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The Emergent In-Between

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the emergent in-between
by
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the emergent in-between
an evolutionary growth of a walkable urban fabric

abstract

As walkability becomes a more critical aspect of the organization of urban environments, it is essential that architects engage in the development of the spaces people actually occupy (the 'in-between') as well as the relationship between the programs they border. Using walkability as a catalyst, this thesis seeks to design a system for growing new urban tissue. Within that tissue are networks and proximities of activities that define the means and destinations of walking, as well as the spatial condition that makes the condition appealing for walking. Such a system should be able to define and optimize program organizations and generate appropriate spatial conditions for those activities. Further, the system should be able to adapt to changing conditions and update the generated proposal based on feedback from actual construction and alternative parameters from designers.
saturation
branching: as size increases, diffusion forces molecules to facet corners, giving more spaces for new molecules to attach, creating a protrusion.

faceting: in low saturation, smooth edges repel molecules while vapor attaches to rough corners more easily, sharpening to a point.

complex branching: when branched crystals enter lower saturation, the points begin to sharpen, creating facets on the branches.

complex branching: once again entering a pocket of high saturation, the corners begin to spawn new branches.

faceted plate beginning to branch.
simple prisms solid columns sheaths scrolls on plates triangular forms
12-branched stars radiating dendrites simple stars fernlike stellar dendrites stellar dendrites
split plates + stars radiating plates sectored plates stellar plates
columns on plates multiply capped columns capped columns hollow plates
simple prisms solid columns sheaths hollow columns twin columns bullet rosettes capped bullets caps isolated bullets
needle clusters crossed needles simple needles
round irregular graupel

morphology

temperature

25-32 °F (-4)-0 °C

14-25 °F (-10)-(-4) °C

(-8)-14 °F (-22)-(-10) °C

(-40)-(-8) °F (-40)-(-22) °C

supersaturation

1.1 g/m³

2.2 g/m³

3.3 g/m³
barcelona (medieval city)
beneath the apparent chaos of the medieval fabric lies a clear logic. A definitive hierarchy lends order to the system, in which the primary active paths weave through residential areas, rather than around them. While the active paths are filled with vibrant activity, small residential side streets, not a block away, are quiet and private. This is due in equal parts to street organization, program patterning, and the spatial condition of these streets. These spatial qualities reinforce desirable activities, while quelling disruptive ones. For instance, active streets like la rambla are broad and open, allowing thousands of visitors, shops, performers, etc to interact freely. Others, just off the main paths, quickly constrict, discouraging large groups and active behavior.
Emergence is “the ability of low-level components to self-organize into a higher-level system of sophistication and intelligence.” In essence, an emergent system is a complex organization made up of many relatively simple components and decisions composed from the bottom-up. Each of these pieces is itself, largely ignorant of the complexity around it, or at least it need not understand that complexity for the system to work. The pieces have no intent, no direction guiding them to generate the top-level organization, only an adherence to a simple set of rules and the ability to react to their surroundings. The cells of an embryo have no knowledge of what a fetus should look like, yet by taking pattern information from only their neighbors, they organize themselves into skin cells, blood cells, bone cells, etc. and become a complex, thinking being. Likewise, non-living occurrences follow patterns of emergence that, with a proper understanding of the base-level ‘decisions’ allow for the anticipation and control of complex systems.

A common axiom attests that no two snowflakes are alike. Indeed, the sheer number of discernible forms makes the assessment appear likely. There are stars, dendrites, stellar plates, radiating plates, columns on plates, capped columns, twin columns, capped bullets, simple needles, crossed needles, and so on. Each of these can exist in different sizes and orientations, and doesn’t even count irregular forms that can’t be categorized. It’s only when we break down the root cause of these formations that an orchestration of a complex whole can be conceived. At its core, the formation of the snowflake is the result of faceting and branching induced by specific relationships of temperature and humidity repeated over and over as the plate falls to the ground. At any given point, the only ‘behavior’ on the part of the snowflake is an attraction or repelling of vapor molecules at the corners of the form, yet over time, the result is an inherent complexity. This knowledge not only provides insight into the natural creation of the flakes, but allows a manipulation of the exposure to these conditions as a method of leveraging the creation of particular forms.

While it certainly may not be broken down to such an elemental, malleable level, the city behaves in a similar manner, just with many more degrees of complexity and a much longer period of development. Though the fabric of the city can be coerced into specific forms, and tissue can be grown in predetermined ways, the core element of the city – the behavior, movement, and interaction of the people within it – is far too complex to anticipate and

fully accommodate. The tissue of the city, therefore, must always be in flux, adapting to fluid relationships between people, between infrastructures, and between programs. This is best visualized in the medieval city, a tissue that has been allowed to evolve over centuries, reacting to those relationships, and always changing. In Barcelona, we see a fabric molded into a finely-woven pattern. Critical connections bulged, while unused paths disappeared. Small secondary paths sliced through the urban tissue, allowing almost limitless movement. Where people gathered, there were plazas cut directly across major networks or withdrawn within quiet spaces. Remarkably, within such a dense, active space, quiet residential streets rested just around a corner from a major thoroughfare. Nothing was detached from the fabric, yet there was still public and private, primary and secondary, active and passive. These were cities that were livable not because they were planned this way, but because they evolved this way. The emergent patterns of human habitation are the key to making sense of the resulting maze. The situation of broad avenues along active arterials or open plazas buried within tightly packed residences is not random. Both are meant to be active spaces for people to congregate, but the groups to which they cater, and the activity that occurs within them are both intentionally and naturally differentiated. When these are viewed through the lens of walkability, the spaces carved into the urban tissue begin to play an active role in deciphering the pattern. The open nature of boulevards (like La Rambla) takes on a natural hierarchy when juxtaposed to the tight residential streets that flank it. Not only does this perform as an effective path finding mechanism, it defines the activity of the people within it. The spatial compression felt when transitioning between street conditions literally limits the kind of behavior that can occur by limiting space, but more importantly, the contextual shift alters the perception of the space, carrying a natural suppression of activity. In this way, peaceful streets may exist in close proximity to very active streets. Further, once activity has been calmed, the spaces may open up again, providing an area for residents to gather away from the excitement of the boulevard.

While this may provide a model for the way the spaces walkable city might form, the evolutionary process in Barcelona required hundreds of years of constant change. If the same principles were to be applied to the development of a new tissue, this development would have to be compressed. What if it could be simulated into a few days? Could we grow an urban fabric that is inherently livable yet entirely modern? Rather than pulling the people away from the things they use, could we anticipate people’s needs and bring them together? Can we grow a city from the bottom up?
selling walkability

Walkability is becoming an increasingly important criterion in determining the value of an area. As people make more and more of their trips on foot, neighborhoods that cater to the pedestrian have seen an increase in value, while those that are isolated or challenging to walk in have declined.
walkscore

In an attempt to quantify walkability and allow users to assess the livability of an area, walkscore was developed as a new way of analyzing the pedestrian nature of a community. Each of the selected categories is assessed individually, producing a score based on distance from the analysis point and weighted for walkability value. The total walk score is a cumulative value of each of the nine evaluated typologies (for a total of 15 possible points) multiplied by 20/3. This value is then adjusted to reflect intersection density and block length to produce a score out of 100 (maximum walkability).

An area benefits from choice within these typologies, so multiple must be measured to get an understanding of the space. The additional walkability resulting from the addition of these elements, however, degrades with higher quantity. Only the closest of these amenities receives a full score, while subsequent amenities garner lower scores.

<table>
<thead>
<tr>
<th>Type</th>
<th>Weight</th>
<th>Distance</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee</td>
<td>1.25</td>
<td>.75</td>
<td>1.25</td>
</tr>
<tr>
<td>Retail</td>
<td>.45</td>
<td>.35</td>
<td>.675</td>
</tr>
<tr>
<td>School</td>
<td>.225</td>
<td>.95</td>
<td>.045</td>
</tr>
<tr>
<td>Bank</td>
<td>3</td>
<td>.6</td>
<td>1.95</td>
</tr>
<tr>
<td>Park</td>
<td>.25</td>
<td>.77</td>
<td>.098</td>
</tr>
<tr>
<td>Books</td>
<td>.25</td>
<td>.75</td>
<td>.100</td>
</tr>
<tr>
<td>Entertainment</td>
<td>0</td>
<td>.9</td>
<td>0</td>
</tr>
</tbody>
</table>

Total walkscore = 48.09
a new analysis

while the walkscore analysis is perfectly serviceable for a quick analysis of the walkability of an area, the data it brings in is limited. It lacks depth in two key areas: first, it measures distances in straight lines, not along a path that humans can actually travel. It has, therefore, no sense of barriers or impediments that may lengthen a seemingly short walk. Second, by filling a quota of searched amenities, the system gives no concern to what lies beyond these initial things.

rather than rely on a system that, though quick, ultimately lacks necessary depth, a new method was developed to more accurately judge the walkability of an area. Here, the actual distance to every amenity within a mile of the sample point is factored into the equation. By determining and measuring the shortest route that people can use to access that point (sacrificing a significant amount of speed) rather than measuring a direct distance, the assessment becomes far more contextualized and gives a better reflection of actual walkability. The calculation of a walkability rating from these distances is similar to that of walkscore, but as this method factors in every point within a mile, it cannot use a quota system to rate the benefit of each amenity. Whereas the walkscore system would assign a value of 1.25 to the closest coffee shop, .75 to the next closest, and then stop looking for coffee shops, the new system must account for all possible coffee shops instead of rigid values. Therefore, the system uses a logarithmic function to simulate degradation of value. A theoretically infinite number of coffee shops, then, would continue to add to the overall score, though only very slightly after the first few.

Beyond simply providing greater accuracy in their measurement, this system provides the ability to visualize the most likely paths that people will take (though at this point based only on distance and without account for spatial conditions). The individual path matters very little, but the cumulative effect of all of the walks from each test point to each amenity begins to illustrate the real flows of people. Later this will become useful for mapping and directing activity along certain paths and away from others.
walkscore: 98
walkability: 83

910 E Street walkscore: 75 walkability: 59

Guerrero's Market distance: 1292 ft walkability contribution: 3.77

Park Middle School distance: 1152 ft walkability contribution: 11.23

F Street Recreation Center distance: 1433 ft walkability contribution: 2.91

Lied Center distance: 921 ft walkability contribution: 4.125

Panera Bread distance: 980 ft walkability contribution: 2.85

Vincenzo's Ristorante distance: 2421 ft walkability contribution: 0.81

Highly walkable car dependent residential amenity 1/2 mile network usage bus network walking network
**Walkability Intensification**

Lincoln Suburb

With an ability to determine the walkability of an area established, the next step to growing an urban tissue from this system is to introduce a dynamic element. If outside points can be added and subtracted from the system, the effects of elements can be individually analyzed. Placement of amenities could then be optimized for a particular scenario. Potentially, this allows for a rapid testing of alternative solutions simply by regenerating the parameters that drive this optimization. If an entirely new tissue begins to grow around an optimization of a neighborhood that prioritizes a particular typology, a shift in typological parameters should drive an entirely different tissue. The suburb provides a unique opportunity to test the theory in a condition where changes will be most apparent. This particular suburb (and areas where single family homes dominate in general) presents a large number of potential paths while maintaining only a small number of amenities dispersed primarily around the perimeter. This means that the effect of introducing new programs to the area will have a more pronounced appearance, both because the existing presence of that program is likely small, and because the diverse nature of the winding paths will emphasize the impact of location upon one path or another. Two prototypes were developed for this site with the intention of testing the impact of placing these programs in particular places. This, at its core, becomes the basis for what will eventually become an independent growth model, in which the coordination of many optimized points of program defines a new tissue.

**Prototype One**

Using the re-conceived model of walkability, the test points on a rail are used to assess an impact on the model. Instead of measuring the score of a point of interest, however, this test inputs an amenity, in this case a grocery store, and extracts the impact on each of the points already within the system. Here, a blue dot representing the store is shifted through arbitrary points in the site and the route to each house is calculated by the aforementioned algorithm. This test could be as extensive as the test requires, theoretically analyzing every potential spot. In this way, the impact of adding a program at a certain point can be examined, and in fact optimized, before it is ever really set into the system. While this, by itself, has potential as a tool for introducing new programs to an existing system in a way that is inherently walkable (even if narrow scope due to a reliance on proximity of experiential qualities), pushing this idea further will require a more complex organization of multiple programs, as well as the establishment of optimized residential densities. To achieve the former, another site will be needed, but the latter can be approached by shifting the focus of placement to the dwelling rather than the amenity in a second prototype.
Larson Building
Walkability: 36
Walkscore: 55
Super Target
Distance: 4159 ft
Walkability Contribution: 4.24
Cavett Elementary
Distance: 2561 ft
Walkability Contribution: 6.44
3740 El Paso Drive
Walkability: 27
Walkscore: 62
Grata Bar and Lounge
Distance: 1086 ft
Walkability Contribution: 3.97
Highly walkable car dependent
Residential
Amenity
1/2 mile network
Bus network
Walking network
prototype two: house placement

Beyond testing for the ideal location for introducing program, housing conditions can also be assessed through the same system. Identifying the most beneficial locations for housing provides an opportunity to direct density towards the areas that need it most.
As a test of tissue growth, the system needs to move beyond existing conditions to an area that will allow for a more complex and sizable intervention. North St Louis provides an opportunity to develop new networks of program in place that has experienced extreme decay and requires significant redevelopment over a large area. Uniquely, though, the crumbling neighborhoods north of downtown retain links to more vibrant districts, including both the downtown itself and active residential areas along its borders. The North St Louis area itself has held on to little of that activity, meaning that any vitality that might be hoped for must be introduced by careful examination and coordination of program and space.

The story of North St Louis really begins in the period after WWII. As mechanization transformed farming in the south, field workers and sharecroppers were forced to immigrate to the cities for work. In St Louis, due to cost, necessary proximity to work, and discriminatory housing practices against migrants (many of whom were poorly educated blacks), the neighborhoods north of downtown were some of the few places where residency could be found. The conditions in these neighborhoods were poor. The infrastructure was crumbling, houses were overcrowded and in disrepair. Many lacked basic amenities like indoor plumbing, yet the people here were trapped. There was nowhere else they could go. A contemporary map of substandard housing in the area (top right) demonstrates the magnitude of the problem. While entire sections of the city were blighted, in the neighborhoods just north of downtown, the prevalence of unfit housing conditions approached 100%. Meanwhile, the city assumed that this post-war spike in growth would continue, meaning there would be even more people crammed into these areas. A 1947 city proposal (bottom right) suggested in a condition where low income workers remained close to public transport, downtown amenities, and riverfront jobs, the resulting density of the areas north of downtown would reach nearly 100 persons per acre. In the existing condition, the area simply could not handle that. Something had to be done.
the pruitt-igoe problem

In 1950, the city set in motion a plan to dismantle the slum and relocate the residents to publicly funded facilities. Most of the existing structures in the area were considered unsalvageable and were subsequently razed. Much of the territory could be carved up for redevelopment, while tenants were given residence in Pruitt-Igoe, a massive complex of 33 buildings that would house 12,000 residents. By condensing the displaced families into dense towers, the ground around the buildings could be softened for recreational usage. Not only did families have new, spacious apartments, they finally had access to broad lawns, recreation facilities, adequate parking, and community gathering areas. For a time, it seemed like a haven from the surrounding despair. But even from the beginning, Pruitt-Igoe suffered problems.

The scale of the almost entirely residential complex isolated it from the surrounding city fabric. People had to leave to go shopping, to go to school, to go to work, etc. leaving the streets dormant and unwatched. Moreover, because it was entirely composed of low-income housing, living at Pruitt-Igoe acquired a stigma for its residents. Combined with newly affordable housing and transport in the suburbs (largely exclusive to whites), many who could leave, did so. This had the effect of further isolating the poorest residents who had few alternatives. Meanwhile, the people around the complex began to move outside the city boundaries. Because St Louis' boundaries were legally set in the late 19th century, it could not annex the growing communities at its borders. This exodus, then, resulted in a shrinking tax-base, effectively crippling the city's ability to provide services like police and fire protection. By 1970, only 2500 residents remained. Unimpeded by police, who were by this time unable to enforce laws in the complex, buildings were overrun with crime. The weakened community that remained in Pruitt-Igoe could do little to salvage their haven. The project was such a disaster, the problems so immense, that the project was completely scrapped, and in 1972, the city began to demolish the complex. To this day, the site sits vacant and overgrown, the area a dormant wasteland.
population distribution 1940-2000
This exodus, however, was not restricted to the Pruitt-Igoe complex. Despite the city’s proud claim as the “Gateway to the West,” its performative role in this capacity had largely been usurped by Chicago first with the Illinois-Michigan canal in 1848, and further with the construction of the Rock Island railroad in 1854. St Louis’ presence as a hub was immediately threatened by waterway competition along the Great Lakes – Erie Canal – Hudson River route, and by rail movement through Chicago. Migration to the city dropped dramatically and induced a slow, but continuous decline in the city. Still, by concentrating around the existing river business, the city retained much of its internal population. In 1940, most of the population of the St Louis area lived in the city itself. Residents congregated around the city’s river-industrial and commercial districts and provided St Louis a strong tax base. The spike in migration to the city during the 1940’s generated hope that the city might new population growth might halt the decline. A simultaneous shift, though toward suburbanization, brought on by housing policies, new highways, and the development of a new social norm, began to draw residents beyond the city’s reach. Because the city could not annex areas beyond its set boundaries, growth outside the city proper would never fund city services. Moreover, the settlement outside the city was disproportionately wealthy, educated, and white, effectively leaving St Louis more segregated and more poorly funded than it would have otherwise been. Today, few areas within St Louis contain more than 10,000 people per square mile while remaining neighborhoods, particularly north of downtown are left almost entirely segregated by race and income.

2: Lewis F. Thomas, “Decline of St. Louis as Midwest Metropolis.” Economic Geography 25.2 (1949) 118-27
The city of St. Louis was once a vibrant center for commerce, production, and travel as it crossed the continent. The 'gateway to the west' has, however, been in a slow, steady decline since its population peaked in the late '50s. Today, St. Louis is a dying city. This is not to say that the metropolis is in any danger of disappearing - the area as a whole is actually growing, yet its core is rotten, and the fabric of the city decays from the inside-out. While pockets of this center remain vibrant, tentatively tying the bloated extremities together into a believable cohesion, much of the area surrounding downtown slowly crumbles. The city is being strangled by its own satellites. With no more space to grow around its border cities, and unable to annex them, the city cannot expand to compensate for the hollowing of its center. If the city is to survive, it must grow inward. To reclaim the rotted core, the city must resolve the problems that helped to destroy it in the first place. Despite north St. Louis's proximity to an active downtown, the area appears severed. Patchwork infrastructure projects, divisive industrial concerns, and acres of deserted lots separate the two areas. The city is in dire need of a proper connection. Further, within the north St. Louis area itself, few amenities exist to serve the residents who are there. Any project that intends to resuscitate the area has to find a way to put the amenities people need within their reach, particularly if any of the current residents, many of whom live below the poverty line, are to remain there.

A History of North St. Louis since 1940

Exodus
New suburbs, fed by freshly constructed highways and lopsided housing policies, begin to attract middle-class citizens and jobs out of the city.

Migration
After World War II, many rural blacks moved into the city, one of the few places where discriminatory housing practices would permit them to live.

Exodus
New suburbs, fed by freshly constructed highways and lopsided housing policies, begin to attract middle-class citizens and jobs out of the city.

St. Louis City Population

2,000,000

0

1,000,000

1940

1950

1960

1970

1980

1990

2000

2010

1950

1960

1970

1980

1990

2000

2010

1940

1,000,000

2,000,000

3,000,000

St. Louis Metro Population

Slum Clearance
With many of the city's poor now housed in public buildings, the rapidly decaying slums of the area are demolished. Few buildings are replaced.

Pruitt-Igoe (Demolished)
The city's housing experiment-a dismal failure; neglected residential blocks are overrun with crime with little hope of salvaging the project. Pruitt-Igoe is demolished.

Pruitt-Igoe (Constructed)
The most infamous of the city's housing blocks, designed to eliminate slums for the poor, is opened.

Gateway Arch
The city's first attempt at reconnecting with the riverfront draws downtown to the water.

Metrolink
The city introduces the Metrolink, allowing rapid movement across St. Louis. Most of North St. Louis is bypassed.

Northside Regeneration
Parts of North St. Louis are included in an evolving plan for a revival.

Decay
With little new construction in the area, much of the existing housing is in very poor condition, lacking basic amenities like plumbing.
the selection of a site for intervention within the degraded North St Louis area is based on four key parameters. The first is the walkability of the area, measured using the same methods applied to the previous Lincoln studies. Because the focus of this study is on growing new fabric around a livable system, areas with low existing walkability will demonstrate the most dramatic need. Those that border more walkable zones are given priority so that a continuous network can be developed. The second measure is how well the land is being utilized. This is gauged by approximating the number of occupant hours spent in the area per day. Those that are used the least (either because density is too low or because the mixture of usage types cannot support extensive use) are most likely to be replaced. The third metric is program type. While the actual value of an existing property is reliant upon multiple factors, including age, condition, location, etc., a rough estimate of this value can be gleaned from the type and extent of program usage. Buildings with high value (civic or monetary) are more likely to be replaced. Finally, areas that are ripe for intervention are molded to fit existing major paths in the city's fabric, thereby causing the least possible disruption.
5898.7 people per sq mi
$15,000 median household income
2.9% white, 95.1% black
23.1 years median age
35% households with children
37.5% work in sales or office
30.6% work in service occupations

3000 people per sq mi
$35,000 median household income
50% white, 50% black
40 years median age
10% households with children
30% work in sales or office
40.5% work in professional occupations

4500 people per sq mi
$25,000 median household income
40% white, 60% black
35 years median age
35% households with children
35% work in sales or office
35% work in service occupations
The peculiar situation of the site leaves entirely different groups of people at various points within the network and around its periphery. At the core of the site, relatively dense clusters of public housing are left intact providing a continued user base. These residents are almost all black families (half have children) and typically have a very low income. As site users, they will have very different requirements than people who may be drawn in from development along the southern downtown border. Downtown residents are generally older; few have kids, and most have significantly more income than other residents of the area. How would such a demographic be stitched together with growth on the Old North St Louis side or the JeffVanderLou side? Undoubtedly, the natural progression of growth will favor a patchwork of clustered groups rather than a smoothly transitioned homogeneity. The key, then, becomes the ability of the network to tie these patches together effectively, encouraging fluid movement between areas. While the existing road network provides a certain degree of fluidity, it’s a detached movement, in which users do not engage with anyone on the journey. Instead, an ideal system would allow a rapid, but more connected journey.

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crime perception

The decay in the city has caused another problem that needs to be dealt with in the new tissue. The city of St Louis is often perceived as a dangerous place. Much of this stems from the appearance of the crumbling infrastructure in dying neighborhoods, but much is also drawn from crime statistics that often rank the city among the most dangerous in the country. If we analyze the crime statistics collected by the FBI, there seems to be some merit to this. Last year, St Louis had 1856.7 violent crimes and 35.3 murders per 100,000 people. Compared to other regional cities (above), the rates of violence and murders are quite high, beat out only by Detroit’s 2137.4 and 48.2, respectively. But the city of St Louis is only a small part of its metro. The crime rate is artificially inflated. If we compare the rates of the metro as a whole, 495.4 and 7.6, to other cities the crime rate is only slightly higher than those of Lincoln or Omaha. Though crime is higher in the area of focus than in the suburbs, if the crime is compared to downtown, which is generally considered safe, rates are relatively even. The issue, for the most part, is one of perception. The key is creating spaces that make people feel safe and want to be on the street. Spaces must invite people to be on the street while retaining different levels of intensity. Side streets must maintain a sense of security without the volume of people available on major paths.
When establishing relationships and densities of programs, another factor that needs to be considered is the relative integration of the streets. Major, active paths are considered well integrated into the network. The further a path segment is pulled away from these major axes, the less integrated it becomes. Integration of paths does not necessarily, however, degrade linearly. It is not merely a function of distance traveled, but of orientation as well. A path, three blocks long, diverging perpendicular to a major route will experience a decay of integration as the user moves away from the most active part. A path of the same length that turns at the end of each block, though, will experience greater decay because the perception of connection is decreased more greatly. An entire network can, then, be analyzed for to determine potential activity at each point and optimize program for the appropriate level of engagement.
highly connected street: though not a heavily trafficked street, this segment of 20th st achieves a high degree of connection with primary routes. Two primary factors play into this effect. First, the segment is positioned just one block north of St Louis Ave, lending it connectivity through proximity, and second, the angular relationship with Florissant Ave (40 degrees) creates continuity, allowing a stronger perception of integration.

mildly connected street: this street is less than 150’ from the busy Cass Ave, yet feels less connected because of the nature of the route required to reach the main avenue. The resulting ‘actual distance’ plays a significant role in this perceived seclusion, but even more critical is the 360 degrees of turning required to reach the street.
scenario one

Using the Metrolink as a catalyst for growing the tissue in the site, the relationship of walkability and integration can be drawn into a composite that reveals the potential intensity of each part of the site. Areas with the most potential for activity tend to be centered on transit stops. The high degree of connectivity with other segments of the rail network, as well as the large volume of traffic moving to the stop and along the major axis makes these conditions ideal for heavy mixed use development, including offices, retail, and entertainment, while residences can be integrated above the ground floor. Areas along the major network paths that are further from desired amenities (or further from transit stops that would allow people to reach those amenities) are too busy to be desirable for residences, but implementation of single-use, lower density services and offices will benefit the overall walkability while fully utilizing exposure to busy streets. As the streets become less integrated they become predominantly residential. Areas that are the most walkable become dense, multifamily residences. As walkability decreases, so does the density of the residences until it dissolves into the single-family blocks prominent in the surrounding neighborhoods.
high walkability, high integration
blocks which provide both a high degree of walkability and integration with primary circulation have the highest potential for intense usage. These areas are primarily mixed use, allowing for retail, offices, and entertainment on the ground floor, with residential above and away from heavily trafficked paths.

low walkability, high integration
these blocks have a strong connection with heavily trafficked paths, but are removed from desired amenities, making them less walkable. This combination incites single use program along major paths (which will boost walkability in areas of lower demand) and residential away from busy streets. Individual programs can utilize more space in this condition, allowing for larger retail and social uses.

high walkability, low integration
the low integration of these blocks makes them undesirable for intense commercial usage, but the high walkability makes them ideal for intense residential programming.

low walkability, low integration
lower walkability and integration make these blocks most appropriate for low density residences, providing seclusion from heavy traffic and activity. Local recreation is also suitable for these areas.
typological optimization

Breaking down the potential intensity of areas gives a general sense of the activities that can take place in specific areas, but assessment of actual programmatic need requires another step. A potential program was optimized in the Lincoln suburban prototype, but to generate new tissue, that evaluation needs to be turned around. Instead of arbitrarily introducing a new program, a need can be established from the data collected from the existing site. To do this, the walkability of each block (or an averaged composite of all the blocks) can be broken down into its component parts. The exact ‘amount’ of walkability gleaned from each category can be extracted to determine what the block already has access to. To determine a need, though, the data must be compared to a benchmark, a desired program availability. Various typologies, each with their own requirements (below), can be applied to the system, allowing different types of growth, depending on the kind of condition the designer wants. These can be applied interchangeably so that different tissue growths can be simulated before anything is built.

Once an appropriate typology is selected, the site is tested against the benchmark condition and a deficiency map is created. This tells the designer what is most needed under the established growth condition. The impact of the most desired amenity is then tested at each possible point on the
<table>
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<td>6.47</td>
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</table>
grocery optimization

having been selected as the most needed amenity in the site, a local grocery is tested at each suitable site to determine where it would be most effective
Once a central node is established, it begins to spawn new programs. The amount of space allocated to various usage types is adjustable by modifying the input parameters. The next two pages demonstrate how altering the required integration threshold for high intensity usage changes the way buildings take form on the site, then how raising the walkability threshold begins to pull the most intense activity back to the center of the node and less dense, single-use programs begin to take up the periphery. In this way, the overall volume of space can be controlled to ensure that the amount of density built fits with the number of people who may actually use the site.
after the optimal block for programming is selected, a new amenity is applied

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<td>large office</td>
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<td>--</td>
</tr>
<tr>
<td>restaurant</td>
<td>23.33</td>
<td>15</td>
</tr>
</tbody>
</table>

because the system has now changed, the site needs must be reassessed. a new deficit is generated that will inform more development in the node

<table>
<thead>
<tr>
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<th>deficit</th>
</tr>
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<tbody>
<tr>
<td>local retail</td>
<td>43.17</td>
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<tr>
<td>restaurant</td>
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</tbody>
</table>
each block can now be programmed in the same way, incorporating only what is most needed after each change. because there is no direct control over what kind of program ultimately ends up in each building, the output from this simulation can be used as a tool for marketing to businesses for investment by demonstrating the traffic that must move past their storefront in any given condition.

<table>
<thead>
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<th>actual walkability</th>
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</table>

the ability to simulate the programming gives designers the ability to alter benchmarks during the sequence and start to generate an altered tissue at any point.

<table>
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<tr>
<td>restaurant</td>
<td>19.91</td>
<td>.09</td>
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</table>
the lack of direct control, though, does mean that the system must be adaptable to things outside the designer’s control as well. The designer may anticipate a pattern of growth that actually develops in a different way. By continually re-running the simulation, the system can incorporate new data and make necessary changes.

<table>
<thead>
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<tbody>
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<tr>
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<td>22.39</td>
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key walk transitions

transit nodes
scenario two

The real strength of the system is its inherent adaptability. It can, therefore, generate a new tissue whenever parameters change. If, for instance, the Metrolink were suddenly removed from the plan, the site would have to change drastically. An emergent system allows for this, regenerating the walkability and integration evaluations to fit a situation where nodal developments can no longer exist around transit hubs. Instead, the most intense areas of the site are shifted to the border shared with downtown. This allows the most natural transition to the amenities in that area if only walking can be employed in getting there. The site takes on a gradient pattern, with dense activity and residences clinging tightly to the southern border, and then quickly dissipating into single-family homes and single-use commercial. Minor nodes still occur at the crossings of major streets where the sheer volume of traffic makes intensity inevitable.
high walkability, high integration
blocks which provide both a high degree of walkability and integration with primary circulation have the highest potential for intense usage. These areas are primarily mixed use, allowing for retail, offices, and entertainment on the ground floor, with residential above and away from heavily trafficked paths.

low walkability, high integration
these blocks have a strong connection with heavily trafficked paths, but are removed from desired amenities, making them less walkable. This combination incites single use programs along major paths (which will boost walkability in areas of lower demand) and residential away from busy streets. Individual programs can utilize more space in this condition, allowing for larger retail and social uses.

high walkability, low integration
the low integration of these blocks makes them undesirable for intense commercial usage, but the high walkability makes them ideal for intense residential programming.

low walkability, low integration
lower walkability and integration make these blocks most appropriate for low-density residences, providing seclusion from heavy traffic and activity. Local recreation is also suitable for these areas.
key walk transitions

dissipated activity

most intense activity
low density single-family

Within the network, spatial conditions transition smoothly from one to another to allow a natural compression and expansion of space that encourages a variety of activities at different points. The suburban street presented here is not, in itself, all that different from the typical condition of neighborhoods at the edge of any major city. It is from this point it draws its success. Instead of radicalizing the suburban block, it is the relationship of many blocks, and the transition through them that is altered...
minor shopping node

One of several distributed throughout the site, the first thing encountered upon leaving the quiet street is not an abrupt edge, but a softened transition into a small finger of retail extending off the primary path two blocks away. The activity here is far less intense than that of the larger streets, but serves as a way of opening up the pedestrian path and allowing the occupant to acclimate to a higher intensity of sidewalk usage.
medium density commercial/residential

As the user approaches a major axis, activity and program intensity increase. Residences become more dense, taking on a row house form where individual dwellings are compressed to allow more activity. While commercial buildings increase in size and usage, small pockets begin to form just off the street, creating small plazas that allow activity to continue when yards are no longer practical.
At the transit stop, the most intense point in the network, density becomes much higher. Retail spaces open up more to engage pedestrians, while apartments and offices occupy the spaces above the street. Because the intensity of the surrounding program precludes many open spaces, the sidewalk becomes the primary occupiable zone, sheltering people from the street while allowing spaces for sitting, bicycling, walking, and viewing storefronts.
compressed residential

Extending perpendicular from a major route, residential streets compress the in-between to change the character of the space. Beyond simply addressing a hierarchy of streets, the compression helps to subdue the intense activity as the user transitions into a residential area.
residential expansion

Just beyond the compression of the initial residential condition spaces begin to open up again, allowing small lawns, wider streets, and voids in the residential fabric where parks or gathering spaces can occur. These areas are not as intense as the row house residential that borders a major axis, but incorporate higher densities typical of many St Louis neighborhoods to allow a larger presence of people.


The Pruitt-Igoe Myth. Dir. Chad Freidrichs and Jaime Freidrichs. First Run Features, 2012. DVD.


