

THE 6th Annual Building Control Officers' Convention

(BCO CONVENTION 2016)

Theme: *“Resilient Built Environment Management for life*

**Shaping the future: *Sustainable building transformation
in the South African housing sector***

Amira Osman

Sustainable building transformation within the South African housing context

My works relies heavily on Habraken's theories of Supports, Open Building levels, concepts of disentanglement by Stephen Kendall, as well as theories of material/component re-use.

Adaptability Assessment Tool (AAT)

*Assess the
adaptability
potential of new and
existing buildings*

*Assist in decision
making during the
development of new
buildings and
refurbishment/
upgrading of
building stock.*

Case Study 1
K206
London Road
Alexandra
Johannesburg
by ASA Architects



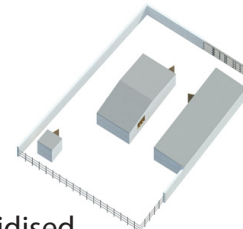
Case Study 2
Elangeni Gardens
80 Albert Road
Marshalls Town
Johannesburg
by Savage + Dodd



Case Study 3
Potters' House
288 Burgers Park
Lane
Pretoria
Tshwane
by Paul Munting



Case Study 4
Felicia's House
1015 Aces Street
Nelmapius
Tshwane
Government-subsidised



adaptation possibility

easy adaptation

moderate adaptation

intensive adaptation



independent adaptability
unconnected component



moderate connection
move, alter, adjust or possibly reuse broken component



integral connection
replace or substitute broken component

case study

X

attribute under assessment:



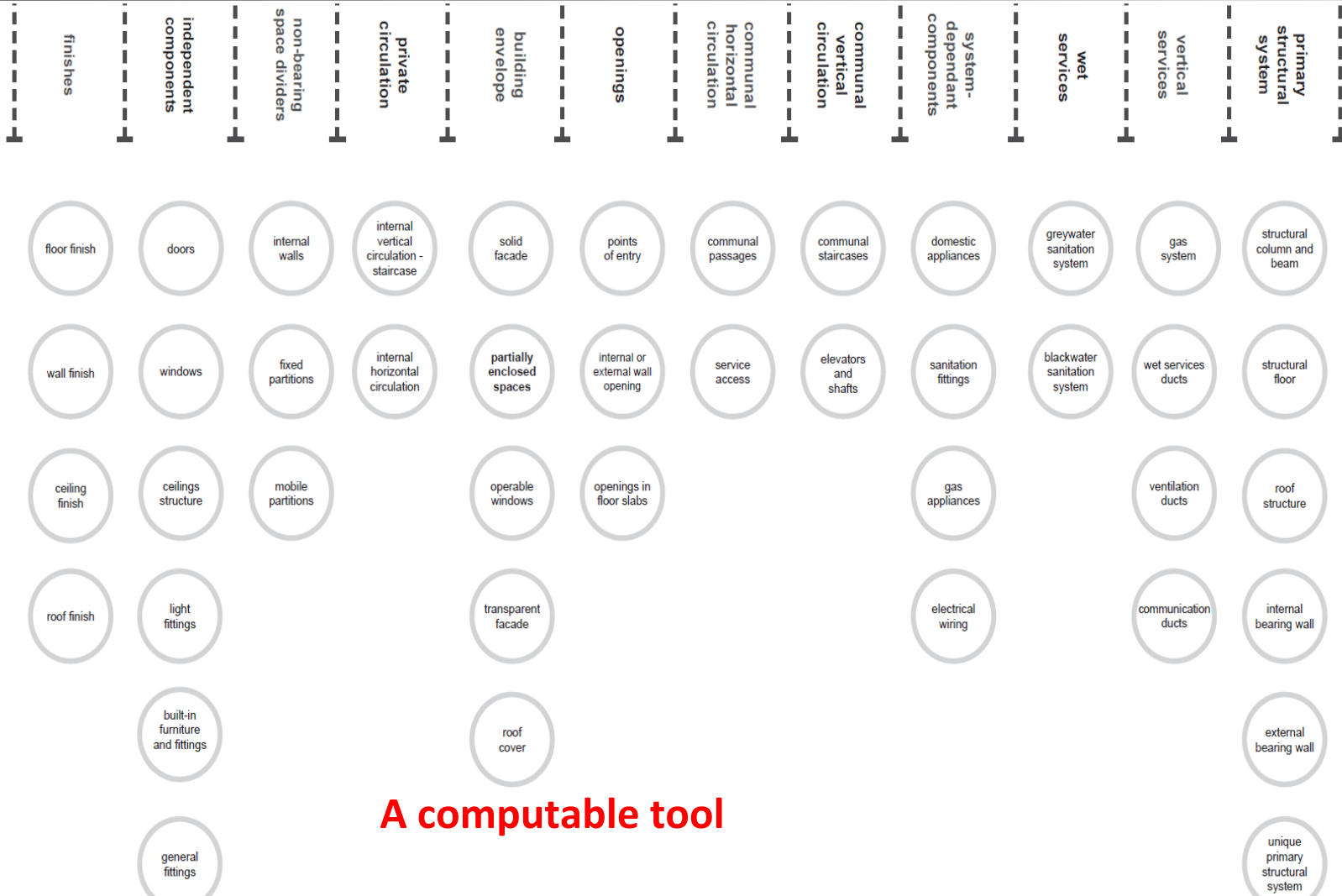
description

xxxxxxxxxxxxxxxx

result

X-X-X

xxxxxxxxxxxxxxxx xxx xxxxxxxx xxx x
 xxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
 xxxxxxxx xxxxxxxx xxxxxxxx
 xxxxxxxx xx xxxxxxxx xxxxx



A computable tool

qualitative assessment, numerical + graphical representation of building attributes

higher frequency of change

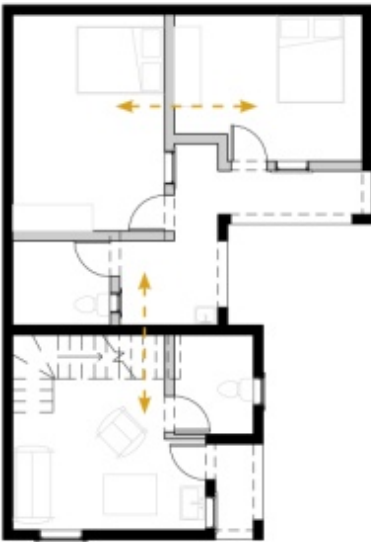
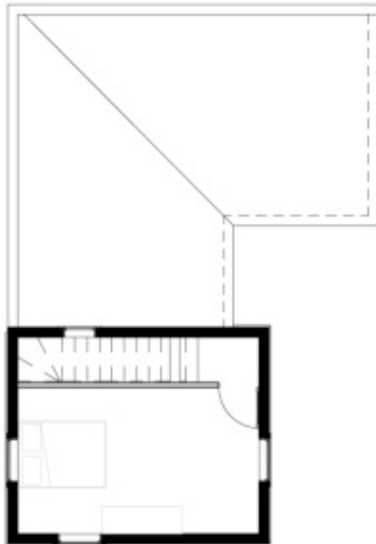
lower frequency of change

The K206 government-subsidised housing project in Johannesburg was selected for more intensive scrutiny.

Occupants of the housing project were informally interviewed to determine which building attributes they would most like to adapt and what they have already adapted.

The buildings were also further studied and attributes ranked to facilitate future consideration in the development of the tool.



	First level	Second level	Comments on adaptability potential
K206	 <p data-bbox="314 796 490 818">K206 ground floor</p>	 <p data-bbox="923 789 1058 811">K206 first floor</p>	<ul style="list-style-type: none"> <li data-bbox="1402 187 1903 268">-semi-private threshold space is easily enclosed <li data-bbox="1402 315 1850 446">-house may be extended upwards over the two rental rooms <li data-bbox="1402 494 1903 879">-the two rental rooms may be merged with the primary unit – however this means losing the threshold and creating an awkward passage in one scenario or breaking down a structural wall, under the stairs, in another

CATEGORIES	SITE	SKIN	SERVICES	SPACE
	<p>ENTRANCE</p> <ul style="list-style-type: none"> Some occupants have paved the front garden areas and some have tiles and painted the interior floors and walls. 	<p>EXTERNAL WALL FINISHES</p> <ul style="list-style-type: none"> Facelifts, exterior plastering, painting and cladding, is a common occurrence. Some residents have plastered and painted the external walls and in one case the occupant has clad the lower storey of his/her unit with stone cladding. 	<p>FITTINGS</p> <ul style="list-style-type: none"> Many occupants have or are currently installing sanitary fittings such as baths or showers; this seems to be one of the first changes undertaken 	<p>NON LOAD-BEARING WALLS</p> <ul style="list-style-type: none"> Limited breaking through walls.
	<p>BOUNDARY WALL</p> <ul style="list-style-type: none"> Internal courtyards shaped by communal driveway – in some areas, immediate neighbours have enclosed the perimeter by means of a steel palisade fence in a response to crime. 	<p>EXTERNAL DOORS AND WINDOWS</p> <ul style="list-style-type: none"> Burglar bars have also been installed as a security measure. Timber doors have replaced the original steel doors increasing the social value. Plaster surrounds of the windows and doors have in some cases been repainted with a new colour. Similarly so to have some thresholds/entrance patios. 	<p>LIGHTING</p> <ul style="list-style-type: none"> Insertion of more lights. 	<p>SUB-DIVISION OF SPACE</p> <ul style="list-style-type: none"> Some upper storey spaces have been sub divided by a brick wall resulting in very small, but private, sleeping spaces.
	<p>BUILDING</p> <ul style="list-style-type: none"> In many cases the threshold has been enclosed (by brick, glass, steel sheeting or burglar bars) to extend one of the ground floor rooms for additional living space or alternatively transform it into some or other business front (spaza shop, hair salon, etc). 	<p>SEMI-ENCLOSED EXTERNAL SPACES</p> <ul style="list-style-type: none"> The passage way along the 2 rental units is in most cases enclosed and occupied by the rental unit closest to the driveway...this requires the occupants of other rental unit to reposition door opening and their window also is also blocked off. 		

d is a narrow 3 300
y uniform reinforced
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ng walls.

icture

WINDOWS ARE
TO SMALL
& INCORRECTLY
ORIENTED
TO ADJUST
ENOUGH NATURAL
LIGHT IN

ndows

sily be upg
tenants p
Windows
preference

ices

PLASTER REVEALS
HAVE BEEN
POINTED
VARIOUS COLOURS

BRICK USED
IS NOT A COMMON
OR EASILY ATTAINED
BRICK.
NEW EXTENSIONS
HAS MADE USE
OF OTHER
BRICK TYPES

GULLEY & SEWAGE PIPING
INHIBIT EXPANSION

WINDOWS TO INSERT
WALL OPENINGS

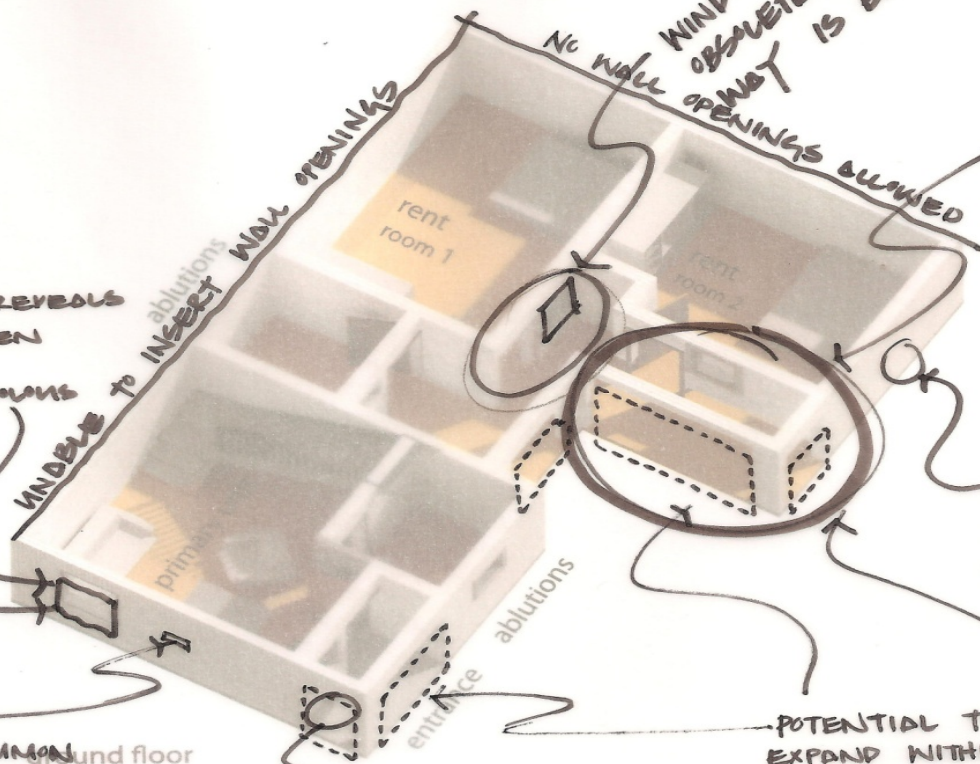
NO WALL OPENINGS ALLOWED
NO WINDOW BECOMES
OBSOLETE IF PASSAGE
IS BRICKED - UP

COMMERCIAL
OPPORTUNITY
SOME RESIDENTS
HAVE PUT UP
BURGLAR BARS
& CONVERTED
SPACE INTO
SPAZ SHOP

PAINT COLOUR IS
UNCOMMON.
NEW PAINT IS
OF A NEW COLOUR.

POTENTIAL TO
EXPAND WITHIN
"5 YEAR RULE"

SPACE HAS BEEN ENCLOSED
CONVERTED INTO
SPAZ SHOP
ABLUTION FACILITIES



Priority Assessment for Design for Disassembly based on Environmental Impact

adapted from (Nordby, 2006)

ENVIRONMENTAL IMPACT of building part	High			e.g. aluminium framework used for partitioning
	Medium	e.g. concrete support structure of housing unit		
	Low			
		Low	Medium	High
Turnover of building part				

Priority Assessment for Design for Disassembly based on Social Impact

SOCIAL IMPACT of building part	High		e.g. in/decrease size of unit	e.g. façade's doors and windows
	Medium			
	Low	e.g. support structure of housing unit		
		Low	Medium	High
Turnover of building part				

- *the tool needs to ultimately have the capability of being generic enough for wide-scale application*
- *specific enough to be useable in the South African residential sector*
- *accessible and easy to use*
- *to analyse and strategically plan developments of existing building stock*
- *to aid in the design of new buildings to be viable in the long term*

bearing structure



ease of change

The structural grid is a narrow 3 300 mm, with primary uniform reinforced face-brick masonry bearing walls. It will require professional input to breach the bearing walls.

secondary structure



ease of change

The secondary interior concrete masonry structure is easy to manipulate and change - many tenants have done so already.

doors and windows



ease of change

All doors can easily be upgraded according to the tenants preference and capabilities. Windows are less easy to adapt to preference.

building services



ease of change

Wet services can be somewhat adapted or moved. Electrical services are easy to manipulate.

facades finishes



ease of change

The masonry facade appearance is easy to change and manipulate through building additions and decoratively - many tenants have done so already. All interior and exterior finishes can be adapted, changed or replaced easily.

surfaces



ease of change

All interior and exterior walls or horizontal surfaces can be adapted to personal preference.

components



ease of change

Upgrade building components (e.g. doors, plumbing fixtures, floor and ceiling finishes, roof cladding material). Increase ablation areas and insert extra openings in walls for natural light and ventilation.

interior spaces



ease of change

Merge the two rental rooms into single space by removing internal secondary non-bearing walls. Join rental rooms with primary house by enclosing exterior circulation space with infill materials. Point of entry can change.

mergers



ease of change

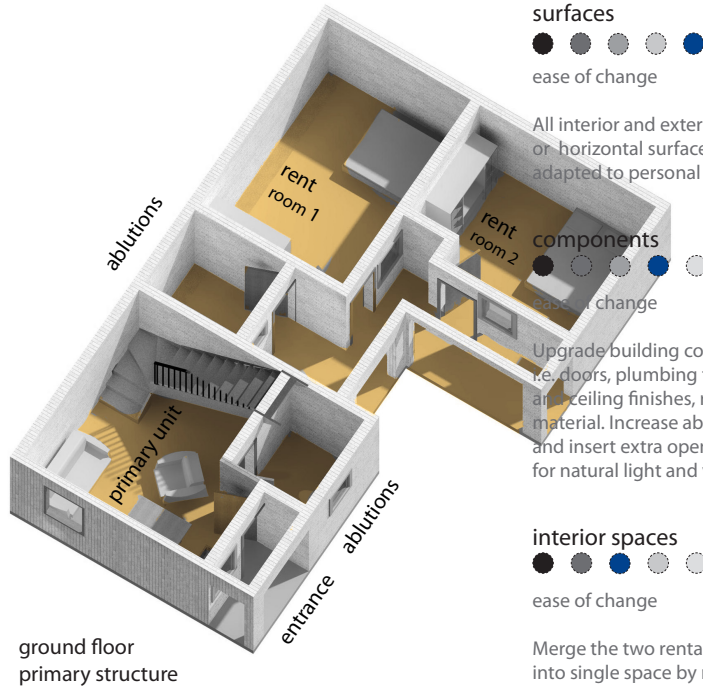
Typical tenants would be able to adapt two units to merge into a single unit but only by breaking through bearing walls and under professional supervision.

extension

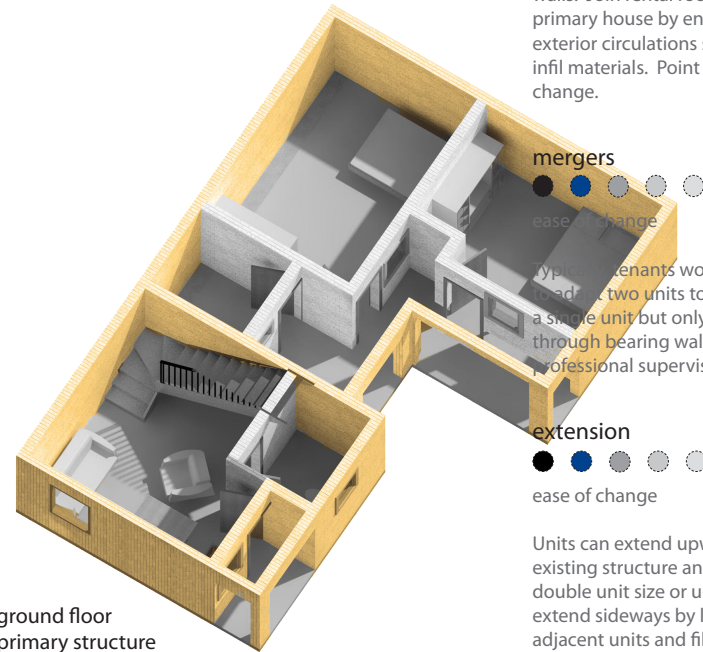


ease of change

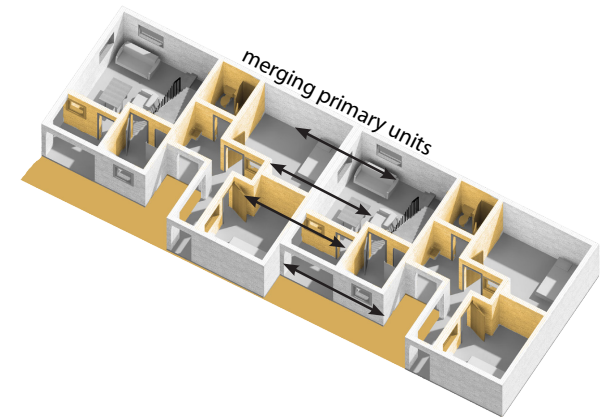
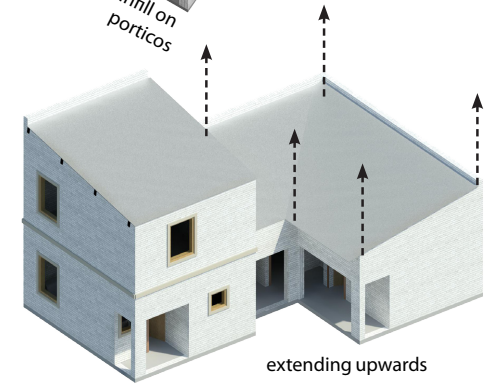
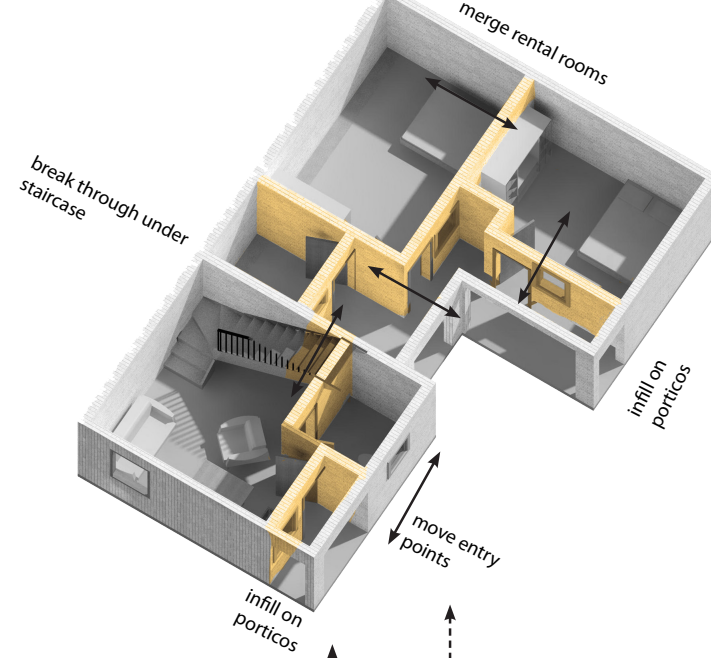
Units can extend upwards on existing structure and almost double unit size or units can extend sideways by latching onto adjacent units and fill in walls on ground floor porticos.

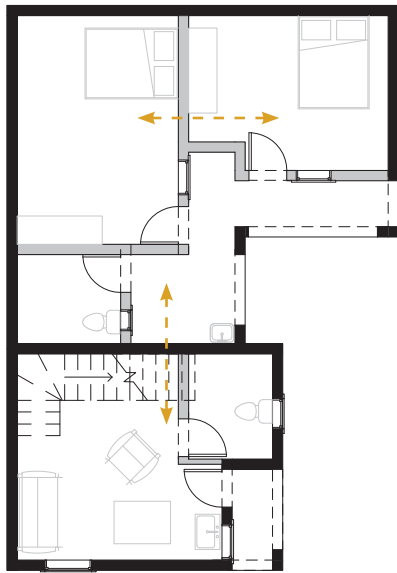


ground floor primary structure



ground floor primary structure





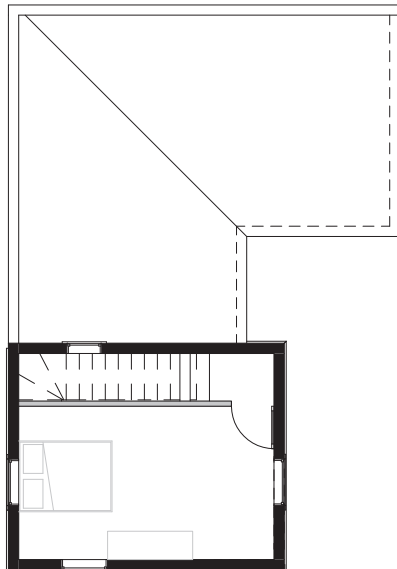
K206 ground floor

low turnover

bearing structure

facade

- * impacts on surroundings in multi-family dwellings or high-density context is fairly easy to negotiate by the tenant
- * needs minimal professional inputs and official approvals
- * allows for various internal spatial adaptations and extensions
- * easy to manipulate low-cost concrete masonry primary and secondary walls
- * easy to replicate the low-cost construction technologies and materials
- * low-cost elemental facade allows for medium amount of personalisation and adaptation



K206 first floor

doors windows

high turnover

services

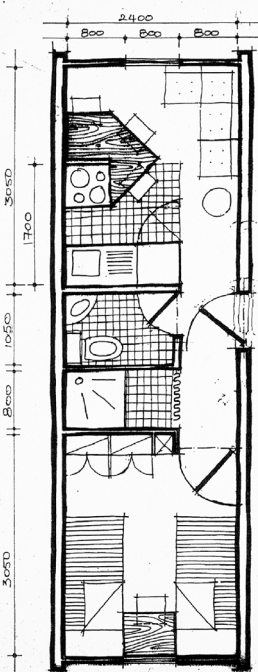
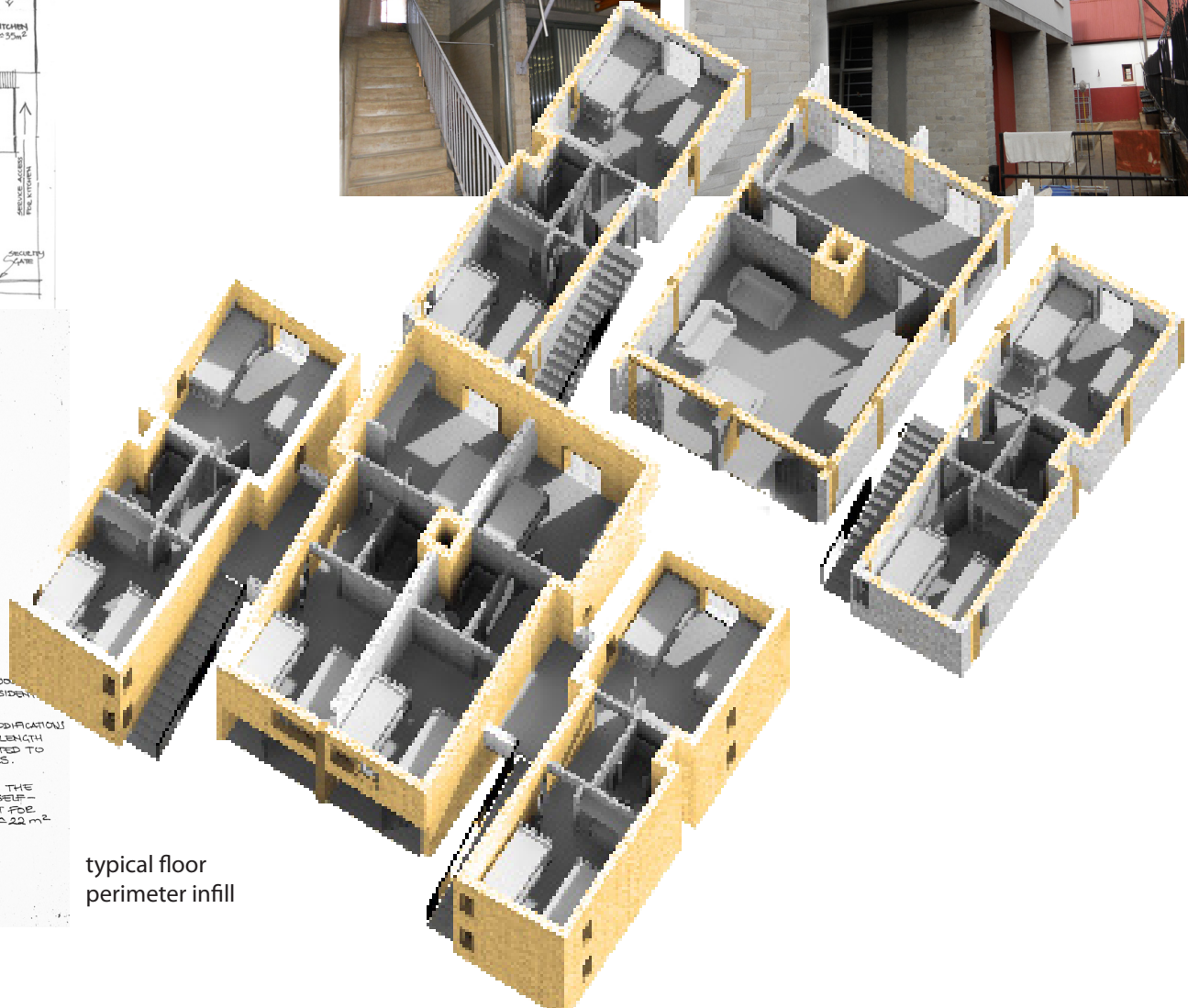
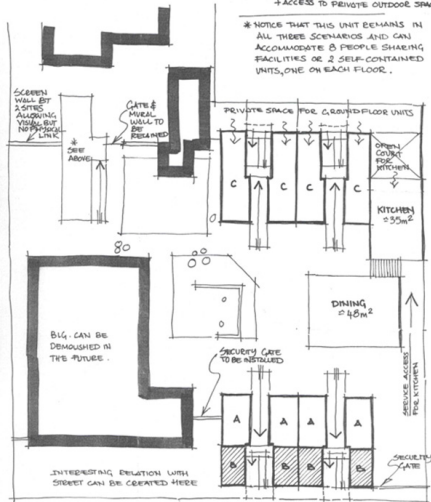
finishes

- * low-cost steel doors are easy to upgrade
- * low-cost steel-frame windows are robust and will require some effort to replace or change
- * controlled at family unit at primary-unit level
- * no need for any professional inputs or approvals
- * low-cost unit services can be upgraded easily
- * all finishes and components are easy to replace, to manipulate or to upgrade

Analysis of ground floor layout for 3 scenarios -

- (A) 2 PEOPLE WITH SHARED BATH/TOILET
- (B) GARAGE OR WORKSHOP SPACE
- (A)(B) CAN BE A UNIT WITH SHARED BATH/TOILET FOR 4 PEOPLE OR A PART OF SECT
- (C) 4 PEOPLE WITH SHARED BATH/TOILET + ACCESS TO PRIVATE OUTDOOR SPACE

* NOTICE THAT THIS UNIT REMAINS IN ALL THREE SCENARIOS AND CAN ACCOMMODATE 3 PEOPLE SHARING FACILITIES OR 2 SELF-CONTAINED UNITS, ONE ON EACH FLOOR.

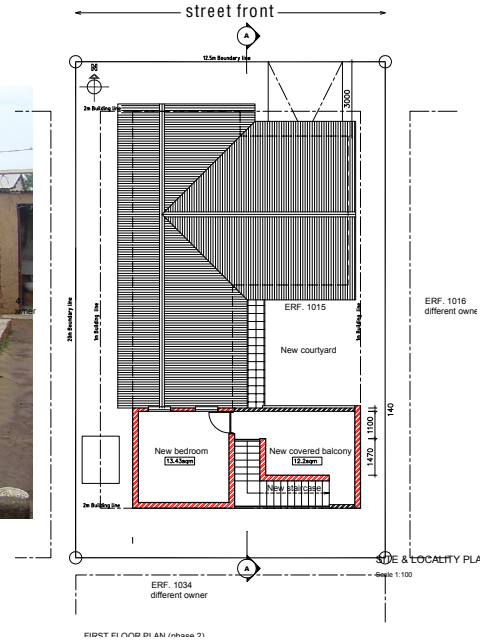


THIS IS THE LAYOUT OF A BASIC RESIDENTIAL UNIT.
 WITH A FEW MODIFICATIONS & CHANGES IN LENGTH IT CAN BE ADAPTED TO DIFFERENT USES.
 AS SHOWN HERE THE AREA OF THIS SELF-CONTAINED UNIT FOR 2 PEOPLE IS : 222 m²

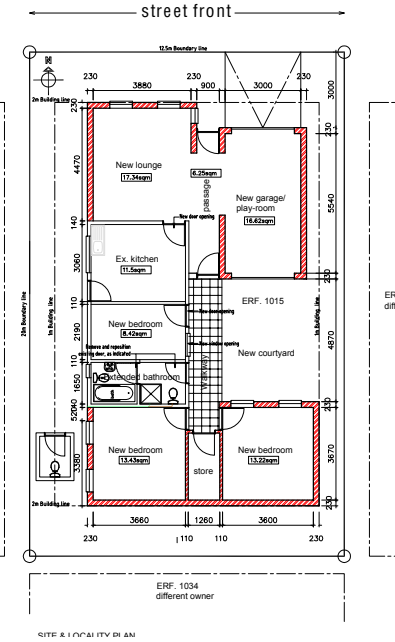
typical floor perimeter infill



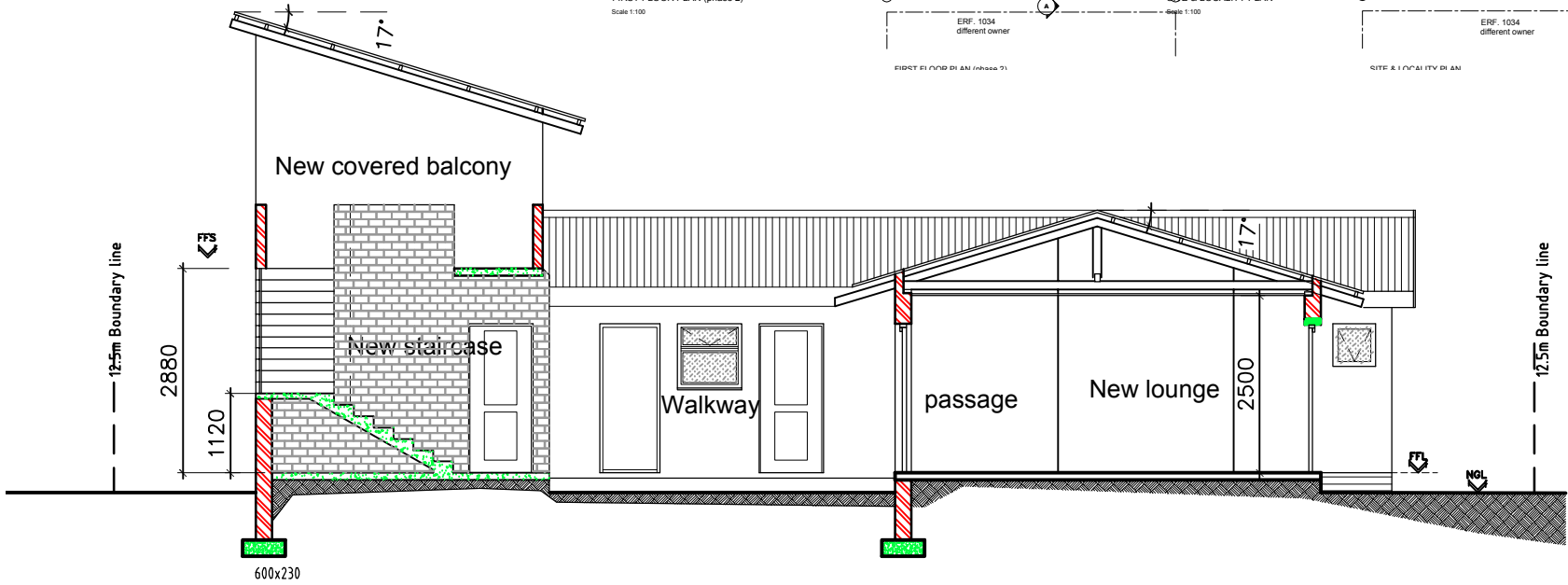
FIRST FLOOR PLAN (phase 2)
Scale 1:100



SITE & LOCALITY PLAN
Scale 1:100



SITE & LOCALITY PLAN

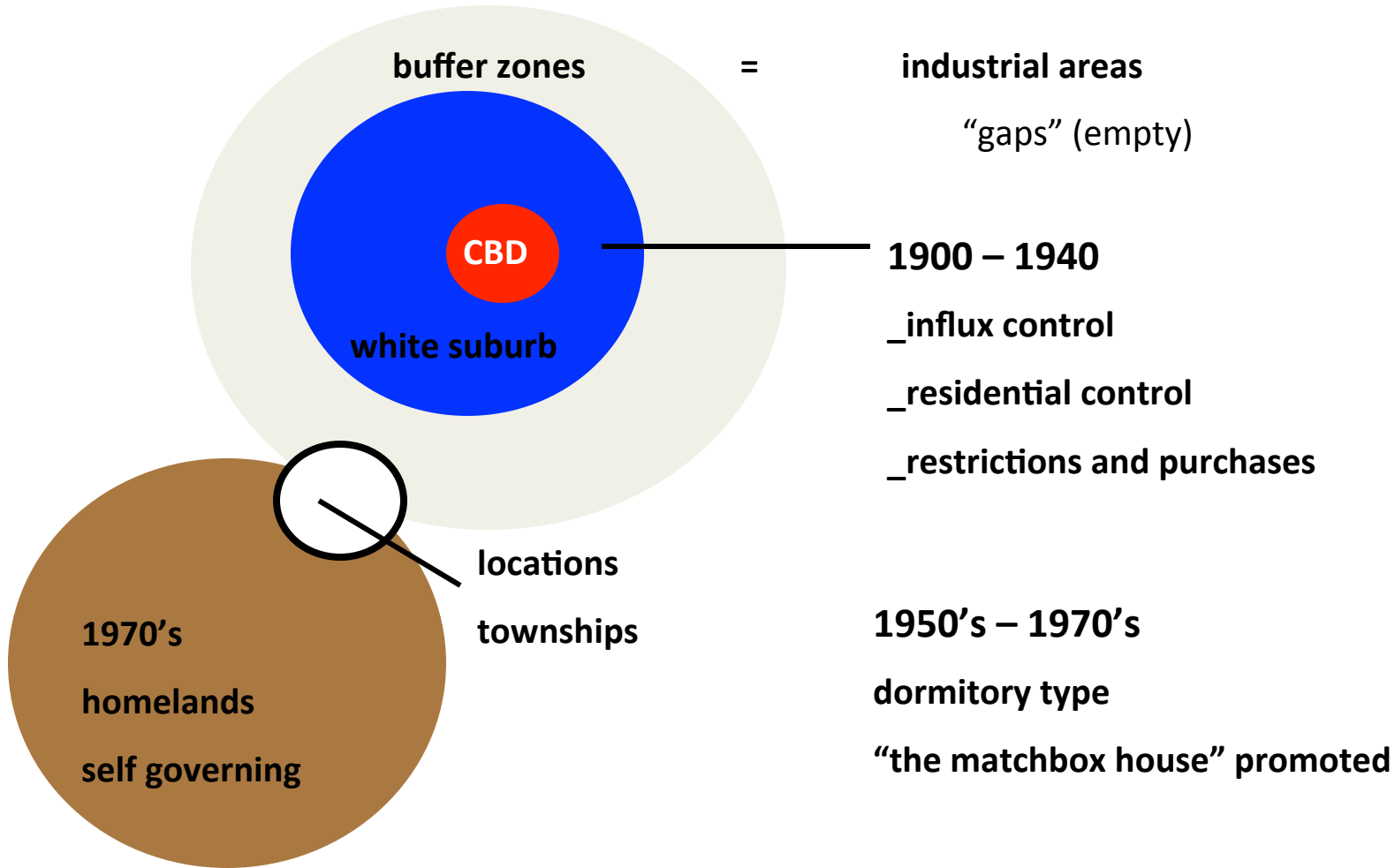


Section a-a (phase 2)

Scale 1:100

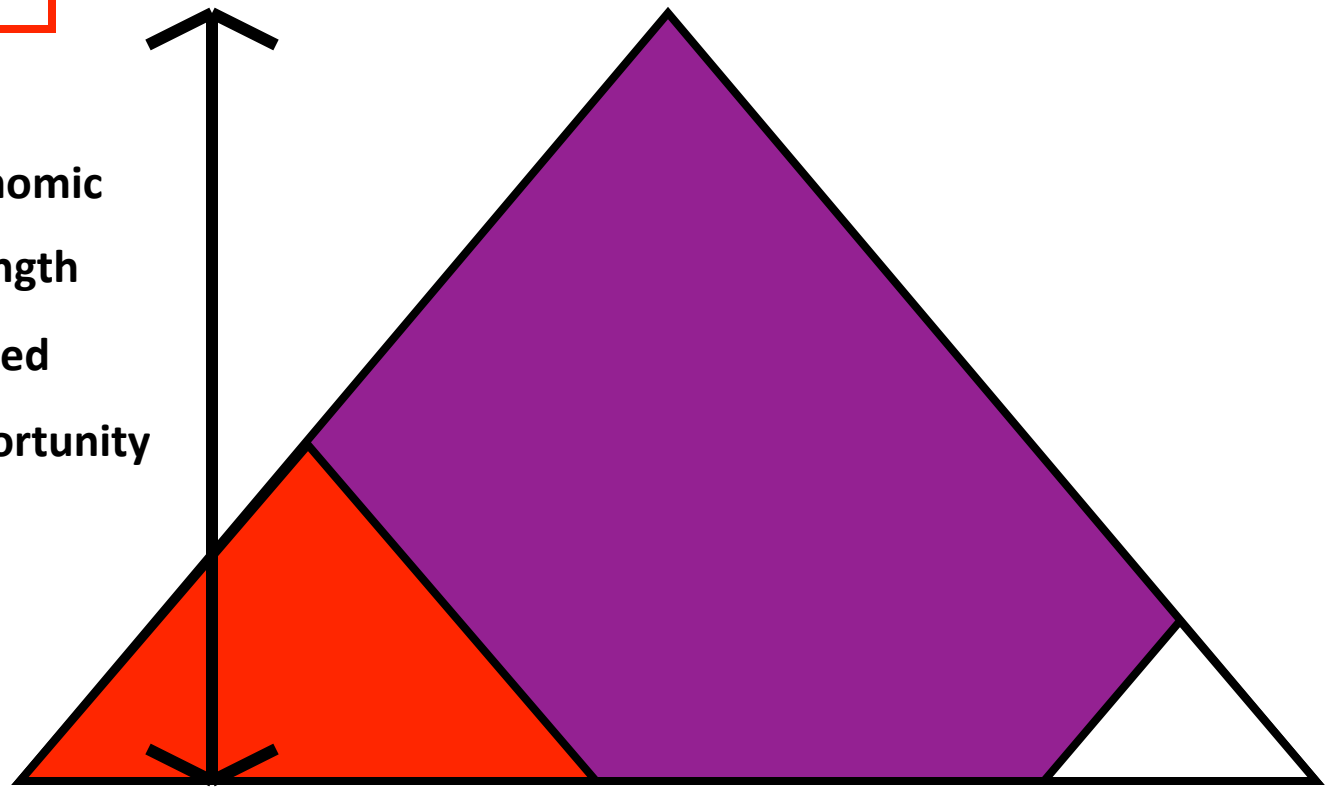
THE SOUTH AFRICAN SCENARIO:

MORE COMPLEXITY IN THE SYSTEM.



RESULTED IN:

**Economic
strength
missed
opportunity**



**CBD + “new centers”
in suburbs**

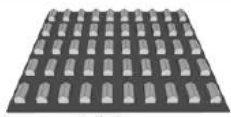





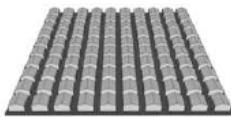
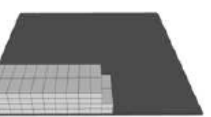
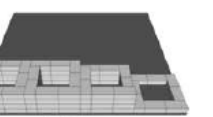
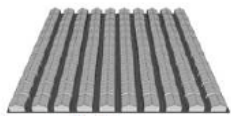
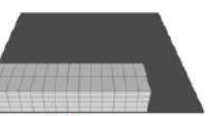

**Routes &
“gaps”**

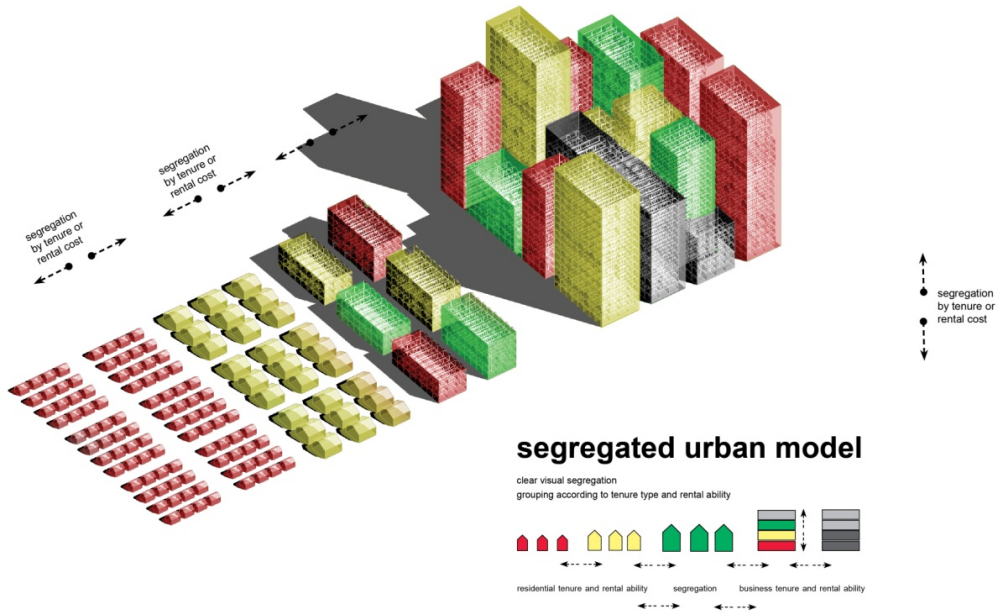
Townships

- _ FRAGMENTED CITIES**
- _ DIFFICULT ACCESS TO
WORK AND FACILITIES**

- _ BLAND LANDSCAPES**
- _ ENVIROMENTAL DEGRADATION**
- _ “DISABLING” LOCATIONS**

NOSIZO SEBAKE CSIR

	DETACHED	STACKED	PERIMETER
50 du/ha	 <p>Floor area ratio: 0,25 Coverage: 25% Height: 1</p>	 <p>Floor area ratio: 0,25 Coverage: 7% Height: 4</p>	 <p>Floor area ratio: 0,25 Coverage: 8% Height: 4</p>
70 du/ha	 <p>Floor area ratio: 0,35 Coverage: 35% Height: 1</p>	 <p>Floor area ratio: 0,35 Coverage: 9% Height: 4</p>	 <p>Floor area ratio: 0,35 Coverage: 12% Height: 4</p>
100 du/ha	 <p>Floor area ratio: 0,5 Coverage: 50% Height: 1</p>	 <p>Floor area ratio: 0,5 Coverage: 12% Height: 4</p>	 <p>Floor area ratio: 0,5 Coverage: 16% Height: 4</p>
120 du/ha	 <p>Floor area ratio: 0,6 Coverage: 60% Height: 1</p>	 <p>Floor area ratio: 0,6 Coverage: 15% Height: 4</p>	 <p>Floor area ratio: 0,6 Coverage: 16% Height: 4</p>



*“...the scale that the challenge posed by the gigantic Apartheid City requires, **deserves and justifies; not just a case of tinkering at the margins here and there.**”*

*“...the South African City requires far more than just a smart, **acupunctural, targeted investment in the system – it needs a major overhaul.**”*

Mark Oranje (2014)



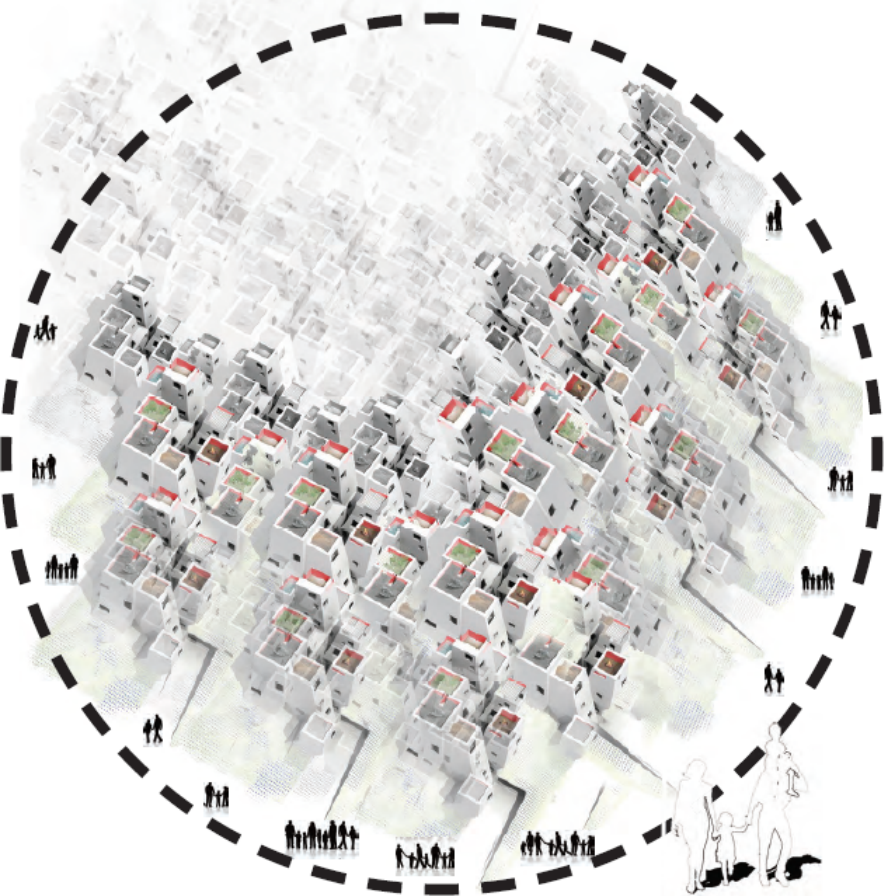
Hout Bay/Imizamo Yethu, Cape Town
Johnny Miller

10 KEY PRINCIPLES

Existing and New Neighbourhood interventions

- 1) *Revise Zoning to Encourage Desegregated Mixed Use***
- 2) Ensure Sustainable Densification Opportunities for XS,S,M,L and XL*
- 3) *Just Add Housing***
- 4) Refocus Government Subsidies on 1 hr (+/-3km) Wide Neighbourhoods*
- 5) Street Edge Activation as a Condition for Development Approvals*
- 6) Phased and Adaptable Developments*
- 7) Distributed Decision Making for Mass Customization and Self-Regulation*
- 8) Culturally Adequate, Desirable and Dignified Environments*
- 9) Public, Private Partnerships Led by Committed Project Teams*
- 10) Technical innovation in the services of a vision (and not vice versa)*

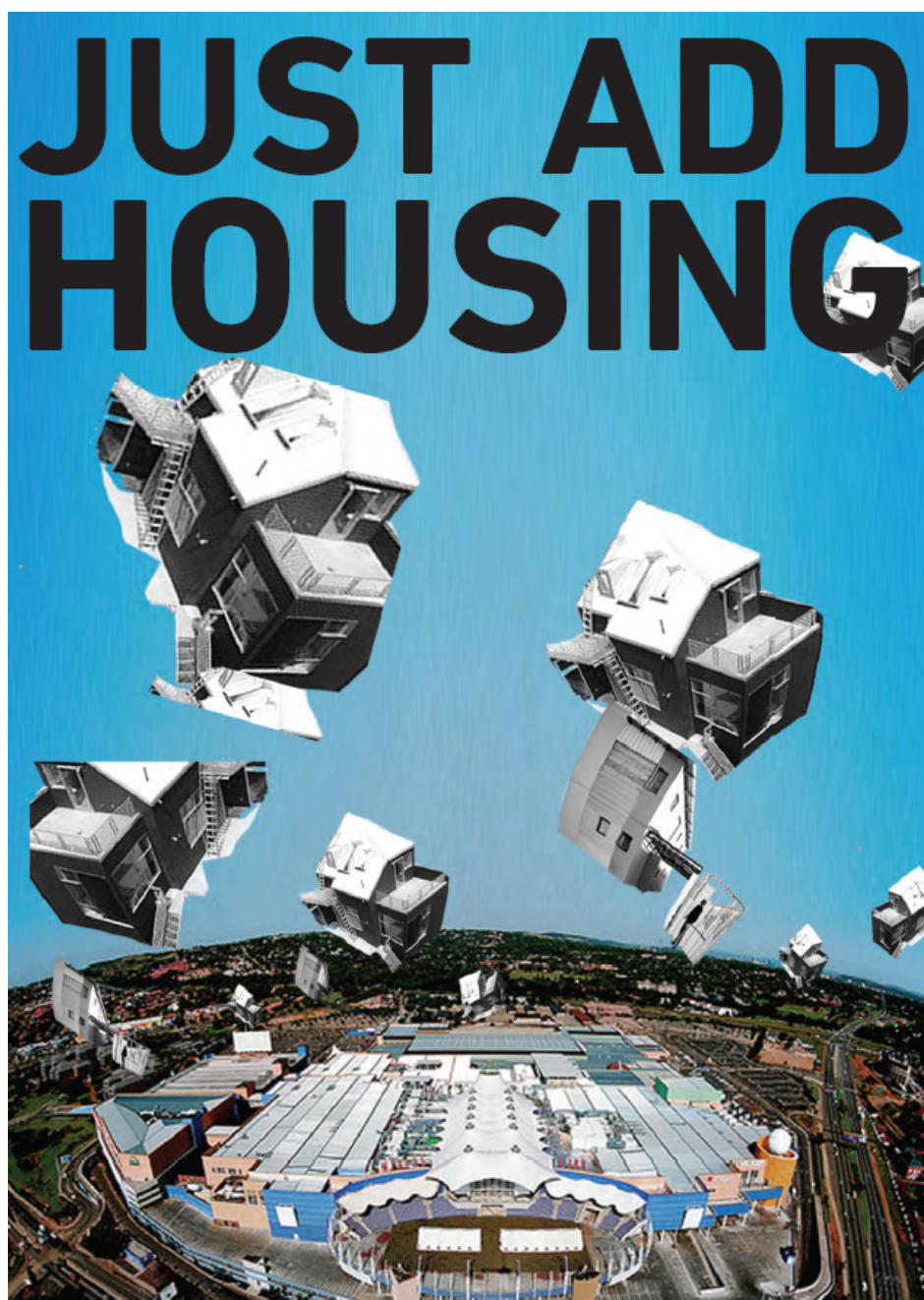
THE 1 HOUR WALKABLE COMMUNITY



A DIGNIFIED CITY



INCLUSIVE SOCIETY



LIVABLE STREETS



Managing project funds differently
Designing differently

DISENTANGLEMENT
STRICT SYSTEM SEPERATION

DISTRIBUTE DECISION-MAKING among the various
stakeholders in efficient ways

DISTRIBUTED DECISION-MAKING = key OPEN BUILDING
concept – a time-based approach

propose a system that is inherently PARTICIPATIVE through suggesting:

- *NEW PROFESSIONAL GUIDELINES FOR INTERVENTIONS IN THE BUILT ENVIRONMENT*
- *NEW SYSTEMS, METHODS AND TECHNOLOGIES*
- *NEW FORMS OF ENGAGEMENT*

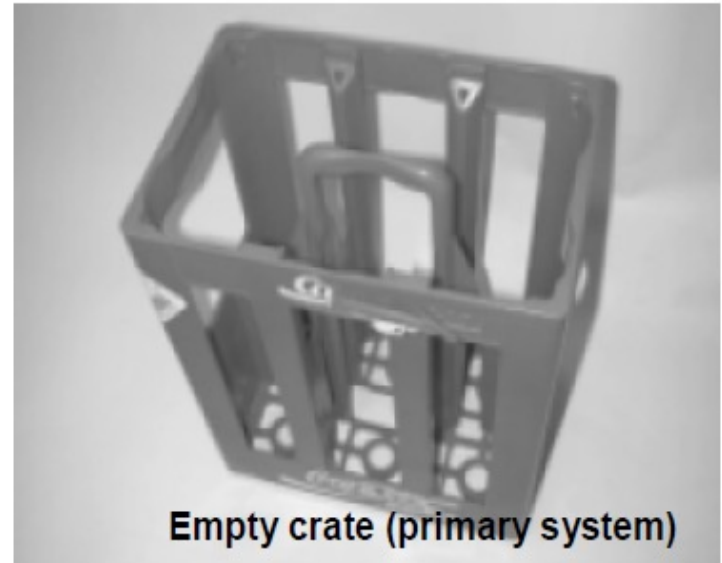
and most importantly,

- *HOW TO REPLICATE INTERVENTIONS AT SCALE TO ACHIEVE MAXIMUM IMPACT*

A METAPHOR FOR URBAN FRAMEWORKS



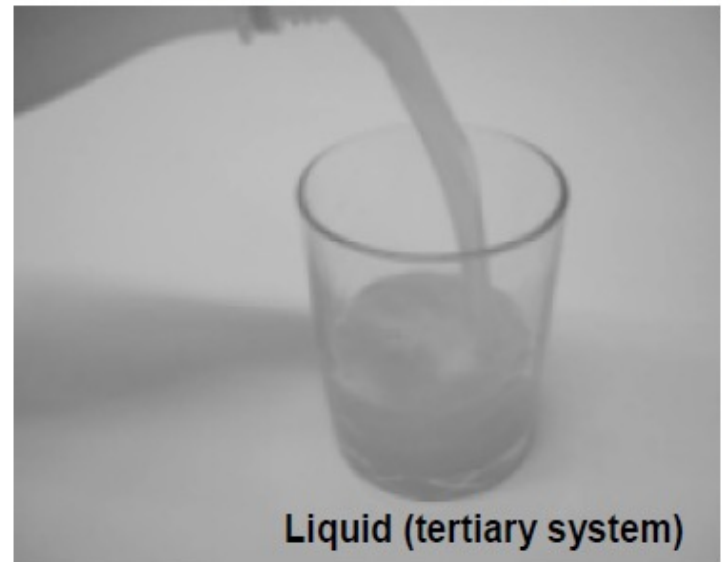
Crate with bottles (system levels)



Empty crate (primary system)

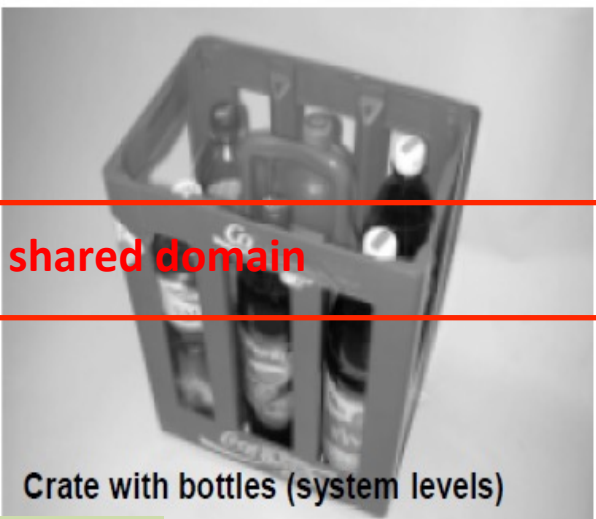


Bottles (secondary system)



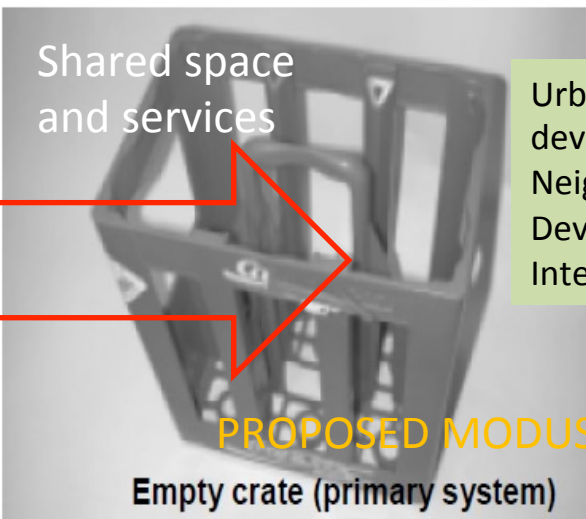
Liquid (tertiary system)

Inspired by Geiser and the INO hospital in Bern Switzerland



Crate with bottles (system levels)

Permanent, shared domain



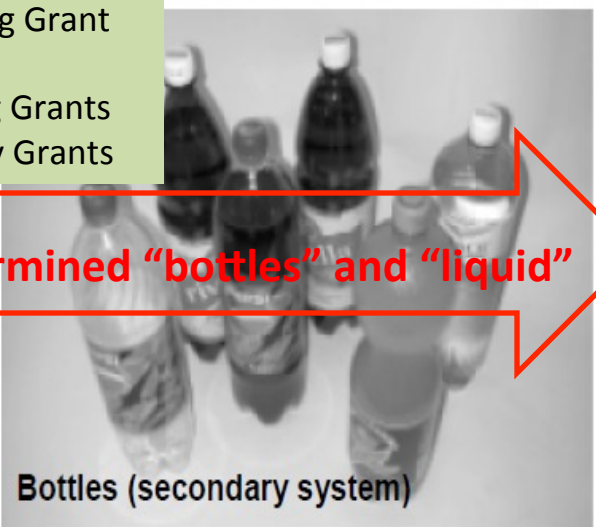
Shared space and services

Empty crate (primary system)

PROPOSED MODUS OPERANDI

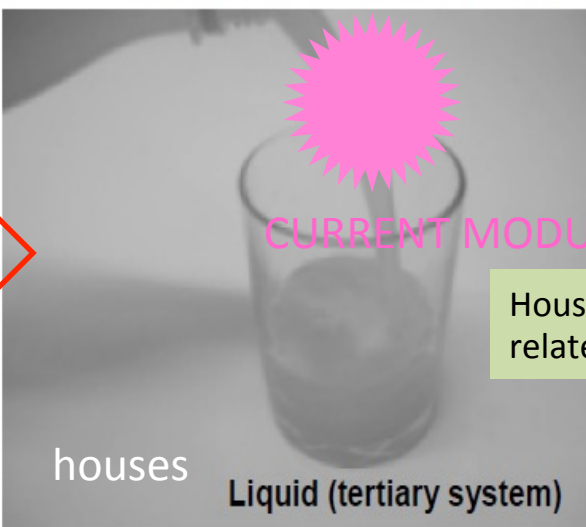
Urban settlement development Grant?
Neighbourhood Development Grant
Interim services

Social Housing Grant
CRU Grants
Restructuring Grants
Pre-feasibility Grants



Bottles (secondary system)

Pre-determined "bottles" and "liquid"

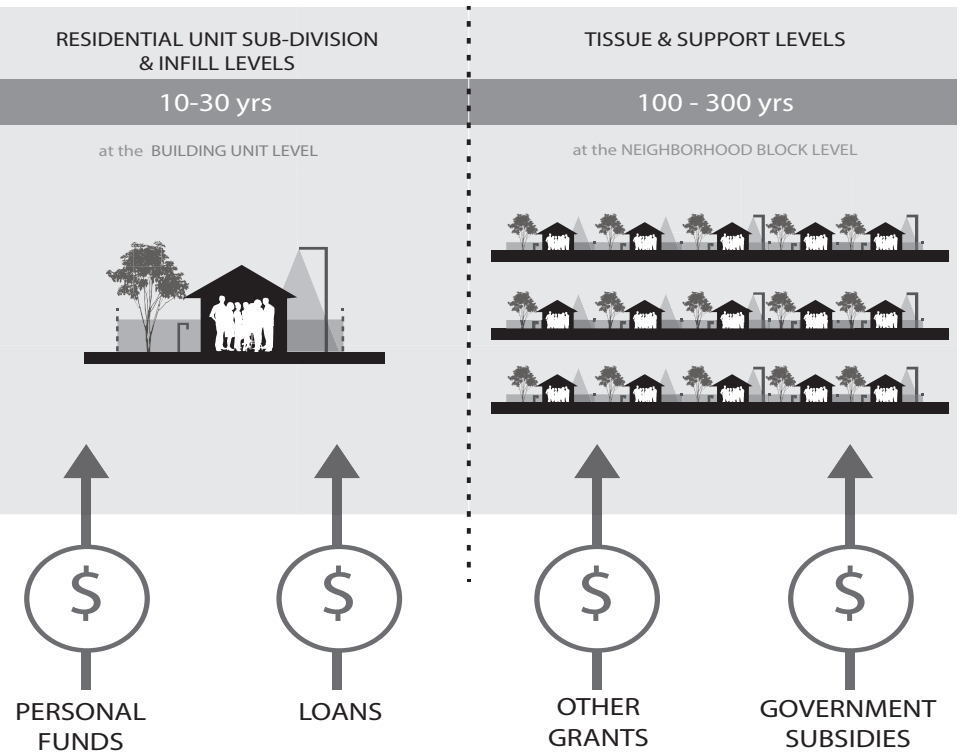
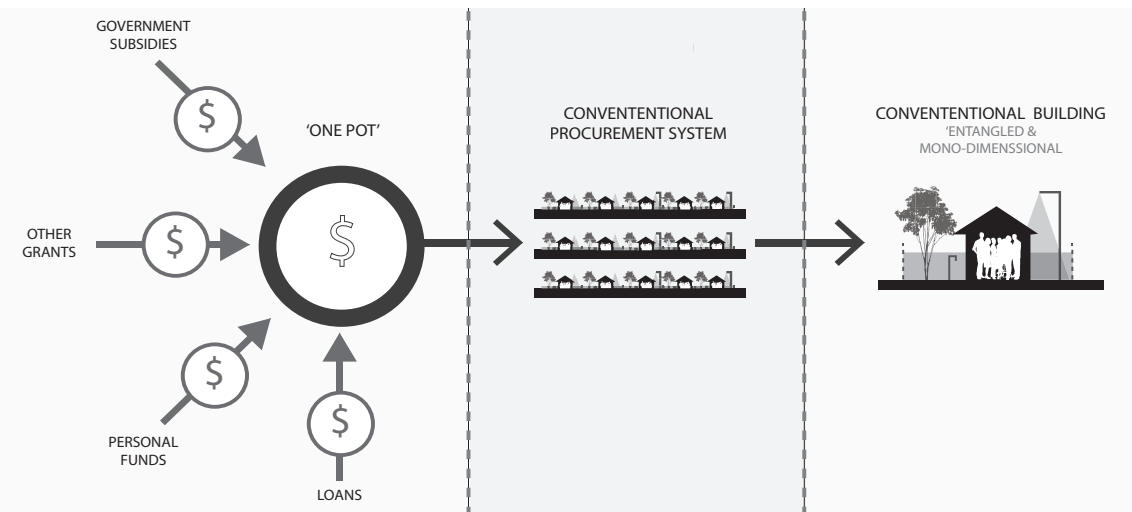


houses

Liquid (tertiary system)

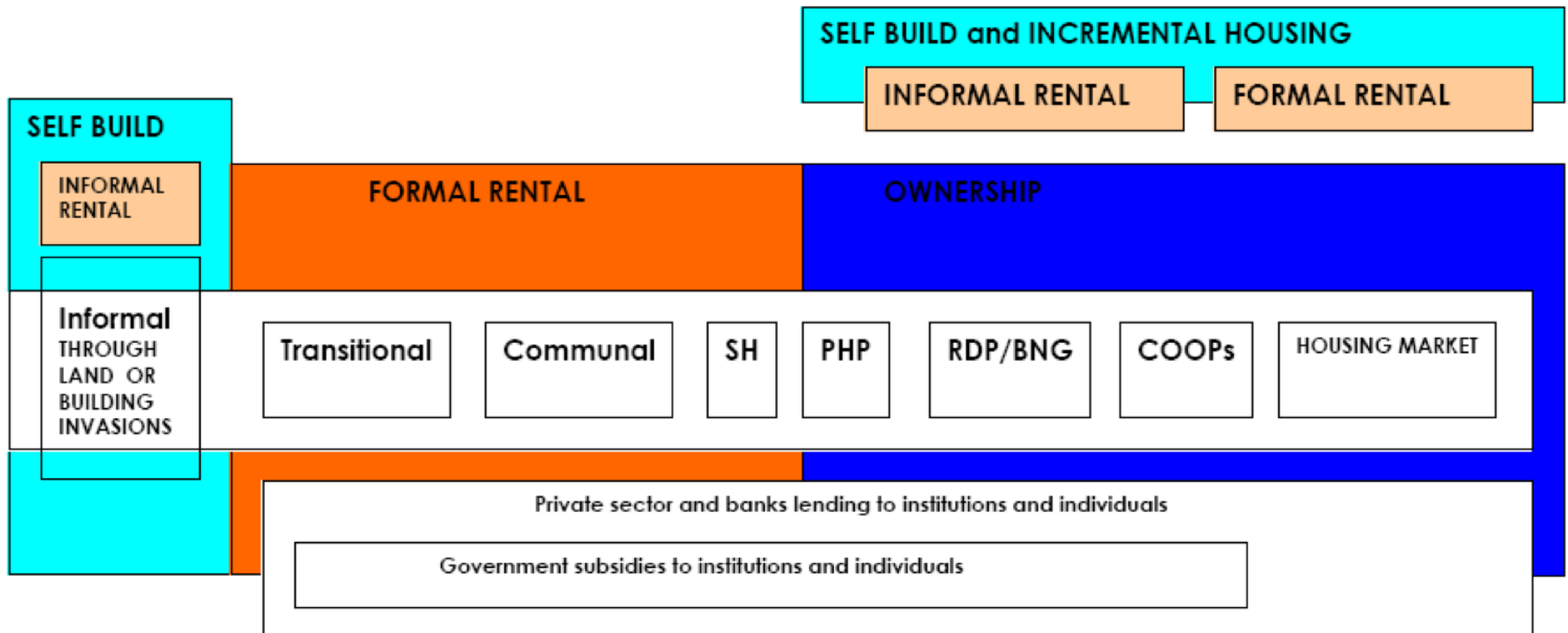
CURRENT MODUS OPERANDI

Housing subsidy and related grants



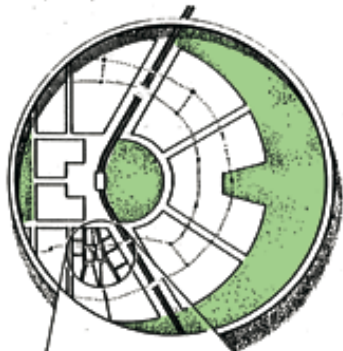
Address the disparity in the built environment in different parts of the country and within cities

Injecting government funding in structures, which are shared by everyone, irrespective of income level, would surely reduce the discrimination that arises from the distinctly located, designed and built housing for the poor?



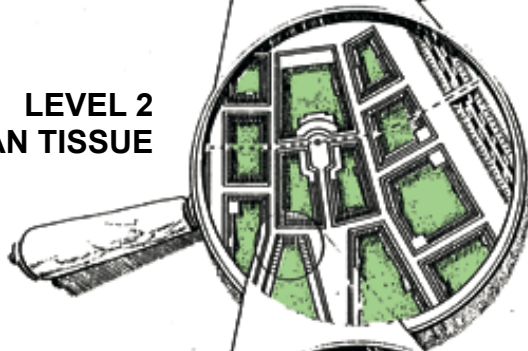
THINKING IN OPEN BUILDING LEVELS

**LEVEL 1
CITY STRUCTURE**



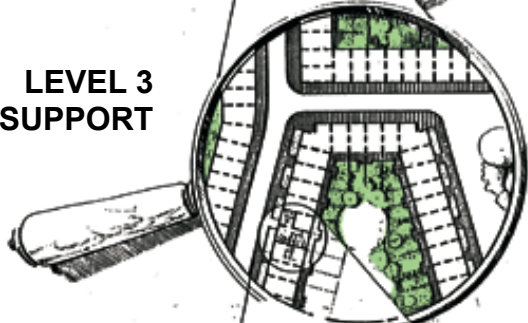
Area: the total territory of the city
Final decisions: city authority
Design elements: roads, public transport, district boundaries and programmes, city centre, university, city park, stadium
Designer: city planning teams
Scale of plan: 1: 10 000

**LEVEL 2
URBAN TISSUE**



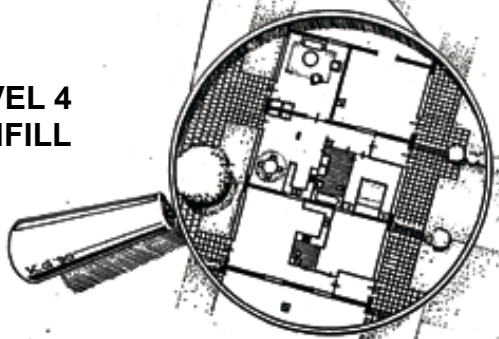
Area: one of the city districts
Final decisions: city authority
Design elements: outdoor spaces, streets, courtyards, parks, building zones, market square, social cultural centre, schools
Designer: city planning teams
Scale of plan: 1: 1 000

**LEVEL 3
SUPPORT**

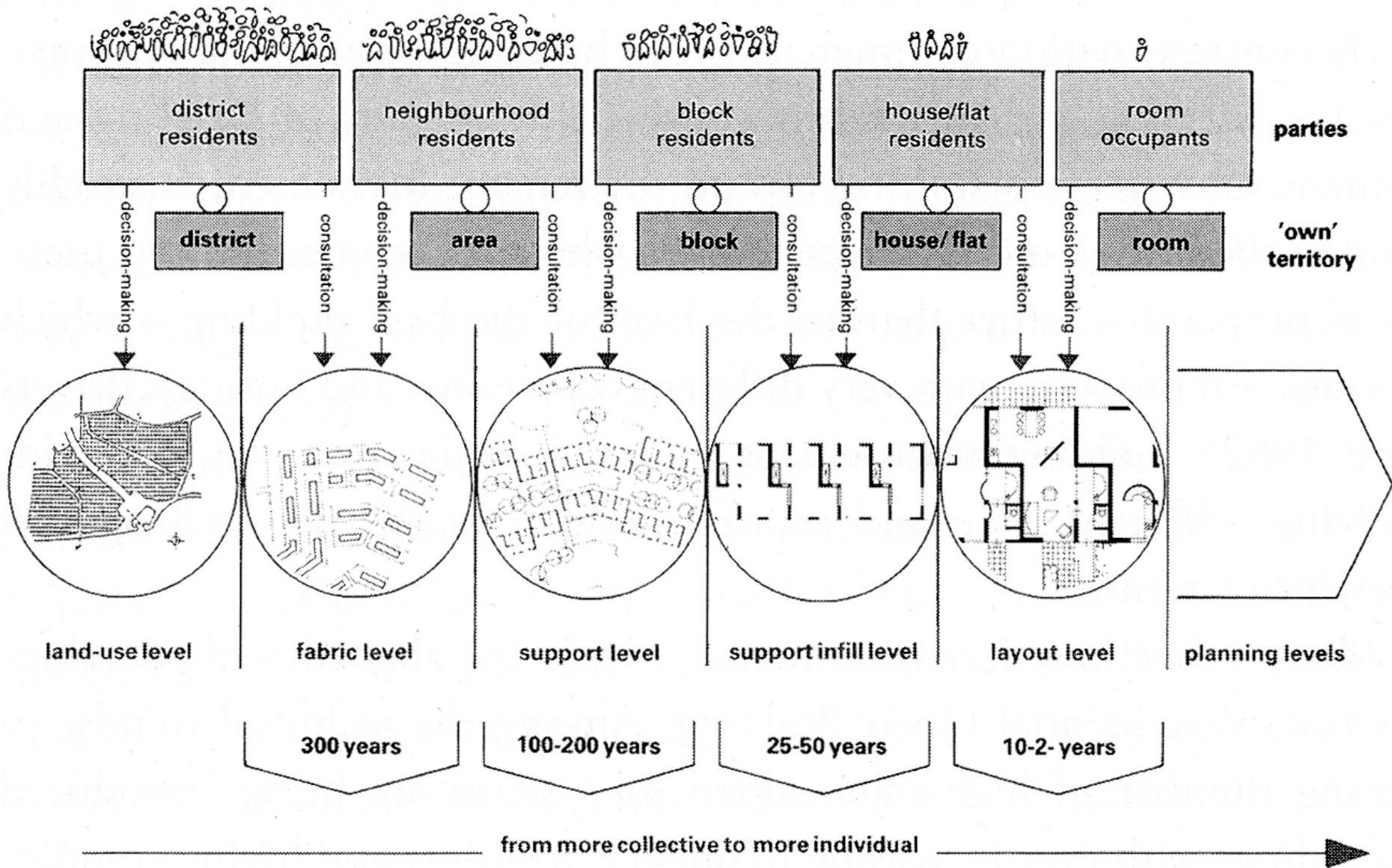


Area: a building lot, a part of the building zone of the tissue
Final decisions: housing association, developer
Design elements: foundations, walls, floors, roofs, facades, stairs, ducts, pipes
Designer: architect
Scale of plan: 1: 100

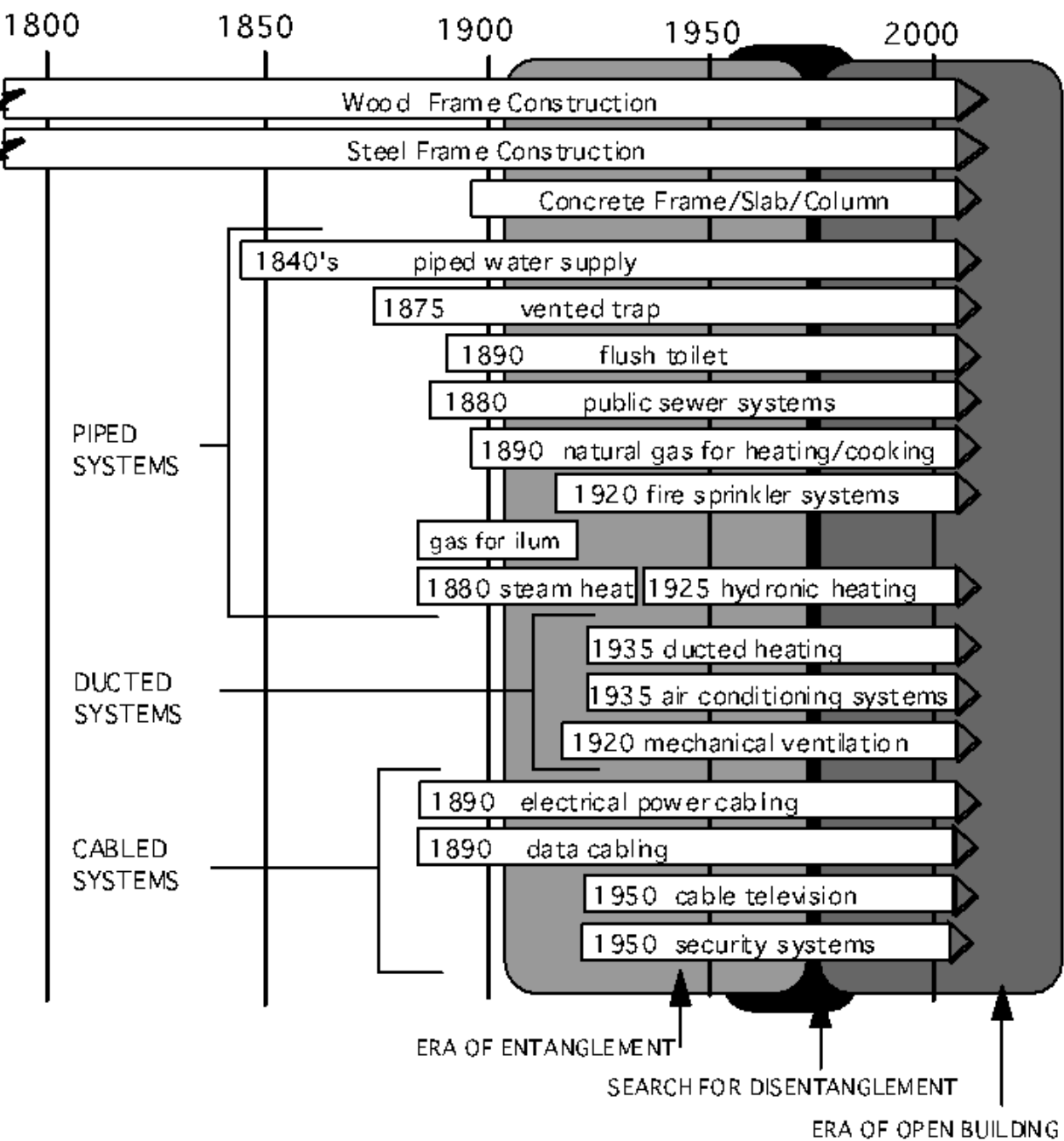
**LEVEL 4
INFILL**



Area: a dwelling, an office unit
Final decisions: users
Design elements: partitions, doors, fittings, pipes, facades
Designer: consultants to users
Scale of plan: 1: 50 and 1: 20



Introduction of Technical Systems into Building Construction





Would you buy a car if the tires were moulded to the wheel rims, and the wheel rims welded to the chassis?

The first time your car needs a tire change, you would have to destroy the entire vehicle – although it still drives perfectly well – to make it fit for the road.

This procedure has always been followed in the construction sector.

Cables are sometimes buried into concrete load-bearing ceilings.

When you need to replace them you have to destroy the intact building fabric.

"Spaghetti junction"

GEISER

A building is never quite finished. It changes over time

The different service lives of the individual components of a building must be taken into account

An assembly of elements can only reach the age of its shortest-living component

*This notion of separation or “**disentanglement**” contradicts the usual conventions of the planning and construction process*

GEISER

OPEN BUILDING IS A VERB

*An Open Building project is **NOT** an incomplete project*

*An Open Building project does **NOT** have to look different*

Location	1000 years
Outside	100 years
Inside	10 years

Frank Bijdendijk

Existing built environment.



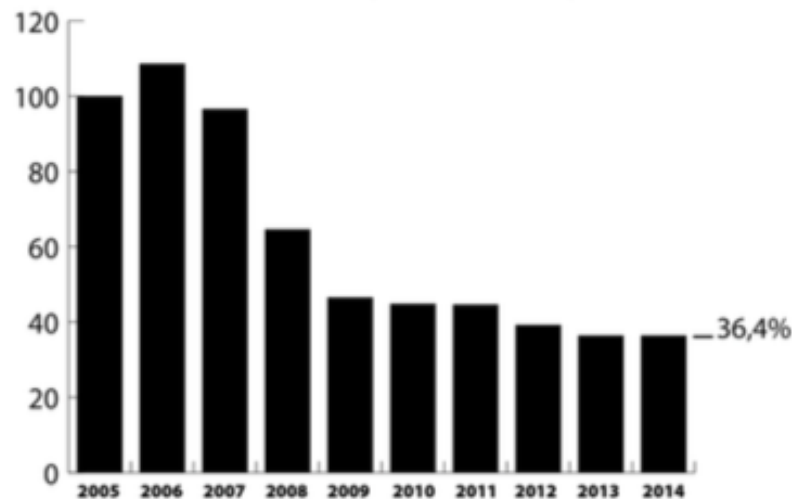
99% housing needs.

Existing built environment.



€ 60.000 billion.

Building Permits-annual data.
EU 28 (Eurostat)



Frank Bijdendijk

<http://thematicdesign.org/wp-content/uploads/2015/10/BijdendijkETH.pdf>

The creation of environments that are valuable because they are

lovable

and because they have
accommodation capacity.

These environments are “**open**”, sustainable because they can accommodate change.

GEISER/BIDJENDIJKE

Inspire an alternative approach to the built environment

- *South Africa as a pioneer*
- *Seeking innovations at the interface of various professions*
- *Inter-disciplinary experimentation*
- *Emergence of unique insight and novelty*
- *Making business sense as well as achieving a developmental agenda*
- *Higher-level strategies that enable project level innovations*
- *Project level innovations that can inspire policy change and strategic decision making at a higher level*