Informal

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...it was conceived by an architect, it indicates things are changing: People understand they now have the right to what was only available in the so-called “formal city”. The philosopher Felix Guattari once said that aesthetics are fundamental and revolutionary!"
- Jorge Mario Jáuregui

...In the current state of the planet, architects posses the potential for an unprecedented agency through the built environment

97%
of built environment unengaged by architects
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“The cities of the future, rather than being made out of glass and steel as envisioned by earlier generations of urbanists, are instead largely constructed out of crude brick, straw, recycled plastic, cement blocks, and scrap wood. Instead of cities of light soaring toward heaven, much of the twenty-first century urban world squats in squalor, surrounded by pollution, excrement, and decay”

- Mike Davis
For the first time in global history, the urban population has exceeded the rural,

the evolution in population density is felt strongest in cities of the global south.  

1 In the developing world, 95% of the world’s population growth between 2000 – 2030 will happen within urban centers, bringing with it a new understanding of the urban configuration.

Source | UN-Habitat
The ballooning of urban centers is transforming the social, spatial, and economic structures of contemporary cities.

Understandings of spatial scale, configuration of functions, employment, and human settlements are in a state of flux.

Source: London School of Economics
A large portion of this influx has resulted in the proliferation of slum populations across the world.\textsuperscript{2} However, urbanization has potential to reduce overall poverty...\textsuperscript{3}

The explosion of urban growth in the global south has resulted in a collision of population density, poverty, and limited resources of governments. In 2001, 920 million people – roughly 1/3 of the urban population lived in slums.\textsuperscript{6} The proliferation of slums has increased pressure on limited state support leading to the deterioration of conditions within. In turn, reduction of government support exposed these populations to environmental health problems. The intensification of conditions has also lead to the heightened spatial segregation within cities.

Often, slums exist as the only option to house the urban intensification. When governments cannot provide adequate housing or services, the next step is squatting and self-help. The way slums develop and evolve within the growing mega-cities of today demand a new understanding and strategy in urbanization in the twenty-first century.

Migration from rural to urban provides the potential to consolidate efforts to alleviate severe conditions.\textsuperscript{7} In conjunction with the increased availability of livelihood options and raised incomes, governments are better suited to providing services within city limits. The density produced by urbanization has the potential to heighten efficiency in infrastructure and education distribution.

As a result, migration to cities has helped reduce overall poverty. The percentage of urban populations living in slums declined from 39% to 32% between 2000 and 2010.\textsuperscript{7} However, the rate of reduction is simply not adequate to offset the population surge. The rate of growth in slums greatly overshadows the efforts made to reduce poverty. As such, the proportion of urban poverty is increasing.
For the first time in global history, the urban population has exceeded the rural. In the global shift to urbanization, the population living in slums has exploded, recently surpassing one billion slum dwellers – accounting for 1/3 of the world’s urban population. Proliferation of slums has brought an unprecedented presence of the informal in relation to the formal. In the global south, the structure of the metropolis is increasingly integrated with the informal economy and reliant on its workforce. The urban explosion has also led to a heightened sense of economic disparity contributing in part to the social unrest seen in the last year; ‘occupy’ protests around the world and the Arab Spring. A new urbanism is emerging from the informal evolution within our cities.

The boundaries and parameters that allow for the existence of informal settlements also operate as a social, economic, and political barrier from the formal city. The boundary becomes an edge condition defined by terrain, jurisdiction, or circulation infrastructures. These edge conditions create a spatial segregation, separating the legal from the paralegal. The two cities are codependent and cannot exist without the other; the informal provides the foundation for the formal economy which in turns supports the city.

The division also inhibits the slum from accessing the “urban advantage” – the consolidation of transportation, water and sanitation services, electricity, schools, police, and health care. Without means to access the formal city, the population most in need of support is largely disconnected. The spatial segregation encourages both the dwelling and commerce to stay within the slum, creating perpetual poverty.

Much of architecture’s normative mode of operation: methodology, tools, and materials do not offer agency in the informal paradigm. In order to achieve agency within the dynamic of the informal, traditional rules of architecture need to be broken, making available to the architect a new range of methods and potentials to produce and embody agency. Architecture can provide a foundation of components with the potential for reformulation and dynamic definitions in the use of space and urban relationships. Through this plasticity, architecture has the agency to blur the spatial segregation between formal and informal, dismantling the encrusted edge condition between favela and city.

I contend that architecture can offer agency in new forms of urban relationships to engage the edge condition between formal and informal, critical to the success of today’s in-situ slum upgradation and integration to the formal city. Dismantling the spatial segregation will socially, economically, and politically integrate the two cities for sustainable growth of the metropolis.
A divided city, the edge condition

Parameters that allow for the existence of informal settlements – land unsuitable for any other use – becomes an edge condition, producing a physical, social, and economic disconnect from the formal city.

1 The features that allow for the existence of informal settlements become their most limiting factor, an inherent catch-22. Governments have not been able to adequately provide housing or services to a significant portion of the urban influx, forcing them into squatting on unoccupied or illegal land. The price of rent or buying property within the black market is the only available option for much of this population. These parcels of land are obtainable because of their inadequacy for any other means: government land adjacent to railways, canals, river banks, and garbage landfills as well as limitations of terrain such as flood plains, swamps, and mountain slopes. These become the edge condition that produce a physical, social, and economic disconnect from the formal city.

2 In the division of cities, slum dwellers cannot benefit from the ‘urban advantage’ – the consolidation of transportation, water and sanitation services, electricity, schools, police, and health care. Without means to access the formal city, the population most in need of support is largely disconnected. Children living in slums compared to the formal city are less likely to complete primary education, opting for the increasing employment within the slum.

The physical edge condition inhibits the movement across the boundary as well as dangerous zones of friction between formal and informal. Boundaries such as train tracks and canals can make the access to the formal city dangerous and nearly impossible. These zones can also become breeding groups for crime, violence, and drugs.

Caracas, Venezuela
“The existence of such massive exclusion generates two parallel economies, legal and extra legal. An elite minority enjoys the economic benefits of the law and globalization, while the majority of entrepreneurs are stuck in poverty, where their assets—adding up to more than US$ 10 trillion worldwide—languish as dead capital in the shadows of the law.”

- Hernando De Soto

3 The edge condition creates a boundary that encourages the informal economy to stay within the boundaries of the slum, encouraging perpetual poverty.14 The informal workforce and output provides the foundation of the city while the formal drives the economy and produces capital for the city to function. The separation of the economies becomes an inhibitor for the city as a whole.

Urbanism today needs to engage with the division of the informal city – providing 85% of new employment worldwide and facilitating future growth, with the formal economy – providing services and infrastructure in a symbiosis for a sustainable metropolis.7
Proliferation of slums and limited capacity of squattable land produces “marginality within marginality” – a hyper density of population bound by the edge condition 4

4 Space available for squatters is finite. Margins that have become populated with informal settlements have reached maximum capacity in many cities. Proximity of the slum to employment is integral to the livelihood of its inhabitants. When work is too far displaced the cost of transportation becomes impossible with the income of inhabitants – often demanding up to half a daily wage in travel alone.
2.0 background

etymology
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Etymology

Slum
The term originated in 18th century England to categorize the poor housing conditions of Dicken’s London, associated with crime, drugs, filth, and overcrowding. Since its introduction the word has retained much of the associated slander and insinuations. It becomes a loaded word.

“The term is laden with emotional values: decay, dirt, and disease. Danger, despair, and degradation. Criminality, horror, abuse, and fear.” - Neuwirth

Squatter Settlements
Squatter Settlements is largely a western construct – having a deep history in the US. It evolved as a term for occupying land without land title. The term emerged during the time of the revolutionary war in New England, describing the population settling on land which they didn’t own.

The influence of Charles Abrams and John Turner evolved the definition into our modern understanding of illegality. The term defined occupying land without official title or unauthorized tenancy. The new understanding was applied to the populations of the global south without tenure or government regulation.

Shanty Town
Implies low construction quality, temporality, and unsanitary conditions. Materials often include corrugated metal, plastic, and plywood. Contrasted to slum of which implies higher densities and relatively higher sanitation.

Favela
In the late 1800’s the Rio De Janeiro government declined housing for Brazilian soldiers returning from the War of Canudos. The outcast soldiers settled on illegal land, the periphery slopes of the city. They called their new settlement Favela hill named after a skin-irritating tree local to Canudos – an ironic jest at the government. The term favela was inaugurated.

The term favela has continued to identify the settlements on the periphery slopes of Brazilian cities.
Slum Typology

Slums operate outside of the city influence, basic services such as water, sanitation, and electricity become severely limited.  

As well, land tenure and threat of eviction is an inherent challenge in the nature of squatting. 

UN-Habitat defines a slum household as lacking one or more: 

- Access to improved water
- access to improved sanitation facilities
- sufficient-living area
- structural quality/ durability of dwellings
- security of tenure

The urban influx is forced to find alternative means in human settlement within the margins of the city – land that is incompatible with any other means. Slums have proliferated along railways, canals, river banks, garbage landfills as well as impossible terrain including flood plains, swamps, and mountain slopes. The slum fends for itself, often illegally tapping into water supplies and electricity lines.

The extent of the government’s acknowledgement and acceptance of squatter settlements greatly influences services and support provided for a community. There is a wide historic and contemporary range of government and international intervention, successful to varying degrees.

The UN-Habitat has provided several seminal reports on the state and conditions of informal settlements across the globe, representing the primary foundation of knowledge for governments, agencies, and NGOs.

Another understanding of slums, considering the socio-political relation to the city, is manifested in city maps. In the majority of cases, informal settlements are absent from government mapping. This blindness of government is indicative of the support and relation of slum to city.

There is an inherent danger in the usage of the term ‘slum’. The label is a vehicle for both stigmatization as well as generalization. In the modern day effort to incorporate informal settlements into the...
The lack of sanitation, water, and food has wide ranging health implications. The concentration of low-income residence combined with high price of food in urban areas leads to the malnourishment of the population, in particular children. The access to clean water and sanitation has immense impacts on both health and social component of slum life. The limitation in these services impact children the greatest, heightening diarrheal diseases, malaria, and respiratory infections. Governments lack of formal acknowledgement of slum areas have excluded these areas from schools and education funding allocation.

Inherent limitations of basic services lead to adverse effects in health, education, and social functions.

However, the informal economy has become ingrained into the evolving understanding of today’s metropolis, comprised of two separate economic engines – the formal and informal.

The urban intensification seen in the informal segment of cities has massively changed the structure of the mega-city economy. Boundaries that define the slum also act as socio-economic barriers - often hindering the economic exchange and performance on both sides. 40% of the workforce in cities of the developing world originates from the informal economy. This can be seen most clearly in Latin American employment where the informal economy represents 57% of workforce and provides 80% of new jobs. Hernando De Soto describes these as two parallel economies as the legal and extra legal. He promotes the importance and significance of the extra legal, claiming its global value at US $10 trillion. The informal economy provides a critical foundation for the city providing employment in all industries such as manufacturing, retailing, and construction. Significant capital is also accumulated through entrepreneurial spirit within the informal community. This has come to define life in many slums with inhabitants utilizing their dwelling and home as a base for business. The distinction of space defining private, work, and public is blurred – becoming interdependent. The functioning and intricacies of the slum can be understood on a continuous plane.
Design of aid: evolution from neoliberalism

Until recently, development programs have largely failed, damaging nations and populations more than helped.  

1 Development initiatives during of the 1950s launched the global trend of first world countries pouring money into developing nations – with the intent to accelerate the social and economic development.

Initial public response was triggered by the tense political climate between nations post World War Two and during the Cold War. Developing nations in a pretense of easy susceptibility and influence became an entity of concern of superpowers. The US responded to the direct threat of communist influence through the use of development aid by launching its own programs.9

Development decade & Ford Foundation

Development during the late 1950s and throughout the 1960s can be summarized by The Big Push and The Ford Foundation. Both initiatives failed to produce positive results. This was largely due to the top down approach common to that era. The Big Push was structured around Rostovian development theories- the idea that a large capital injection to the economy in conjunction with regulation reforms would produce acceleration in the economies.9 $20 billion dollars of aid was invested in Latin America to produce a stimulus in which the economy could propel itself into self-sustainment. However, the intended economic effects never came to fruition and little effect remained for the capital expended.9

The Ford Foundation directed its efforts towards India in a ‘package reform’ engaging with education, health, farm equipment, irrigation, and crop diversification. This was in attempt to engage points of limitation within markets to enable significantly greater flow of commerce. Without much success the Foundation turned from the Rostovian development ideals to the newly formed Hirshman theories of ‘inducement mechanisms’. The strategy was designed to accelerate a single sector ahead through aid, forcing other sectors to strive in maintaining equilibrium and promoting growth.9 Again the Foundation found little success in the top down importation of regulations and ideals.

Structural Adjustment Programs

The Bretton Woods Conference in 1944 lead to the creation of the International Monetary Fund (IMF) and the World Bank. Both institutions have been heavily involved in the global development aid since their inauguration. The institutions gained their infamous reputation through Structural Adjustment Programs (SAPs) – notably during the 1980s. The banks provided loans and decreased interest rates to developing countries under a variety of conditions. These conditions were implemented to ensure the loans would be used effectively so that they will be paid back. The structure of the conditions was based on first world interpretation and theories of how developing countries should operate – usually in a neoliberal approach.

The SAPs bring reform changes in regulation including reallocation of subsidies, broadened tax base, promoting foreign investment, and privatization of government programs. During the 1970s developing countries relied on the banks to a greater extend in response to the oil and debt crisis, stagnation, and economic depressions. The increased influence of the SAPs had a profound impact on the nations involved.

Effects of the SAPs was felt greatest in the slums of developing nations. The heightened adjustments forced austerity programs, causing budget cuts in social programs - diminishing education, water supply, sewage infrastructures, and health. The agricultural land reforms curbed government influence in subsidies and irrigation for farmers. This contributed greatly to the urban influx from rural areas.11 Privatization of government programs created another barrier for the lower portion of the poor population, making it impossible to afford health care. This was seen in the early 1990s in Zimbabwe where the introduction of health care fees lead to a doubling of infant mortality.10
The World Bank and IMF evolved their approach in response to the failure of previous neoliberal ideals, incorporating bottom-up design in the fabrication of the Millenium Development Goals:\(^1\):

- Eradicate extreme poverty
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

The development goals have yielded many positive gains in their ambitions, with India and China achieving greater outcomes as result of continued rigor.\(^3\)
(Re)designing approaches: clearance

Slum clearance and evictions increased segregation, densities, growth in the informal market, and commodification of housing within slum pockets.

1 Slum clearance as a governmental approach has been seen throughout history. Slum evictions were heightened during the 1970s and 80s in response to many failed development strategies aimed at the economy. Clearance was pursued without compensation or alternative choices for the displaced populations. The government believed that without housing populations would disperse. However, the masses simply migrated elsewhere in the city, often at the periphery.
(Re)designing approaches: relocation

Major shortcomings in relocation have resulted from the lack of consideration in the structure of slum typology, community, and horizontal spatial overlaps integral to daily functioning. Government strategies soon shifted towards the relocation of slum areas, in theory providing alternative housing and services. This has produced a wide range of outcomes, from success to utter failure. The provided housing often attempts to consolidate masses by expanding vertically. This high-rise typology destroys the interdependent use of private, work, and public space. Much of the entrepreneurial ventures within the slum residence are dependent on the use of their home as a base for business and production. The cookie cutter housing blocks inherit no flexible nature or link to public space, challenging the livelihood of many slum dwellers. Social cohesion in the shared space no longer exists.

However, there have been several successful relocation schemes – always adopting a participatory process that takes cues from bottom-up design. As slums proliferate in illegal and otherwise unusable land, they often exist in threat of flood, land erosion; danger in proximity to rail tracks; and health implications from waste sites. In many of these scenarios, slum relocation can act in both the government and residence interest.

This was seen in the slum settlements that have grown along the rail lines that connect the periphery to the heart of Mumbai. The dwellings are built within three feet of the rail tracks. This becomes extremely dangerous for the inhabitant of the slum, especially children who often fall victim to the passing trains. The close proximity also reduces speed of trains, slowing transit of commuters into Mumbai. The three entities involved – slum dwellers, the Railways, and government – worked in unison to provide an alternative means for rehousing the slum population. Although having to fund much of the initiative, the Railways benefited by increased train speeds. The slum squatters received housing improvements with...
(Re)designing approaches: upgradation

Widely used today, upgradation schemes accept the slums and work to provide increased housing, infrastructures, and sanitation in effort to integrate the informal with formal.

Projects have approached a variety of strategies including public space, improving housing stock, water supply, sewerage, transportation, introduction of specific programs (school, community center, gym), and edge condition. The various strategies identify areas in which an operation of external forces can have wide reaching effects on the informal community.

Himanshu Parikh developed ‘slum networking’ - an approach addressing several components to improve conditions on many levels of the slum. This was seen in the informal populations of Indore, India. The strategy combined implementation of services to the community to coincide with improvement to the city’s river system. This multifaceted approach benefited both the informal and formal populations and the city. The multifaceted approach engaged the slums on many levels; manipulation of the natural ground slope for water supply, sewerage and storm water drainage as well as women’s groups and micro loans. Much of the success of the project is contributed to community involvement in both implementation and maintenance. This makes a clear distinction between the government as a ‘provider’ of subsidized housing and towards a ‘facilitator’ in the slum/ government collaboration. Having a foundation of increased services and conditions, the informal residence can efficiently work towards improving their livelihood.
Upgradation, through bottom up design and grassroots approach, have proved the most successful design in addressing the proliferation of slums in today’s urban intensification.

The last several decades have produced many approaches and strategies engaging the proliferation of informal populations of the global south. Top-down reforms as seen in early development aid regimes and local governments - The Development Decade, Structural Adjustment Programs, slum clearance, and slum relocation have failed or caused damage to both city and slum. The new era in development has adopted a bottom-up strategy, incorporating NGOs and grassroots approach in conjunction with local government agendas. This has realized greater success in the initiatives such as the Millennium Development Goals and slum upgradation strategies. These approaches have operated on defining components that define the framework of the slum typology.
3.0 **current scenario**

geneology of boundary site Study
dharavi & train tracks
kibera
components of slum
Genealogy of boundary

SPATIAL SEGREGATION
social • political • economic

PHYSICAL

TOPOGRAPHICAL

INFRASTRUCTURE

RAIL
bara slums | mumbai, india

ROAD
barra de pava | sao paulo, brazil

MARSH FLOODPLAIN
makoko | lagos, nigeria

HILLY TERRAIN
rocinha | rio de janeiro, brazil

JURISDICTION
kibera | nairobi, kenya

SITE STUDIES

Dharavi train tracks
Mumbai, India

Medellin
Colombia

Informal
Formal
Site Study: Dharavi Train Tracks
Mumbai, India

Source: Royal Dutch Geographical Society KNAG (2009)
Imbalance of education distribution to population density reflects social segregation as a result of jurisdiction.
Components of the slum

ACCESS TO FORMAL CITY
The boundaries that allow for the informal to exist also operate as a social, economic, and political barrier from the formal city. The spatial segregation inhibits employment, infrastructures, Access to the formal city can engage with these issues, merging the two disparate populations in a mutually beneficial symbiosis.

CHILDREN
Poverty has an increased effect on children within the slum - vulnerability to adverse health and dependence to support family. The combination of malnutrition with a lack of sanitation or immunization leaves children vulnerable to disease. Family responsibilities are elevated, often preventing the opportunity for education.

Children within the slum are much less likely to complete primary education than children living in the formal city, placing them at increased odds to opt for the increasing employment within the slum. The decreased education makes it increasingly difficult for slum dwellers to take part in the formal city. Government expenditure on education systems often overlook the population densities of slum pockets across the city.

COMMUNITY
The social cohesion in slum community is immense – enabling it with agency. Slum community as an external force can exert political pressure and reduce crime. Internally, the community supports and provides for individuals within. This can be seen in the micro-finance strategy to target groups of women for their cohesion and interdependency. The group is much more able and likely to pay the loan back as a community rather than individual.

COMMUNITY INVOLVEMENT
The success of bottom-up design and grassroots approaches illustrate the importance of community involvement in both the implementation and maintenance of slum initiatives. Blanket approaches and top down strategies have largely failed. Initiatives developed to be responsive to cultural and need specifics have a greater chance of success and acceptance within the community.

CRIME
Although crime can become problematic within slums, it is often not nearly as bad as portrayed in the media. However, certain elements such as edge conditions can create friction zones that exist in the boundary can foster crime, violence, and drugs.

EDUCATION
Children within the slum are much less likely to complete primary education than children of the formal city. Lack of education increases the chances of children joining the informal workforce, encouraging them to stay within the slum. The household dependence on girls to fetch water and provide food results in an increased disadvantage to access education.

EMPLOYMENT
The edge condition of slums creates a clear distinction between legal and para-legal employment. For many slum dwellers their job only provides the resources to survive day by day, without immediate or long term security. Division of the two cities creates redundancy in the labor force – duplicate copies on either side.

GOVERNMENT
Governments fund most projects engaging with slums; however the most successful strategies have been born from a collaboration between government, architects, and community leaders. The flexibility of government to accommodate adaptations to zoning, regulation, and policy become paramount to the success of an intervention within the slum. This is clearly seen in the Manguinhos Complex case study.

HEALTH
The limitation of sanitation, water, and food leads to adverse health effects within the slum, especially children. The combination of these elements with a concentration of low-income residence leads to sickness and disease including malaria, respiratory infections, and diarrheal diseases.

INCREMENTAL HOUSING
Slums possess a dynamic nature of constant evolution and rebuilding. Fluxuations in family size/ capital investment/ home based entrepreneurship dictates the expansion or contraction of the dwelling. Relocation projects that provided static housing fail to translate slum life into a highrise. Successful projects allow for the evolution of the building to adapt as seen in the Quinta Monroy Housing by Elemental.
LAND TENURE

Squatting on illegal land inherently complicates inhabitant’s security and livelihood. Security of tenure is always a factor determining slum functioning – putting dwellers at constant risk of eviction from government or slumlords. The increasing densification of slums makes free land within the city a thing of the past. This has an effect of commoditizing squattable land. If slum inhabitants do not have the luxury of owning their settlement, they often pay rent to a slum lord. This is particularly prevalent in slums of Kenya.

Hernando De Soto is seen as the father of the movement to provide slum dwellers with security of tenure. Providing tenure to the residence empowers them with a source of investment and credibility. The home becomes a physical investment allowing for residence to invest in their homes and raise the standard of living. The house as a physical manifestation of capital also allows for credibility, raising the potential of livelihood.6

However, residence who cannot afford to initially purchase the land within the slum – the bottom portion of the poor, do not benefit from land tenure. Davis argues that the ones who need land tenure the most are excluded from the benefits of the initiative.9 Although the strategy is not all encompassing and certainly not the golden ticket, it has significantly alleviated conditions of slums across the globe.

LIVELIHOOD

Outside of health, security of livelihood in the slum can often be the largest challenge: a combination of dwelling and employment. The illegality of squatting and lack of employment security create the means of livelihood a day by day challenge for the slum resident.

LOCAL BUILDING RESOURCES

The use of local building resources, both material and labor, make construction significantly cheaper and therefore more pertinent within the slum.

LOCATION

When work is too far displaced the cost of transportation can become impossible for the income of the inhabitants – often demanding up to half of a daily wage in travel alone. Slums exist in patches across cities as a result of both availability and proximity to work. The informal economy represents such an intrinsic foundation to the formal city that displacing the slum location can be hugely detrimental.

MONEY

Commodities have a skewed pricepoint resulting from the lack of infrastructures. In many cases, water becomes several times more expensive within the slum than the formal city – leading to a severe limitation of water.

NGO

NGOs offer a grassroots approach and understanding of slum – operating from a bottom up approach. The collaboration between government and NGOs proves successful in the balance of both parties interests.

POINT OF OPERATION

With limited resources the government cannot provide adequate housing. As such, strategic projects and insertions that produce agency on a larger scale becomes the greatest design challenge.

PUBLIC BUILDING

Public buildings have an increased agency within the immense community of the slum. The presence of community buildings can reduce crime as seen in the Metro Cable Project case study.

PUBLIC SPACE

The distinction of space defining private, work, and public is blurred – becoming interdependent. The functioning and intricacies of the slum can be understood on a continuous plane. The understanding of public space within the slum becomes paramount to both social cohesion and livelihood.

SEWERAGE

Without infrastructure, support from the government sewerage infrastructure can by very limited. In many slums of India and Africa the government provides toilet blocks to serve entire communities. These Toilets are often left uncared for and quickly overfill and become highly unsanitary. Slums in Kenya are known for ‘flying toilets’ – residence bagging the excrement and launching it as far from their own dwelling as possible. Many residence in the slums of India utilize the land immediately adjacent to train tracks as bathrooms. These conditions lead to severe health problems.

TRANSPORTATION

The lack and expense of transportation becomes another boundary for the slum. Without transportation infrastructure, only employment within a walkable radius of the slum remain an option for residents. Greater distance increases both time in travel and expense; enough to become as much as half a daily wage.
WATER
Water is a critical aspect in the daily functioning of slum life – often becoming a commodity. As the slum exists outside the influence of the city service network, availability of clean water can be sparse. The lack of water leads to many health implications such as diarrheal diseases and malaria. In many slums such as found in India and Kenya the only availability of water exist in water spouts often removed from the dwelling. Water as a commodity enables the inflation of prices far beyond that found in the formal city.

WASTE MANAGEMENT
The lack of infrastructure within the slum makes waste management a challenge. The presence of waste management decreases sanitation and therefore health conditions within the slum. In many slums of Kenya, no infrastructure exist to deal with human waste. This leads to uncontrolled [discharge] of excrement and health implications.

WOMEN
Women are more affected by the shortage of services within the slums then men. The household depends on females to acquire water, which in the case of far removed water standpipes can require several hours of commuting a day. This time can mean the difference between having an opportunity for an education or not. Also, within many developing countries it is frowned upon for females to go to the bathroom in public as men do. With a lack of sewerage within house, this leaves time between sunset and sunrise, putting females at increased risk of being victimized at night. Women have also found to be a highly motivated and responsible entity within the family, leading to better with financial accountability. Micro finance initiatives have identified women as the ideal target group within the slum.
4.0 strategies of intervention

case studies
PREVI: Lima
metro cable
mangueiros complex
taxonomy: engaging the boundary
a new architecture?
PREVI began as an experimentation into incremental housing, mimicking the dynamic and fluctuating needs of households. The project incorporated designs from 14 architects to create a neighborhood of subsidized housing for Lima.
However, a governmental crisis terminated the project. Only one third of the units proposed were built - handed over to the residence as partial construct, without guidance or technical assistance...
“...the families, turned into incidental architects, had completed the project and transformed it into a consolidated and integrated piece of the city.”

- Fernando Garcia-Huidobro

The partial foundation of housing offered a flexibility for the residence to evolve and grow the neighborhood in a much more successful way than traditional housing typologies.
In response to the government’s original proposal to demolish existing houses to make way for road infrastructure, Urban Think Tank consulted with architects, planners, barrio leaders, and locals in search of an alternative solution. Through collaboration the team proposed a cable car as a better solution than roadwork. The metro car was implemented connecting three stations in the favela, along the mountain ridge, with two stations integrated into the transportation network of the formal city. Additional programs are introduced into each station to augment social and cultural aspects of the favela. The metro cable not only enables the vertical movement of favela residence with the community but integrates them into the formal city.

The government’s initial proposal to clear a significant portion of the slum as a means to provide transportation infrastructure had massive implications and detriments to the fabric of the slum. The machinery necessary to construct roadways on difficult terrain would require a large portion of the slum to be demolished. The introduction of roadways is divergent with the social grain and fabric of the existing neighborhoods. Urban Think Tank – as the architect generalist – consolidated the knowledge of city planners, university activists, and barrio leaders to formulate an alternative proposal.
In conjunction to dissolving the edge condition, the design utilizes social densification of stations to provide publicly enriching programs.
Although the program successfully created a transportation infrastructure linking into the formal network, the engagement of jobs and workforce was not directly addressed. Favela residence are provided with a means to access the formal city but no supplemental programs such as space for a market. The implementation of the metro cable in conjunction with additional programs such as space for a market, are integrated into the stations. The influence of an architect made possible the synthesis of collaboration between city planners, barrio leaders, and locals into a design. This relationship brought an alternative approach that was not accomplished through the officials in the government planning department.

The implementation of the metro cable in conjunction with additional programs facilitating the social and culture aspect of the favela produced effective and quickly realized success. The combination of public buildings with public space created a sense of community as well as an outlet for children which ultimately lead to a 30% reduction in surrounding crime.
The metro cable is particularly successful in dissolving the edge condition by connecting deeply into both formal and informal, producing a far reaching effect on its surrounding context through the use of program in addition to transportation infrastructure.
The edge condition that defines the informal settlements of Manguinhos in Rio de Janeiro promotes social boundaries and segregation. The Favela Bairro Project engages this issue by blurring the distinction between the formal and informal city. Existing train lines create a definite boundary between the two adjacent neighborhoods. Jorge Jauregui design elevates the rail line and introduces programs that support community space - shared by residence on either side of the track. Social, cultural, park, recreation, and sport programs are introduced. The scheme also engages with infrastructure, accessibility, and organization of social nodes within Manguinhos. The scheme integrates the informal settlement into the formal city through an operation along the edge condition.

Rail lines that define the boundary and edge condition of Manguinhos have lead to segregation and crime. The severance of informal from formal rejects the community from job opportunities and social inclusion. The disconnect also promotes drug trafficking, gang crime, and violence. In the upgradation of the settlement the boundary condition became a major inhibitor.
Integration of informal with formal city promotes livelihood of residents

Integration of the informal and formal city

Community input through public hearing and meetings

Architectural agency synthesizes goals of government with the community

Public buildings provide community centers and social interaction

Public space through parks, plazas, and spaces for gathering

Transportation system services tram, subways, and Angpaoi

Process

Raising train tracks that divide formal from informal, inserting public space and programs underneath begins to dissolve the edge condition - blurring the spatial segregation

Increase of education

Public buildings and space create sense of community

Architectural agency

Community

Goals

Government

Integration

Public space

Transportation

Train tracks

Dissolve edge condition

Blurred spatial segregation
Response and facilitation of community and NGOs from the flexibility of government combined with architectural agency became critical for the design of the initiative.

Architectural agency allowed for the initiative to dissolve the edge condition and spatial segregation.
The project dismantles the edge condition both physically and socially, however the static design permanently encrusts the delineation between formal and informal.
The programs are fragmented and placed into horizontal bands, creating intentional explicit boundaries and edge conditions. This configuration allows for a maximum amount of tensions which produce new programmatic mutations and relationships.

2 Small scale elements – designed to be autonomous - are distributed across the site in a grid. The methodized system creates predictability and unity through the site; however the scaled elements and each program mutually influence each other, creating new definitions.

3 Circulation provides a means to traverse and exploit the new programmatic mutations from boundaries.

The design purposefully arranges programs in horizontal bands to create explicit edge conditions; the friction creating new understandings of program and providing a foundation for the transverse circulation to be in opposition to
Taxonomy: engaging the boundary

RAIL
- Bandra slums | Mumbai, India
- Kibera | Nairobi, Kenya
- Makoko | Lagos, Nigeria

ROAD
- Barrio de julio | Caracas, Venezuela
- Rocinha | Rio de Janeiro, Brazil

HILLY TERRAIN
- Boa viagem

JURISDICTION
- RAIL + ROAD

MARSH FLOODPLAIN
- Nalagaru | Nagercoil, India

INFORMAL MARKET/VENUE PARK
- Community Center
- Library
- Nursery
- Computer Lab
- Gymnasium
- Community Training Center
A new architecture?

In a similar means to the Gestalt psychology theories, gaps produced by juxtaposition allow the user to complete the picture and fill the void with his own interpretation. Interpretation of the user allows for a continuous redefining of various components in relation to one another. Departure from the explicit use and dictatorship of architecture allows for indeterminacy, a dynamic and evolving product, defined by the user.

Approaching architecture in this method becomes particularly effective in the informal dynamic. The nature of constant evolution and ambiguities of space lend themselves to architecture that itself can become dynamic, weaving itself into the fabric of the informal. To engage the boundaries through this method allows a plasticity in the edge that allows for future blurring of spaces.
5.0 evaluating a city

- sustainable site
- health conditions
- economic integration
- scale
- evaluating:
  - jakarta
  - mumbai
  - caracas
The sustainability of a site will determine the most pertinent type of project – relocation, infrastructures, or edge condition.
Accessibility of water and sewerage has immediate impacts on health, becoming a critical foundation before alternative approaches to slum upgradation.
The edge condition divides legal and para-legal economies, forcing each to stay within its container – resulting in redundancy of economic sectors.
Increasing scale and depth of informal settlements produces a displacement which becomes a barrier from transportation networks of the city.
Evaluating: Jakarta
Evaluating: Mumbai
Evaluating: Caracas
6.0 caracas
geneology of boundary: caracas
population surge
ideals of modernism
caracas edge condition
urban development
analyzing the barrio
Genealogy of boundary: Caracas
OIL DISCOVERED
MARACAIBO BASIN

DEPARTURE FROM COLONIAL PLAN

U.S. INFLUENCE
HIGHWAY INFRASTRUCTURE

MIGRATION LAWS
COLUMBIA
ECUADOR
CHILE
PERU PARAGUAY

1914, 1920
1950-1958

DENSITY [POPULATION/HECTARE] POPULATION [IN MILLIONS]

Source: Penfold, Liverpool University Press
population living in informal settlements: 3,000,000 (60%)

population living in Petare North: 500,000 (8.3%)

land Petare North occupies in Caracas: 6,000,000

416% density of informal compared to formal population
Favelas in Caracas have evolved on the steep valley slopes, cut off from the formal city by both terrain and road infrastructures. This spatial segregation confines inhabitants and commerce within the boundaries of the formal and informal.
Ideals of Modernism

Latin America became a laboratory for Modernist architecture ideals, often erasing existing orders to establish buildings of a dictated lifestyle perched on a tabula rasa.16

Structural Adjustment Programs were felt strongly in Caracas as seen in the 1989 ‘Caracazo’ riots, a response to IMF imposed regulations.
23 DE ENERO
VILLA ZOLIA
PETARE

SEVERITY OF EDGE CONDITION

DISTANCE TO FORMAL CITY

CONNECTION TO METRO

TRAVEL DISTANCE

PERMEABILITY

VILLA ZOLIA
PETARE
<table>
<thead>
<tr>
<th>Factor</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
<th>None</th>
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</thead>
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<tr>
<td>VILLA ZULIA</td>
<td>![Image]</td>
<td>![Image]</td>
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<tr>
<td>Severity of Edge Condition</td>
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<tr>
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<tr>
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</table>
A COMPLETE EXISTING ROADS TO IMPROVE CIRCULATION NETWORK
B ALIGN ROADS TO NATURAL DRAINAGE

FORMAL INFORMAL

CIRCULATION | PROPOSED

CIRCULATION | EXISTING

LOW ACCESSIBILITY AND WATER SUPPLY

FORMAL INFORMAL
A ESTABLISH SUB COMMUNITIES TO MANAGE RAIN WATER INFRASTRUCTURE
B INTEGRATE AUXILIARY PROGRAM ABOVE WATER HOLDING TANKS
A UTILIZE INFRASTRUCTURE AND SPATIAL DIVISION TO CREATE ECOTONE
B SPLICE BARRIO ROAD INTO CITY GRID TO CREATE A CONNECTIVE ARMATURE
C DISTRIBUTE AND INTEGRATE IMBALANCED PROGRAMS ALONG SPINE

ESTABLISHING THE ECOTONE
MITIGATING HIGHWAY RAMPS
A RELOCATE DISPLACED BARRIO RESIDENCE TO ECOTONE
B RELOCATE RESIDENCE FROM UNSTABLE TERRAIN TO ECOTONE

accessibility

networked communities

police presence

increased house value

higher value

SLOPE ANALYSIS | BUILDINGS AT HIGHEST RISK

RETAINING WALL + PUBLIC SPACE

DISPLACED RESIDENCE
Tenure will be provided to dwellings existing on sustainable sites, however land plots that are at increased risk of landslide due to slope are relocated to housing within the ecotone.

The holding provides a foundation to provide auxiliary programs to the surrounding barrio and to the community. The framework supports future growth and adaptations in program scope and footprint.

<table>
<thead>
<tr>
<th>Parks/Recreation</th>
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<th>Market/Train Station</th>
<th>Expansion to Road</th>
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<td>62.5 m</td>
<td>10%</td>
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</tbody>
</table>

SCOOTT REYNOLDS
The holding tank provides a foundation to provide auxiliary programs to that the surrounding barrio is lacking. The framework supports future growth and adaptations in program scope and footprint.

Restructuring and reorienting the road network facilitates accessibility to the barrio. This increases the physical connection between formal and informal as well as the availability of public services such as water, electricity, and sewage infrastructures.
11. Slum networking reading