SLUMIFY
Qualifying Informal Urban Densification
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Conclusions from theory

HOW CAN ONE QUALIFY A SLUM?

A framework which endeavours to qualify a slum must make up for the blind spots which are evident in existing frameworks. This is achieved by proposing a number of tools which may be utilised in order to understand the parameters extracted from the research.

The theoretical investigation aided in the digestion of relevant parameters, and the suggestion of which tools are relevant to the qualification of the different parameters. The description of the tool alone is not enough to formulate a means of educating people about working in slums. One needs to understand the onsite implications of utilizing the tool on order to formulate a means of qualifying a slum.

It is henceforth relevant to develop a set of guidelines, including examples from practice, which may aid in the education of architects, students and practitioners who are immersed in a similar position to the architects, students and practitioners who

local community at the centre point of the course of action. Allowing one to consider context specific projects and ideas which allow for the development of people, rather than the development of buildings. The guidelines must initiate a participatory course of action, thereby placing the community at the centre point of the discourse.

A comprehensive approach is called for, aligning to the premise put forward by adopting a qualitative research methodology. A certain level of standardisation must be allowed in order to facilitate the qualification process, but flexibility must be built in to accommodate context specific issues which may influence the results.

Parameters gained from the research may be quantified and qualified, in order to qualify the slum. This allows one to recognise potentialities of the site. The implication is that various different methodologies and tools will be utilised in order to qualify the slum. This approach is incredible useful in formulating a course of action for qualifying a slum environment as it allows one to consolidate a number of existing tools in a manner which allows one to fully understand the constructs of the site.

The guideline document puts forward a means of qualitatively appraising a site, thereby qualifying informal urban densification. The guideline document acts as a point of departure for a process of appraising a slum, and eventually formulating a means of upgrading said slum.
The map of the guidelines forms a complex summary of the preceding theoretical research. A map was produced in order to understand which tool applies to which parameter.

The multiple parameters were summarised into 16 major categories in order to simplify the process. These categories are assigned with various tools which may aid in the appraisal of the site.

It is important to realise the multiplicity of tool usage. One tool may apply to several categories. Therefore it is suggested that a detailed plan is formulated, regarding which information is necessary and how that information may be gathered, before embarking on the mission to qualitatively appraise the context in which one is working.
"If you want to know how the shoe fits, ask the person who is wearing it, not the one who made it"

Nick Wates (Wates, 2000)
WHY DRAW A SLUM?

The majority of slums are not mapped, they don’t exist on formal maps, and yet are abundantly clear on satellite images of the same areas.

In order to study a site it is important to first understand the morphology and topography of the site. The study of the surroundings and the rough study of the distribution of housing can lead to an in-depth understanding of how people organise their own space.

The act of putting marginalised communities on the map is in essence an act of empowering the people. Map Kibera, a project in Nairobi Kenya, endeavours to put Kibera on the map. By giving form to the settlement, its problems are highlighted and opportunities are exposed.

Maps are incredibly powerful. A map can be entered into evidence in court, to stop evictions. It can be utilised by other agencies in order to raise awareness. It can also be presented to government officials in order to highlight issues and garner a response.

A map can help slum dwellers negotiate with city authorities. They give slum dwellers a voice, show them that they are part of the city, and that they are important.

Use the high-resolution image as a base to conduct detailed independent analysis of the site. It may be useful to utilise the resultant image as a base to draft a detailed plan of the site for future site investigations.

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HOW TO DIAGNOSE THE TOPOGRAPHY

1. Open Sketch-up and delete the main
2. Insert the location from Google Earth
3. Draw a rectangle around the extents of the site, ensuring that it is below the lowest point on the landscape
4. Choose at which intervals you wish for the contours to be at
5. Copy the rectangle vertically enough times to cover the topography
6. Select all the geometry and intersect with selection
7. Delete excess geometry
8. Use the map as a base in order to understand the landscape

Draw different elements on different layers in order to make sense of different parts of the site, such as transport, typologies, natural features, etc.

USE GOOGLE EARTH TO REMOTELY ANALYSE THE SITE

USE GOOGLE EARTH TO REMOTELY ANALYSE THE SITE

Grasshopper makes the modelling of settlements a lot easier. Use a script to project the volumes onto the landscape.

Understanding the spatial construct of the site is important; it forms the base on which the rest of the research will grow.

*Final map of Kliptown Informal Settlement (author, 2015)
Understanding the climate

WHY IS THE CLIMATE SO IMPORTANT?

In order to fully understand the environment surrounding the site, one must analyse the climate of the area. Climate is the first thing that architects and designers should consider when designing a building, as it dictates which design strategies are most suitable for the site.

Issues that need to be analysed and presented are: temperature, humidity, relative solar position, average precipitation, and wind. These elements provide a comprehensive view on the climate and resultant strategies. Furthermore it is important to map how the climate affects the people living in the settlement, and what can be done differently in order to mitigate these effects.

The climate information may be presented in a number of ways. The most common way to show temperature is in a chart, mapping monthly averages and extremes, and average daily sun hours. Humidity will most likely be shown in a similar way. The solar position is commonly mapped as a sun path diagram, in order to ascertain the implications of the suns daily and seasonal changes. Precipitation is shown by means of a chart. The chart will include monthly averages and extremes. Wind is displayed by means of a wind rose diagram.

SUN POSITION DIAGRAM

The position of the sun in the sky provides valuable insight into potentials of shading structures. The sun diagram itself is readily available from http://www.sunearthtools.com/, but might prove tricky to understand. It is also possible to model the position of the sun in order to understand the direct design implications.

[Image of Sun Position Diagram]

**STEPS**

1. Select the chart of the correct Latitude.
2. Select the date line.
3. Select the hour line and mark its intersection with the date line.
4. Read off from the concentric circles the altitude angle.
5. Lay a straight edge from the centre of the chart through the marked time point to the perimeter scale and read off the azimuth angle.

TEMPERATURE

Temperature data is given as a monthly and daily average. Temperature is the most obvious metric to consider for passive heating and cooling design. The metrics can teach you both about the air temperature and the humidity.

**HUMIDITY**

Humidity is just as important as temperature for human comfort. People generally prefer relative humidity to be within a range of 40% to 55% or between 30% to 70%. Humidity affects which passive heating or cooling strategies are most effective. For instance, evaporative cooling is far more effective in a dryer climate.

**AVG. PRECIPITATION**

Understanding the amount of rainfall that is expected to fall each year, leads to an understanding of how much water will be able to be harvested from such a site, as well as how many days will be available to harvest water.

**WIND**

The average wind speed and a description of the prevailing wind is extremely important for the optimization of passive design strategies. Wind information is readily available on the majority of meteorological websites.

*climate data for Klipskop (author, 2015)*
In order to get a good understanding of the feeling and atmosphere of the slum environment one must take a walk through the environment as a first step. The most widely used method of organized slum walking is the “transect walk”.

A transect walk takes approximately two to three hours to complete and involves systematically planning routes through the settlement in order to map the surroundings. The transect walk is an information gathering exercise. It is important to find a local who will be able to advise as to the route through the settlement, and perhaps accompany you en-route. The simple tool is easily adopted and replicated at the community level. The method involves outdoor activities, on-field observation, discussions and diagramming.

WHY WALK THROUGH A SLUM?

The deliverables include transect diagrams, drawn on large sheets of paper, and on the floor. The value of the transect diagram is in the analysis, key questions which may be answered are:

- What resources are abundant, and which are scarce?
- Where do people obtain water and firewood?
- What constraints or problems are in the different areas?
- Is the community segregated or mixed?

The deliverables are as diverse as the equipment utilised in order to achieve them, the most valuable deliverable is a thorough understanding of the site.

EQUIPMENT

- map
- large sheets of paper
- notebook
- pens & markers
- pencils
- coloured stickers (for map)
- post-its
- cardboard

you can use many different materials, as diverse as a stick and the ground in order to document the process.
Through the use of a prepare semi-structured questionnaire, information will be gathered on site, in order to understand individuals and community dynamics. The methodology of gaining answers to the questions will be through casual conversation, rather than the filling out of a form. The informality of the methodology is necessary in order to receive accurate answers to the questions, and it acts as a means to receive extra, unsolicited information. If needed, a translator, or third party will be asked to assist with the questions. According to Michiel Smits, the inclusion of a third party in the survey process facilitates more honest responses to the questions asked. This third party will be responsible for asking the questions, and recording the responses, and should therefore receive a certain amount of training before hand. The level of questions asked must be easy enough for all to understand, in order to ensure factual and to the point answers. The adjacent factors, categories and resultant questions provide a grounding to the surveying process, but are in no way conclusive.

WHICH QUESTIONS MUST ONE ASK?

The answers to the questions will form a broadscale understanding of the construct of the community. A summarised report can be written, based on the answers to the questions in order to understand the information. If necessary or relevant infographics can be utilized in order to convey the outcomes found in the investigation. Videos of the conversations can form part of a final site investigation. The survey outcome should provide insight into the psyche and construct of the individual and community dynamics. By talking to people you will gain a better understanding og their issues.

**TYPICAL QUESTIONS & FACTORS**

**SOCIO-CULTURAL FACTORS**
- How do the community members make a living?
- Do they have access to clean water?

**TECHNICAL FACTORS**
- What is the housing like?

**ECONOMIC FACTORS & CONDITIONS**
- How do they prioritize their expenditures?

**POLITICAL FACTORS & CONDITIONS**
- What type of relationship does the community have with local, regional and national branches of the government?

**ENVIRONMENTAL FACTORS & CONDITIONS**
- How do they handle their waste?

**COMMUNITY HEALTH FACTORS & CONDITIONS**
- How often are they sick?

**INSTITUTIONAL FACTORS & CONDITIONS**
- Are there any NGOs or other service based organizations in the area?

**EDUCATIONAL FACTORS**
- What level of education do children typically complete?

**RELATIONSHIPS**

**ENVIRONMENT**

**MATERIAL WELL-BEING**

**COMMUNITY**

**LEGAL & POLITICAL**

*Refer for the theory chapter on quality of life in order to understand the different sub concerns associated with the categories*
### Participatory Mapping

Participatory Mapping is the “bottom-up approach” that allows people to create their own maps, reflecting the true nature of their site (Warner, 2015). Community mapping is a form of participatory mapping which utilizes community spatial knowledge around a given area in order to quantitatively and qualitatively map the area.

When understanding a mapping it is important to consider three distinctive levels. The first level is the municipality data, or in the case of the majority of slums, the satellite imagery used as a base for mapping. The second level is too fine to be mapped by city officials, this is the layer that mapping is interested in. It is the layer that contains things that are there, but are not widely available to all. The third layer is how people actually experience what is already there (Warner, 2015).

Mapping is an effective way to understand how people perceive the settlement. It is a great way to gather vast amounts of data, and to understand the differences in perspective held by the stakeholders. The mapping exercise acts as a basis for joint planning. Individuals or groups create physical maps of their neighbourhood. Different layers of evaluation will be provided.

### Typical Factors to Map

**LANDMARKS**
- Community Elders
- Shops & Spazas
- Bridges
- Water Points
- Trees
- Illegally Zoned Spaces
- Recycling Centers
- Transport Nodes
- Places for Children
- Toilets
- Light Poles
- Electrical Points
- Community Centers
- House Names
- Dumping Places
- Sports Facilities
- Community Elders
- Frequently Visited Places
- Dangerous Places

*Factors are recommended by MIT and Warner 2015

### Equipment

- Map (for reference)
- Large sheets of cardboard
- Notebook
- Pens & markers
- Coloured stickers (for map)
- Post-its
- Tape
- Pins
- Cardboard
- Chalk
- Colored stickers (for map)
- Post-its
- Tape
- Pins
- Cardboard
- Chalk

*In order to understand the spatial quality of the site, it is vital to understand the community’s perceptions their surrounding. Community mapping allows one to understand specific points and their qualities, or distinct lack thereof.*

### Deliverables

The outcome will be a cumulative layered map created in order to provide a definitive understanding of the area. The map will showcase the settlement as seen from the perspective of the inhabitants. The map acts as a second layer to the previous mapping exercise.

*The formal deliverables depends entirely on what is relevant to the specific project, or endeavor. The project may call for a formalized map, or simply a sketch.*

In order to understand the spatial quality of the site, it is vital to understand the community’s perceptions their surrounding. Community mapping allows one to understand specific points and their qualities, or distinct lack thereof.

*An example of community mapping in Kliptown (Author, 2015)*

*Mapping of Kliptown in 2015 (author, 2015)*

*Use low-tech solutions, such as stickers on maps to document the site*
Taking Photographs

IS THERE A MEANS OF PHOTOGRAPHING POVERTY WHICH DOES NOT SEEM DEGRADING?

Photography is often used to document an urban condition. When carrying out this process within slum environments, an outside researcher is confronted with two notable reactions. The first reaction is the hoards of children who will pose and request the photographer to “shoot” them. The excitement at seeing their face on the camera is contagious, and leads to a fair amount of distraction.

The second reaction is that of contempt, many people are tired of tourists with DSLR camera’s taking pictures of them. The degradation of the act of photographing them in their often desperate state is often too much.

To counteract this a photography workshop, or survey is proposed. People are provided with cameras of some sort (disposable cameras are suggested, but digital cameras may also work), and are asked to photograph their surroundings pertaining to various themes. The individuals or teams take pictures of their settlement.

After processing the pictures. The photos are sorted, selected and placed on large sheets of paper or maps. Comments and ideas may be added to these sheets (Wates, 2000).

*Themes are recommended by Wates, 2000

TYPICAL THEMES TO PHOTOGRAPH

MEMORABLE PLACES  BEAUTIFUL PLACES
UGLY PLACES  PLACES TO BE ALONE
PLACES TO SOCIALIZE  PRIVATE PLACE
PUBLIC PLACES  UGLY BUILDINGS
BEAUTIFUL BUILDINGS  THREATS

EQUIPMENT
- disposable camera
- map (for reference)
- large sheets of cardboard
- notebook
- pens & markers
- coloured stickers (for map)
- post-its
- tape
- pins
- cardboard

DELIVERABLES
Ning Tan, a facilitator in a Philippines workshop pointed out that she was surprised as to how the photographs added a new dimension to everyone’s perception. The photographs themselves are valuable deliverables. The photographs provide valuable insight into the perceptions of the people taking part in the workshop.

The camera is allowed into places that the typical researcher would not be allowed, and therefore provides an extremely intimate look at the slum, from a societal perspective.

*Instructional image (author, 2015)
Models are extremely useful when interacting with people with little to no spatial awareness. When working in a slum environment it often takes a long time to explain the concept of a map, and the subsequent understanding of that map is also limited.

The use of models, in any shape or form, is therefore very useful when trying to understand the problem. In Kliptown, the objective of the model building exercise was to decipher the priorities of people when considering their dream home.

Using spatial techniques, based on scaled blocks that were to act as building materials and components, people were asked to build and explain the building of their dream house, from this exercise the priorities of different age groups could easily be deciphered.

Although the scale of the model was not understood, the blocks aided in providing spatial awareness to the problem, and acted as a platform to engage in meaningful conversation about the priorities of the various stakeholders.

- Map (for reference)
- Cardboard
- Blocks
- Glue
- Tape
- Notebook
- Pen
- Clipboard

**HOW CAN MODELS INCREASE THE LEGIBILITY OF THE PROBLEM?**

[1] Identify the core problem to be dealt with in the workshop.

[2] Design a means of spatially representing the problem in order to allow people to build their solution.

[3] Prepare the materials necessary for the model building.

[4] Select and organise a venue for the model building of each participant independently.

[5] In order to actively engage in the outcome, it is recommended that one researcher should observe the model building of each participant independently.

[6] Take note of the process, and photograph the end result in order to ensure that data is not lost.

[7] Consolidate the data graphically, or through a written report

Building models in the way it is suggested, is a means of engagement and not a means of design.

*model building in Kliptown ca. 2015*
WHY SHOULD ONE ANALYSE THE TYPOLOGIES OF THE SITE?

Don't ask me what poverty is because you have met it outside my house. Look at my utensils and the clothes that I am wearing. Look at everything and write what you see. What you see is poverty. - A poor man, Kenya 1997

The issue of slums raises a large problem in terms of accurate data collection, whether physical or socio-economic or spatial. Through on-site work, it is found that it is easiest to collect data on a small scale and then extrapolate that data and apply it to the settlement as a whole.

This starts with the analysis of individual typologies. There are many different typologies available in any informal settlement or slum, but one can extrapolate various categories which the majority falls under. By doing this, one can systematically and accurately model the situation in one of the dwellings within the larger category, in order to gain an in-depth understanding of the living condition within a slum.

By drawing the house, one learns about the construction methodology, by drawing the interior one will formulate an understanding about typical belongings, and by drawing the thresholds, one understands how the house interacts with its direct environment.

The deliverables of this tool are bi-fold. A catalogue of typologies forms an interesting and important means of education. The typologies will also serve as an input to the tool which deciphers lessons from existing typologies.

**TYPICAL TYPOLOGIES TO MAP**

<table>
<thead>
<tr>
<th>HOUSING</th>
<th>SANITARY SPACES</th>
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</thead>
<tbody>
<tr>
<td>COMMUNITY HALLS</td>
<td>SHOPS/SPAZAS</td>
</tr>
<tr>
<td>ENTERTAINMENT</td>
<td>BARS/SHABEENS</td>
</tr>
<tr>
<td>RECYCLING CENTERS</td>
<td>VEGETABLE GARDENS</td>
</tr>
<tr>
<td>MEETING POINTS</td>
<td>CHURCHES</td>
</tr>
<tr>
<td>WATER POINTS</td>
<td>MIXED USES</td>
</tr>
<tr>
<td>TOILETS</td>
<td>BRIDGES</td>
</tr>
<tr>
<td>LIGHT POLES</td>
<td>TRANSPORT</td>
</tr>
</tbody>
</table>

**STEPs**

1. When on site make sketches, measures and pictures of relevant typologies
2. Draw the typologies, whether, sketched, modelled or simply drafted in order to understand the make up of the house/centre.
3. Consolidate the data in a comparable way.

**DELIVERABLES**

The deliverables of this tool are bi-fold.

A catalogue of typologies forms an interesting and important means of education. The typologies will also serve as an input to the tool which deciphers lessons from existing typologies.
Learning from a Slum

Why Should One Learn from a Slum?

Much can be drawn from analysing existing activities and practices within a slum. The slum itself acts as an autonomous settlement, and people provide what they need for themselves. It can therefore be said that by analysing what people have done, you can understand what they need. The lessons may be drawn from any of the tools and presented in a manner which makes sense to the project.

In order to get a grip on the detailed elements within a slum, it is important to analyse and withdraw lessons from the slum itself. Alfredo Brillembourg is one of a number of prominent urbanists who believe that we can learn a great deal from slums. He points out that slums are more resilient than formal cities because they work together, produce less trash, and use fewer resources.

Brillembourg adds that what is interesting about slums is how they act as one cohesive whole. An entire slum can be regarded as a huge house. This cohesion, resulting in a new type of urban village is one of the many major innovations to come out of slums (Smedley, 2013).

The slum at its best is a "wiki-city", one where there are no rules other than the resources that are available and the collective agreements that are formed by the residents (Smedley, 2013). Brillembourg adds that the most important lessons to architects is that they are poised to become the person that designs the process rather than the form.

LEARNING LESSONS FROM SLUMS

ECONOMY OF RESOURCES

Alfredo Brillembourg explains a costly system in Zürich which seamlessly allows for the formation of many micro-economies, which may teach us a lot about informal economies.

Poverty within slums requires a level of entrepreneurship that is incomparable to formal environments. The freedom to open up a shop and participate in informal economies allows for the formation of many micro-economies, which may teach us a lot about informal economies.

Slums inherently place the pedestrian at the centre point of operation. Much can be learnt from the organization around the pedestrian.

Low energy footprint

The spirit of the settlement is entrepreneurial, people without legal status, illegal connections, and generally run on as little energy as possible, due to the difficult availability of electricity. Houses run off batteries or solar power, reducing waste emission and garbage.

Public space

Slums, as a rule, have a lot of open space due to the limited space of the dwellings. Public space is used for outdoor activities and communal living.

Food garden

Every household will have a small kitchen garden, which is usually located on the roof or a small balcony. These gardens are usually small, but still provide enough food for the household.

Pedestrian prioritization

Slums inherently place the pedestrian at the centre point of operation. Much can be learnt from the organization around the pedestrian.

Low energy footprint

Slums are extremely energy efficient. They are built in a way that they require very little energy, and even in the absence of electricity, they have a high level of efficiency.

Compacting form

The form of the house itself is often compact and efficient, minimizing wasted space.
Understanding stakeholders

WHY IS IT IMPORTANT TO UNDERSTAND WHO IS INVOLVED IN THIS PROCESS?

Knowing the objectives of all parties involved is both “predictive & strategic” and is therefore very valuable to understand who is involved in the up-grading of the slum.

The understanding of all the people involved in the project’s interests, serves to inform the riskiness and viability of the project. This is linked to institutional appraisal and social analysis.

Stakeholders are any persons, groups or institutions with interests in a project or programme. There are various levels of stakeholders within any given project. Shlomo Angel derives seven key categories of stakeholders, as shown in table 1 (Angel, 1983).

Analysing the people involved in the project draws out the interests of the stakeholders in relation to the problems to be dealt with. It can also help to identify possible conflicts between stakeholders, and potential relations between them which may be built upon, and aid in the assessment of the appropriate type of participation to be utilized.

It is therefore important to conduct a stakeholder analysis at the inception of a project in order to inform decisions that will be taken throughout the research and design phases (Overseas Development Administration, 1995).

COMMUNITY BUILDERS

- Politicians
- International Funders
- Local Funders
- Municipal Engineers
- Houses
- Community Development
- Religion
- Poverty reduction, Food security
- Undertake摸up the rehabilitation framework
- Street cleaning, Rubbish collection, Grass cutting
- Socio-economic transformation
- Theft of laundry, Illegal electricity, Winter cold
- Allocation of funds
- Allocation of funds

*important stakeholder groups (Angel, 1983)

[2] Assess the importance and impact of the various stakeholders & which are important for project success.
[3] Draw out risks affecting project design and participation
[4] Identify appropriate stakeholder participation
[5] Identify key stakeholders in the proposed project
[6] Identify power relations between stakeholders (who has the most say?)
[7] Determine stakeholder interest and potential involvement in the project.

All steps are optional

<table>
<thead>
<tr>
<th>Stakeholder Categorization</th>
<th>Local Funders</th>
<th>Municipal Engineers</th>
<th>International Funders</th>
<th>Houses</th>
<th>Scientists</th>
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<tbody>
<tr>
<td>Politicians</td>
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<tr>
<td>International Funders</td>
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<td>Religion</td>
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*example of stakeholder table from Kliptown, South Africa (author, 2015)
Understanding vulnerability

WHY MUST ONE UNDERSTAND WHO IS VULNERABLE IN THE PROCESS OF UPGRADE?

The vulnerability analysis is a qualitative means to understand the vulnerability of the community. Through the analysis of 9 possible vulnerabilities, one can map a picture of individuals vulnerabilities and family vulnerabilities and eventually community vulnerability.

There is considerable variation along “low-income groups” in the range and severity of environmental hazards present. Furthermore the presence of environmental hazards does not mean that it will harm someone; the characteristics of the individual, household or social group exposed to the hazard determines the effect that it may have.

Individuals or households that are unable to avoid environmental hazards are generally termed vulnerable. By assessing the characteristics of the individual, household or social group exposed to the hazard determines the effect that it may have.

The analysis reveals groups which are particularly vulnerable to disasters and environmental hazards, and would therefore benefit largely from the upgrade process.
HOW CAN ONE UNDERSTAND THE PROBLEM AND ITS CAUSES?

The problem tree analysis tool is central to many forms of project planning and is well developed amongst many of the leading development agencies. Understanding the problem, and the anatomy of its causes and effects around the issue, in a similar way to a mind map, helps to find suitable solutions.

The problem can be broken down into manageable and definable chunks, to enable prioritisation and clear project planning (Evaluation Toolbox, 2010). The problem tree identifies consistent issues and arguments, through a process of analysis which helps build a shared sense of understanding, purpose, and importantly action.

Problem tree analysis is best executed in small groups of six to eight people, using a large sheet of paper, in order to encourage conversation. This participatory process of planning encourages a deeper understanding of problems perceived in other parts of the qualification.

EQUIPMENT
- Map (for reference)
- Large paper/flip sheet
- Markers
- Notebook
- Clipboard
- Sticky notes

STEPS
[1] Settle on the core problem
Identify the problem that the projects seeks to overcome. Debating the with key stakeholders is a good idea. Write the core problem in the middle of the page.

[2] Identify the causes and effects.
Participants in the focus group must collectively decipher the direct causes and effects of the problem. The aim is to produce a linear cause-effect relationship for a problem tree.

[3] Develop a solution tree, also known as an objectives tree. It is developed by reversing the negative statements that form the problem tree into positive ones.

[4] Select the preferred intervention. The solution tree may present a number of separate or linked interventions which may be undertaken in order to solve the problem. The final step is to select a preferred strategy for upgrade.

The problem tree is a rudimentary means to spark a conversation between stakeholders about key problems, and interventions can easily be related to suit the situation.

*example of problem tree analysis from Kliptown, South Africa (author, 2015)
Three important concepts are evident when analysing the myriad of available literature, and become even more evident when one conducts any type of site investigation. These are density, autonomy and time; three fundamental building blocks behind the development of slums. Density refers to the current high density situation of slums. Autonomy refers to the condition of many contemporary slums, acting as proto-cities, largely independent of governmental services. Time refers to the events and policies which formulate the grounding on which the slum grows.
Projecting the Future

IS THERE A WAY TO PROJECT PROBLEMS AND POTENTIALITIES OF FUTURE GENERATIONS?

Designing for the future of slums means that one needs to understand the implications of acting in a slum environment. The environment changes so rapidly over time, that one may project a means of upgrade that works one year, and not the next.

In order to mitigate this eventuality, one can project population numbers within the slum using data from countrywide census, and mathematical projections, often available from country based statistical websites or the World Data Bank. The data should provide information that through a series of logical steps, can be distilled in order to understand the implications that the growth has on the specific settlement that you are working in.

It is important to understand the expected growth within a settlement in order to design in such a way that the present and future generations are accounted for in the up-gradation process.

The process starts from country wide data, and slowly filters it down through considering ratios of provinces/states to the global growth projections, and then down to city wide projections, and finally to area based ratio calculations.

DELIVERABLES

The deducted data may be presented in any way deemed appropriate for the project. The use of infographics such as graphs, makes the data more accessible to the viewing audience as well as to the designer themselves.

STEPS

1. Ascertain relevant data for the population projections.
2. Make a table from the data
3. Understand the percentage of the population currently residing in each province/state, and then divide the projected population growth by the ratio to understand how much population growth will occur in the specific province/state.
4. Within the population of the specific region, work out the percentage of people that the current population of the settlement accounts for within the provincial/state population.
5. Use this percentage to understand the implications that the projected population growth will occur within the given settlement.
6. Project that increase over a period 50 years or more to indicate the future projected population growth of the settlement.

Delimitations: It is not possible, without a certain extent of mathematical expertise, to accurately model the projected population growth within a settlement. This method makes use of a series of logical deductions in order to make an educated guess in order to inform the development goals of the informal settlement.

Current trend in architectural education point to the use of models and typologies as a means of setting up precedents and understanding spatial constraints. The oversimplification of social capital into spatial norms may undermine the future of development.

Greg Chrysler points out that cities cannot be considered by their boundaries, but rather by the interconnected urban networks that define them (Chrysler, 2003). John Habraken describes networks in the built environment as a series of levels, with corresponding hierarchies (Habraken, 2008).

Engaging with an unfamiliar network poses many challenges. In order to understand the autonomy (or lack of autonomy) of a settlement, one must first organically interact with the network of people, resources and services in order to fully comprehend the conditions.

It is important to consider the larger tangible and intangible networks within a settlement in order to understand the relationships and roles of people in the autonomous actions within the settlement.
**IS THERE A WAY TO UNDERSTAND THE VARIOUS LAYERS OF THE SITE**

It is essential to gain a thorough understanding of the settlement or slum that you are working in. In order to do this, the history of the settlement must be understood. It is crucial to understand why and when it was created, by whom and why the specific site was chosen.

It is also necessary to understand how neighbours and landowners reacted to the occupation of the land in order to ascertain a general feeling for the attitudes surrounding the settlement.

The role of the municipality in providing for the community should also be thoroughly understood in order to understand at which level they have acted.

In order to effectively design interventions within any context, it is essential to understand the context to the best of one’s ability.

It is easiest to understand the history of the settlement after already drawing the slum.

**Analysing History**

**STEPS**

1. **Consult literature in order to formulate an idea about the origins and reasons for the formation of the settlement**

2. **Consult historical aerial imagery in order to understand the formation of the settlement in terms of expansion over time**

   Historical imagery may be difficult to find Google Earth has historical imagery for about 10 years back, but farther than that it would be wise to access the archives of local municipalities in order to access aerial imagery.

3. **Formulate an understanding of the political and social context in which the settlement grew and extended.**

   Often occurrences within a slum are closely linked to the political context. For example, within South Africa, immediate election time, you are more likely to notice informal settlement upgrade programs.

4. **Visualise the data in a means that makes it accessible to the greater public of the settlement.**

   The layering of site is extremely important when considering a settlement when they have significant heritage value. It is essential to ascertain a location is in order to understand the scope of historical relevance.

5. **Consult local oral history in order to validate and add to your findings.**

   Oral history is an extremely powerful way in which all people in the formation of their history. Historical accounts are no longer limited to the famous or literate, but are made to include all people, and thereby give a more inclusive and hopefully accurate picture of the past. Oral history depends on living people, and therefore can only go back one lifetime.

**DELIVERABLES**

The suggested means of delivery is a graphical representation of the historical layering of the site, as shown. The output may also take the form of a report or written document whichever form is deemed appropriate for the project.
WHY IS IT NECESSARY TO EXPAND UPON THE EXISTING GUIDELINES?

It is naive to assume that research of this nature may ever be finished, or that it may belong to one person. The guidelines produced in this thesis form a start to what should be regarded as a process of iteration and additions.

More examples need to be added through comprehensive fieldwork, and more tools need to be added in order to fill the gaps which are inevitable within the short time frame of a masters research.

The guidelines are therefore presented as an incomplete base which is open to interpretation and addition.

The guidelines must be personalised, and adapted to ensure that they are relevant to the site under question.

The intention is to provide a means of comprehensively qualitatively appraising a site in question. Therefore in order to act, one must free themselves from preconceived ideas and notions and allow the process of enquiry to inform the formulation of a feasible course of action within the upgrading efforts of a slum environment.

**ADDITIONS**

Different contexts need to be approached in different ways, therefore changes and additions need to be made in order to maintain relevance.