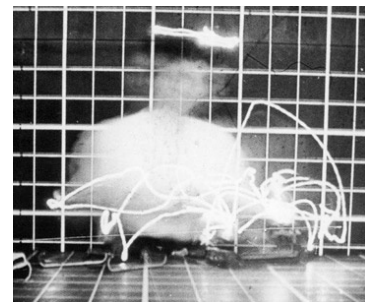
In a way, people analytics is about lending credibility to one of the most vital and yet overlooked functions of a company—getting the most out of the unruly hominids who make it run. In a modern corporation, data is a kind of currency. The idea that an organization can be made more effective by quantifying the moods and actions of its human constituents is likely to be intoxicating for managers who are accustomed to optimizing supply chains and IT infrastructure. But there are pitfalls in all this measurement. If the management's goal becomes optimizing certain performance metrics, whatever isn't measured can fall by the wayside.<sup>37</sup>

Championed by Ben Waber, MIT and CEO of Sociometrics, People Analytics tracks user data (primarily in the workplace) and then synthesizes the information for later use informing design decisions.

This is a successor to Taylorist economics (Taylorism 2.0 as proposed by Dewinter and Kocurek and Nichols)<sup>38</sup> and the time studies that used long exposure photography to amass light as 'data' of how to best maximize employee production. The Motion Efficiency Study image, right, shows the tracking method previously utilized to understand how to optimize employee production.<sup>39</sup> Now 'big data' is being used by firms such as NBBJ in the design of Samsung's new headquarters in San Jose, California. Employee collaboration is the ultimate goal of the company as studies, including Waber's, have shown that creativity is



The Sociometric Badge; from Waber, from Ben Waber, *Sociometric Solutions Organizations for Humans*.



Motion Efficiency Study, 1914; photograph by Frank Gilbreth, from Smithsonian Archives, *Take This Job & Shoot It!*.

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37. Christopher Mims, "In 'People Analytics,' You're Not a Human, You're a Data Point," *Wall Street Journal*, last modified February 16, 2015, <http://www.wsj.com/articles/in-people-analytics-youre-not-a-human-youre-a-data-point-1424133771>.
38. Jennifer Dewinter, Carly A. Kocurek, and Randall Nichols, "Taylorism 2.0: Gamification, Scientific Management and the Capitalist Appropriation of Play," *Journal of Gaming & Virtual Worlds*, no. 6.2 (2014): 109-27.
39. Tim Hindle, "Frank and Lillian Gilbreth," *The Economist Newspaper*, last modified September 5, 2008, <http://www.economist.com/node/12060343>.

profoundly impacted by collaboration.

The architecture is designed to facilitate and increase the likelihood of such interaction. However, as principal architect Scott Wyatt suggests in a panel discussion entitled *Data versus Delight*: 'given computational technologies, if the recent past was focussed on modelling building performance, the future is about modelling human performance.<sup>40</sup> So very much in the same way that optimizing building performance for energy efficiency as an incentive for clients, architects can now employ tools of human modelling to sell to their clients. As Wyatt said further, for architects, it has moved from "proof of concept to proof at concept."<sup>41</sup>

Modelling human performance takes centre stage in the Samsung campus designed by NBBJ Architects. NBBJ developed software system of estimating employee interactions and visibility throughout the day. The buzz term is 'serendipitous' interactions but when the architectural design is so focussed on promoting such situations can they truly be serendipitous or is there a level of control being applied? Arguably the digital modelling techniques cannot account for actual people's decisions but they can attempt to use devices to influence what is seen, from where, access to specific locations through what routes and means, and general access to specific areas they believe employees will want to frequent. The goal is to generate what the company Zappos has defined as 'collisionable hours.' It is proven that collisions lead to impromptu discussions that breed

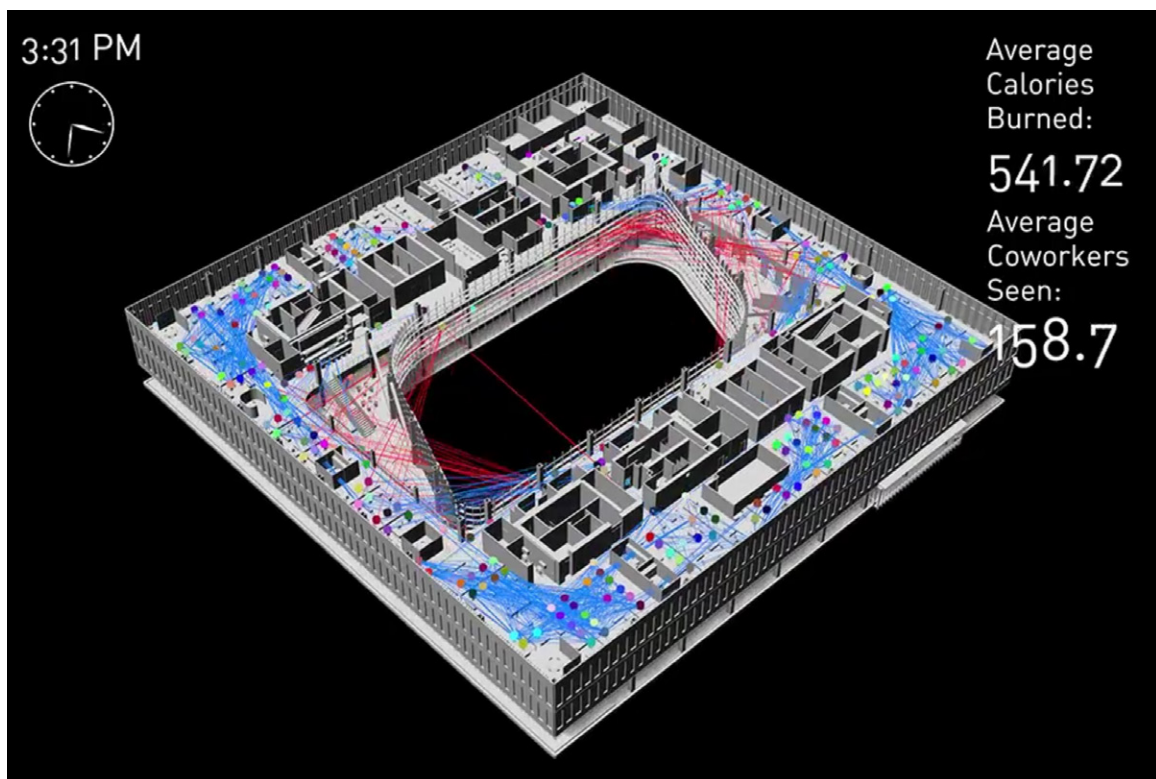
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40. NBBJ Design, "*Data vs. Delight: Should the Workplace of Today Be Driven by People Analytics?*" Vimeo, accessed February 18, 2016, <https://vimeo.com/70880018>.

41. Ibid.

creativity into the workplace. Through the programming of spaces, such as generating focal points of circulation and non-work activity, are such tactics employed by NBBJ at the Samsung campus.

Perhaps the most notable architectural feature of the Samsung building is the central courtyard. Beatriz Colomina's 'gaze' returns in the form of visual connectivity through the central space of the courtyard (red lines in the following image). It is utilized to have employee visual connection to generate movement and increase the likelihood of collisions. There are also a number of exterior spaces (such as roof gardens and amenity pavilions) that are visible through the courtyard.



NBBJ Design, 3D Building Model, 2014; from NBBJ Design, *Day in the Life Analysis*.



The architecture is creating subjects of its inhabitants as it attempts to influence and generate movement through locations outside work activities such as amenities: kitchens, washrooms, exercise locations and outdoor gardens (albeit semi-roof top gardens within the overall building structure). Indeed there is control in place at the Samsung campus. As Karrie Jacobs, editor-in-chief of *Dwell Magazine* suggests:

The idea is that everyone can see everyone and that this will somehow encourage human contact and collaboration. It's post-Panopticon... Not authoritarian but more about visual peer pressure, the built version of social media.<sup>42</sup>

In the same manner of maximizing productivity in the industrial era, architects and designers are now commodifying creativity through designing to maximize creativity. Furthermore, the technology and social systems of the day are being translated into architectural form.<sup>43</sup>

NBBJ's human performance modelling based on design concepts that foster collaboration. Specifically, note the metrics: Time of day, average calories burned and average coworkers seen.

What are the tools, techniques and methods being employed to manifest the new control in the workplace? Is the power and control exerted quantifiable as Russell suggested?

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42. Alexis C. Madrigal, "What Samsung's New American HQ Says About the Korean Giant: The architecture of fitting in in Silicon Valley," *The Atlantic*, last modified July 10, 2013, <http://www.theatlantic.com/technology/archive/2013/07/what-samsungs-new-american-hq-says-about-the-korean-giant/277673/>.

43. Further analysis of the Samsung Headquarters takes place in Chapter 4 - Case Studies.

## Architecture as Control

### Formal Methods of Control

Architecture is the materialization of structure, and the adoption of architecture as a permanent feature of life introduces spatial organization and allocation as an ordering visual dimension.<sup>44</sup>

To begin, it is helpful to identify formal methods of architectural control, those which Wilson describes, provide us with 'spatial organization and allocation.' Furthermore, how such spaces, although seemingly benign, have intentions of control built into them with or without intentionally being designed as such.

#### Structure

This is the definition of spaces. Inherently it defines in and out, holding a dual meaning to inhabitant and outsider. Limits, borders and separations are implied by the establishment of spaces.

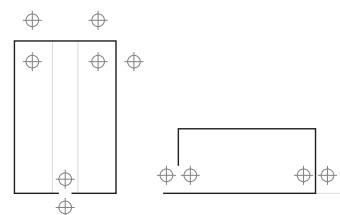


Diagram of Structure.

#### Path

A path implies many things, it is "a location of movement."<sup>45</sup> It is directional and implies a route and 'goal' and "it will give the traveller no significant alternative to the goal, forcing him to access it."<sup>46</sup> The placement of the goal allows for exercise of power. A dominant path implies hierarchy over others.

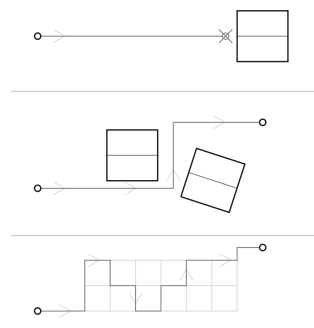


Diagram of Path.

A path can also imply a perimeter of the objects "oriented

44. Peter J Wilson, *The Domestication of the Human Species*. (New Haven: Yale University Press, 1988), 58.

45. Molly Glenn. *Architecture Demonstrates Power* (Thesis, Haverford College Dept. of Philosophy, 2003), 32, <http://triceratops.brynmawr.edu:8080/dspace/handle/10066/714>.

46. Ibid, 32.

not toward the traveller, but toward delimiting the fixed space on either side... closes space off, limiting movement and choice."<sup>47</sup> Similar to the way in which the path defines spaces it also puts certain locations in important points of focus.

### **Axiality**

Axiality in architecture focuses a space on a specific point of interest, a point of importance. It is a highly dominant orientation wherein participants in the space interact with the point of focus.

Most notably this type of architecture is associated with churches, in some cases the axiality is "so powerful, symbolically as well as architecturally, that entrances into churches are often positioned to avoid confronting it directly."<sup>48</sup>

### **Centrality**

Centrally organized spaces have no dominant orientation and as such imply an egalitarian organization. However, there remains an important location, the point which resides at the centre.

### **Monumentality**

"Monumental architecture is, specifically, architecture built by those with power, not just everyday citizens, and it always makes an impression on the people that see it."<sup>49</sup>

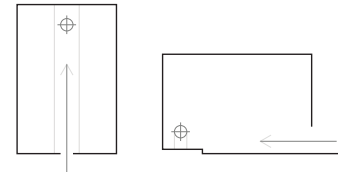


Diagram of Axiality.

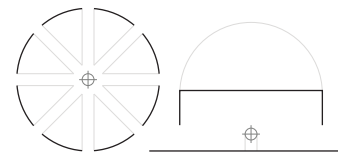


Diagram of Centrality.

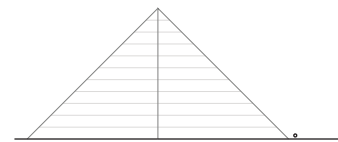


Diagram of Monumentality.

47. Ibid, 33.

48. Simon Unwin, *Analysing Architecture*, (London: Routledge, 2003), 88.

49. Glenn. "Architecture Demonstrates Power", 32.

## Clandestine Controls

### *The Origins of Control Studies in Technology Company Towns*

The linking of corporate technology campuses with company towns has been made by numerous authors. However, there is more opportunity for analysis.

Company towns, both historic and contemporary, provided a choice in lifestyle. Current technology companies would argue that they need to make their workplaces attractive and enjoyable in both a financial and lifestyle manner. Arguably though, the amenities currently being provided by technology companies serve as objects of control in the power relationship between employee and company.

For instance, one must question if free meals provided on campus, at company cafeteria's, are indeed only a perk or if they serve another purpose. The company then has the ability to control what is on the menu to encourage ideal dietary decisions. Following this thought, better diets would lead to healthy employees, which would lead to less sick days and more uptime. Another consideration is that employees interact together in the cafeteria rather than need to leave over the course of the day for meals.

A touchstone is "the nap pod." Many companies provide napping pods for weary workers to re-energize through napping in the office. Is the nap pod a benevolent provision, or is it an amenity to extract more value out of employees?

Every amenity should be analysed as an artifact of a power relationship. The playful, relaxed atmosphere of the workplace courtesy of such amenities should be understood as fulfilling at least a dual meaning, one for employee and one



A private napping pod at Facebook Seattle, 2015; photograph from Frank Catalano, Geekwire, *Top tech internships of 2015*.

for employer.

The analysis moves beyond simple objects such as nap pods and foosball tables. Yes, where the 'prototypical watercooler' is located does have a large impact on the relationships within an office. Still, although those elements do hold importance the question remains, what power does architecture hold and how can it be measured?

### **Concepts of Network Power**

Network power is similar to what Brynjolfsson and McAfee defined in their third factor promoting the shift, "the increased importance of networks and standards."<sup>50</sup> Scholar David Grewal, defines Network Power which includes two things, networks and standards. Grewal proposes that networks are: "an interconnected group of people linked to one another in a way that makes them capable of beneficial cooperation," and the linkages between people are standards which are: "the way in which a group of people is interconnected in a network."<sup>51</sup> The standards are the rules of the game that people accept in order to participate in the game with others.<sup>52</sup> It must be asked how such concepts impact architecture.

To return to Brynjolfsson and McAfee,

networks can create 'demand side economies of scale that economists sometimes call network effects. We see them at work when users prefer products or services that other people are flocking to. If your friends keep in touch via Facebook, that makes Facebook more attractive to you, too. If you then join Facebook, the site be-

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50. Brynjolfsson and McAfee, *The Second Machine Age*, 165.

51. Grewal, *Network Power*, 10.

52. Grewal uses the game analogy often. He states that users choose to play the game because "it is the only game in town."

comes more valuable to your friends as well.<sup>53</sup>

Any person is ultimately a member of many networks at any point in time; such networks could be language, currency, or as this thesis is investigating, architecture spatial configurations. Furthermore, through greater acceptance of standards, options are eliminated; multiple networks still exist, but choices within them are limited.

The notion of network power consists in the joining of two ideas: first, that coordinating standards are more valuable when greater numbers of people use them, and second, that this dynamic—which I [Grewal] describes as a form of power—can lead to the progressive elimination of the alternatives over which otherwise free choice can effectively be exercised.<sup>54</sup>

With the loss of options and as a result, choice, participants in the network are eventually forced to choose their inclusion or exclusion. Furthermore, as Grewal says, “billions live as subjects to a power they feel but whose nature they may not be able to articulate clearly.”<sup>55</sup> Can anyone directly state the power they are subject to from architecture — or even more so, are inhabitants cognizant of the standards of power in architecture that form the network?

It is to suppose that people have a choice in which network they choose to involve themselves in but at some point the network grows so as to make it detrimental to be outside the network. In addition to Grewal’s concepts, Manuel Castells further suggests that “in many instances the power holders are networks themselves.”<sup>56</sup>

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53 Brynjolfsson and McAfee, *The Second Machine Age*, 166.

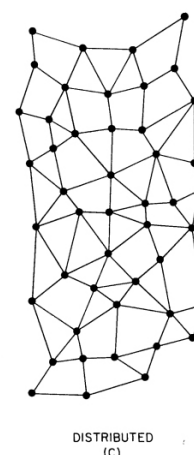
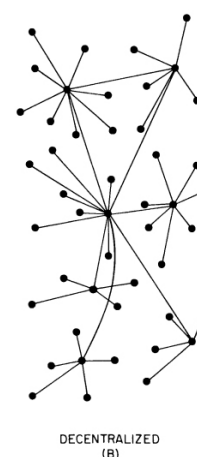
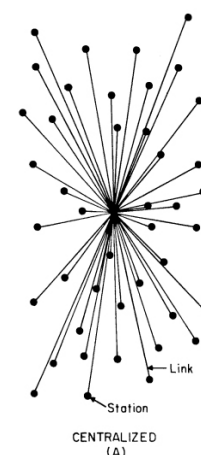
54. Grewal, *Network Power*, 4.

55. *Ibid.*, 10.

56. Manuel Castells, “A Network Theory of Power,” *International Journal of Communication*, no.5 (2011): 776.

Looking at historical network typologies (of power relationships) Grewal builds on the work of David Ronfeldt, Marshall Sahlins, and Paul Baran.<sup>57</sup> The latter who was influential in attempting to theorize how a communications network should be modelled given the United States was under threat during the Cold War. In fact Baran was speculating how to set up a network of communication. Proposed were ideas of centralized versus decentralized, and distributed networks. Ultimately it was suggested that a distributed network provided security and redundancy and thus was better suited.

The concepts are further adapted by Grewal for understanding social constructs. Diagrams of networks which describe a system of communication are interpreted by Grewal to understand societies. It is the abstraction of technology to describe social structures and what is more, these systems of understanding the impact of technology on social and spatial structures can be further understood as: “the internet and the airplane, in our day, have furthered the compression of distance began by the sailing ship, the railroad, and the telegraph.”<sup>58</sup> As such, further analysis of Grewal's diagrams of societies can provide some insight as to the implications of networks of power on social and spatial relationships. The following image shows such potential network structures.

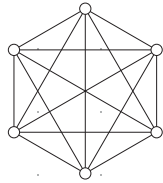


Diagrams of Centralized, Decentralized and Distributed Networks, 1964; from Baran, *On Distributed Communications*, 2.

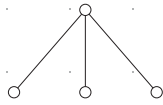
57. David Grewal, *Network Theories of Power*, last modified March 2, 2010, <https://www.youtube.com/watch?v=35RVa5VQ3bk>.

58. David Grewal, *Network Power*, 192.

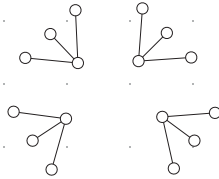
## NETWORK TYPOLOGIES



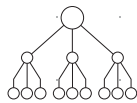
POLIS



OIKOS/TRIBAL



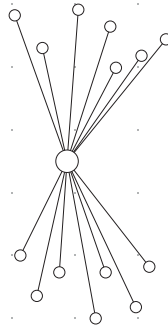
TRIBAL/ANARCHIC FEUDALISM



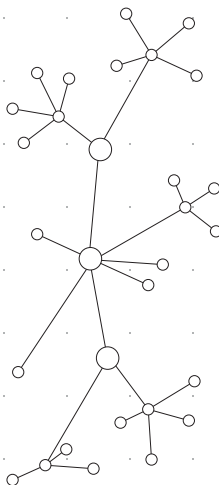
FEUDAL/INDUSTRIAL



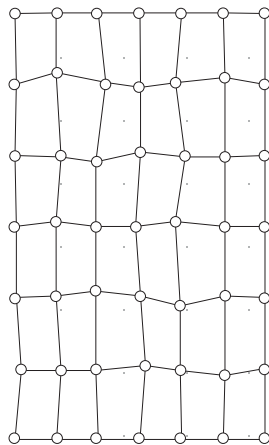
EXTREME HIERARCHY



CENTRALIZED



DECENTRALIZED



DISTRIBUTED NETWORK

Social Constructs; data from David Grewal, *Network Theories of Power*.



The idea from Grewal is that although it may be believed that the network society is distributed, it is in fact only decentralized. That some users are still in greater positions of power. Embracing the realm of communication, although we think we have a greater ability to communicate amongst ourselves we are still dependent on the systems that companies provide, this could be telecom networks or software to connect via web pages. Although users are essentially free to communicate whatever message they choose they are still dependent on the network to do so.

Those semi-centralized nodes can be related back to the architectural strategies from before attempting to influence social encounters. What can be seen is that power in the current society is decentralized (still with some centres) and in terms of spatial relationship it holds true as well. Spaces that are the most connected have greater likelihood of people interacting in them, and as such, more power to generate creativity and the reported benefits. It is as Castells suggests, "there are power relationships at work, albeit in new forms and with new kinds of actors."<sup>59</sup>

Whereas historically positions of power were hierarchically organized, driven by imposition of one's will in a ruling fashion, they now are multi-centered and control is that over the connections between others. Where does this leave architecture—that which creates physical connections for people?

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59. Castells, "A Network Theory of Power," 776.

## Establishing Analysis of Power

I take the stand that buildings are not primarily art, technical or investment objects, but social objects... such analysis involves taking things apart, probing, suggesting and experimenting, and emerging with some answers.<sup>60</sup>

Thomas Markus studies the concept of power in buildings by analysing the connection between spaces—defined as ‘depth.’ Furthermore, the maps can be used to identify properties such as ‘ringy’ or ‘tree-like.’<sup>61</sup> Ringy would imply multiple paths through a building, tree-like results in dead ends. These two concepts describe the segregation or connectiveness of spaces, which in turn can be used to understand spatial power of one space with regards to others.

The value of relative asymmetry (RA) discusses the level of integration or segregation with regards to the overall network. “Each space is a number of steps from all others; those that are, in sum, spatially closest to them all (low RA) are the most integrating.”<sup>62</sup> Arguably, the spaces of low RA values then form the spatial centres equivalent to Grewal’s centres in the social constructs of network power. Furthermore, the closer the overall value of the network configuration is to zero would imply a more distributed system. Relative Asymmetry has since been updated and discussed as simply integration. To slightly complicate the issue however, integration values are the inverse and the closer the value is to zero the less integrated a space is. The image top right shows a series of floor plans and assessments which outline the differences.

Another value important to Markus, is depth. “Depth indi-

60. Markus, *Buildings & Power*, xix.

61. *Ibid.*, 14.

62. *Ibid.*

### THE SHAPE OF THE ARGUMENT

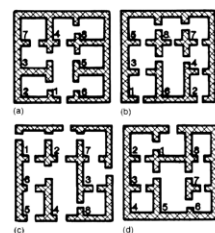


Figure 1.2  
Floor plans, their  
spatial maps and RA  
values  
Source: Redrawn from  
Hillier and Hanson  
(1984)

Depth	RA
0	0.392
1	0.071
2	0.321
3	0.250
4	0.250
5	0.321
6	0.250
7	0.500
8	0.500
Mean	2.125 0.317

Depth	RA
0	0.367
1	0.367
2	0.367
3	0.250
4	0.250
5	0.362
6	0.214
7	0.392
8	0.392
Mean	2.375 0.365

Depth	RA
0	0.107
1	0.214
2	0.111
3	0.214
4	0.143
5	0.286
6	0.250
7	0.285
8	0.285
Mean	1.375 0.202

Depth	RA
0	0.786
1	0.536
2	0.357
3	0.250
4	0.500
5	0.286
6	0.464
7	0.429
8	0.571
Mean	3.750 0.464

Thomas A Markus, diagrams of Space Syntax, 1993; from Markus, *Buildings & Power*, 13.

cates power.”<sup>63</sup> Depth as power can be interpreted in two fashions: first, that the spaces at the furthest depth of the tree are in a position of hierarchical power in that it takes more ‘steps’ in order to reach that space; second, that in some cases the power relationship is inverted, that subjects which are deeper in the tree are subjected to more controls and power.<sup>64</sup>

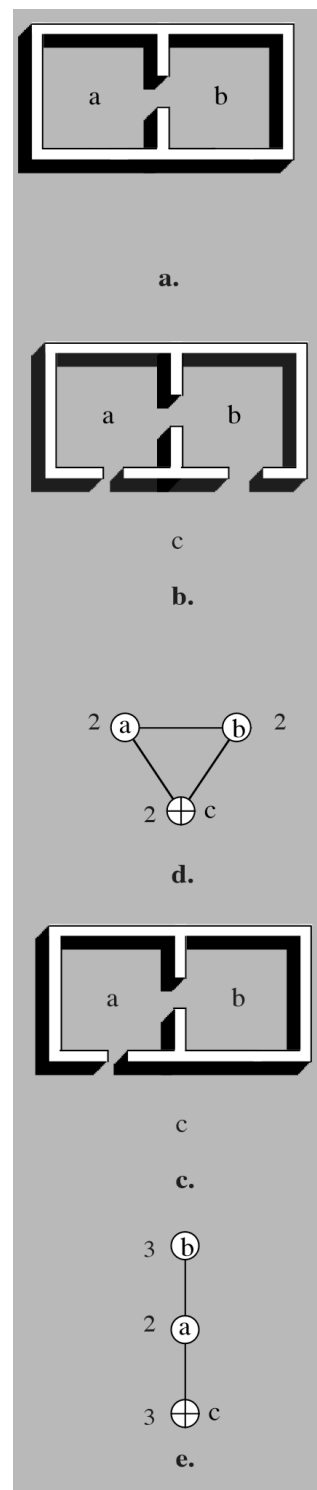
In contemporary situations in order to quantify power the objective is assumed to be creativity. That creativity is generated by the previous techniques but the primary objective continues to be employee interaction the ‘collisionable hours.’ Given this, a language of spatial syntax, developed by Bill Hillier and partially utilized by Thomas Markus in his seminal work *Buildings & Power: Freedom & Control in the Origin of Modern Building Types*, is employed to develop an analysis of potential interaction between inhabitants.

The argument is that in addition to functioning as bodily protection, buildings operate socially in two ways: they constitute the social organisation of everyday life as the spatial configurations of space in which we live and move, and represent social organisation as physical configurations of forms and elements that we see. Both social dimensions of building are therefore configurational in nature, and it is the habit of the human mind to handle configuration unconsciously and intuitively, in much the same way as we handle the grammatical and semantic structures of a language intuitively. Our minds are very effective in handling configuration in this way, but because we do work this way, we find it very difficult to analyse and talk rationally about the configurational aspects of things.<sup>65</sup>

63. Ibid., 16.

64. Markus cites Hillier here, giving the example of prisons and hospitals as places where the depth is inverted. Thomas A. Markus, *Buildings & Power: Freedom and Control in the Origin of Modern Building Types* (London: Routledge, 1993), 17.

65. Bill Hillier, *Space Is the Machine: A Configurational Theory Architecture* (Cambridge: Cambridge University Press), 1999.



Bill Hillier, diagrams of space syntax, 1996; from Hillier, *Space Is the Machine*, 24.

This set of objective analysis provides tools which allow an investigation of spatial configurations. Space syntax “is a robust technique that can be used to describe a system and analyse patterns of architectural space both at the building and urban level.”<sup>66</sup> What it allows is an objective manner in which to discuss controversial concepts such as power and control in the built environment.

The following page shows a breakdown of syntactical analyses. The analysis is based on the idea that people move (axiality) and gather (convexity) and that spaces can be described as a series of connections which can be mapped on a graph (depth); shown are three different spatial configurations and how those networks of spaces impact concepts such as ‘degree of choice, control analysis, entropy analysis and integration.’<sup>67</sup> The definition of terms are from Pirouz Nourian and the small diagrams from Hillier.

The Subsequent page displays a series of tests to show the difference in measures as a result of different spatial configurations. The parametric script is again from Pirouz Nourian.

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66. Mark David Major, *Relentless magnificence: The American urban grid*, Doctoral thesis, (London: University College London, 2015), 3.

67 These measures originally come from Hillier but are redefined through a parametric software package developed by Pirouz Nourian, et al.

# SYNTACTICAL EXPRESSIONS OF SPACE

Space Syntax.

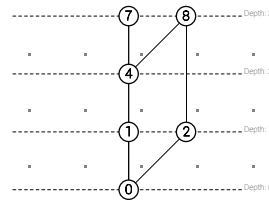
Developed by Bill Hillier and Julienne Hanson in *The Social-Logic of Space*.

Spatial Syntax to analyzes and describes the "material preconditions for the patterns of movement, encounter and avoidance, which are the material realisation — as well as sometimes the generator — of social relations" (Hillier, 1984).



## Axiality

People move in linear fashion from space to space.



## Depth Map

Depth from any one point provides levels of control and integration of a space into the system

## Degree of Choice

Choice analysis as described first in L. Freeman 'A set of measures of centrality based on betweenness', and later as 'Global Dynamic' measure in Hillier, B., Burdett, R., Peponis, J. and Penn, A., 1987, 'Creating Life'. Indicates how often a 'node (or space) happens' to be on a shortest path between other spaces; in other words, it measures 'the degree 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'.

## Control Analysis

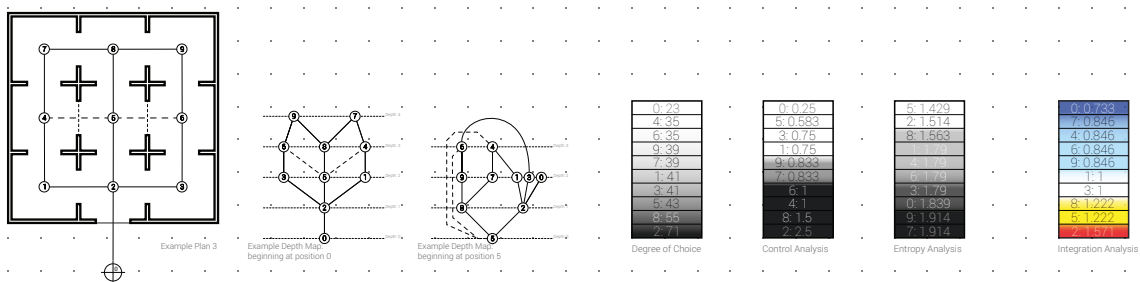
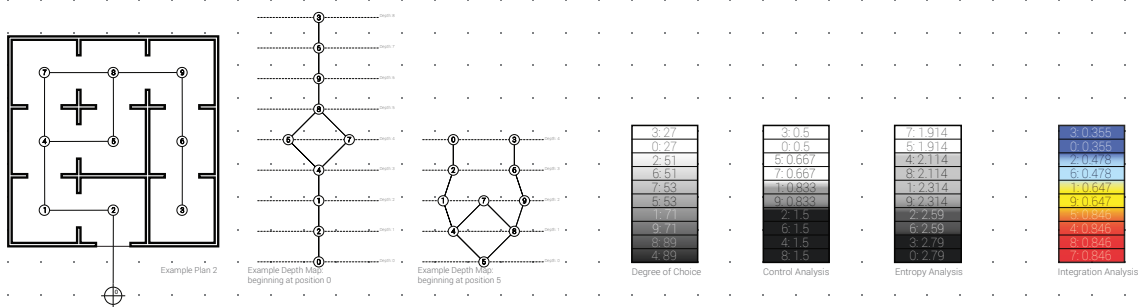
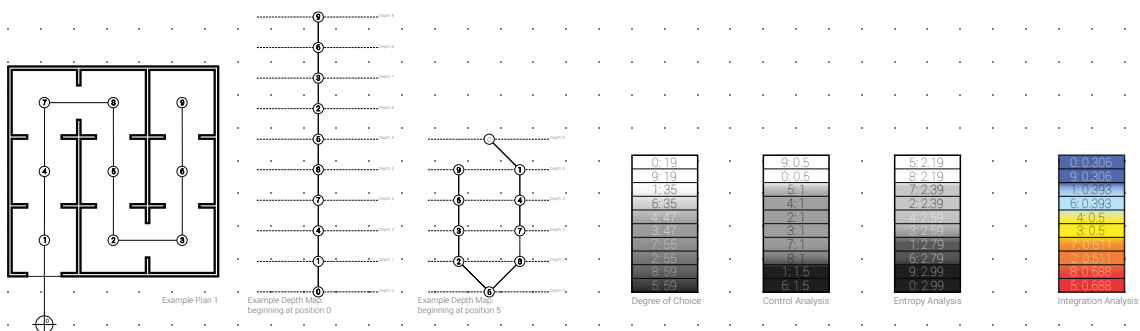
Performs Control analysis as described in Hillier, B., Hanson, J. and Peponis, J., 1987, 'The syntactic analysis of settlements'. Intuitively, indicates how strongly a vertex in a graph (a space in a configuration) is linked to other points in a superior manner.

## Entropy Analysis

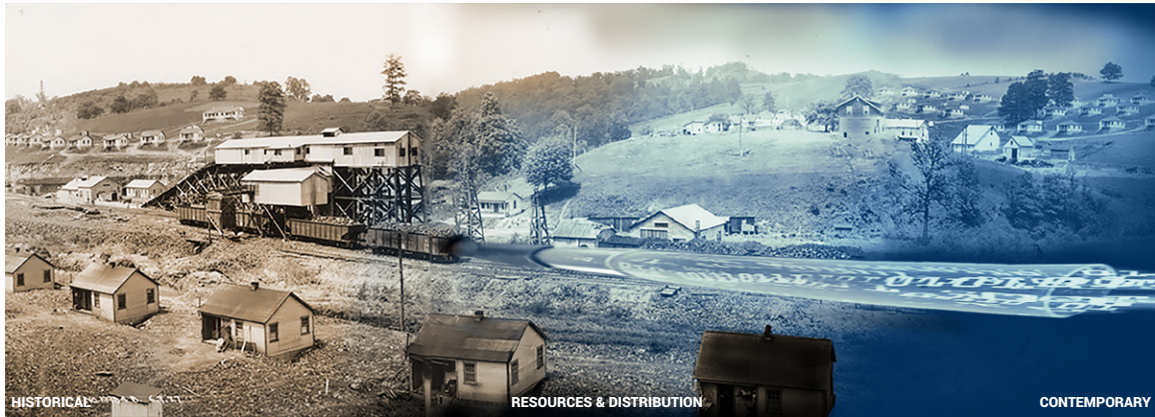
Performs Entropy analysis as described in Hillier, B., Hanson, J. and Peponis, J., 1987, 'The syntactic analysis of settlements'. Intuitively, the higher the entropy value, the more difficult is it to reach other spaces from that space and vice-versa.

## Integration Analysis

Performs integration analysis as described in 'The social logic of space'. Intuitively, the higher the integration value, the more likely for a space to be communal and the lower the integration value, the more private is the space. (Implicitly tied to the relative asymmetry definition from 'The Social Logic of Space, Hillier, 1984).



## CHAPTER 4: METHOD ARCHITECTURAL CASE STUDY ANALYSES



Conceptual collage displaying the shift in technologies, resources and distribution.

### The Architectural Palette of Company Towns

The question remains: what is the architectural expression of a company town? Although company towns were each as different as the next, there are similarities that are identifiable throughout the typology. As noted by Allen, company towns display unique characteristics that help to categorize them.

If a person suddenly found himself in the middle of a company owned town, he would have little difficulty identifying it as such, for certain general features usually stood out. First to be noted would be the standard, uniform architecture of the company... It would be observed that the town seemed to center around a focal point where a store, community hall, school, and other public buildings were located. The company store usually dominated the group. It would be noted that the settlement had no "suburbs," or no gradual building up from a few scattered homes to a center of population. Rather, one would note the complete isolation of the community and the definiteness of its boundaries.<sup>68</sup>

Company Towns are an excellent source for investigation

68. Allen, *The Company Town in the American West*, 79.

of architectural techniques. Due to their immediacy and reactionary nature the cause and effect status principles inherent in the architecture are readily evident. The intrinsically linked social and economic goals are typically apparent. When considering the inception of a community, the question remains how did and do the planning and architecture respond to the economic requirements. Similarly how do the architecture and planning act as zeigeists manifesting the social, technological and economic issues of the time. As such, a comparative analysis of company towns throughout the ages seeks to identify the architectural strategies employed therein.

***Case Study 1. Lowell, Massachusetts.***

Lowell, as one of the first 'planned' company towns of North America it provides a number of interesting factors. The town was a reaction to the expanding textile market as well as the introduction of mechanical powered textile creation. As such, urban planning was based around the necessity of resources for power, specifically water power. Lowell was located in close proximity to Boston but more importantly was located on the Merrimack River to capture the energy of falls of the river. As was shown previously the location and planning are determined by an access to resources and architecture was utilized to control nature.

Just as the requirements for processes dictated the location and organization so too did the industry impose a formal language on the planning and architecture.<sup>69</sup> The industrial revolution provided the "factory and mill [which]

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69. Markus' argument is based around the silk mills of Europe but given that the technology for the Awkwright system was essentially stolen by Samuel Slater the system of analysis holds true for structures in Lowell as well.



are the most revealing industrial forms in their organization and space."<sup>70</sup> The mechanical power distribution of the textile mills was the basis for the development of the community. The following drawing shows a diagrammatic section of a typical mill. From that section a syntactical depth map is developed to analyze the structures of power through the mill and town. This information is based on an original analysis from Markus in *Buildings and Power*.

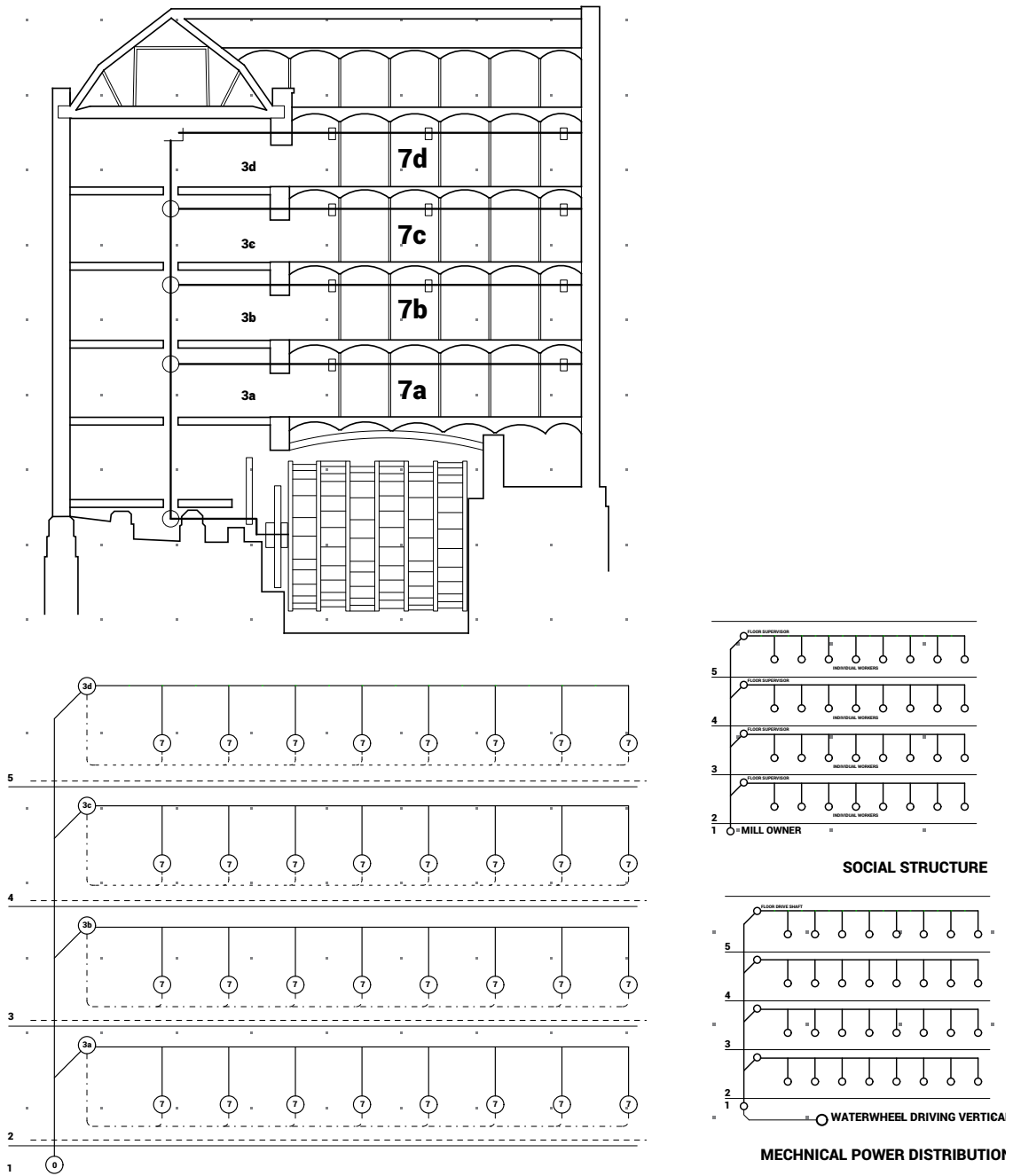
What is evident in Lowell is that as a company town, its inception was decided as a response to resource supply, and its development was designed as a physical manifestation of the technological system utilized for production. The principles of which were also employed in the planning of the town

The demands of the production processes now controlled the totality of experience in the mill settlement; its rigidly geometric organization, rather than expressing a new concept of planning, reflected the new level of control and regularity imposed by the Waltham system... an order structured by the sequence of processes necessary for vertically integrated textile production.<sup>71</sup>

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70. Markus, *Buildings & Power*, 261.

71. Crawford, *Building The Workingman's Paradise*, 25.



Drawing of typical textile mill section showing mechanical power distribution and spaces water powered and hierarchical; drawing adapted from Thomas A. Markus, *Buildings & Power*, 269.

## Case Study 2. Facebook Building 20 - Frank Gehry Architects



Concept collage relating the working conditions of a Pullman Factory and a Facebook Office.

Considering the re-emergence of the company town one of the most recently developed tech campuses is that by Frank Gehry, Facebook Building 20 located in Palo Alto, California. Although Facebook has had a corporate campus for some time, the recent race in the Bay Area to build technology campuses in response the increasing demand in the technology market has led to a number of such designed campuses emerging.

To preface the 'new company town' it is important to define the industry in which the company is operating. In this case Facebook is a social networking company. With that as an industry it is important to note that the industry also exists within a networked society and the previously defined economic considerations, that ideas are the product of creativity as the resource.

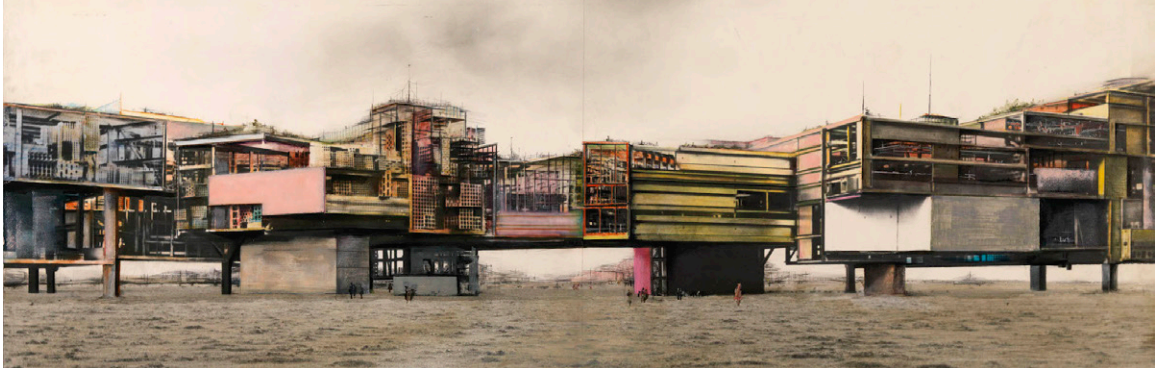
Similar to Lowell, Facebook Building 20 exists as a reactionary response to new technology, to social structures, and attempts to quantify these things physically through architecture. The architectural form is almost quite literally

a translation of a social network into the built form. Yet it differs slightly from Lowell in that the architecture does not seek to control employees for the benefit of production. Rather design decisions are made to bolster creativity (which in turn is the economic equivalent of industrial production).

An analysis of Facebook Building 20 starts to reveal some of the strategies used by employers to generate more resources from their employees. Amenity provision such as cafeterias and kitchens promote casual interaction which is suggested to boost creativity. These elements are placed at either ends of the building to increase employee interactions as they walk to take advantage of the employer provided food. The other groundbreaking aspect of Facebook Building 20 is that it is entirely open from one end to the other. A 1500 foot long open office floor plan is the thing of nightmares for many people. Furthermore given Gehry's Architectural language the building it is difficult for many to comprehend what Gehry is actually trying to accomplish.

Arguably he is in fact attempting to reference Constant's New Babylon. In the interior, the provision of moveable desks and an essentially free floor plate are the keys. An ever changing workplace that allows for changing interactions between employees is inching towards New Babylon. Facebook and Gehry would argue their motivations are the same as Constant's as well – in this case: the illusion that work is nothing more than play.

Formally the exterior of the building is where the allusion to New Babylon can be most readily understood. An elevated highly articulated structure, shifting planes and depth of fa-



Constant Nieuwenhuys, New Babylon, 1959-74; from *Contemporary City, Nieuwenhuys, Constant - New Babylon*.



Gehry Architects, Facebook Building 20 North Elevation, from Lydia W Lee, *Architectural Record, Facebook's Gehry-Designed Headquarters Opens For Business*.

cedes, abundance of colour and almost maze like qualities of the exterior. The double height space (red colour) in the centre of the image of New Babylon, compare it to Gehry's titanium clad double height space that intersects the primary building and the form in the following image and it is highly reminiscent.

Criticism though is warranted as the Facebook building is seemingly elevated only for the purposes of providing space for parking underneath. Also, there are strict physical controls, gates requiring key cards, that allow access to the floors above.

Although bordering on company town status, it is only a workplace. However, that is soon to change as well. Currently under construction is a \$120 million dollar housing development located a five minute bike ride away from the Facebook Campus. Further amenities will also be provided with the ultimate goal of reducing employee decision fatigue – allowing them to be more creative at work.<sup>72</sup> What is clear is that Facebook is much like the original company towns, owning the means of production and now also providing housing for the employees.

What we see within Facebook is the literal translation of the social network into built form. Much like how the mills at Lowell took the architectural form of the power production and social relationships, the Facebook Building does the same and matches the form of the decentralized society which as Grewal pointed out is equatable to a social net-

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72. Dan Bates. *Inside Facebookville: Employees to Get Their Own Housing in \$120m Town Zuckerberg Built*, last modified October 03, 2013, <http://www.dailymail.co.uk/news/article-2442852/Town-Mark-Zuckerberg-built-Facebook-employees-dorm-style-housing.html>.

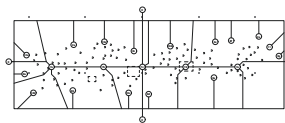
work. Being that Facebook is a social network company, it only becomes more interesting as the building begins to be seen as the embodiment of a mode of organization.

By employing the syntactical method of analyses what is evident is that the work areas become the points of connection to other areas and amenities. This is in part due to the open nature of the office. Furthermore that the floor plate has been syntactically divided using the current pathways (but these are designed to be alterable). Again, it is a focus on the work locations being the centre—or points of connection to other spaces—a change from the typical organization. Whereas in the Lowell example the place of work is the deepest point on the justified depth map, in the Facebook example those points become quite simply points of connection.

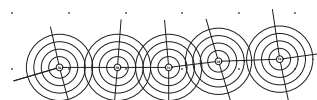
And therein is the power of such a configuration of spaces. The entire building is designed to promote interaction. As such, the primary program of the building, work, can then be re-evaluated. In fact it is simply interaction, and this is in keeping with the purported economic systems, ruled by creativity and collaboration.



ORIGIN AND SEDUCTION



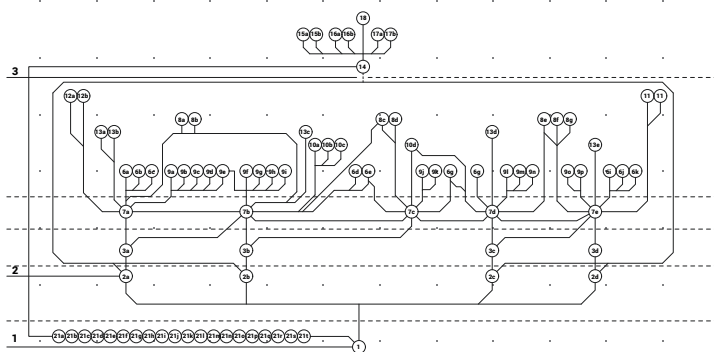
VISUAL RELIEF AND NATURAL LIGHT



OBSERVATION LINES

## FACEBOOK BUILDING 20

Menlo Park, California / Gehry Partners LLP / 400,000 square feet / 2,800 employee spaces /



Spatial Identifiers

- 0 - Space Around Building (carrier)
- 1 - Entry Sequence (v-visitor, a-employee)
- 2 - Floor Landing and circulation
- 3 - Courtyard Landing and Circulation
- 4 -
- 5 -
- 6 - Washrooms
- 7 - Primary Work Zones
- 8 - Exterior Patio
- 9 - Small Meeting Area
- 10 - Training Areas
- 11 - Amenities (a-gym; b-cafeteria)
- 12 - Cafe
- 13 - Small Kitchen
- 14 - Exterior Garden
- 15 - Sunken Garden
- 16 - Roof Drop
- 17 - Roof Extension
- 18 - Exterior Event Space
- 19 -
- 20 - Mechanical Space
- 21 - Exterior Stairs

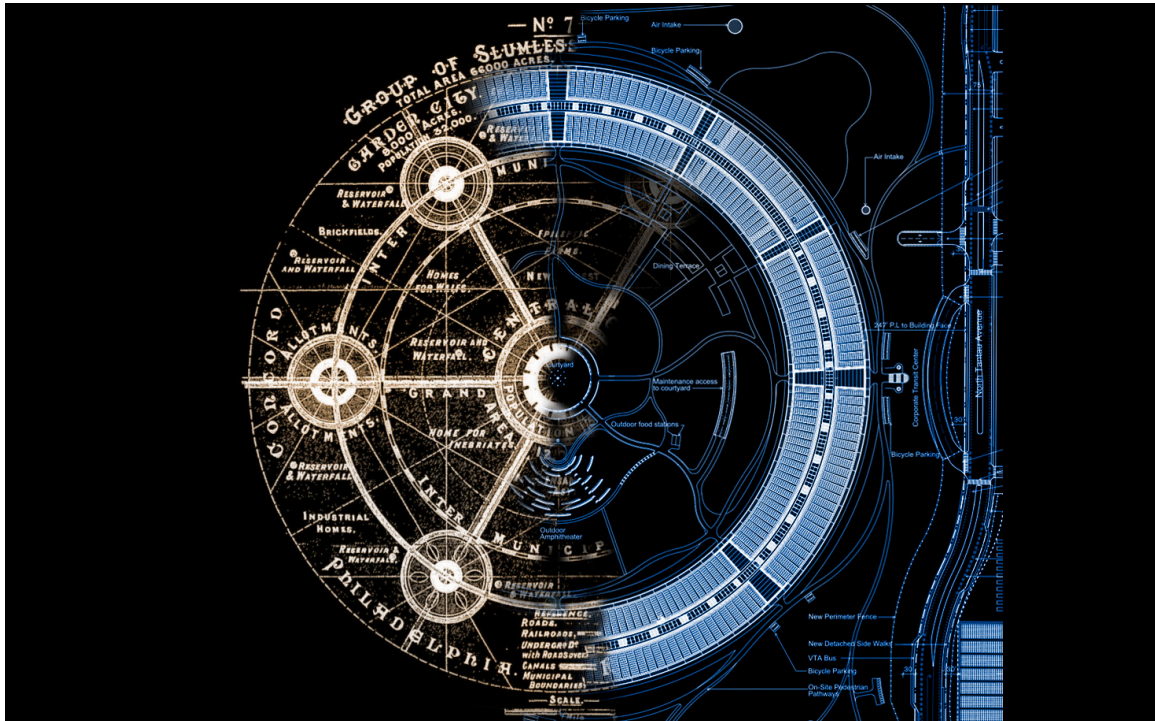
### SYNTAX SPATIAL CONFIGURATION

----- visual link      ———— circulation link

Floor Plans and Syntactical Diagrams of Facebook Building 20; data from Lydia W Lee, Architectural Record, *Facebook's Gehry-Designed Headquarters Opens For Business.*



### Case Study 3: Apple Campus - Norman Foster Architects



Conceptual Collage relating Ebenezer Howard's Garden City organization to that in Apple Campus 2.0.

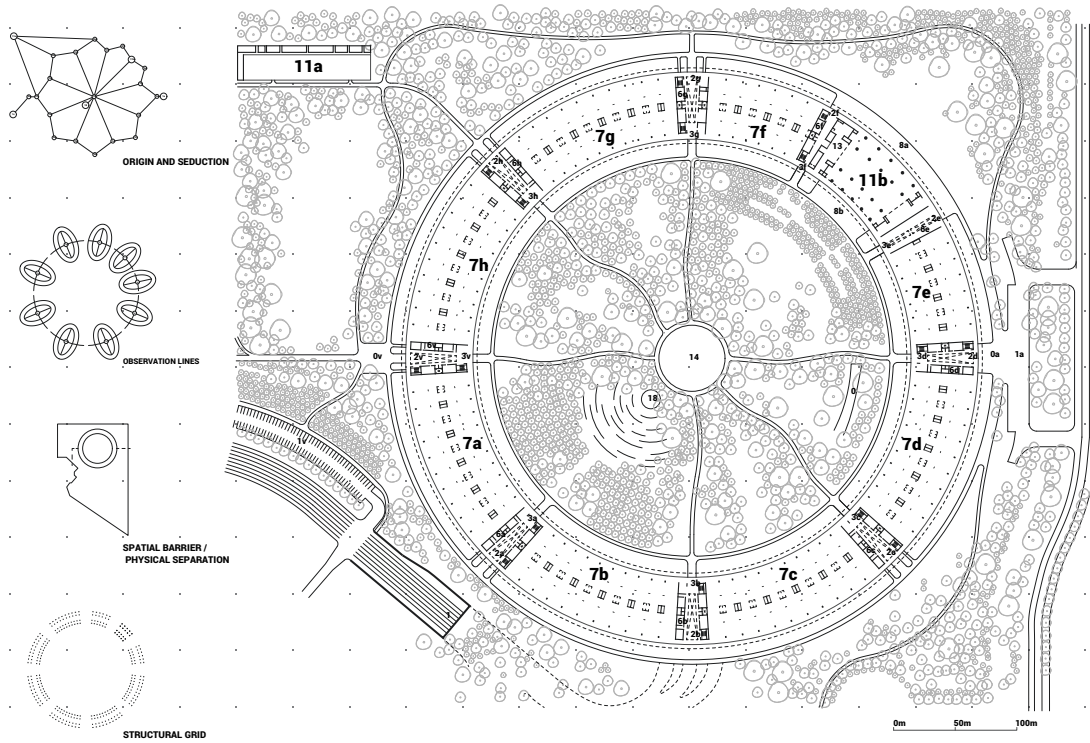
Approximately fifteen miles to the south east of Facebook Building 20 is the new Apple Campus 2.0, located in Cupertino, California. At over five billion dollars in construction costs and set to accommodate twelve thousand employees, the Apple Campus is as much of a city as any construction project. Although it lacks the quintessential company town aspect of housing, it does incorporate many of the amenities that would contribute to company town status.

The above conceptual collage is a commentary on the organizational strategies of Norman Foster and Steve Jobs in the design of the Apple Campus 2.0. The suggestion, similar to Gehry designing a city similar to New Babylon, is where would Norman Foster look when asked to design a city? in this case, the workplace as a city. Maybe it is just

an Apple scroll wheel, but the collage suggests the campus is designed, and may function, more like Howard's Garden City.

Crucial to that idea is that there is a certain amount of sector-like division. Contrary to the Facebook example, the building is strictly defined formally as are all the specific spaces.

By analyzing the campus through the method of space syntax we see the work spaces do indeed operate much differently than the Facebook example. In this case the work spaces are the end of the branch. Although they are integrated in and of themselves, the work spaces require other spaces to perform the majority of connections throughout the campus. The central area is the most integrated and this may be a strategic move to encourage interaction in a space of nature and requiring movement (both factors in increasing creativity). Still, the primary difference is the work spaces and how they become isolated or act as different sectors.

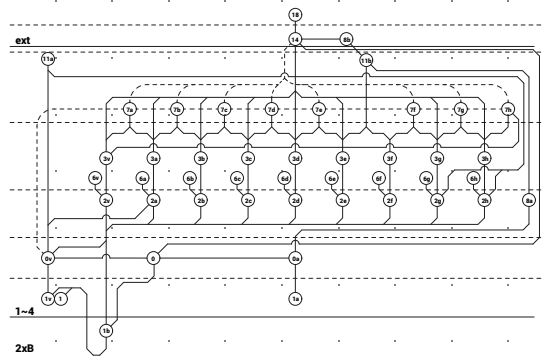


**APPLE CAMPUS 2**

Cupertino, California / Foster + Partners: Innovative Architecture & Integrated Design / 2,800,000 square feet / 12,000 employee spaces /

Spatial Identifiers

- 0 - Space Around Building (carrier)
- 1 - Entry Sequence (v-visitor, a-employee)
- 2 - Floor Landing and circulation
- 3 - Courtyard Landing and Circulation
- 4 -
- 5 -
- 6 - Washrooms
- 7 - Primary Work Zones
- 8 - Exterior Patio
- 9 - Small Meeting Area
- 10 - Training Areas
- 11 - Amenities (a-gym; b-cafeteria)
- 12 - Cafe
- 13 - Small Kitchen
- 14 - Exterior Garden
- 15 -
- 16 -
- 17 -
- 18 - Exterior Event Space
- 19 -
- 20 - Mechanical Space
- 21 -



**SYNTAX SPATIAL CONFIGURATION**  
 - - - - - visual link      ———— circulation link

Floor Plans and Syntactical Diagrams of Apple Campus 2; from City of Cupertino, *Apple Campus 2 Project*.

**Case Study 4: Samsung Headquarters - NBBJ Architects**

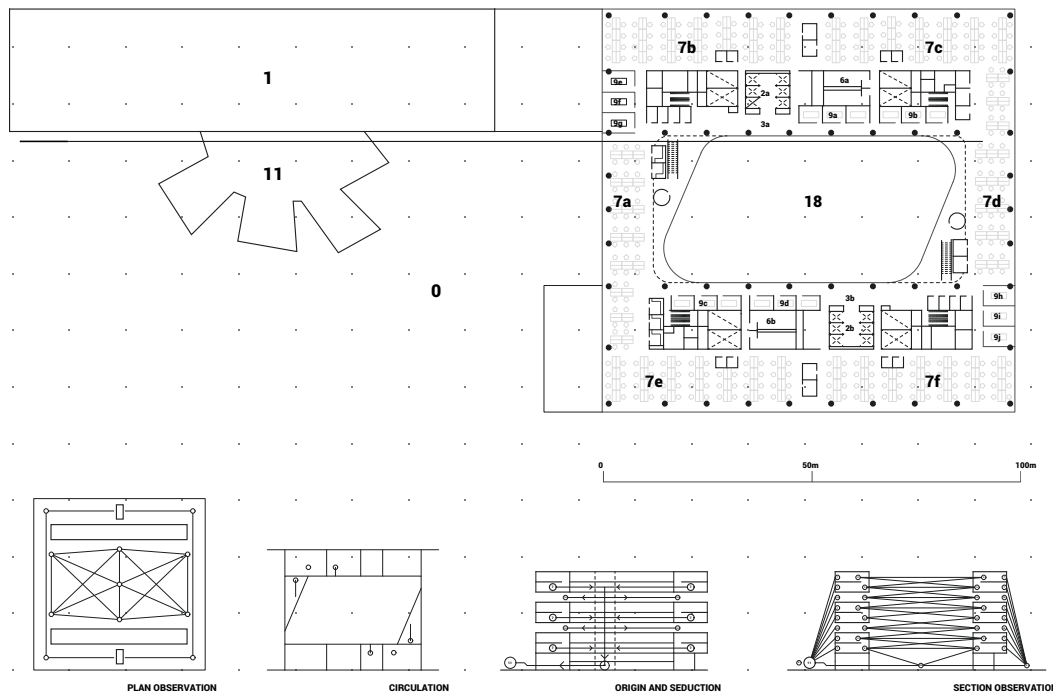
Much of the Samsung North American Headquarters has already been discussed. Similar to the other case studies, spatial syntax studies reveal insights as to the intentions of the designers but also how the building functions comparatively.

Movement and visual connection are the fundamental components of the NBBJ design, and the syntax model describes the spatial configuration as such.

The Samsung building is more equalized in the potential integration and relies heavily on its landings and circulation paths to connect all the spaces. This is similar to the Apple situation but in some cases work spaces connect directly to one and other. Furthermore, sub-work spaces vary in their connections, sometimes off of circulation paths, other times out of primary work spaces.

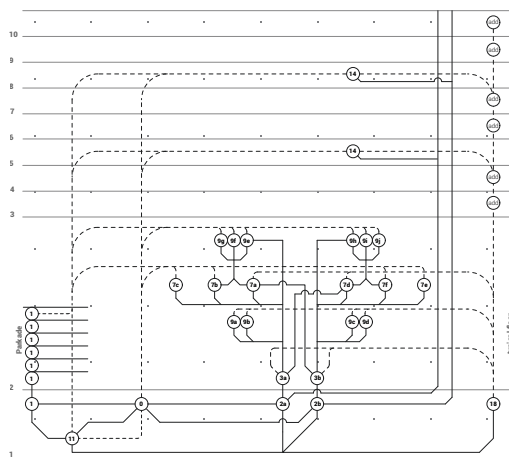
What is most important, and this was discussed previously, is the multiplicity of the visual links. These function primarily to draw people throughout the building, acting as a seductive force to generate movement. In many cases a direct connection is withheld but a visual connection is provided. This is to generate movement through attraction.

This concept of the attractor is taken up by Kristen Sailer as she is currently working to include an attractor equation into the spatial syntax model. What this may allow is to add an additional set of criteria - which may in fact begin to question the importance of integration.



**SAMSUNG CAMPUS**

San Jose, California / NBBJ Architects / 2,800 employee spaces / 1, 100, 000 square feet /



Spatial Identifiers

- 0 - Space Around Building (carrier)
- 1 - Parking Area
- 2 - Floor Landing and circulation
- 3 - Courtyard Landing and Circulation
- 4 -
- 5 -
- 6 - Washrooms
- 7 - Primary Work Zones
- 8 - Exterior Patio
- 9 - Small Meeting Area
- 10 - Training Areas
- 11 - Amenities
- 12 - Cafe
- 13 - Small Kitchen
- 14 - Exterior Garden
- 15 -
- 16 -
- 17 -
- 18 - Exterior Courtyard
- 19 -
- 20 - Mechanical Space
- 21 - additional floors similar to typical

**SYNTAX SPATIAL CONFIGURATION**

----- visual link      ———— circulation link

Floor Plans and Syntactical Diagrams of Samsung Headquarters San Jose, Author's reproduction of floor plans; NBBJ Design, Samsung North America Headquarters, from NBBJ, Design. "Samsung North America Headquarters "Day in the Life" Analysis."

### **Case Study Conclusion**

The current networks of power, in this case, how and where companies are creating their own new cities, are informed and influenced by previous networks. Furthermore, the pressure of the current network of power of proximity, the Bay Area, is geographical but based on the people of the industry. Again, the Bay Area as a network of power is becoming self-referential; it is gaining in power as more companies choose to locate their headquarters there.

Spatial political economy, where early on was based on authority and hierarchy now is almost exclusively tied to level of integration. Companies focus spatial integration in different areas for the purposes of production. The different desires of companies are apparent when spaces are analyzed with a syntax. The concept of the corner office is being replaced by maximizing integration.

A similar argument by Penn et al. (1999) highlighted the importance of spatial differentiation, since shallow, i.e. centrally located spaces afforded unplanned interaction and the rapid transfer of ideas, whereas deep, i.e. segregated spaces afforded the execution of tasks. Therefore, the ability to engage in creative work depends on the affordances of the spatial layout to either bring people together or keep people apart; the balance of communal and private spaces in a workplace environment as realized in a spatial layout shall henceforth act as the second criterion for a successful working environment fostering creativity.<sup>73</sup>

Such a concept, maximum integration equals power, is not a difficult thing to grasp. However when it is applied to the workplace, many people would object to being placed in the centre of the building versus a corner office.

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73. Kerstin Sailer, (2011), "Creativity as social and spatial process", *Facilities*, Vol. 29 Iss 1/2 pp. 9

Technology informs spatial, social, and architectural structure, and as technologies change so too do our spatial structures. When asked to design a workplace like a city what do architects do? Architects attempt to design cities - referencing the work of previous utopian designers. They are looking for design precedent that is not based on traditions as the new economic system is demanding that the spatial response be rethought. The modern day workplaces still rely on traditional controls such as observation and physical controls (spatial separation and thresholds).

The power of seduction to encourage movement throughout a building leads to increased interaction and creativity. This is primarily accomplished through "the influence of attractors as drivers to targeted movement."<sup>74</sup> As such, the planning of attractors will begin to provide and adjustment factor to levels of integration. That through the pre-planned position of attractors certain areas integration, or likelihood of use, will be calculable, map-able, and as a result, analyze-able.

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74. Kerstin Sailer, (2007) "Movement in workplace environments – configurational or programmed?" In: *Proceedings of the 6th International Space Syntax Symposium*, 12-15 June 2007, Istanbul. 6th International Space Syntax Symposium

## CHAPTER 5: GENERATING A RESPONSE

It is through spatial syntax that architectural configurations can be distilled for the purpose of analysis. Furthermore, that through the abstraction of spatial connectivity, concepts of power (an intended effect to be produced), are able to be identified. The intended effects are invariably bound to social relations. As Hillier suggests, a first premise,

human spatial organization, whether in the form of settlements or buildings, is the establishment of patterns of relationships composed essentially of boundaries and permeabilities of various kinds.<sup>75</sup>

What is needed is a framework that investigates how such boundaries and permeabilities can be investigated through design. Moreover, it is how the variations in syntactic organizations develop different social situations. This is a shift from an analytic to generative process.

The simplicity of a framework is developed as 'infrastructure' in the designs of architect Yona Friedman: "The physical form of an infrastructure is generally a network, for which the rules of utilization have been established."<sup>76</sup> Friedman promotes 'infrastructures' for his investigations of the interconnectedness of architecture and social relations.

How people interact within buildings is how architecture influences social relations. As Friedman discusses, "For us, communication is the main tool of domination."<sup>77</sup> It is through the 'boundaries and permeabilities' which Hillier

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75. Hillier and Hanson, *The Social Logic of Space*, 54.

76. Yona Friedman, *Towards a Scientific Architecture* (Cambridge: MIT Press), 112.

77. Yona Friedman, *Pro Domo* (Barcelon: Actar), 132.



discusses that communication occurs. As such, the power of architecture is through the organization of communication between inhabitants.

The framework in this case employs the concepts from Hillier and Freidman. Abstracting the core concepts of connectivity and the formation of networks of relations. Specifically, how are spaces, and the people in them, open, connected, disconnected, or variable. Development of these types of connections allows for a framework within which one can explore how syntactical configurations are spatialized and how different variations can produce different social relations.

## **The Framework Parts**

By analyzing the system of spatial syntax the principle parts of architecture are apparent. In this case we require elements that vary the level of connectedness between inhabitants and a structure in which to place those elements.

### **Structure**

The framework, or Friedman's 'infrastructure,' in this case is a system wherein levels of connectedness can be tested. It is designed to "be as 'uncommitted' ('neutral') as possible."<sup>78</sup> Thus, a simple and infinite series of structural bays allows for an indeterminate number of potential configurations of spaces. An isotropic grid has no beginning or end and ensures "there is no chance of obstacles to any imaginable modification except perhaps the conservatism of the users."<sup>79</sup>

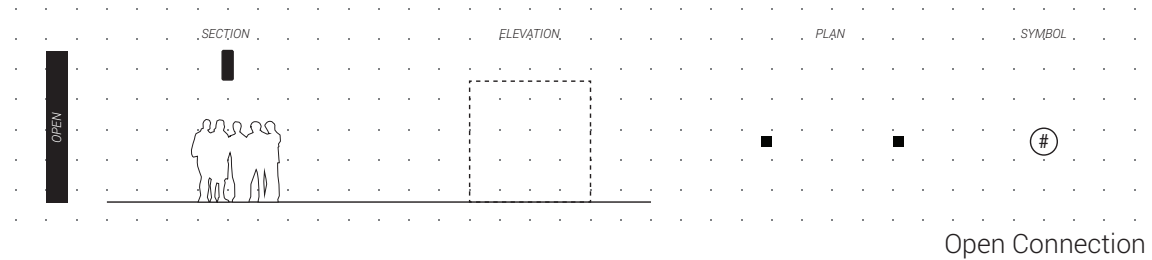
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78. Yona Friedman, *Towards a Scientific Architecture* (Cambridge: MIT Press), 113.

79. *Ibid.*, 122.

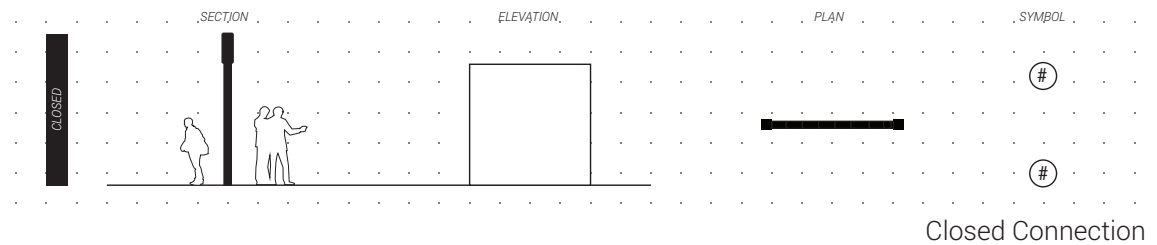
## Open

The space within the infinite grid is considered to be a single open space until elements are added which create concavity (which creates a separate space according to space syntax).



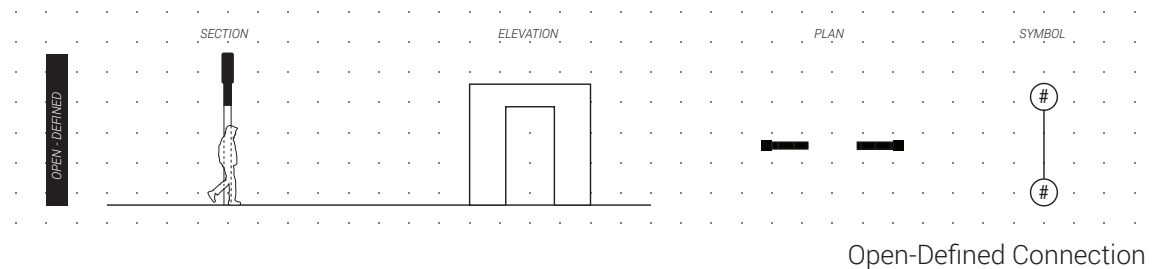
## Closed

A solid infill element defines spaces. It can separate inhabitants but also enclose them. Again, the closed element is designed to be as neutral as possible to allow for the imagination of future inhabitation.



## Open-Defined

An opening in a solid infill allows for the definition of space while still allowing for physical connection between spaces.

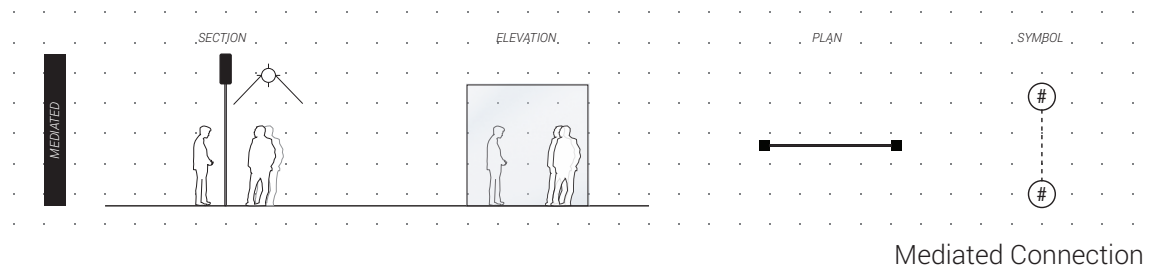


## Mediated

As identified previously the way in which communication and distribution has evolved is to utilize fibre-optic transmission. To distill the concept of fibre-optics, it is at its core quite simply light through glass. Pulses of light which are either on or off. It is through fibre optics that data is transmitted, phone calls are made, and emails are sent. Much of the modern world, its economies and production, rely on fibre optics.<sup>80</sup>

There are arguments on both sides as to whether such communication is better or worse. Removing the value judgement shows that there is still a connection, in whatever form it is. Connecting through light and glass is not better or worse, only different. And it is this different connection that can be thought of abstractly to how a piece of glass in architecture both separates but also connects individuals to a space.

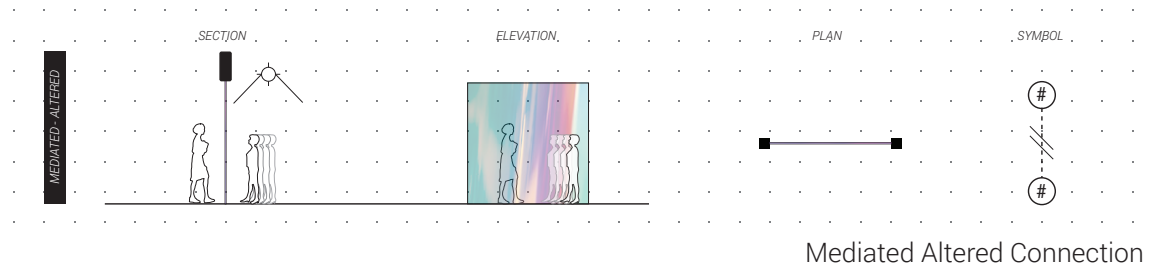
Fibre-optic communication is abstracted to spatial divisions of glass. Much like a window, glazing elements provide a mediated connection within the framework.



80. Following fibre optic map shows the approximate location of fiber optic locations across North America.

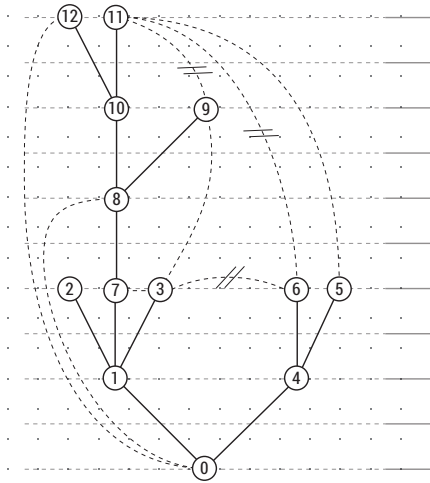
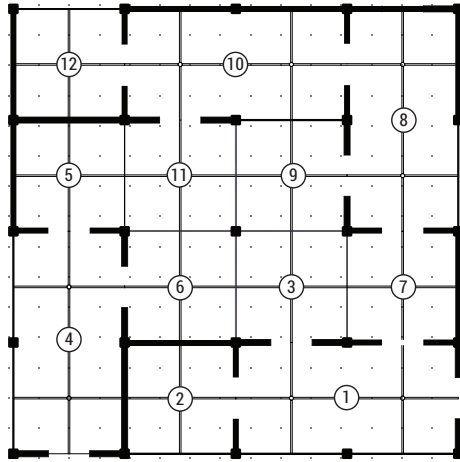
### ***Mediated-Altered***

Utilizing the strategy of glazing, the specific type of dichroic glass is employed to symbolize an altered perception. Dichroic glass filters certain wave lengths of light. The result is the image through the glass depends on the side and also the angle of which one views it from.

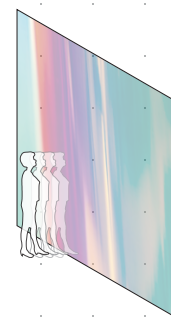
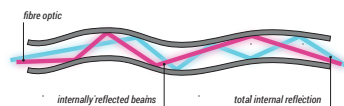
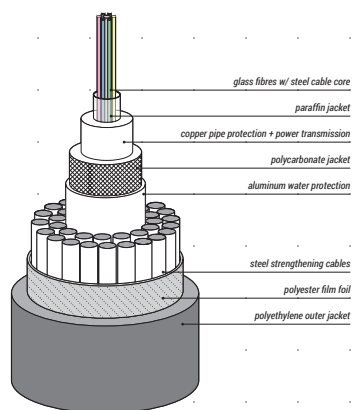
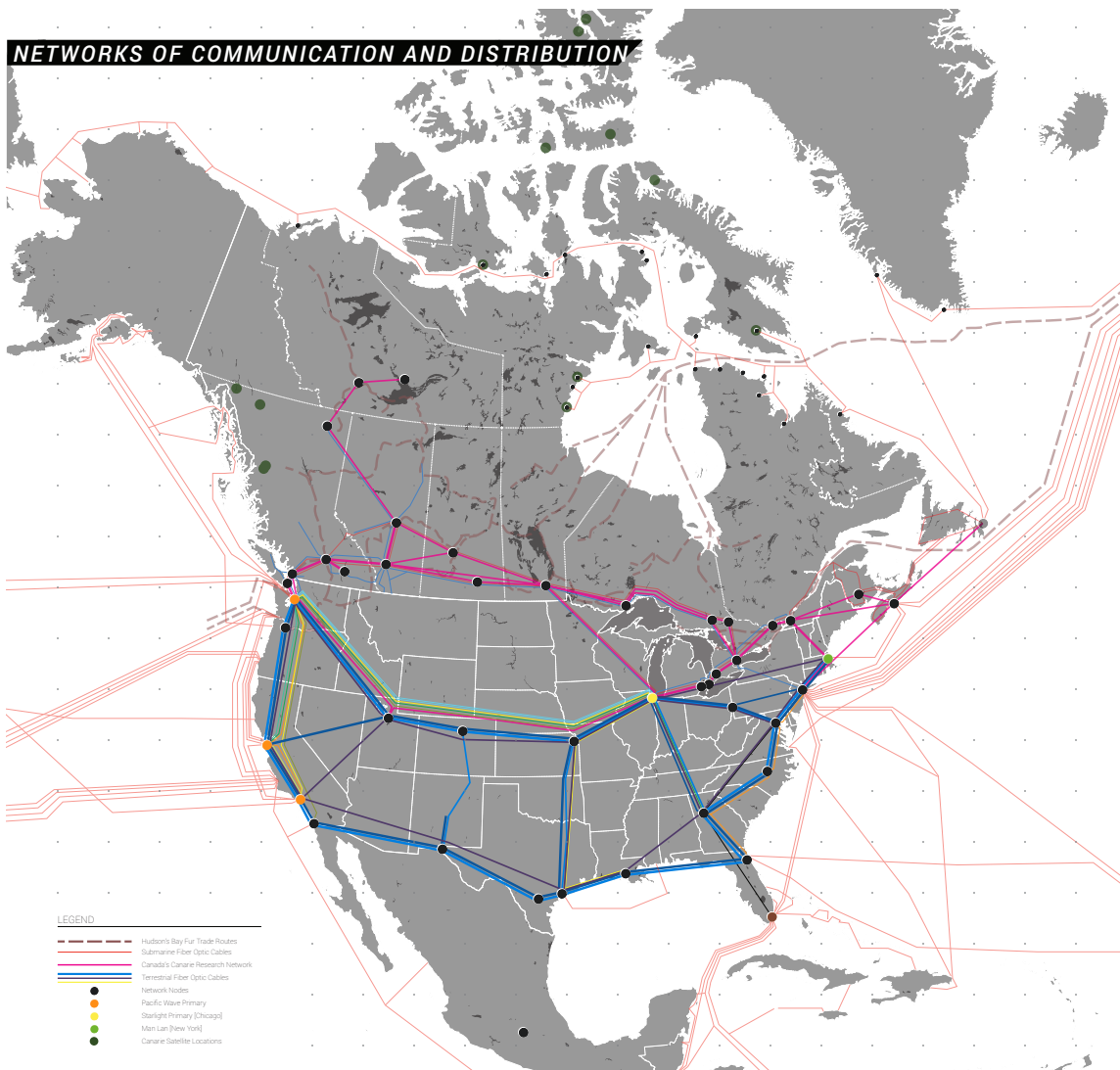


This system of parts begins a process of utilizing spatial syntax as a generative tool. The following page displays the parts employed in a framework, developed as a floor plan, and diagrammed as a syntactical depth map.

**FRAMEWORK PARTS**



	SECTION	ELEVATION	PLAN	SYMBOL
OPEN				
CLOSED				
OPEN-DEFINED				
MEDATED				
MEDATED-ALTERED				



**INFRASTRUCTURE**      **SYSTEM**      **ABSTRACTION**  
 \*Fibre Optic Cable Assembly      \*Fibre Optic Transmission      \*Dichroic Glass

Distribution Networks Across North America; data from Telegeography, *Submarine Cable Map*; Global Lambda Integrated Facility, *North America GLIF Map*; HBC Heritage, *The Growth of the Fur Trade*.

## Employing the Framework

Friedman takes a similar approach in attempting to understand social relations as those of Grewal, a series of diagrams of points (people) connected with lines (personal connections and influences). What is more he goes on to analyze how certain allegiances may form and who in the diagram of the society benefits from inclusion and exclusion of other members. His diagrams show the importance of connectivity between members which will in turn inform connectivity of spaces.

As Hillier suggests in a second premise,

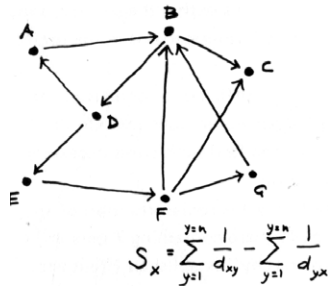
Although there are infinitely many different complexes of spatial relations possible in the real world, there are not infinitely many underlying sets of organizing principles for these patterns. There is on the contrary a finite family generators of complexity in human organization and it is within the constraints imposed by this family of generators that spatial complexity is manipulated and adapted.<sup>81</sup>

Friedman's diagrams provide an understanding of how networks of connections enact power. Grewal's diagrams, provide 'maps' of societies that can then be implemented as syntactical configurations. These base maps are the 'underlying organizing principles' of Hillier, which are sought to provide the basis for understanding social power structures. This then becomes the method of employing the framework. Take the abstracted diagrams of societies, develop a syntax graph of the societal map, and design an architectural space through the use of the framework parts which is a translation of the syntax graph.

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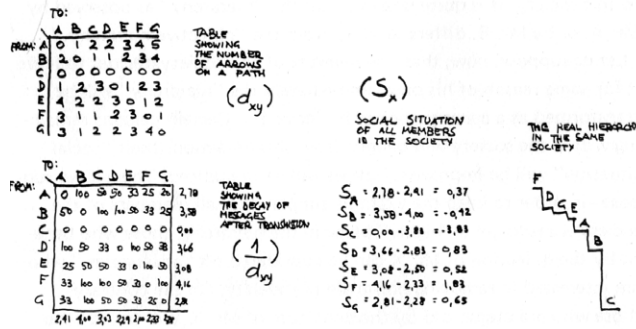
81. Hillier and Hanson, *The Social Logic of Space* (New York: Cambridge University Press, 1984), 54.

It is the reverse of syntactical analysis, it is employing what was an analytical method as a generative design tool. Through an understanding of societal diagrams it is possible to develop architectural configurations which provide influence for intended effects and as such manifest power.



$$S_x = \sum_{y=1}^{y=n} \frac{1}{d_{xy}} - \sum_{y=1}^{y=n} \frac{1}{d_{yx}}$$

Figure 6

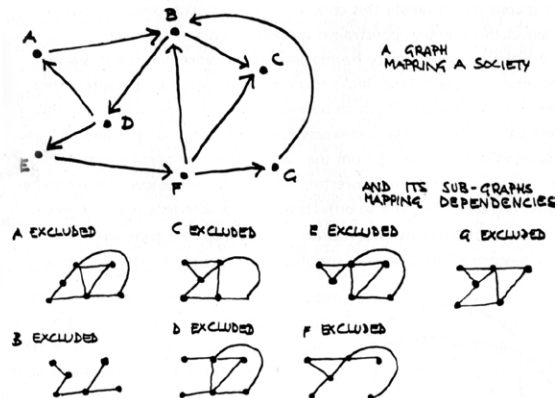


$$D_x(z) = S_x - S_x(y \neq z) = \left( \sum_{y=1}^{y=n} \frac{1}{d_{xy}} - \sum_{y=1}^{y=n} \frac{1}{d_{yx}} \right) - \left( \sum_{y=1}^{y=n} \frac{1}{d_{xy}} - \sum_{y=1}^{y=n} \frac{1}{d_{yx}} \text{ and } y \neq z \right)$$

FOES	Mr X	ALLIES
BCDE	A	FG
ACDEG	B	F
ACE	C	ABDEFG
CDEG	D	BG
ABCG	E	AB
ABCDF	F	E
	G	E

**ALLIES:**  
 THOSE WHO WANT TO KEEP MR X WITHIN THE SOCIETY  
  
**FOES:**  
 THOSE WHO WANT TO CHASE MR X FROM THE SOCIETY

Figure 8



Yona Friedman, Diagrams of Societies' Inclusions and Exclusions, 1975; from Friedman, *Towards a Scientific Architecture*, 148.



## CHAPTER 6: ARCHITECTURAL DESIGN

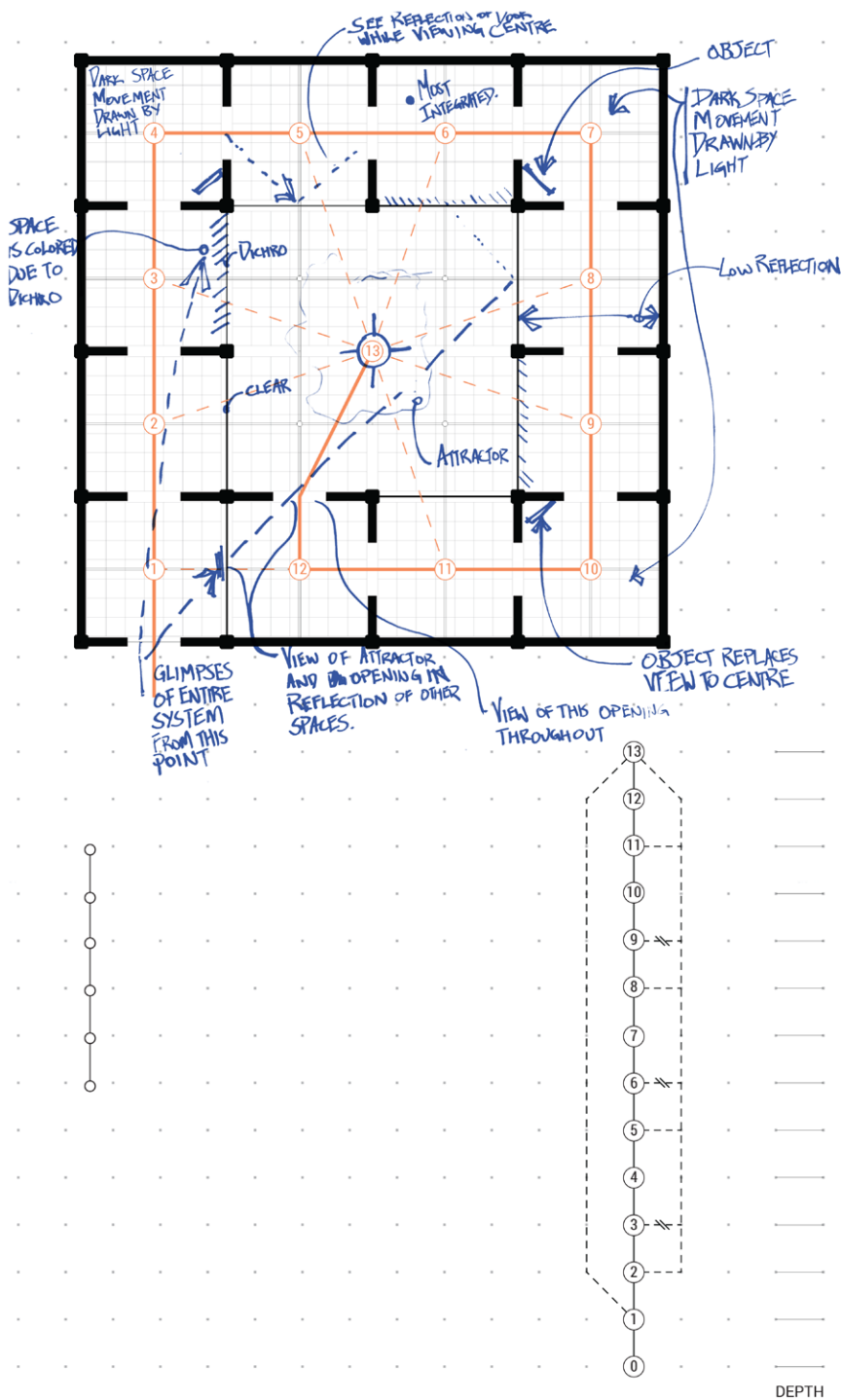
The architectural design is a series of site-less, scale-less, and semi-program-less, spatializations of syntactical configurations. The method of design is: first, instances of societal diagrams interpreted to syntactical diagrams, and second, those syntactical diagrams are designed as spatial configurations. This is accomplished through the use of the infrastructural grid and the framework parts described previously.

Each diagram is implemented then analyzed and notated as to what the implications of the design. The objective is to test how societal power structures may develop as spatial configurations and how such spaces generate different effects.

### **Society to Syntax to Plan Configuration**

#### ***Axial - Central Focus***

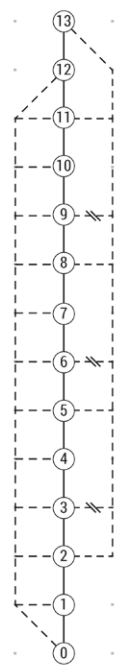
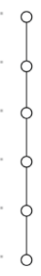
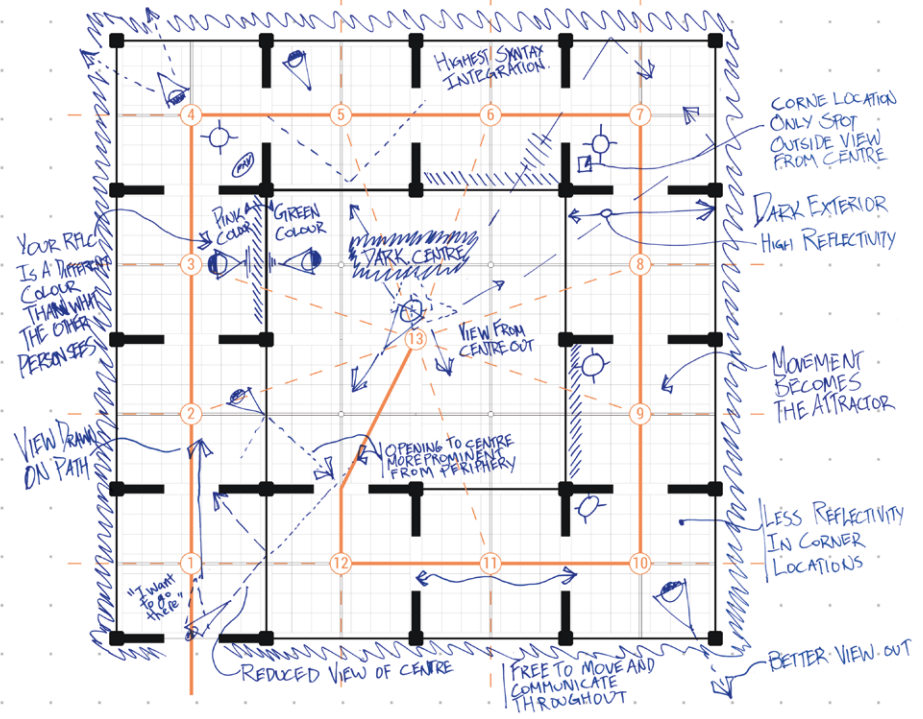
Through the use of denial and visual cues (attractors), the central space of this configuration becomes the focal point. While circulating to it the inhabitant's relationship with that space changes. When entering the network the user is given a view of the centre through the one opening they must use to enter. That view remains throughout the path although it changes depending on the mediated glass connections. Upon entering a new space the view is of the attractor in the centre but also a reflection of the opening to the next space.



Axial Central Focus Plan, with Extreme Hierarchy Society Diagram and Syntactical Depth Map.

***Axial - External Focus***

Utilizing glazed panels on the exterior of the path, the network is changed to focus on those traveling along the path. This is most reminiscent of the Muller House from Loos wherein certain spaces provide the activity and 'theatre' for other spaces to observe. Instances of altered glass change the relationship to the central space while moving along the path. The changing of light conditions creates a zone of high reflectivity within the periphery spaces. As one enters a space, when looking towards the centre they are presented with a reflection of the entry to the next space in the system. The network highlights the movement through the periphery rather than what was the central attractor.



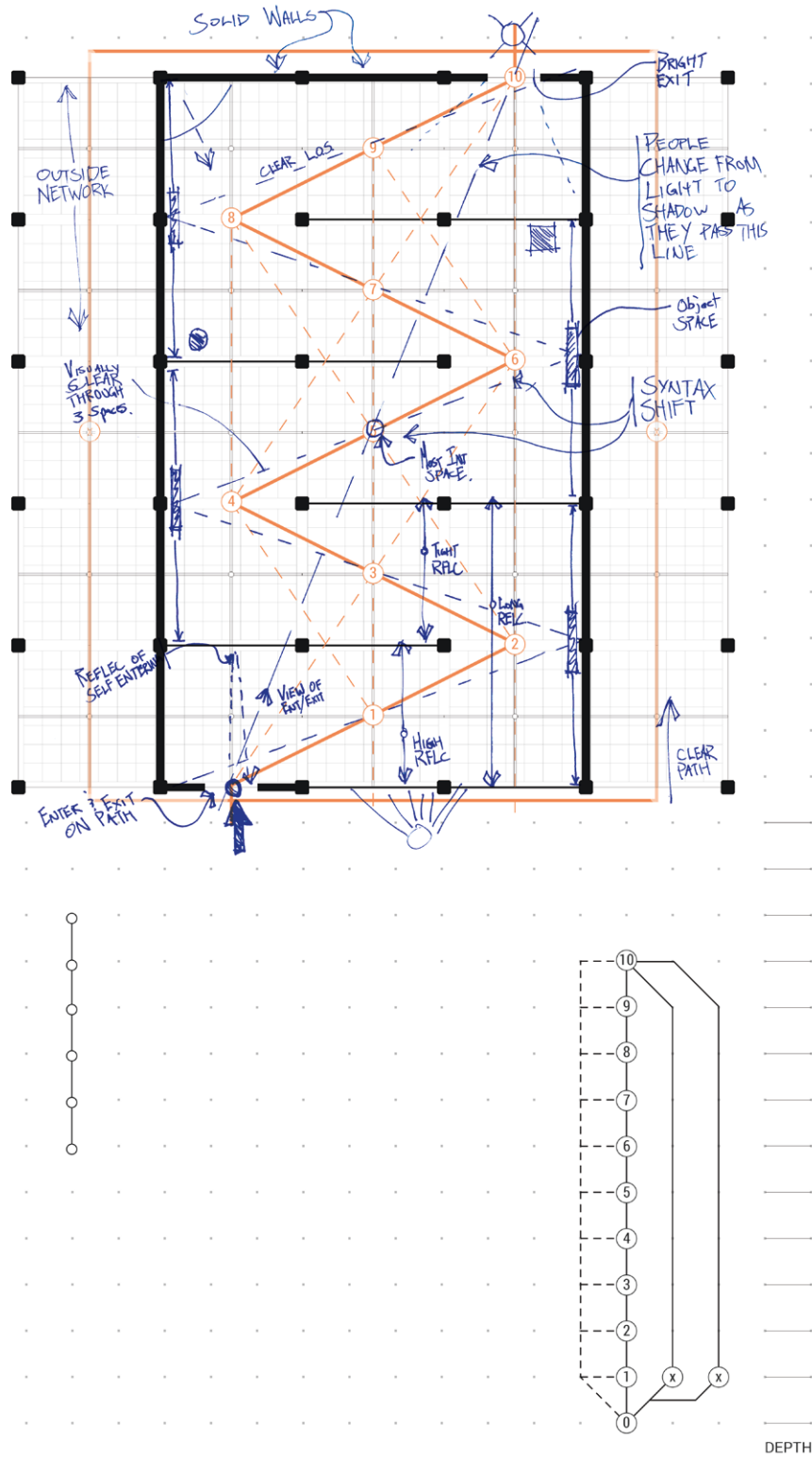
DEPTH

Axial External Focus Plan, with Extreme Hierarchy Society Diagram and Syntactical Depth Map.

***Axial - Axial Focus***

The typical syntax positions shift as a result of the open space and axial connections. This network is an axial orientation with the end obscured by the multiplication of glass and light.

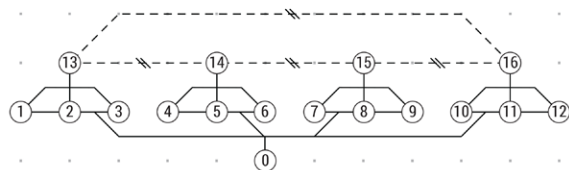
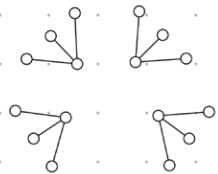
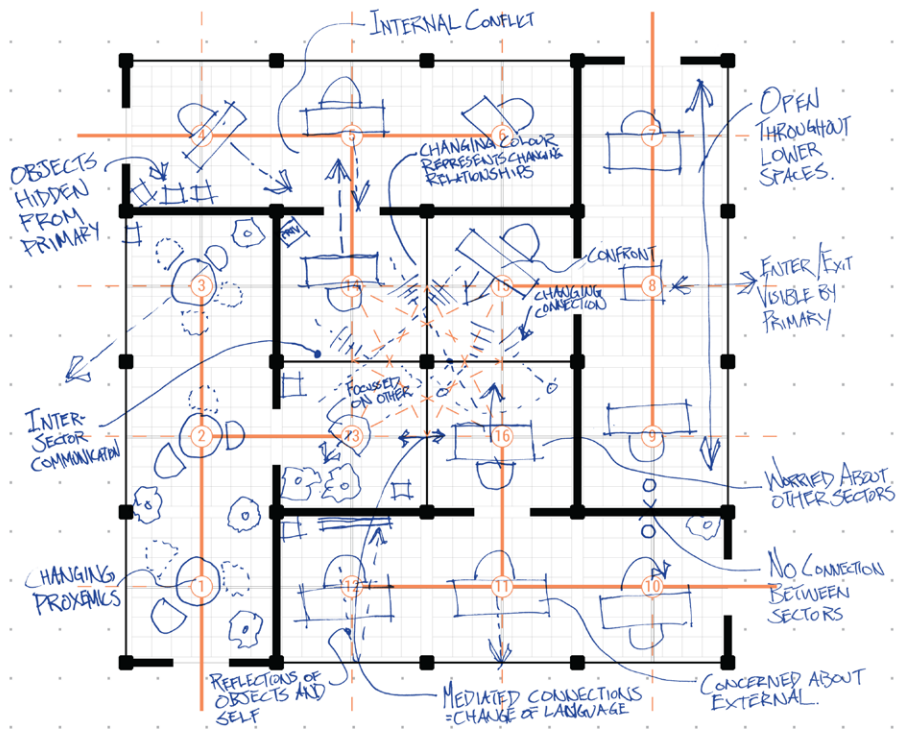
Additive reflections when within the system put the user in multiple spaces but only from their own perspective. The lighting differs depending on the inhabitants orientation. The end of the network generates movement through the single opening at the end.



Axial Axial Focus Plan, with Extreme Hierarchy Society Diagram and Syntactical Depth Map

***Hierarchical - Internal Segmentation***

Akin to a tribal system, periphery users only connect through a single hierarchical space. The branches are connected but mediated through a glass that alters the perception of other sectors. This symbolizes the changing nature of relationships in competitive structures. One instance may be viewed as cooperation and change to confrontational. The periphery spaces are fully open (different to other networks as the internal hierarchy is seen as established and unchanging).



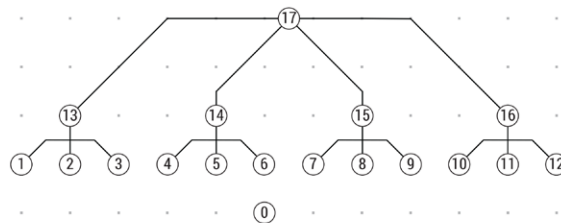
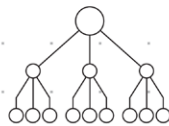
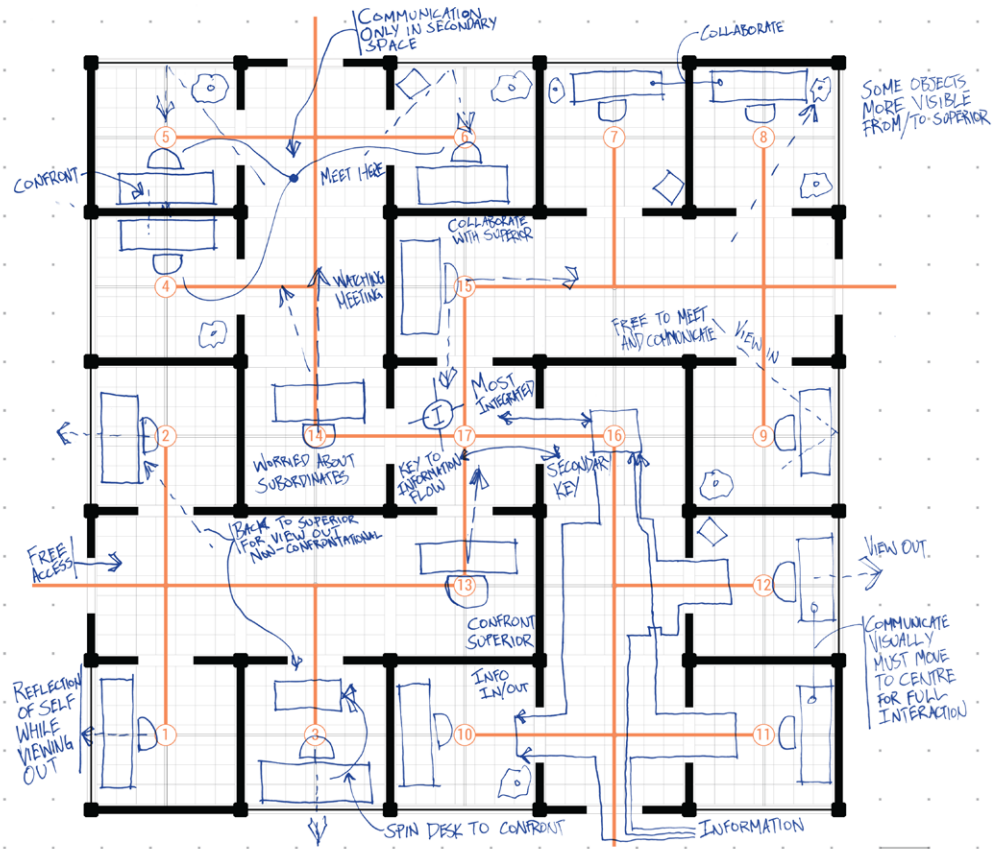
DEPTH

Hierarchical - Internal Segmentation with Anarchic Feudal/Tribal Diagram and Syntactical Depth Map.



***Hierarchical - Compartmentalized***

Counter-intuitive to a typical hierarchical plan, this network focuses on hierarchy of integration. Integration between branches relies on specific spaces to remain open. Thus, those spaces develop more power as a result of occupying that connection point. Information and movement flows depend on the primary and secondary spaces to transmit any signals across the network.

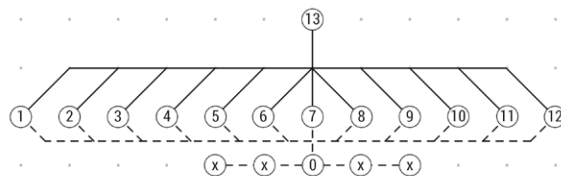
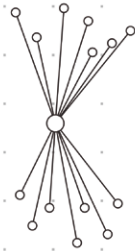
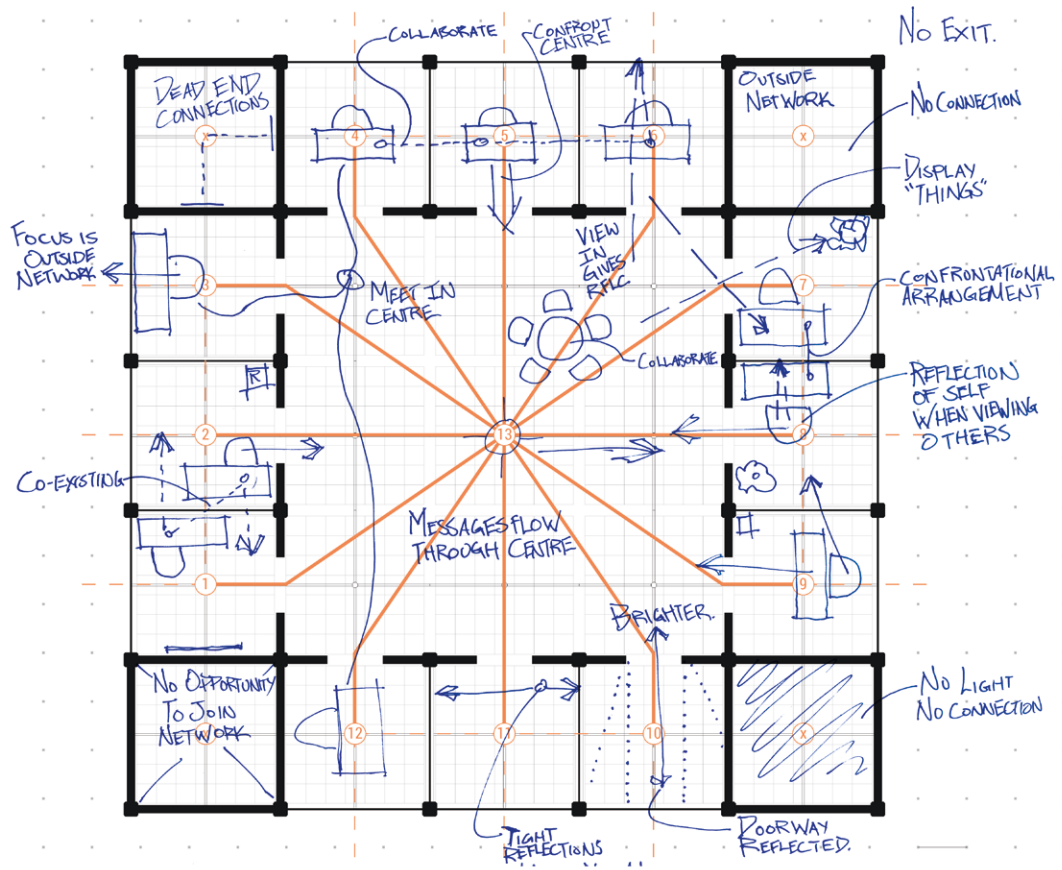


DEPTH

Hierarchical - Compartmentalized with Hierarchical Diagram and Syntactical Depth Map.

***Centralized - Partial Exclusion***

The functioning of this configuration is highly dependent on access to the central area. Likened to a state governance, users may enter or exit the centre freely and the patterns of observation vary depending on centre or periphery location. The inhabitants in the centre are put on display, while those on the periphery only appear as shadows to those in the centre. Those outside the network (the corners) are completely cut off from accessing those within it.

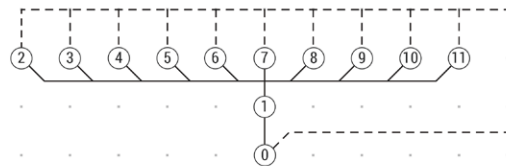
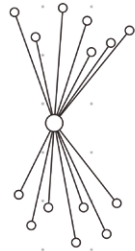
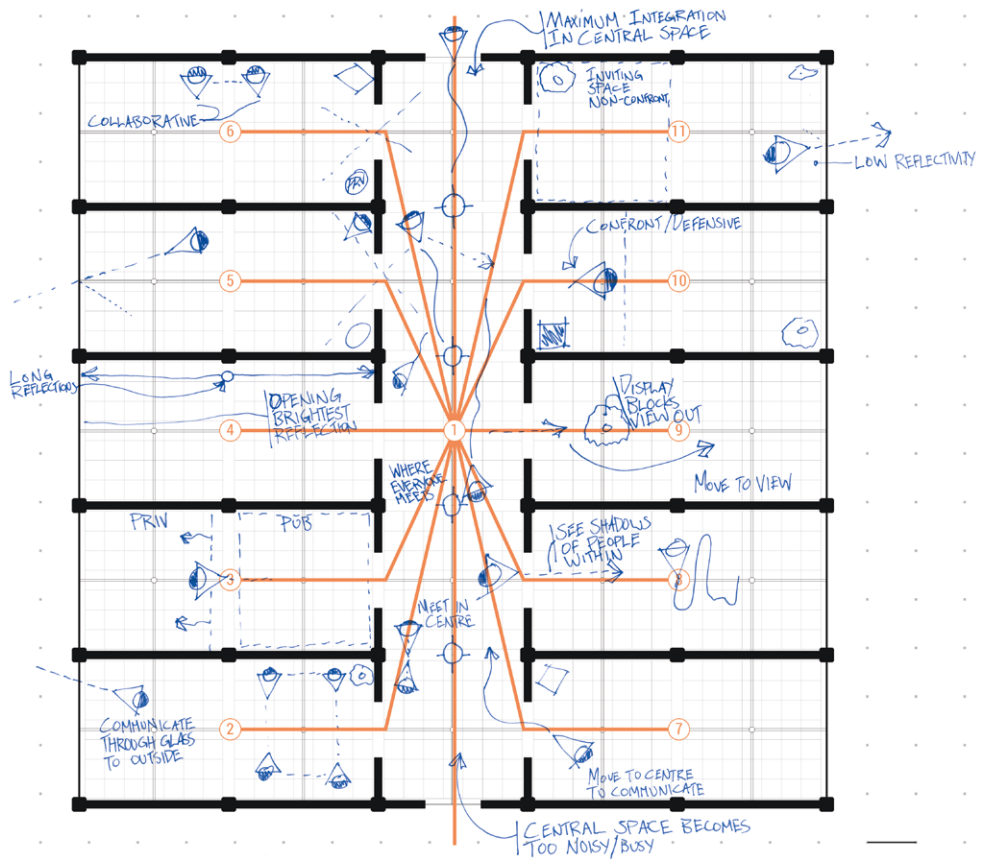


DEPTH

Hierarchical - Connected with Hierarchical Diagram and Syntactical Depth Map.

***Centralized - Connected***

A network wherein inhabitants are connected through a central space. This configuration affords privacy but also disconnectedness and relies on the central space for connection to other networks. If the central space becomes over-utilized then inhabitants retreat to the periphery spaces for privacy. This is indicative of a typical network of power, that users will gravitate to the centre where the high level of integration is an attractor. However, it then becomes highly vulnerable to disruption. Although users may choose to not enter the centre, they must in fact do so to enter or exit any other space as well as the entirety of the network.



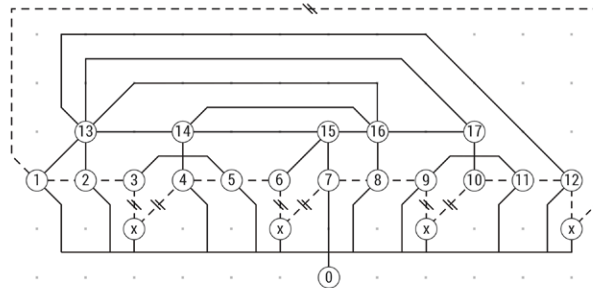
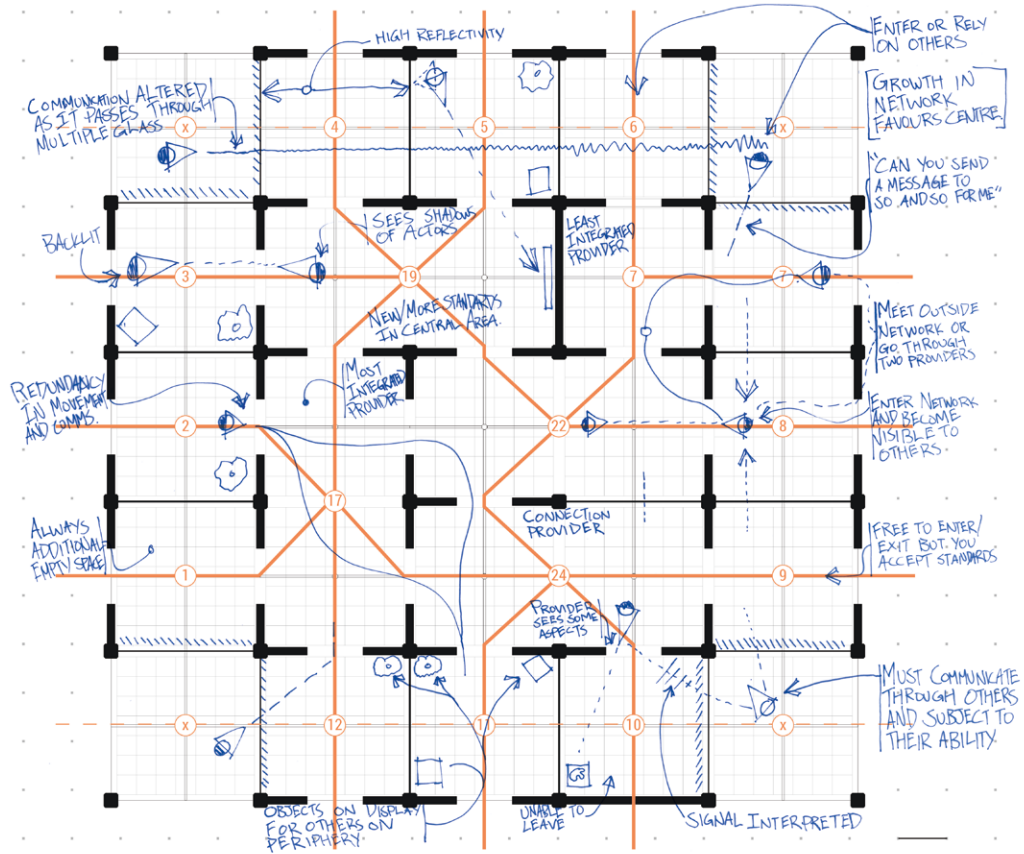
DEPTH

Centralized - Connected with Centralized Diagram and Syntactical Depth Map.

***Hierarchical - Non-internal Segmentation***

A partially distributed network wherein periphery users may connect but only through a series of central users. There are multiple options for paths of connection but the interior users are dependant on the central spaces. 'Providers' control who and how people move and communicate from the periphery. Further out are those who choose not to join the network but they can communicate through other uses through mediated conditions— altered glass. This would be the equivalent to someone who refuses to use a service, for example email, but would ask others who are part of the network of email to send a message for them. This communication and connection is thus subject to interpretation.

This is the type of network that Grewal suggest the networked society currently resembles. A somewhat decentralized yet still somewhat hierarchical configuration. Specifically, this configuration is related to a social network.



DEPTH

Hierarchical - Non-internal Segmentation with Social Network Diagram and Syntactical Depth Map.

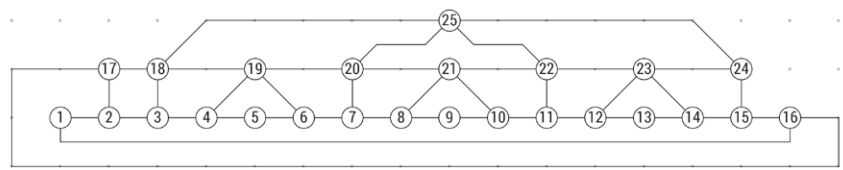
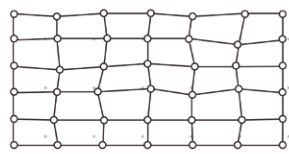
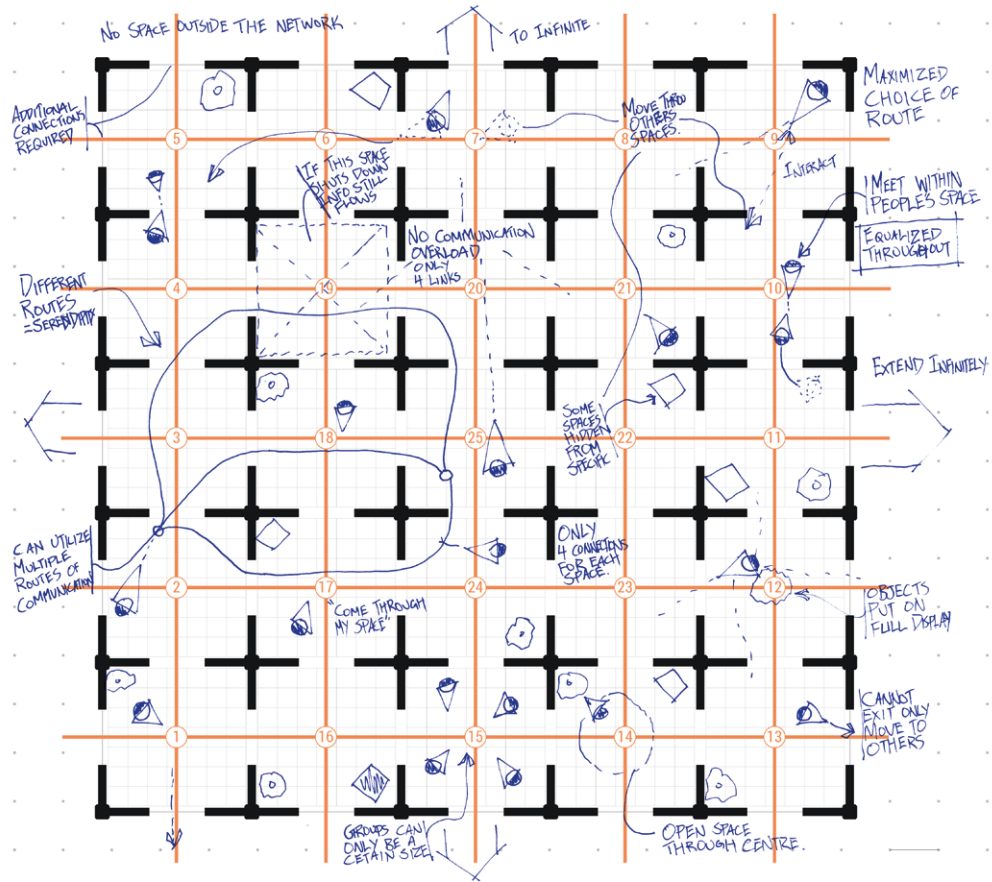


***Distributed - Lattice***

Equal spatially and not dependent on specific locations for communication. If spaces become disconnected, movement and communication will continue through additional channels—at its core this is redundancy. Limiting the number of connections to any one space also prevents overload.

Given the equal number of connections of each space, the level of choice of path selection through the system is ideal.

One issue to consider is, this configuration can only be fully equal in integration and distribution if the lattice is infinite. This is because the spaces at the edges would have less connections than those fully within the network

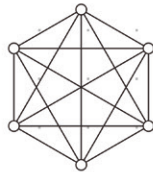
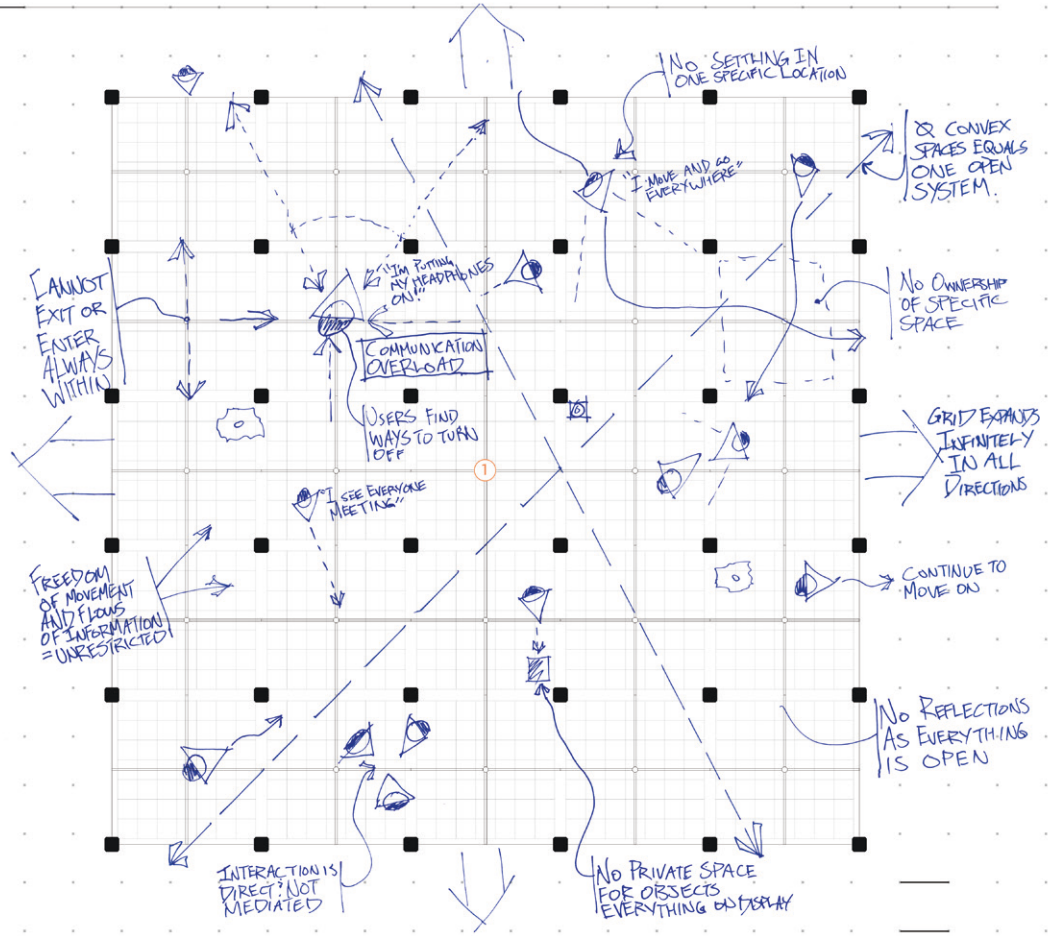


DEPTH

Distributed - Lattice with Distributed Network Diagram and Syntactical Depth Map.

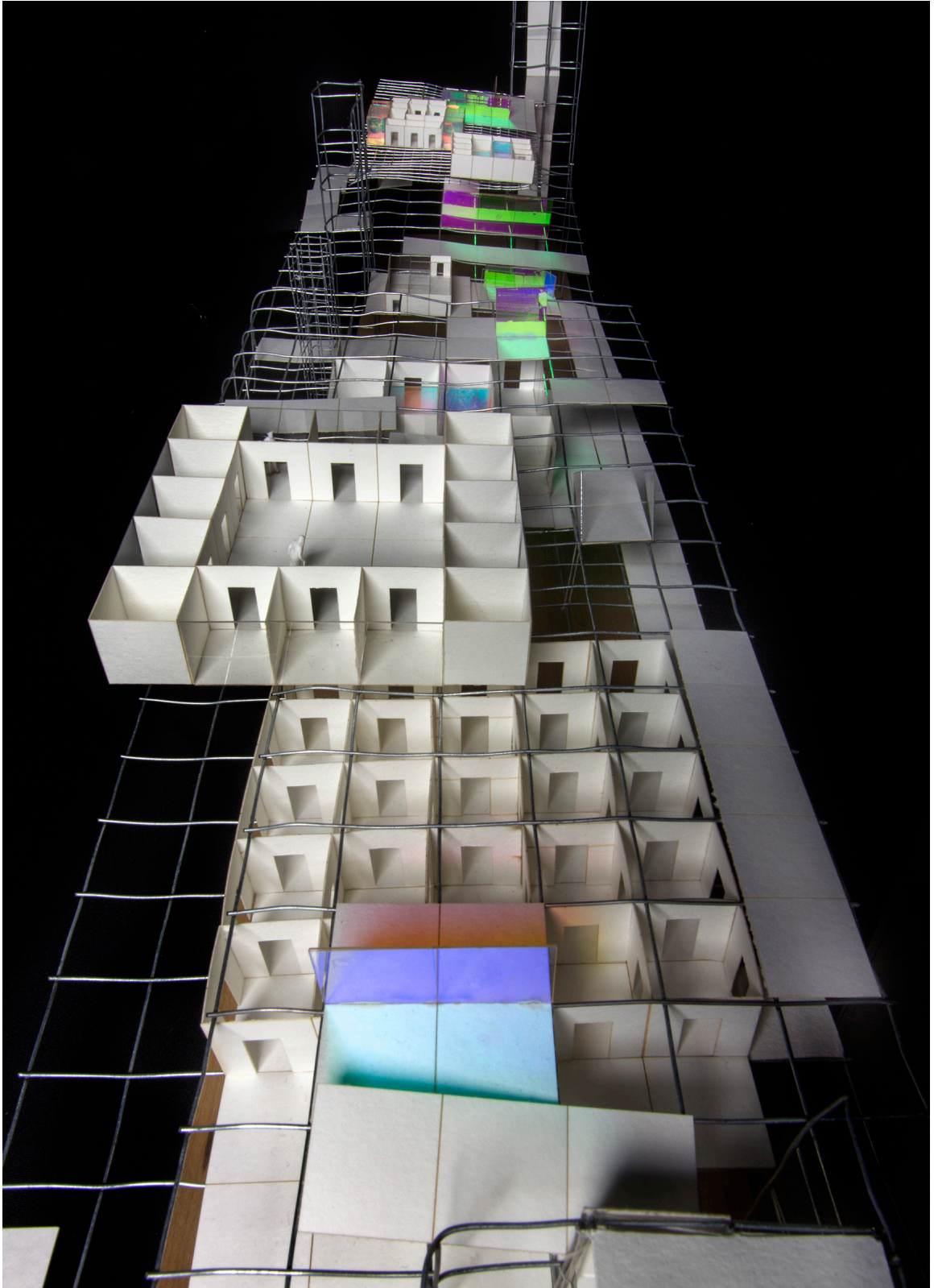
***Decentralized - Open***

An open system where every user moves and communicates freely through all spaces. No space can be disconnected nor explicitly controlled by any one user. Inhabitants embrace nomadism as they cannot 'own' any specific location. No boundaries results in overloads of communication and movement. For the network to be completely equal in distribution and integration it must be infinite and have no specific points of power.

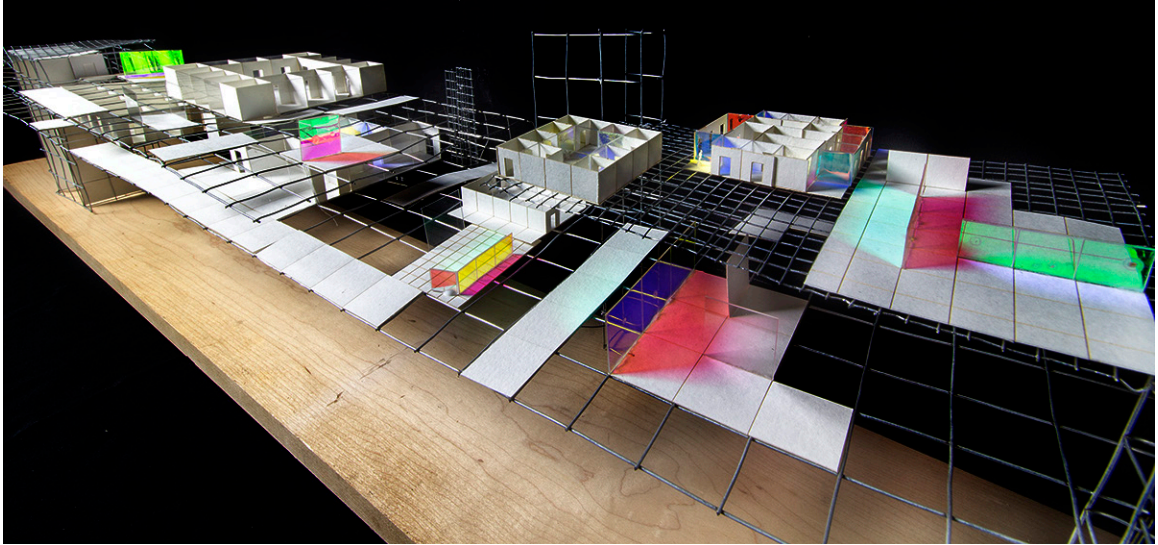


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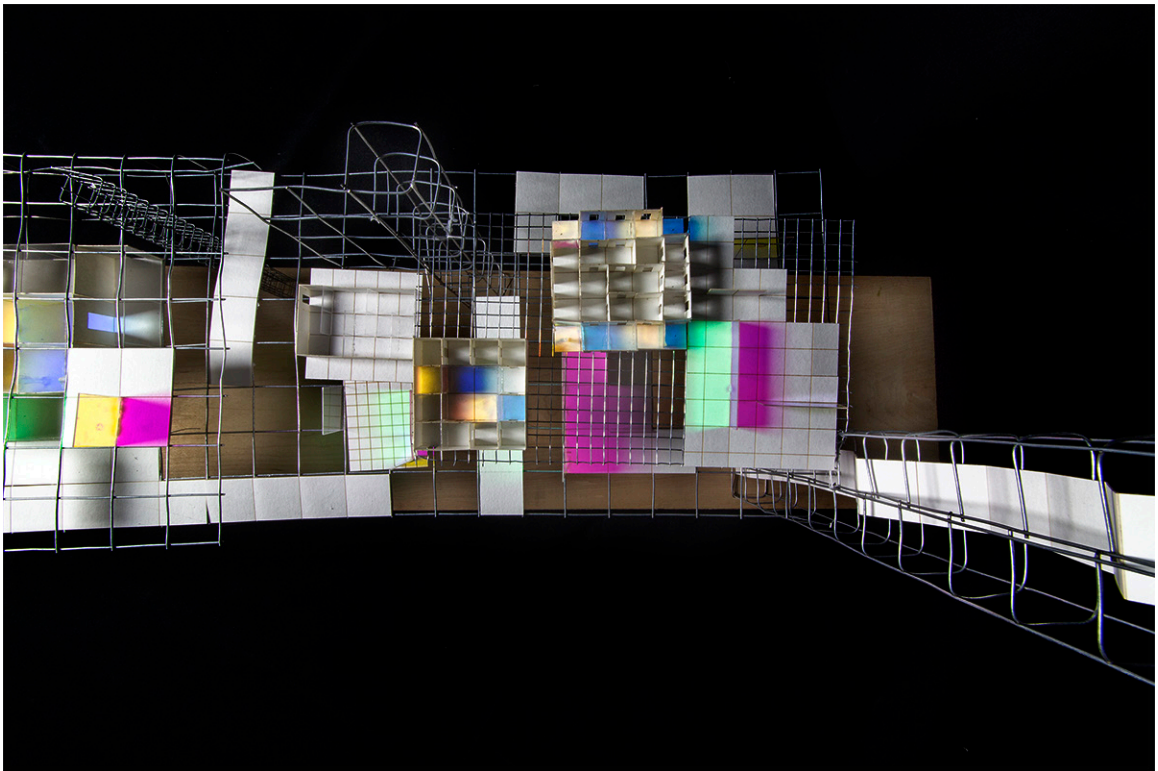
Decentralized - Open with Polis Diagram and Syntactical Depth Map.



Conceptual model of showcasing framework or parts.



Conceptual model , lighting and colour differences of spaces.

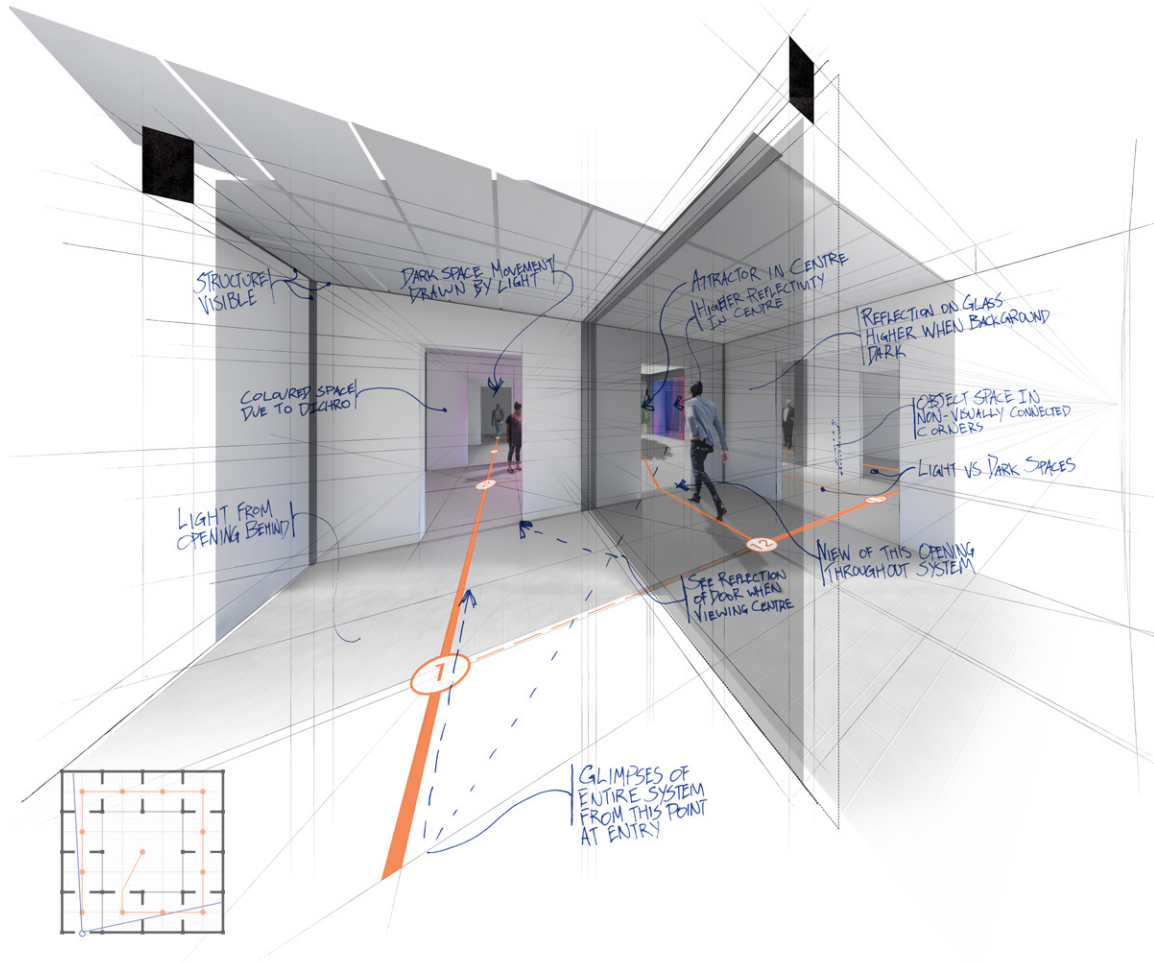


Conceptual model of configuration differences.

## **Inhabitation of the Framework**

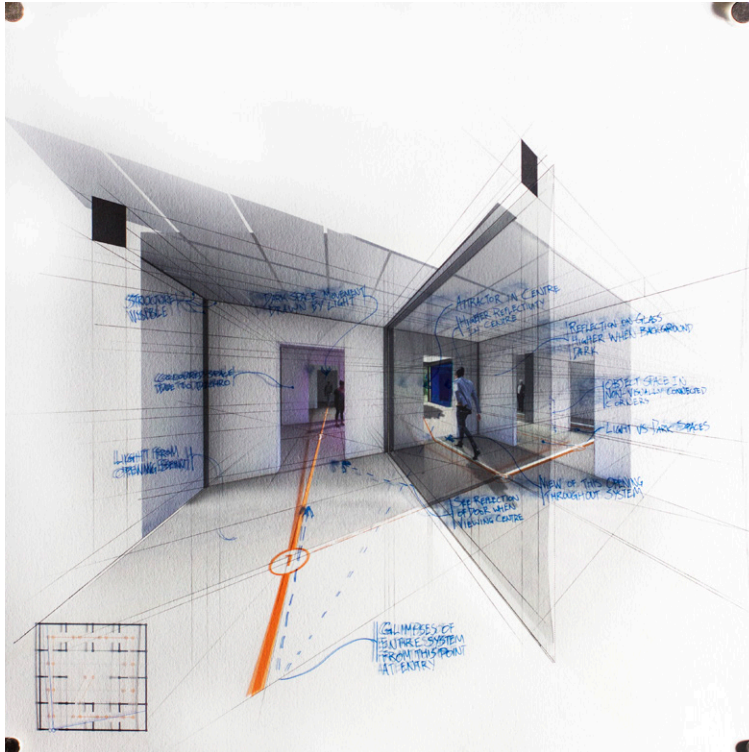
The following pages spatialize different configurations and display the conditions which depend on specific position within the network of spaces. The primary images include overlaid text to describe situations within the network and a syntactical map to locate the viewpoint within the space.

The accompanying pages are photographs of physical collages that display the difference in spatial conditions as a result of movement through the network. Of specific interest are the reflectivities and controlled appearance of people depending on angles of approach to the mediated-altered conditions. In some cases the network spatial experience does not change. In others some people are not visible until certain thresholds are passed.

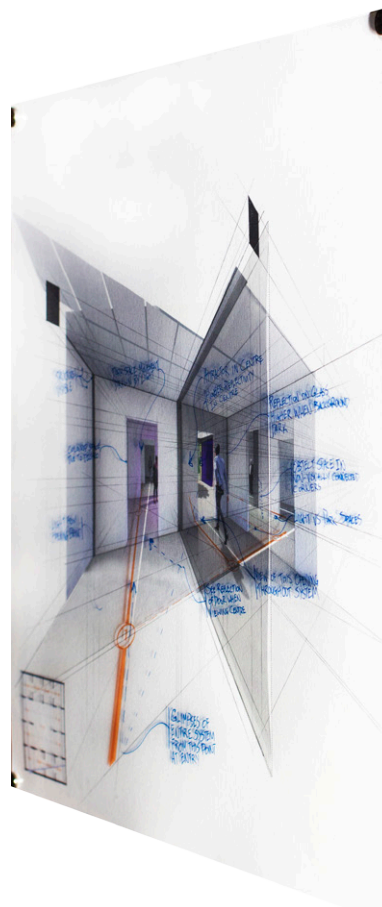


Axial Central Focus perspective, syntax point 1.

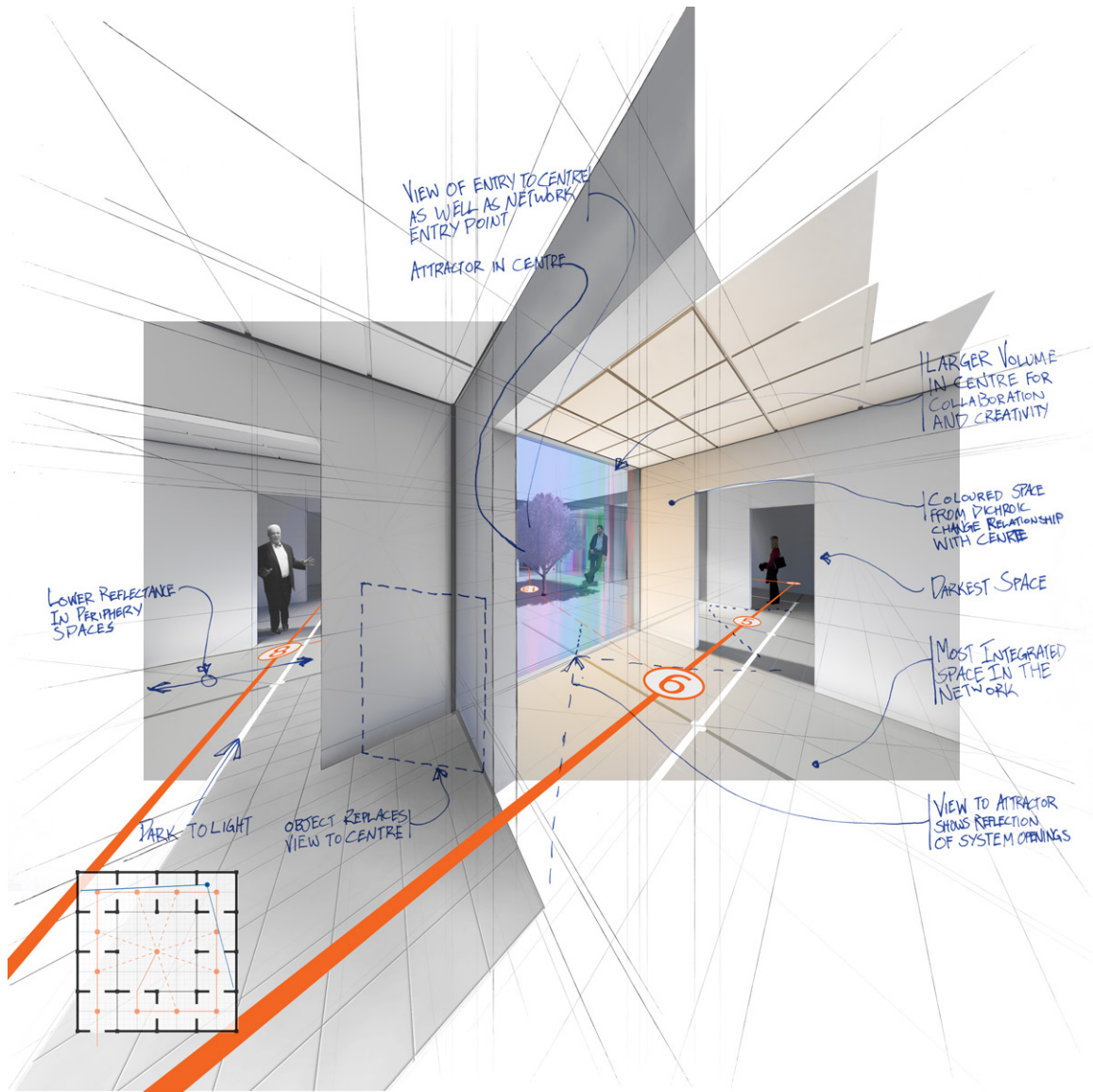




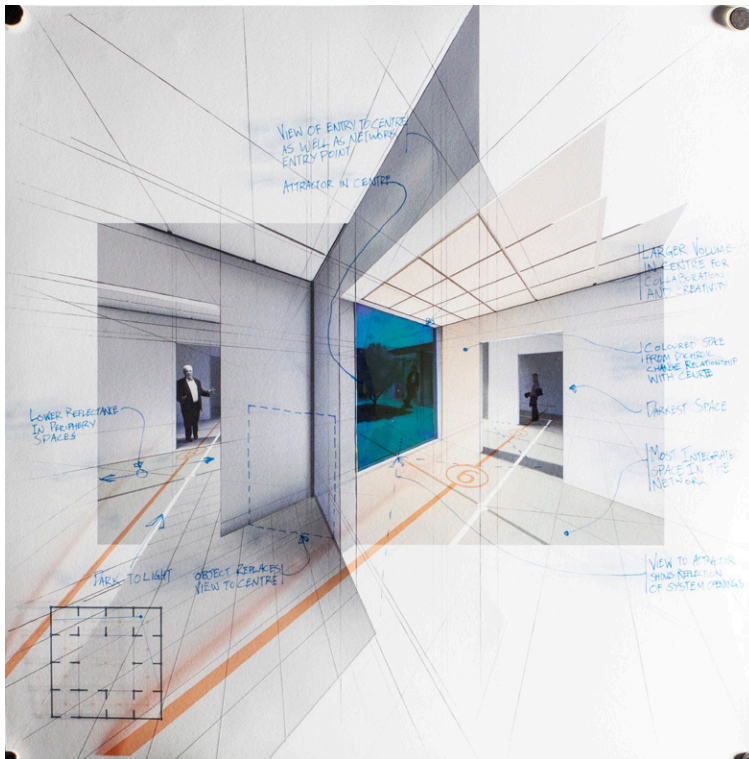
Photograph of layered representation, angle 1.



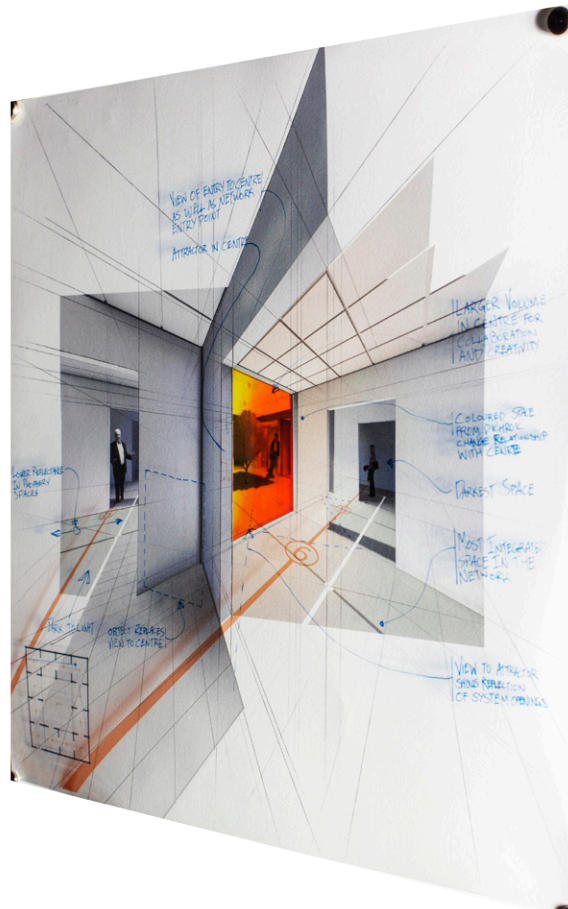
Photograph of layered representation, angle 2.



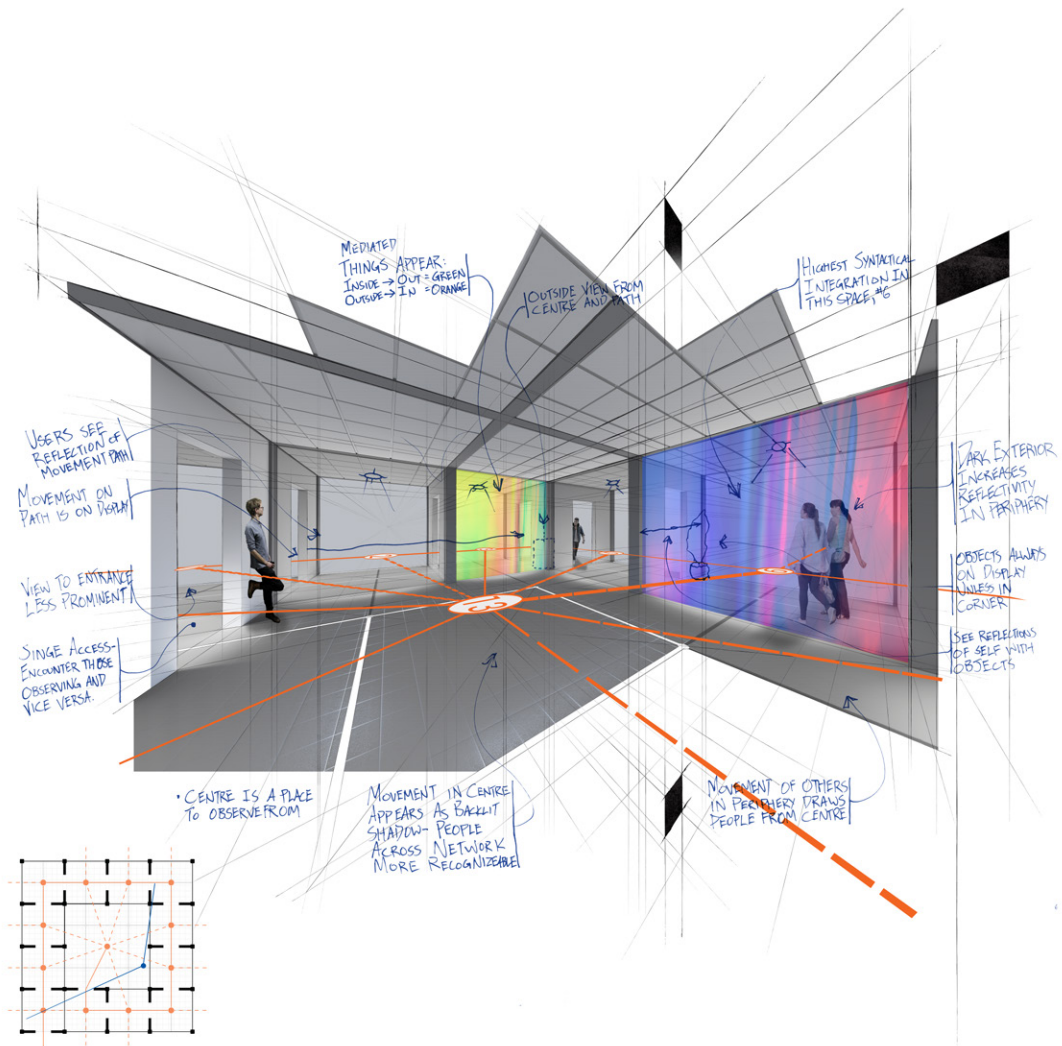
Axial Central Focus perspective, syntax point 7.



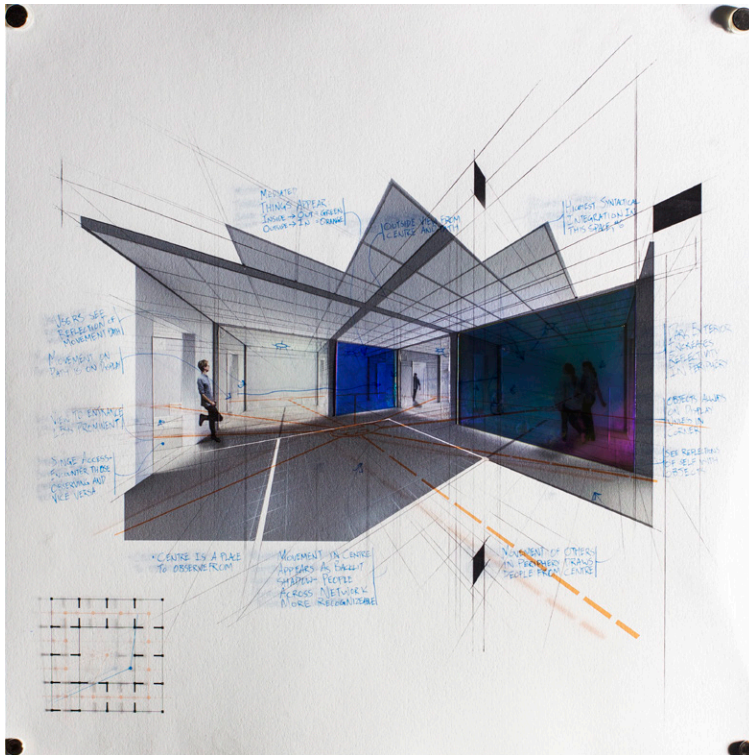
Photograph of layered representation, angle 1.



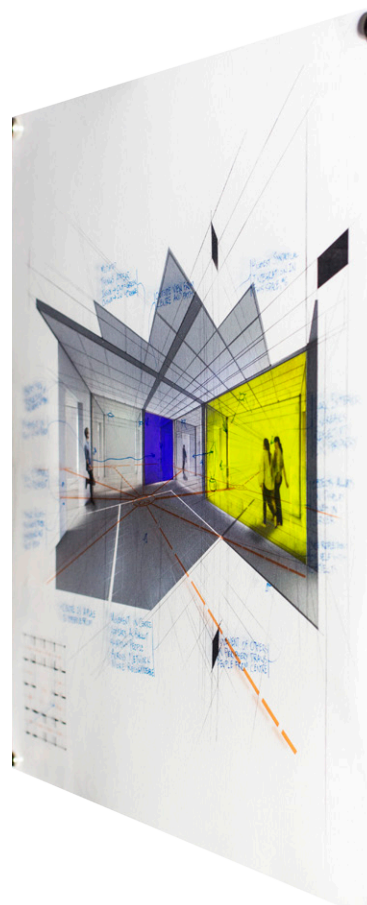
Photograph of layered representation, angle 2.



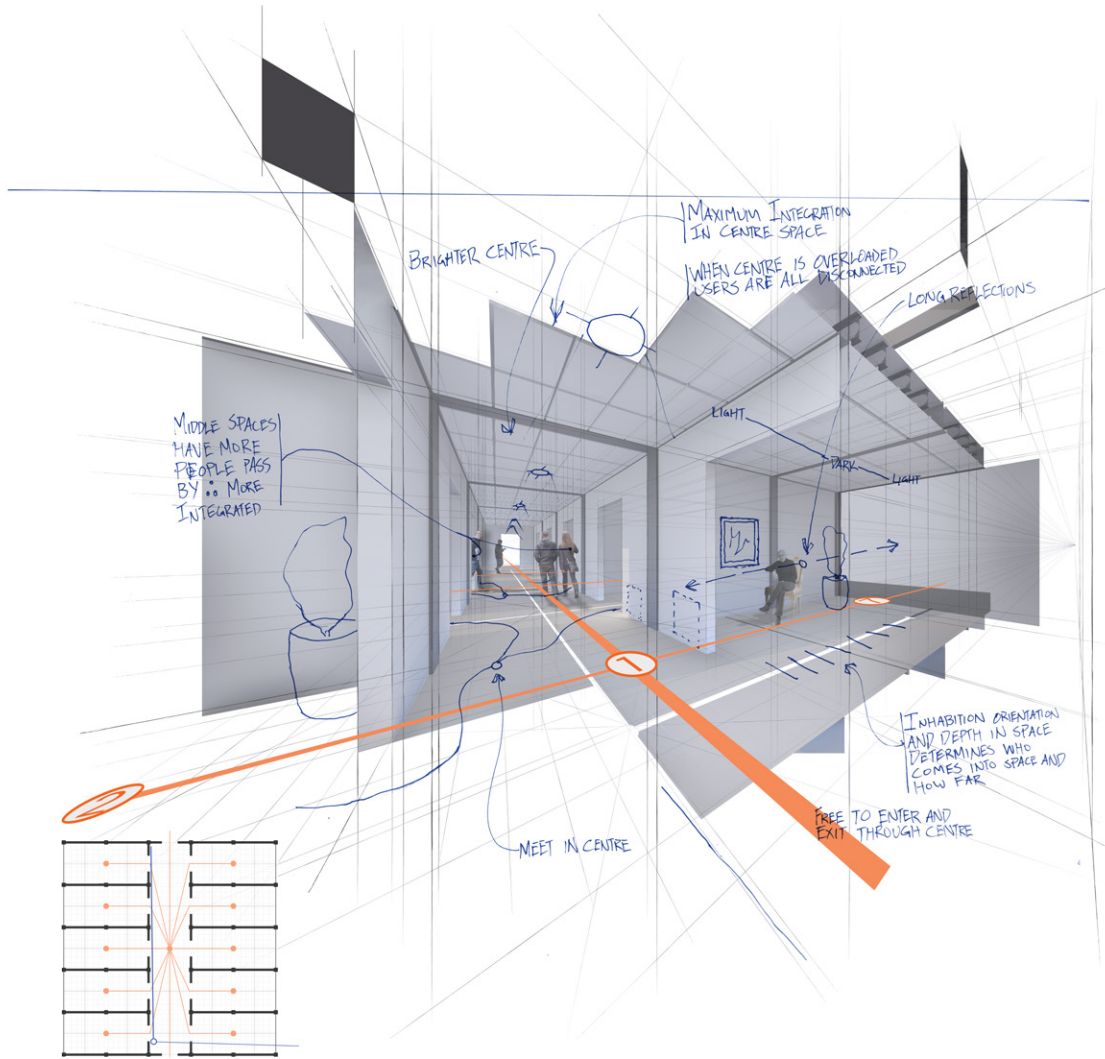
Axial External Focus Plan perspective, syntax point 13.



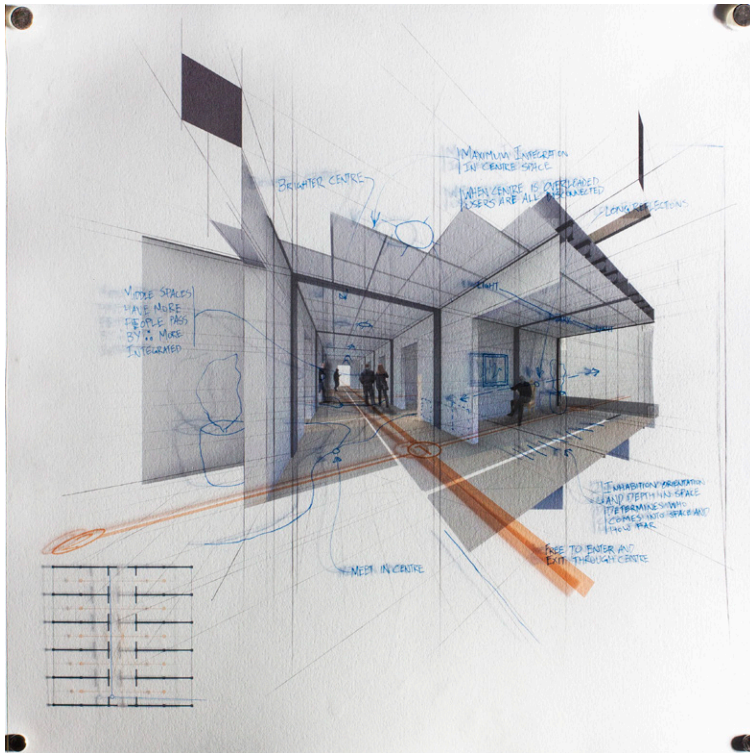
Photograph of layered representation, angle 1.



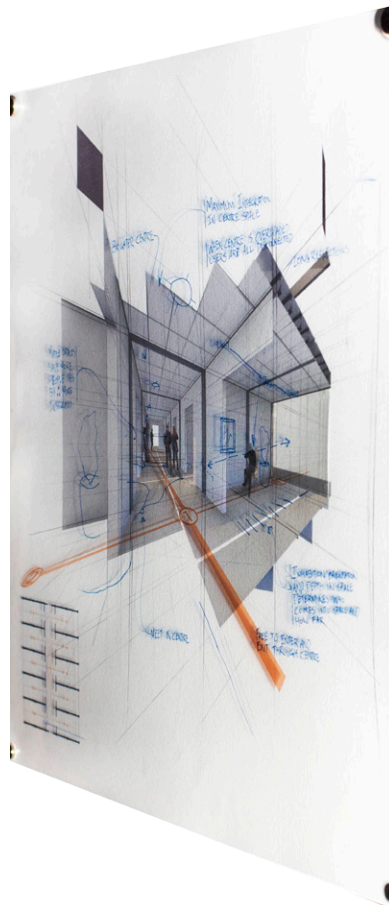
Photograph of layered representation, angle 2.



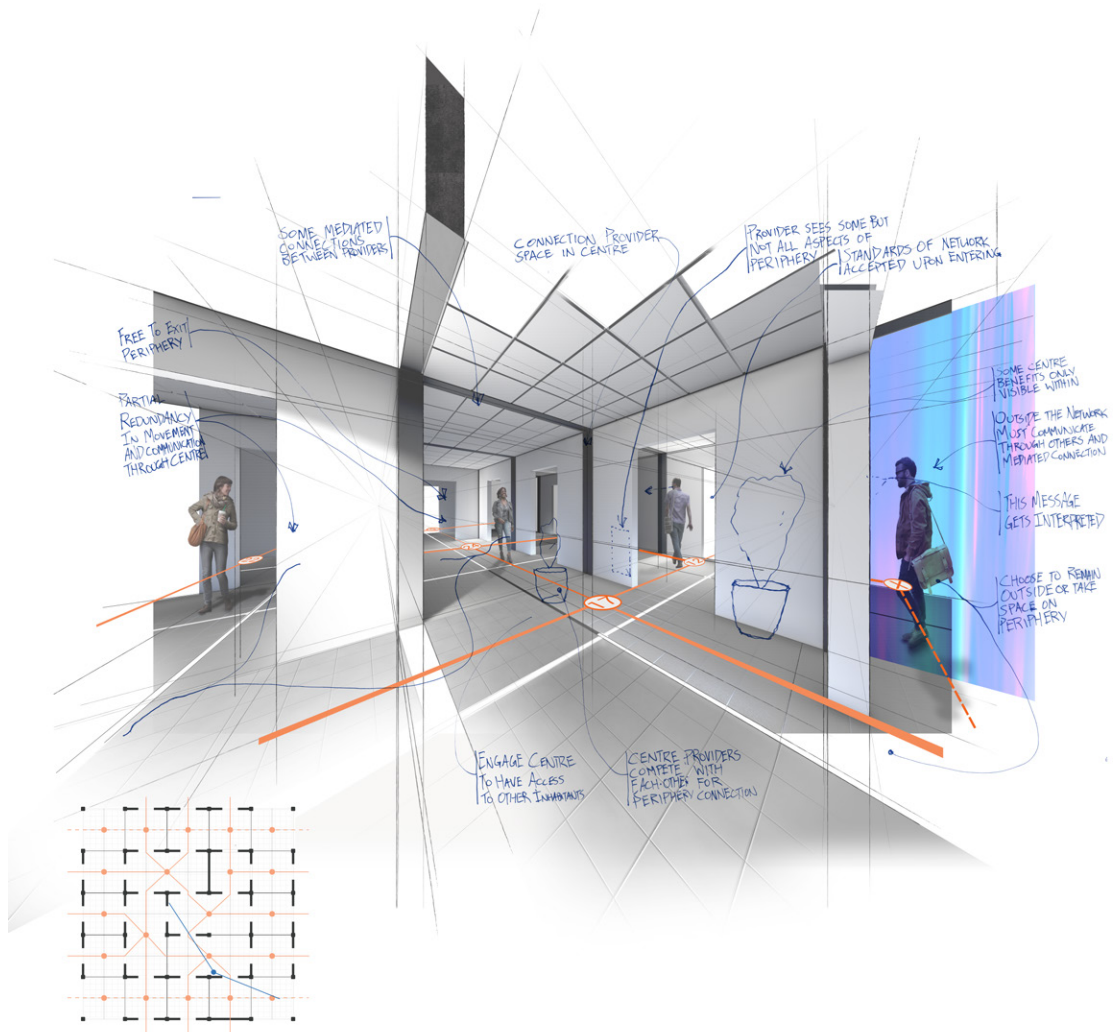
Centralized Connected perspective, syntax point 1.



Photograph of layered representation, angle 1.

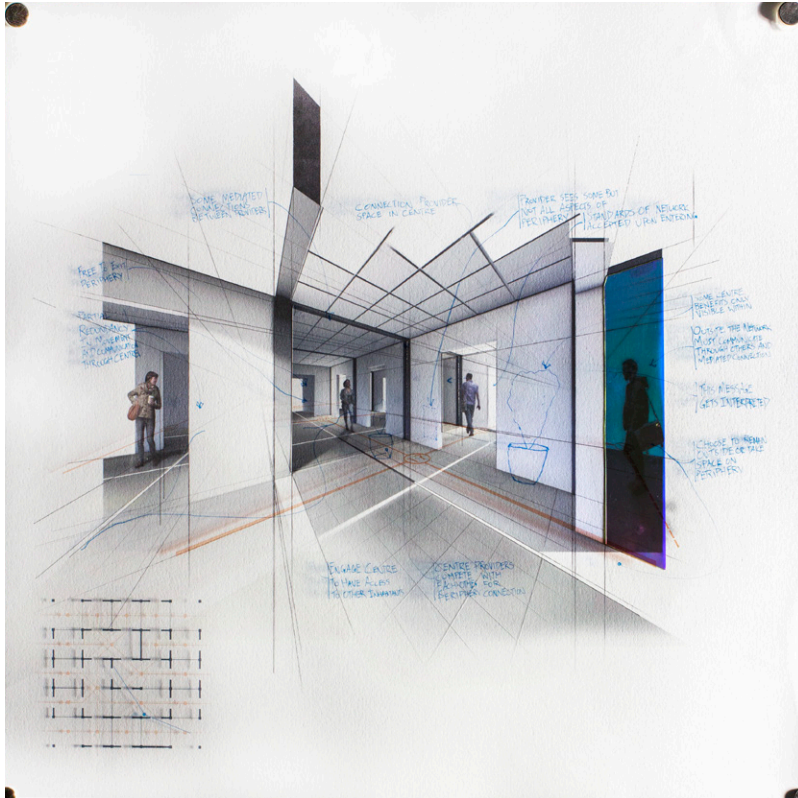


Photograph of layered representation, angle 2.

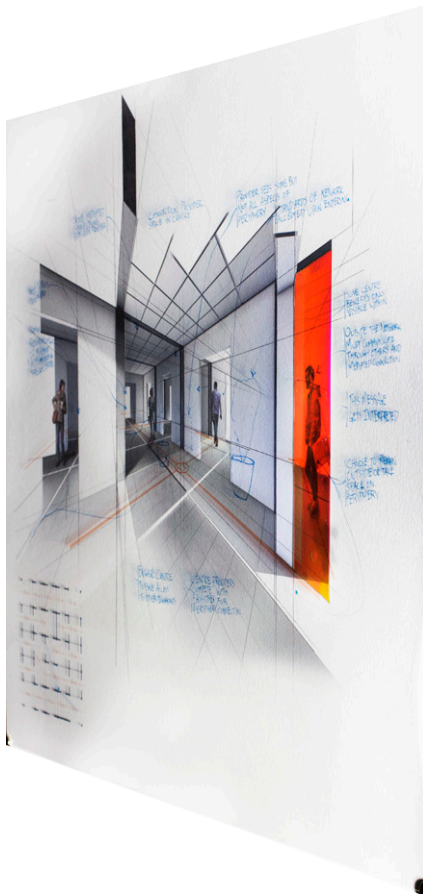


Hierarchical - Non-internal Segmentation perspective, syntax point 17.

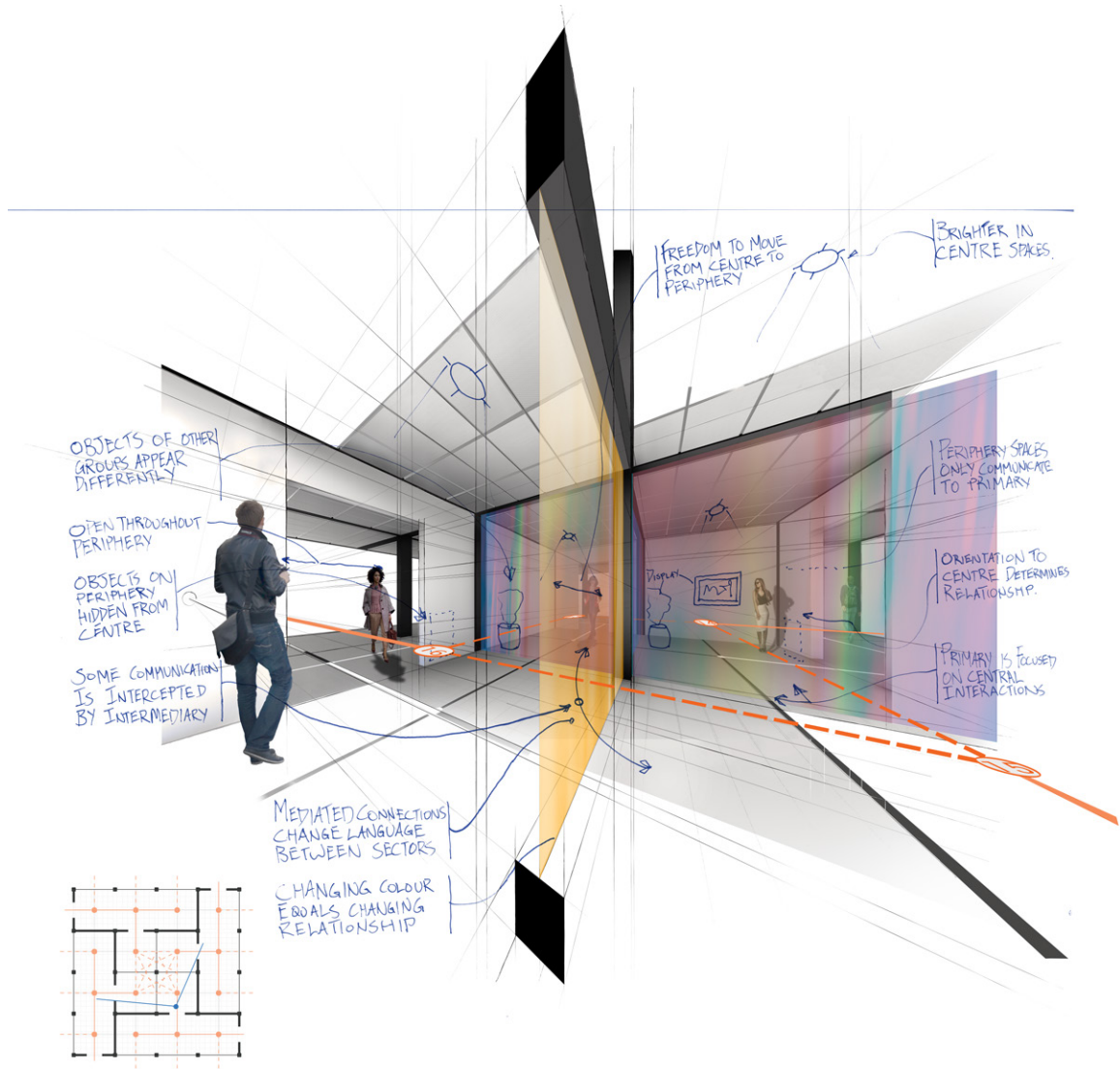




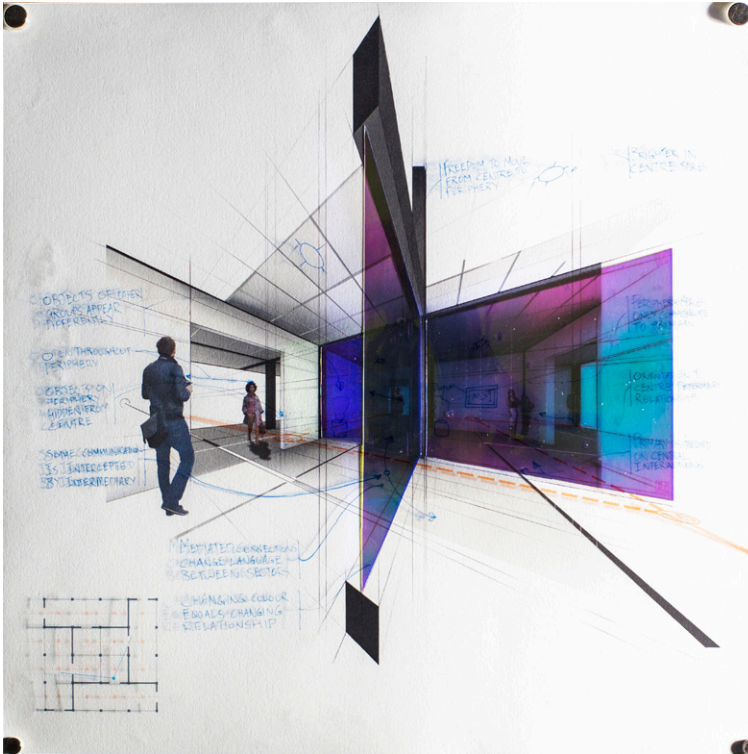
Photograph of layered representation, angle 1.



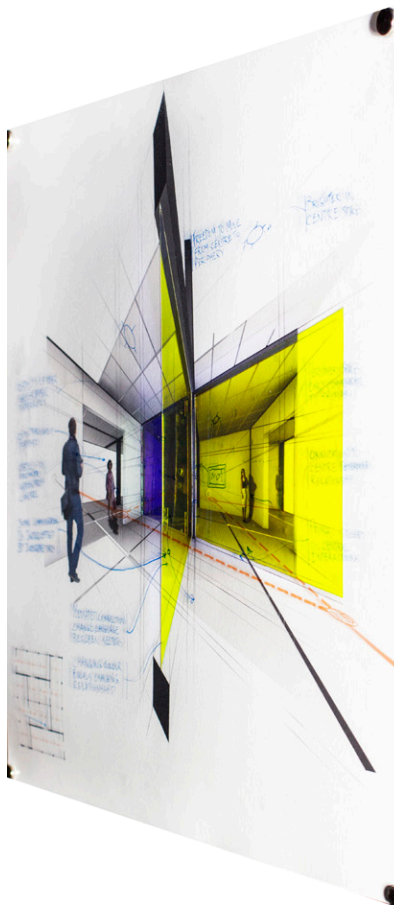
Photograph of layered representation, angle 2.



Hierarchical - Internal Segmentation perspective, syntax point 15.



Photograph of layered representation, angle 1.



Photograph of layered representation, angle 2.

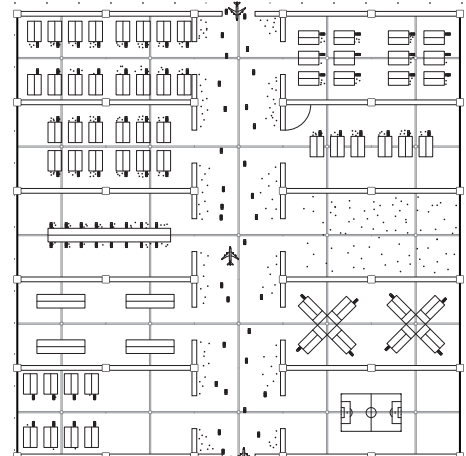
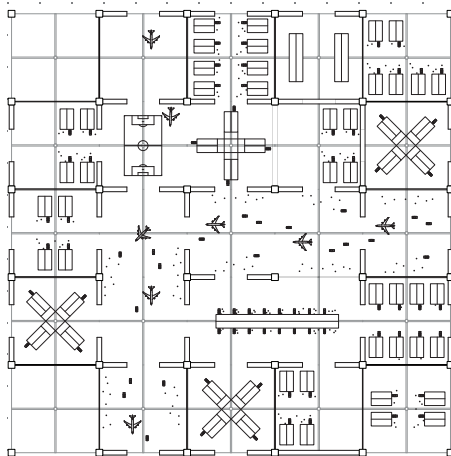
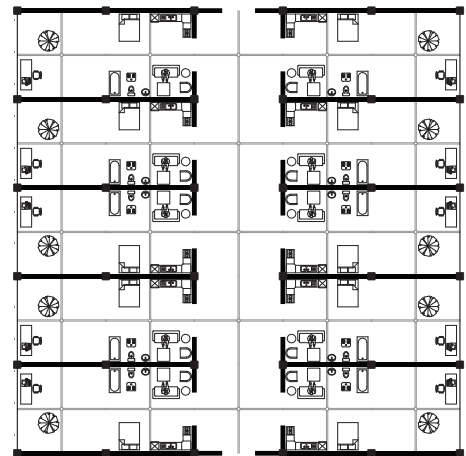
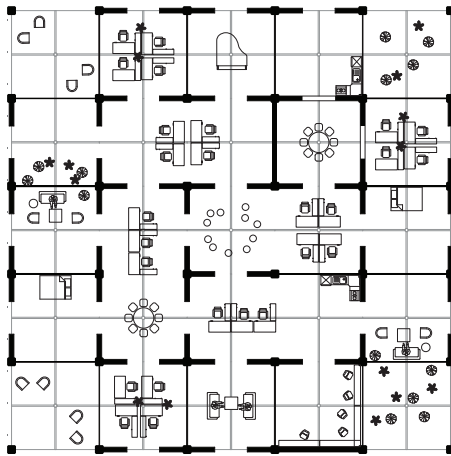
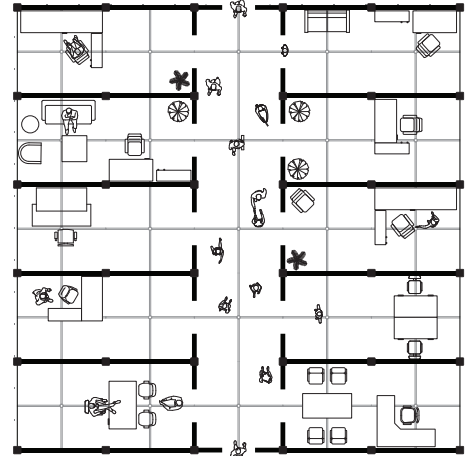
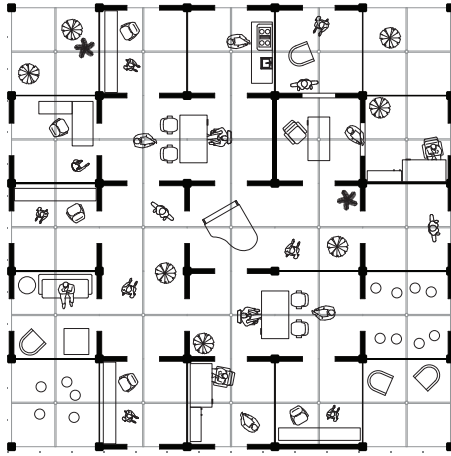
## Scalability of Networks

A further test of network configurations is to show the scalability of them. Individual spaces become larger rooms housing multiple people connected by hallways and further scale increases show neighbourhoods connected by streets. The spaces that connect the network become increasingly important—roadways, airports, and infrastructure.

The principles of the framework parts continue to apply. Certain spaces are connected and have a high likelihood of interaction. Others are less integrated and rely on intermediate spaces for connections to others across the network.

Perhaps it is easier to imagine the effects of network disruption at this scale. A shut down road or airport completely disconnects some people; a interruption to infrastructure such as electricity or fibre optics (data) is hugely impactful in today's society. There are two options to avoid such problems; first, disassociate from a network and its connections, or second, add redundancy to the configuration.

On smaller scales spatially there may not be the same impact, this relationship of scales helps to understand the power of spatial configurations. Some spaces inherently control the ability of others to connect to each other. The following image shows a series of scalar shifts of the same spatial configuration.



## **Reinterpreting Case Studies - An Application of Methodology**

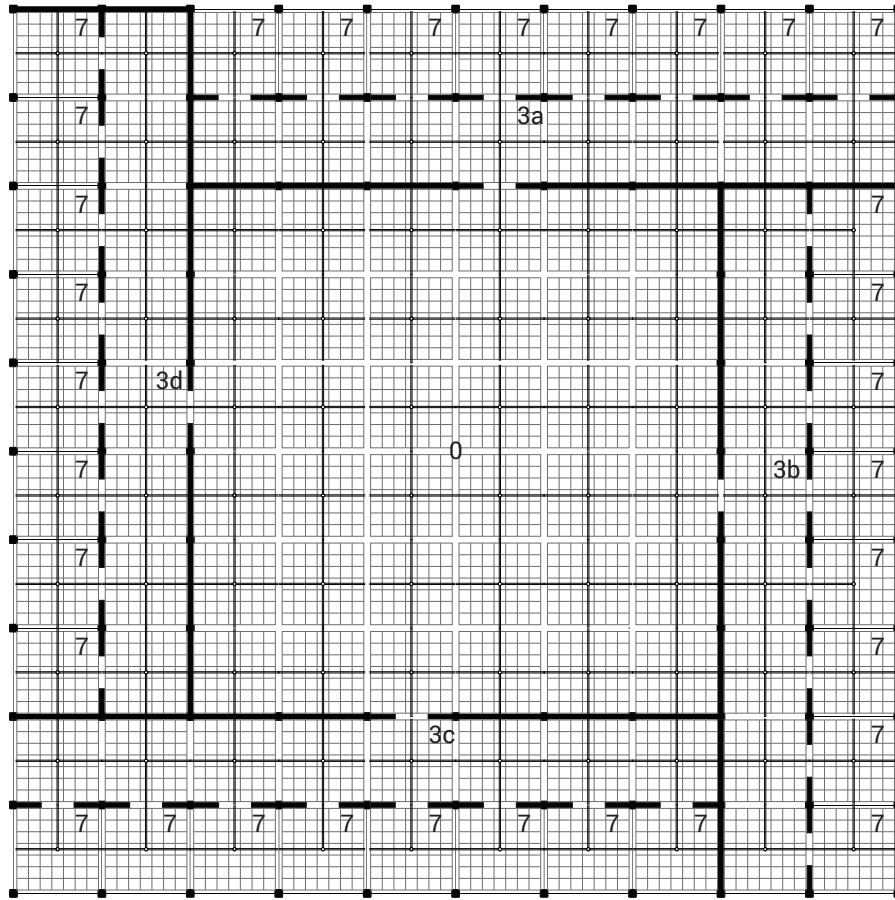
The implementation of the framework developed was based on abstraction of social and spatial relationships. The simplicity of the societal diagrams from Grewal allowed for the investigation of how societies may be interpreted as spatial configurations.

The company town typology provides much of the investigation as to the potential power in architecture. The analysis of the company town buildings originated as simply that, analysis. However, this thesis proposes a methodology of design that goes beyond the analysis. It seeks to reinterpret the diagrams of social constructs into spatial configurations. As such, the logical step is to re-visit the case study analyses to test how the syntactical diagrams may evolve into spatial constructs.

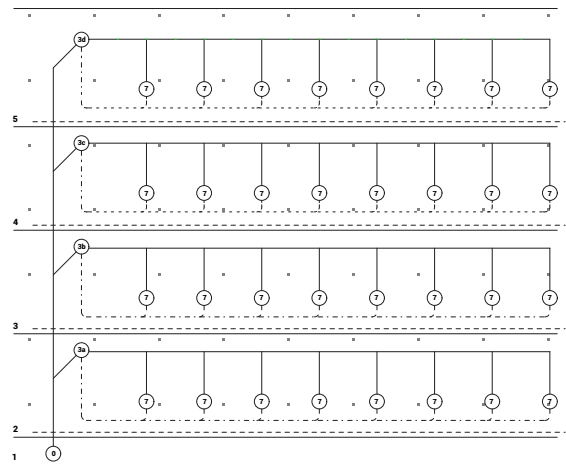
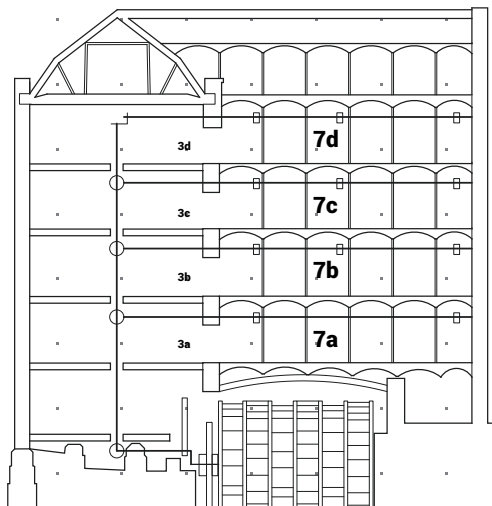
The following configurations take the case study syntax analysis and provide spatial configurations from the syntax depth maps.

### ***Lowell Syntax Spatialized***

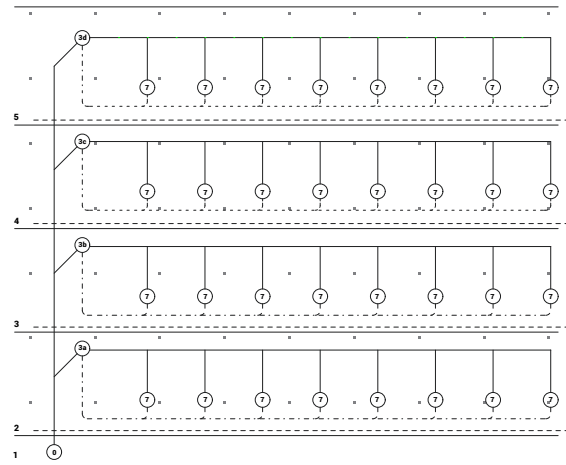
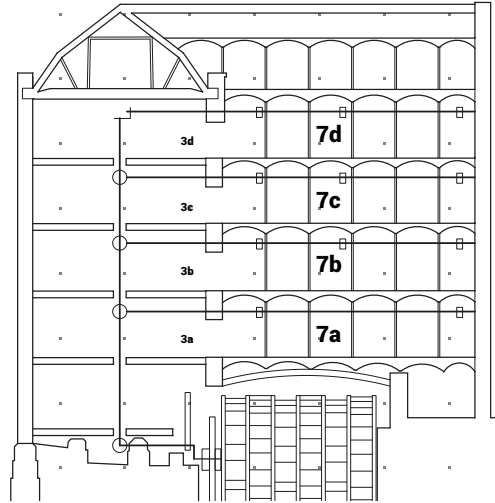
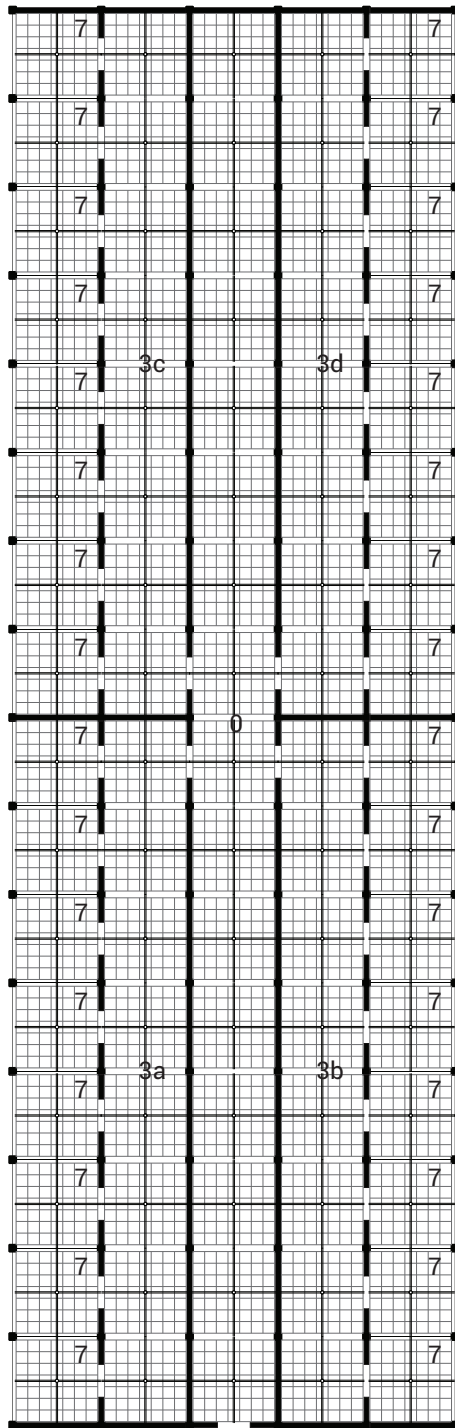
The Lowell case study diagram is tested in two configurations. The first plan takes it queue from the design study of hierarchical and centralized conditions. Interestingly, given the number connections necessary when arranged in a purely centralized arrangement, the centre will grow disproportionately as spaces are added to the periphery. This lends itself to the discussions of network power. That is, as more people join a network, the network and those who define it gain more power and furthermore that then the network exerts more power on those outside it.



Lowell Case Study Syntax Plan Interpretation 1.



Drawing of typical textile mill section showing mechanical power distribution and spaces water powered and hierarchical; drawing adapted from Thomas A. Markus, *Buildings & Power*, 269.



Drawing of typical textile mill section showing mechanical power distribution and spaces water powered and hierarchical; drawing adapted from Thomas A. Markus, *Buildings & Power*, 269.

Lowell Case Study Syntax Plan Interpretation 2.



The Second configuration of the Lowell case study takes the centralized connected form from the design investigations. This was necessary in order to provide connection to outside the network.

With the centralized connected form there is less of a discrepancy in size of space gained when new spaces are added to the network. The primary space could be single loaded which would provide comparatively more space to the centralized position.

In both options the work spaces have visual connections to each other within their sector (these sectors are the floor separations). However, for complete communication and connectedness, inhabitants must venture into the secondary space (which in the case of Lowell was the floor supervisor). This is compounded to the central space again. Power in these configurations is the control of the space where communication happens.

### ***Facebook Syntax Spatialized***

The Facebook Building syntax diagram was unable to be spatialized into a configuration. This is primarily due to the number of connections to the central workspaces. The issue being here is that there would need to be more divisions made within the original floor plan.<sup>82</sup> The pathways could be considered as divisions and may provide the ability to further divide the spaces but the pathways within the building are defined by the user's furniture and specific

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<sup>82</sup> This may be an issue with how the original floorplan was analytically diagrammed. The open floor plate relies on moving pieces and furniture that adjust pathways throughout. Thus, the axiality and convexity that space syntax relies on is constantly changing.

rooms that all move.

This allows for some insight as to the spatial structures of power. In this case the fixed spatial elements can be controlled by the inhabitants and how they configure the space. What would be even more interesting is to apply Waber's sociometric badge to the configurable elements to see how the architectural space is continuously changing given the desires of the employees.

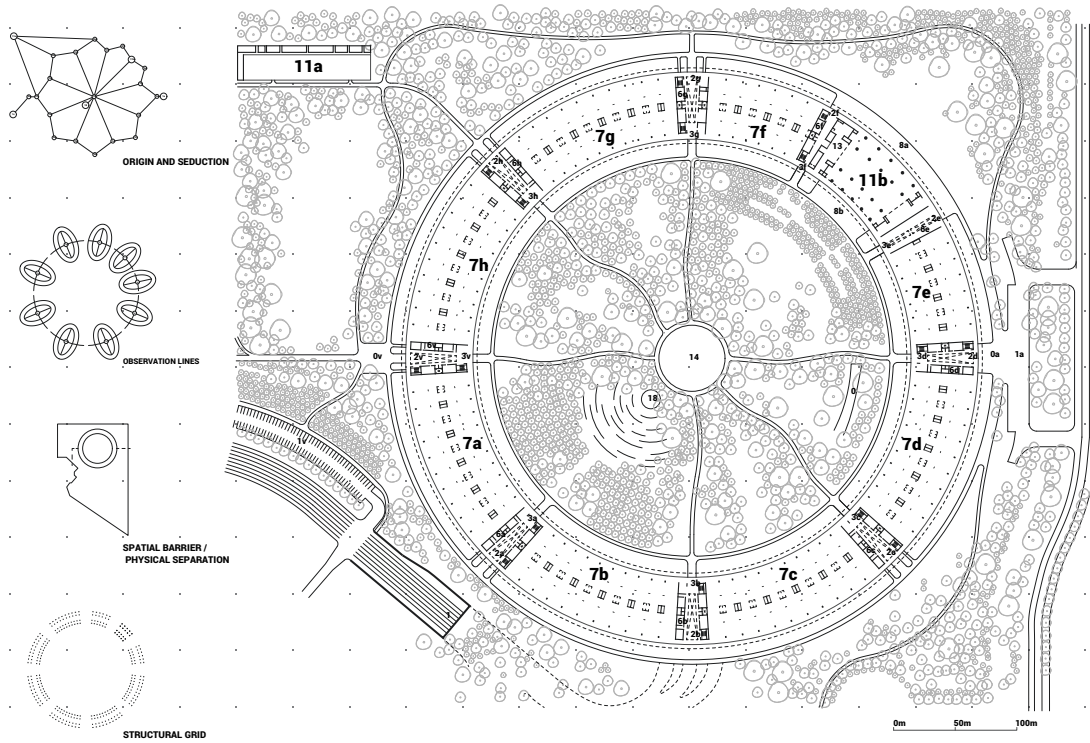
### ***Apple Syntax Spatialized***

The Apple syntax configuration follows the Lowell example and takes the centralized connected form which is determined by the original buildings organization around the central exterior space. The resulting interpretation of the syntax diagram shows the uniformity of the original spatial organization and is not far removed from the original building form.<sup>83</sup>

An interesting condition arises which is the space that sits opposite the cafeteria, 3a. It is forced to accommodate the increased connections of the cafeteria on the opposite side of the plan. As such it is double the size of its '3' counterparts.

The work spaces, '7', are all equal in size and are withheld from many of the amenities such as the interior garden. They are all visually connected to the entire system but at least two steps removed from all amenities.

83. An exception needed to be made to the syntax requirements of axiality - the '0' space around the exterior creates a convex space. This challenges the concept of the exterior of the Apple Campus being one space as there will never be one specific axial line that connects the exterior. The original analysis showed two '0' spaces but there should have been more to satisfy the axial constraints.

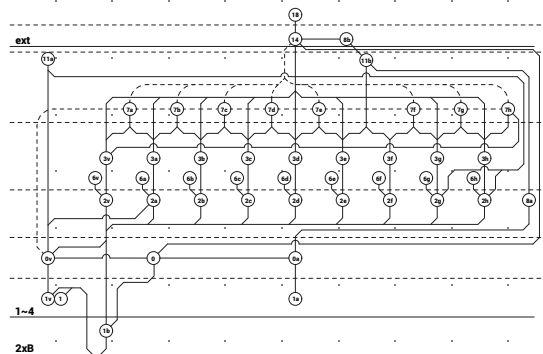


**APPLE CAMPUS 2**

Cupertino, California / Foster + Partners: Innovative Architecture & Integrated Design / 2,800,000 square feet / 12,000 employee spaces /

Spatial Identifiers

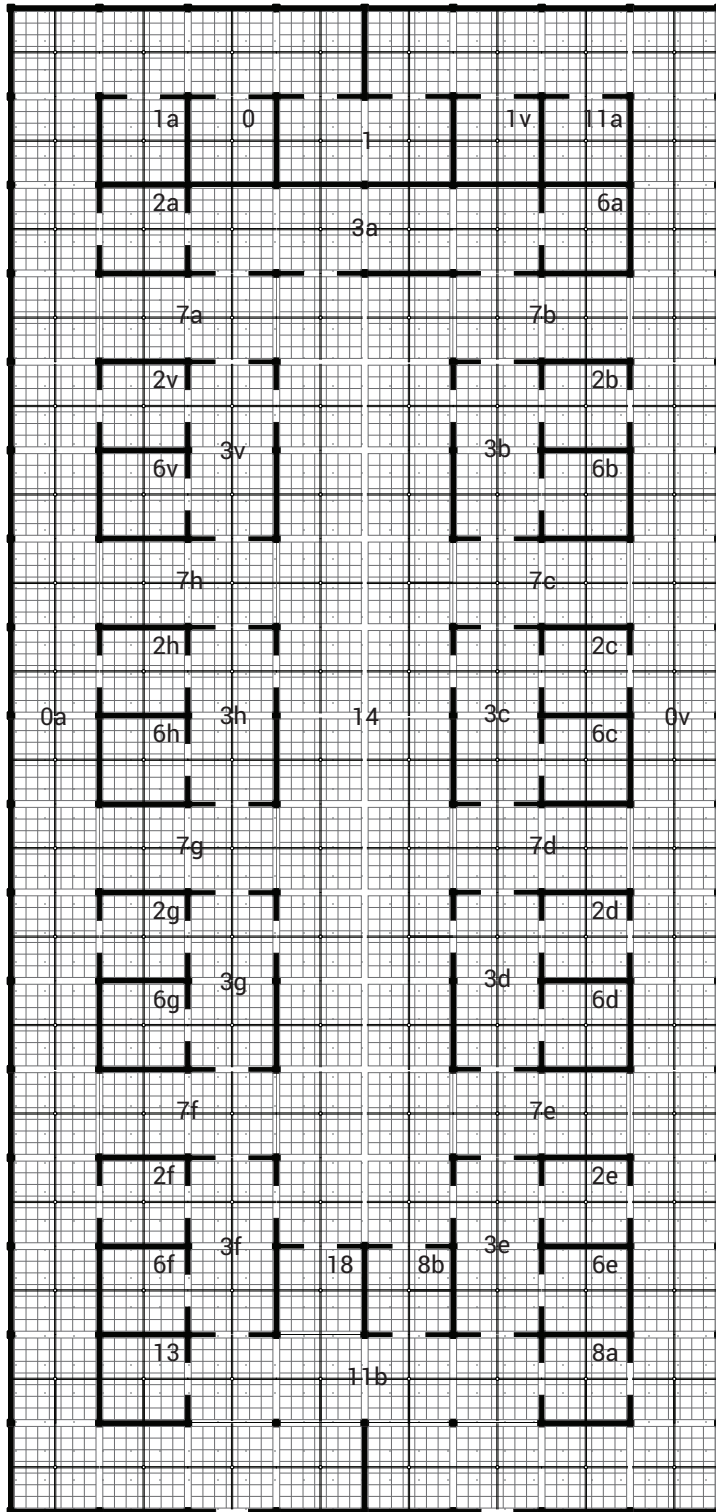
- 0 - Space Around Building (carrier)
- 1 - Entry Sequence (v-visitor, a-employee)
- 2 - Floor Landing and circulation
- 3 - Courtyard Landing and Circulation
- 4 -
- 5 -
- 6 - Washrooms
- 7 - Primary Work Zones
- 8 - Exterior Patio
- 9 - Small Meeting Area
- 10 - Training Areas
- 11 - Amenities (a-gym; b-cafeteria)
- 12 - Cafe
- 13 - Small Kitchen
- 14 - Exterior Garden
- 15 -
- 16 -
- 17 -
- 18 - Exterior Event Space
- 19 -
- 20 - Mechanical Space
- 21 -



**SYNTAX SPATIAL CONFIGURATION**

----- visual link      ———— circulation link

Floor Plans and Syntactical Diagrams of Apple Campus 2, Author's reproduction of floor plans; Foster+Partners, Apple Campus 2, from City of Cupertino, *Apple Campus 2 Project*.



Apple Case Study Syntax Plan.

### ***Samsung Syntax Spatialized***

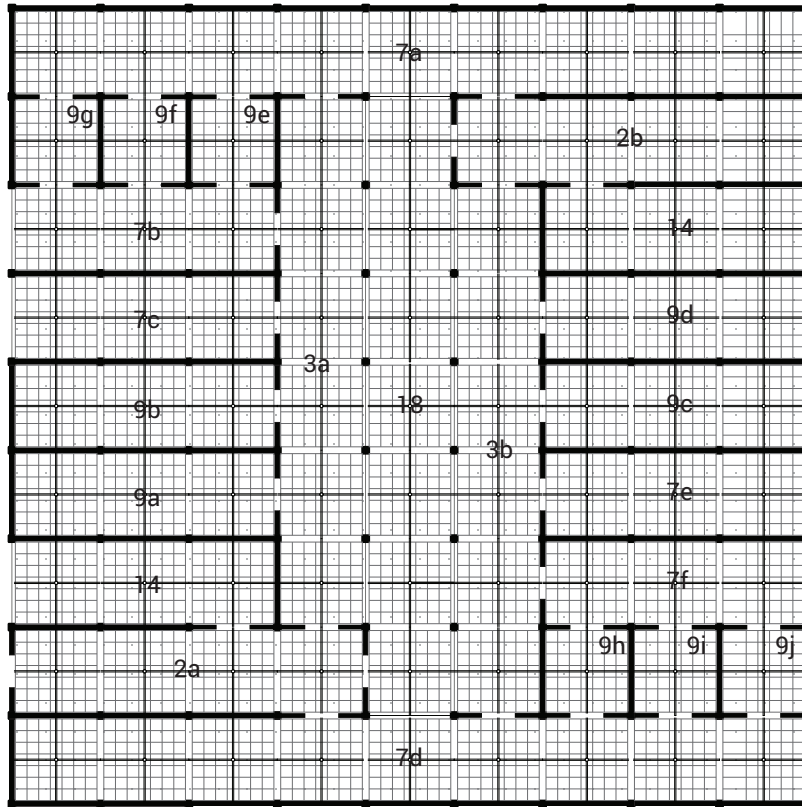
Similar to the Apple translation, the Samsung interpretation begins to mimic the original building form but still has some deviation as additional elements which were not on the floor are incorporated such as tying in the rooftop gardens that take place between floors.<sup>84</sup>

Most notable is the difference in work spaces, 7a and 7d, compared to their counterparts. In the original building plan these were the work spaces that bordered the central space. As such, they take on more space and connectivity in the new configuration. Furthermore they have direct visual connection to interior and exterior space (whereas the other 7's only connect to the exterior).

The '3' spaces are the most integrated in the system with a number of space following closely. What is evident is the circulation spaces are the most important as they are the most physically and visually connected. It becomes even more clear in this configuration that the movement of people is the primary driving feature. Circulation spaces are typically the most integrated areas in multi-floor buildings; in this case it is designed to ensure visual connection as well.

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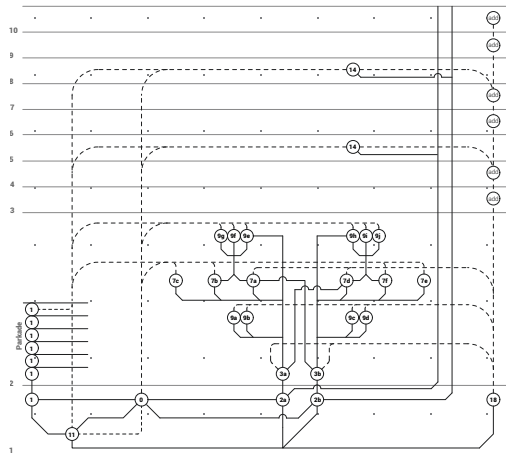
84. Perhaps further investigation would separate the steps of the process to multiple people. Ideally, someone would syntactically diagram a building and then hand it off to someone else to translate it back into building form. This would help to remove the bias of having a preconceived notion of how the building is organized.



Samsung Case Study Syntax Plan.

**SAMSUNG CAMPUS**

San Jose, California / NBBJ Architects / 2,800 employee spaces / 1,100,000 square feet /



Spatial Identifiers

- 0 - Space Around Building (carrier)
- 1 - Parking Area
- 2 - Floor Landing and circulation
- 3 - Courtyard Landing and Circulation
- 4 -
- 5 -
- 6 - Washrooms
- 7 - Primary Work Zones
- 8 - Exterior Patio
- 9 - Small Meeting Area
- 10 - Training Areas
- 11 - Amenities
- 12 - Cafe
- 13 - Small Kitchen
- 14 - Exterior Garden
- 15 -
- 16 -
- 17 -
- 18 - Exterior Courtyard
- 19 - Mechanical Space
- 20 -
- 21 - additional floors similar to typical

**SYNTAX SPATIAL CONFIGURATION**

--- visual link      — circulation link

Samsung Syntax Study.

## CHAPTER 7: CONCLUSION

There is undoubtedly power in architecture. If the understanding of power can be defined in terms of generation of effects, then it opens the discussion to analyze how is it that architecture generates? It is as Wilson suggests:

My understanding of power here differs a little from that of modern political theory, which relies in some way or other on the Weberian idea of establishing one's will over the resistance of that of another. This, to me, seems a special case of the more general notion of power as "having an effect," "making an impact" on a person.<sup>85</sup>

If architecture exists for the experience of its participants then power may present itself in many forms. Scale, aesthetics or symbolism may impact a person. What this thesis is interested in is perhaps slightly less tangible—which is, how architectural spatial configurations impact inhabitants.

As was shown, the trend is towards a spatial political economy that favours integration. Greater disparity with regards to integration is now the definition of power contrary to the absolute hierarchies of historical systems. With so many software companies beginning in garages and dorm rooms (Apple and Facebook), one would think the trend is towards a more distributed system. However, these companies are now centralizing in amazing fashion, both geographically and in architectural configuration. Some may ask why, and the answer is simple, it can be attributed to the concept of network power.

If asked as to the 'best configuration,' a distributed configuration is preferred. As was shown throughout the design

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85. Wilson, *The Domestication of the Human Species*, 58.

situations, a distributed system reduces hierarchies and equalizes the depth graph. Although this may be seen as a value judgement in fact there is justification for such a system.

Distribution equalizes the integration in a network through maximizing connections. Furthermore, the redundancy of connections allows for security as well as greater choice in how inhabitants would navigate through the network of spaces. As a result, with that high level of choice comes the potential for more serendipitous interaction. Although it may not maximize the total number of interactions as would be the case in a more centralized system, the 'by-chance' opportunities would be more likely. If the intended effect is towards equalization, a distributed system is ideal. Still, other configurations have merit as they stand to encourage different effects.

Given the previous paragraph, is there one ideal spatial configuration or pattern that designers should strive for? No. This may seem like ambivalence or avoidance, but before any suggestion towards preference can be suggested there are two important issues to clarify. First, different configurations result in different effects. Those effects, while in some circumstances could be seen as negative, are in other situations positive. This leads to the second point: it is important to understand how different spatial configurations enact power, for unknowingly designers may find unintended effects of their designs as a result of a lack of understanding of spatial power. In the same way a poor window flashing detail may cause water leakages, a poor spatial configuration may negatively impact the potential relationships of users within a network of spaces.



As Markus states, the assumption may be that “analytical skill would somehow be at loggerheads with creative design.”<sup>86</sup> In fact power exists in architecture whether intentionally addressed or not and having an analytical sense for how such power may be dealt with through design remains paramount. It is only through having an understanding of the effects of certain configurations that designers are then able to approach the system in a manner that:

Involves interpretations of the brief, finding forms and creating spatial structures which either now, or in the future, will open as many doors as possible toward shared power relations and freedom for bonds to develop... But to really achieve this requires the designer to possess analytical skills which put—and keep—her or him well ahead of the layperson in understanding meaning.<sup>87</sup>

This thesis proposes a study, a system and a framework to allow for an understanding of power in architecture. It provides an analytical approach which can be utilized as a critical and comparative tool, and ultimately a design tool. It does not promote a specific building, program or space. Rather, the goal is to develop the conversation of power and provide a new manner in which to understand architecture.

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86. Markus, *Buildings & Power*, 318.

87. Ibid.

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