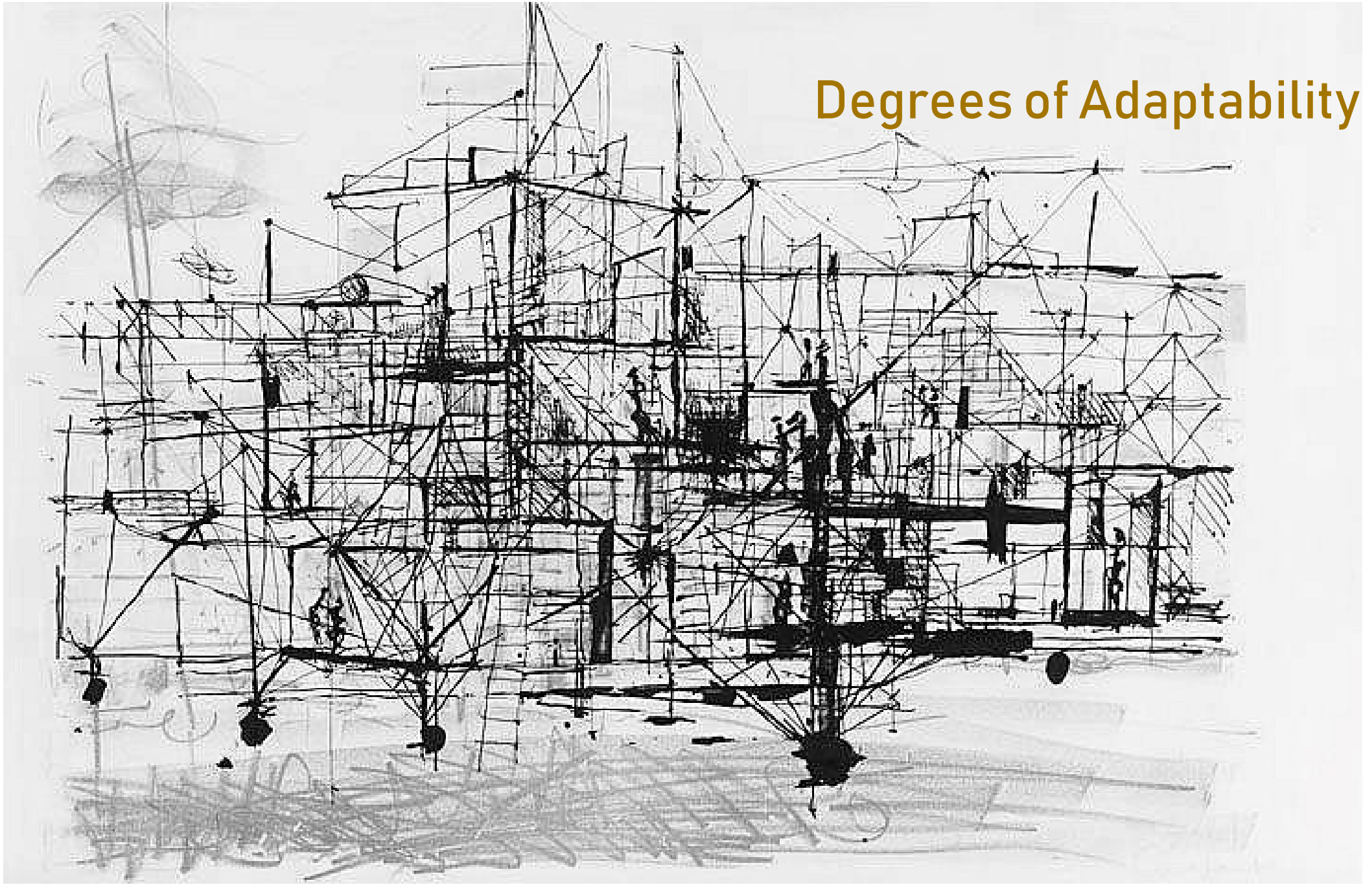
Degrees of Adaptability



Degrees of Adaptability

A Design Framework for Future-Proof Transformation Projects

C.C. Kougea
4746074
P5 Presentation
28.6.2019

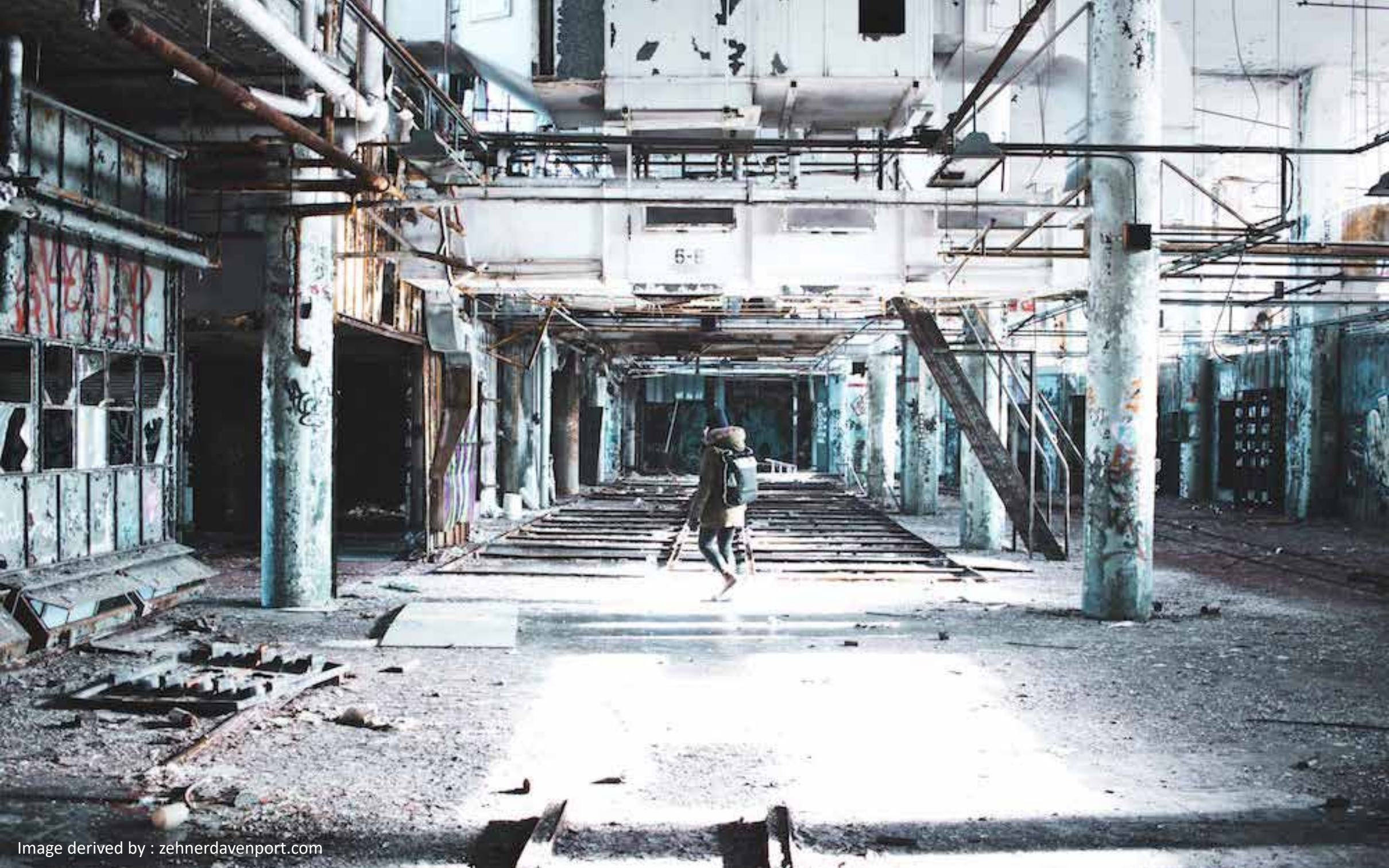
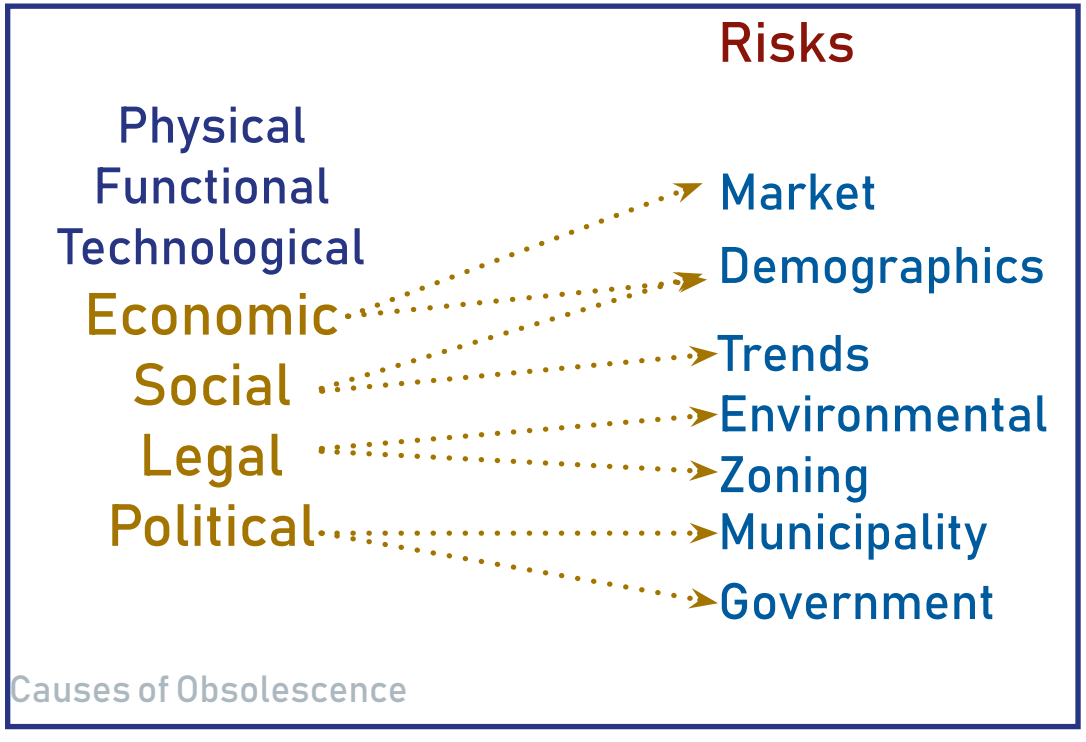


Image derived by : zehnerdavenport.com

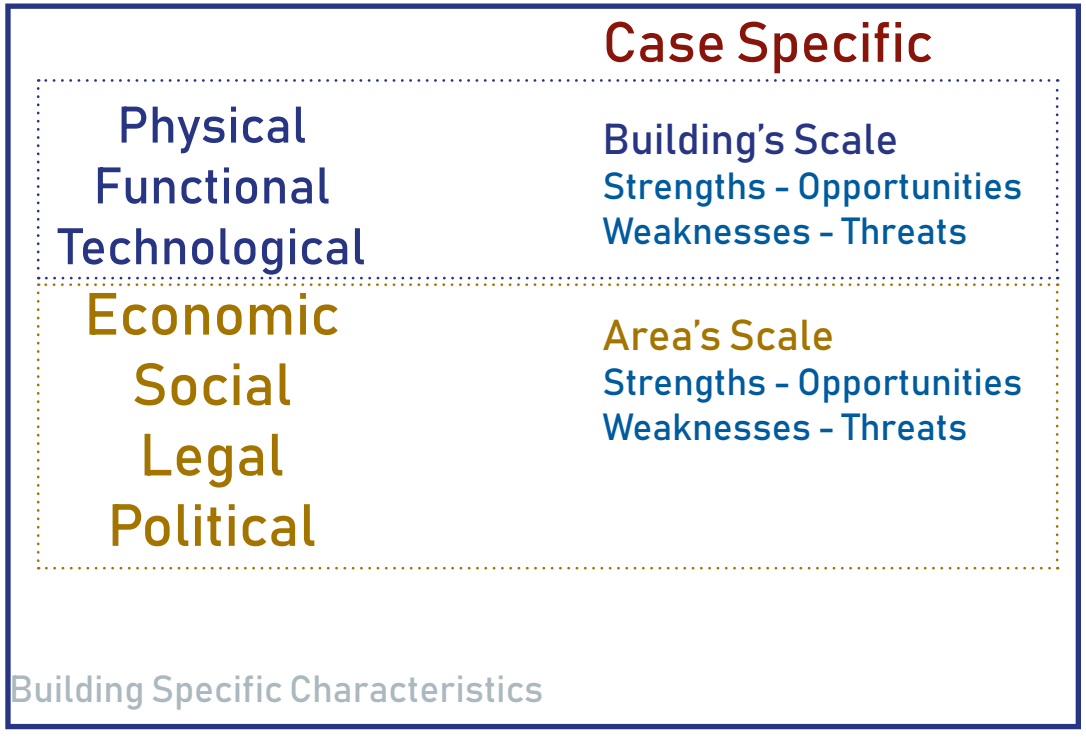
Obsolescence

The process or condition of going out of date or being no longer in use/of utility

Physical
Economic
Functional
Technological
Social
Legal
Political



Causes of Obsolescence



Building Specific Characteristics

Results

High Buildings' Vacancy

When one (or more) of the Obsolescence types occurs building become vacant. At this case they can be considered as financial and social loss

In-Efficient Buildings

The buildings that present obsolescence cannot respond to the market's & user's demands; they do not function efficiently

Criminality - Areas' Depreciation

Areas with high density of obsolete buildings can easily be a target for vandalism and criminality

In a constantly changing world

obsolescence cannot be easily confronted

Demolition

of the existing obsolete building stock

Adaptive Re-Use

of the existing obsolete building stock

In a constantly changing world

obsolescence cannot be easily confronted

Demolition
of the existing obsolete building stock

Adaptive Re-Use
of the existing obsolete building stock

In a constantly changing world

obsolescence cannot be easily confronted

Demolition

of the existing obsolete building stock

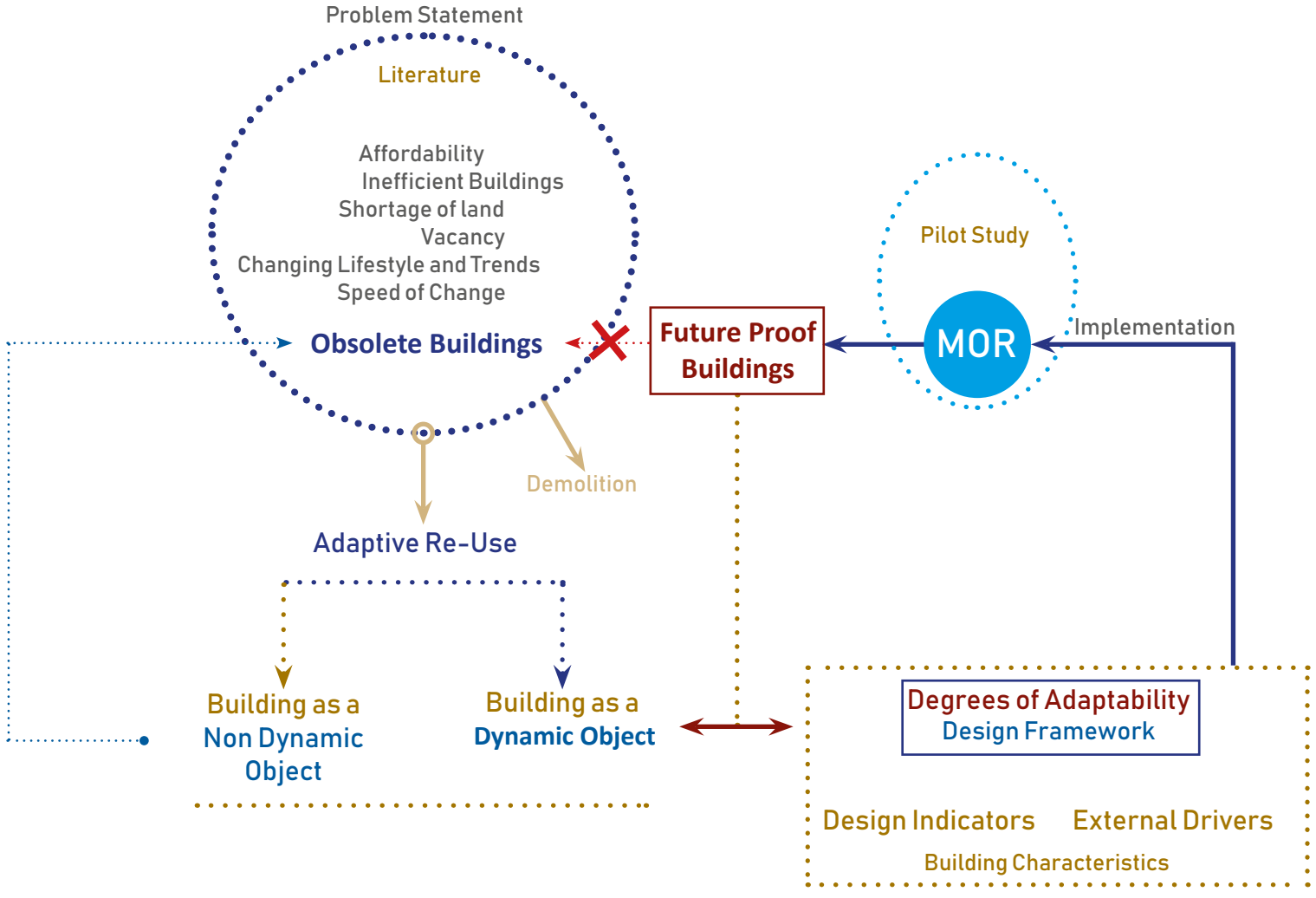
Adaptive Re-Use

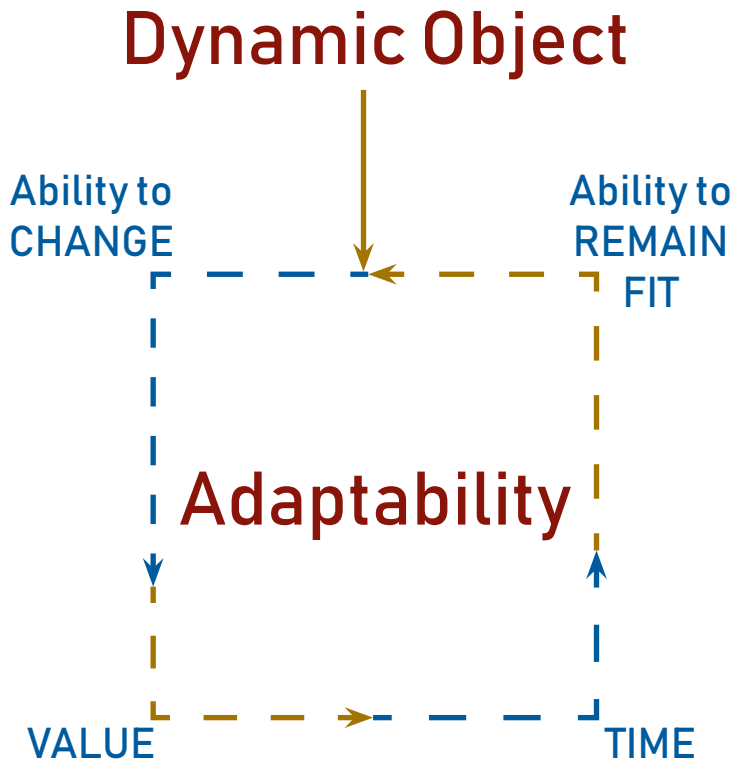
of the existing obsolete building stock

Future Proof ?

(RE)-Obsolescence

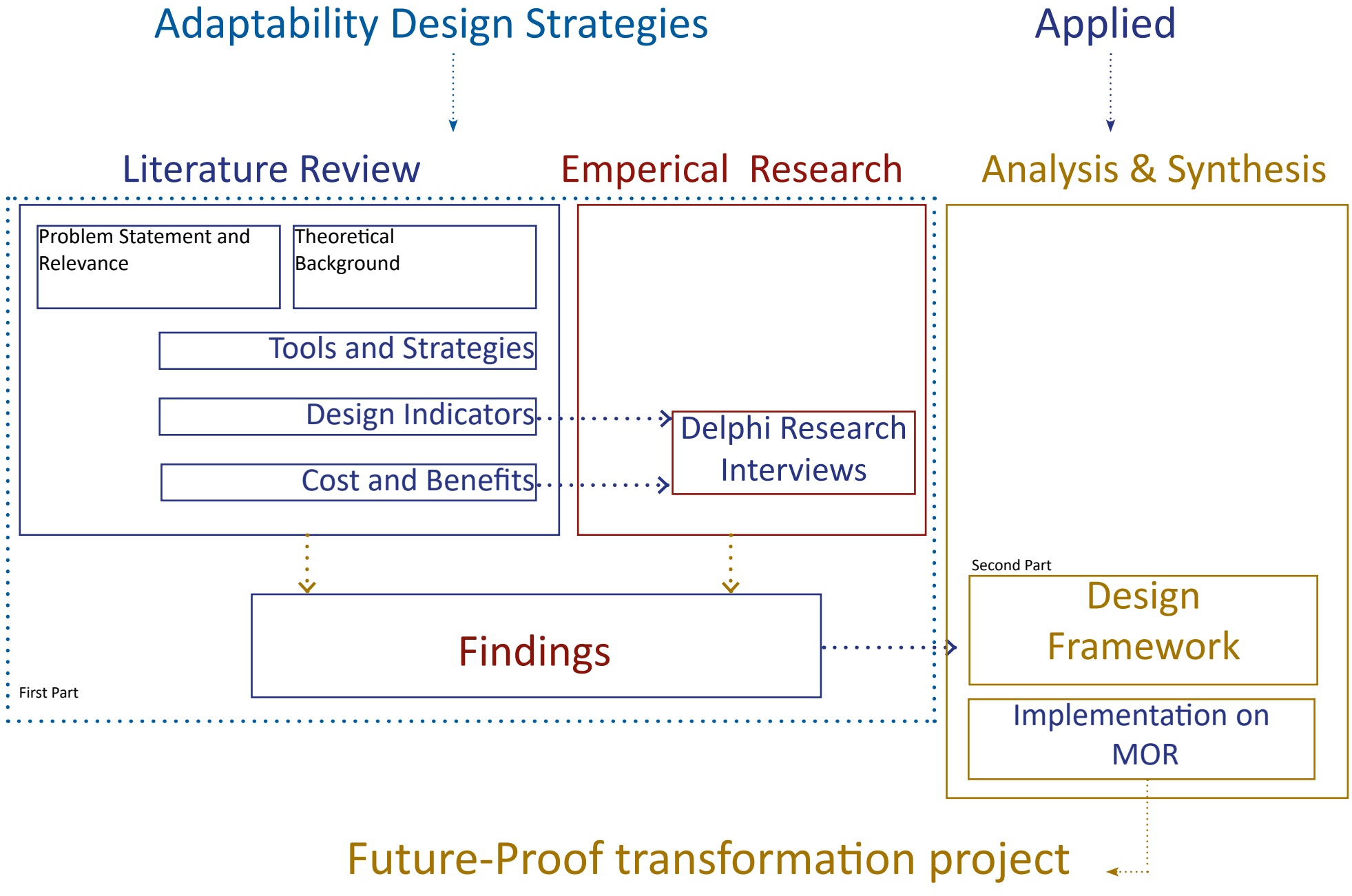
Conceptual Model




Dynamic Object
Ability to CHANGE
Ability to REMAIN FIT
Adaptability
VALUE
TIME

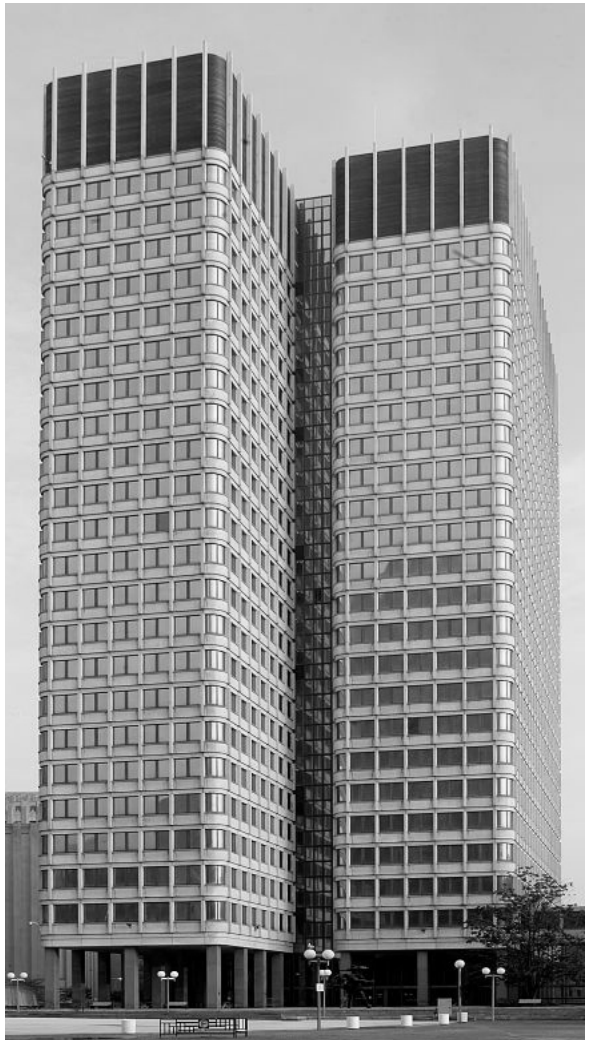
How can adaptability design strategies be applied in order to develop a Future-Proof transformation project?

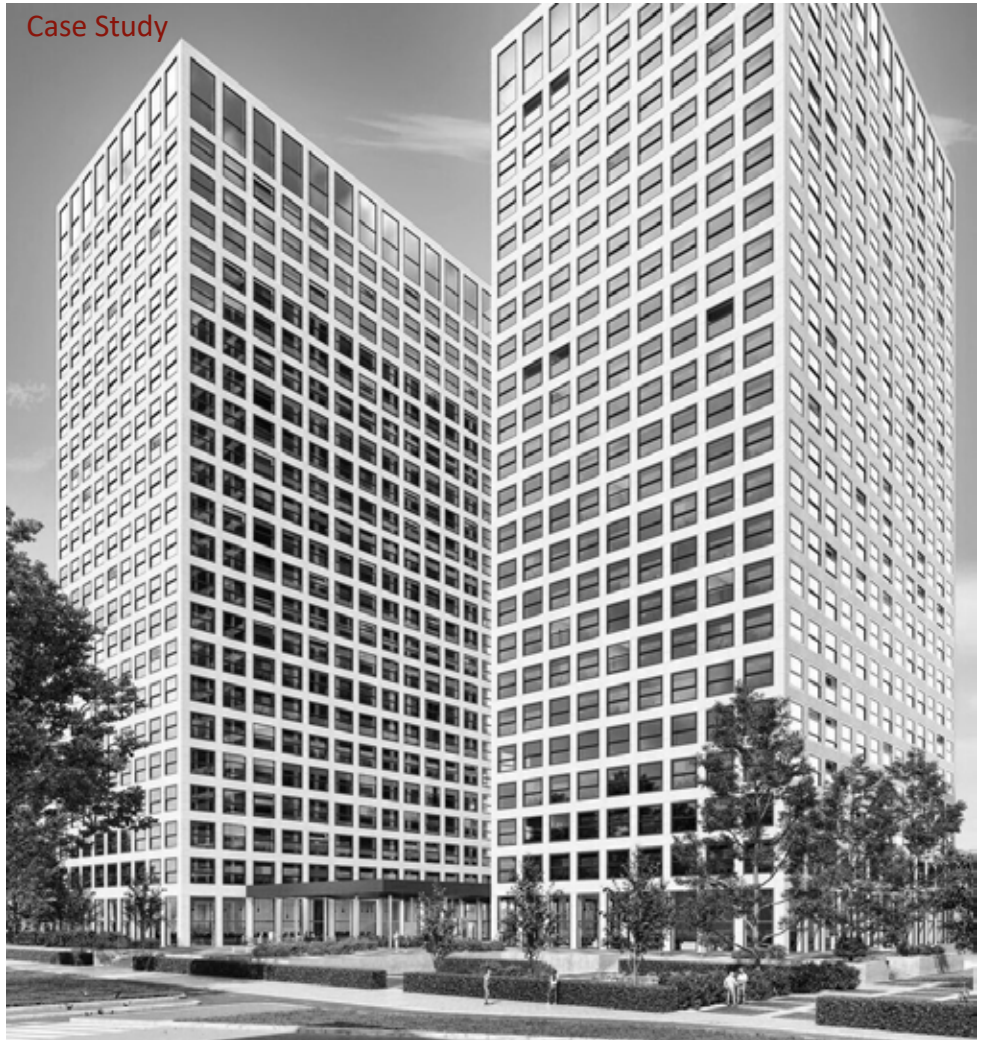
How can
Adaptability Design Strategies
be **Applied**
in order to develop a
Future-Proof transformation project?

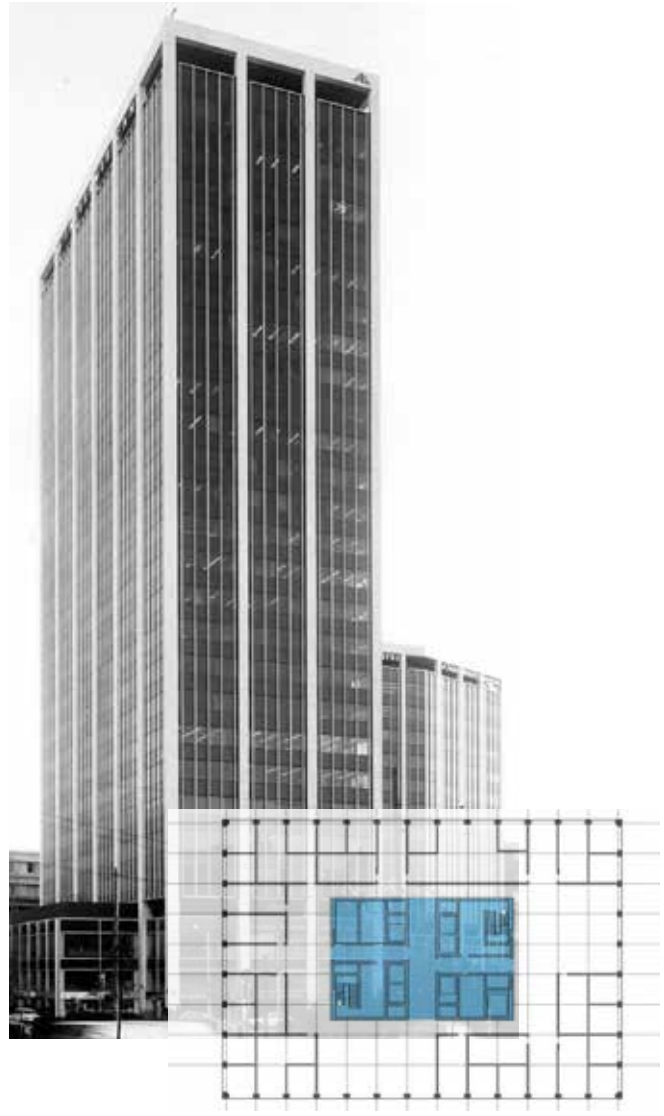

Adaptability Design Strategies
Applied
Literature Review
Emperical Research
Analysis & Synthesis
Problem Statement and Relevance
Theoretical Background
Tools and Strategies
Design Indicators
Cost and Benefits
Delphi Research Interviews
Findings
First Part
Second Part
Design Framework
Implementation on MOR
Future-Proof transformation project

Researched Typology

High densities of Buildings' Obsolescence







Layout Flexibility +

Minimum number of interior columns +

Sufficient Interior Height +

Layout Shape +

Literature Review and Findings

Design Indicators

Plug and Play Elements User Control Stackable No-fixed Objects Detachable Connections Operable Elements	Movable Walls Variety of room sizes Wide corridor widths Frame Construction Flexible ducts Storage space Excess service points	Access Points Standard Shapes Dry connections Coordinated systems Interchangeable components Minimize points of contact	Loose-fit Raised Floors Simplicity Dropped ceilings Multi-functional spaces Excess service capacity	Product Platforms Local materials Known techniques Structural Redundancy Modular Units Extra space Dividable/ Joinable rooms	Inflatable Component Weight Kit-of-parts Easy connections Collapsable Components scale

Schmidt III,2014

Flexibility

Rearrange-Extension-Rejection

Re-locate/ Re-design
Grain size
Facilities
Quality
Expansion
Rejection
Transfer

Measurement system (GRID)
Replaceable inner walls
Demountability-Dismountability
Measuring system Facade
Routing-Circulation Detailing in connections (vertical and horizontal)

Exchangeability of infill construction components
Layout
Accessibility of facility components
Elevators

Geraedts et al. (2014,2015)

Facilities-Quality

Multifunctional Units
Centralized and de-centralized facilities
Disconnect ability of facility components
Accessibility of facility components

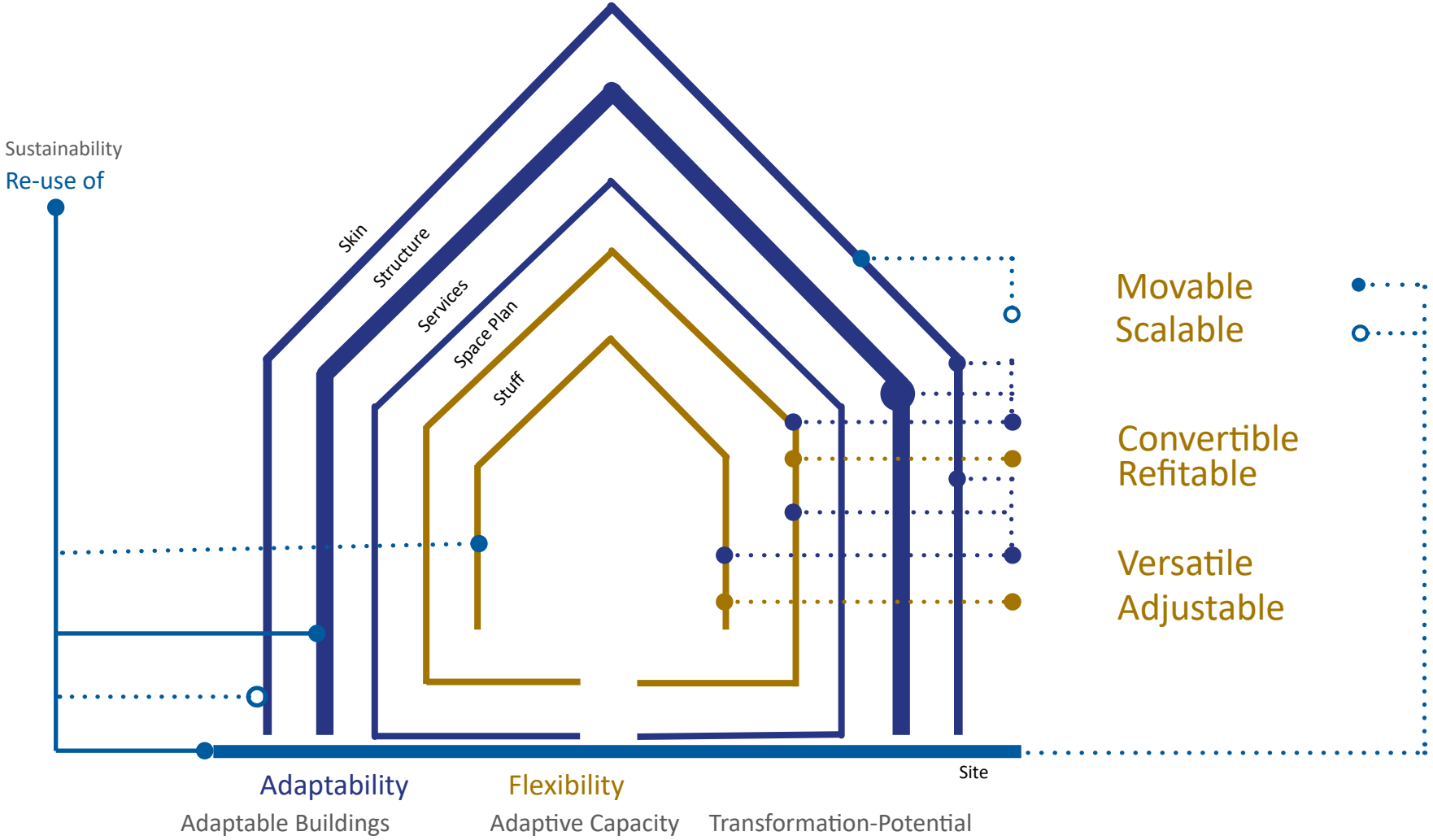
Multifunctional spaces
Partitions and Stuff: light, mobile, demountable, reusable and recyclable
Elasticity-Divisibility
Modularity
Buffer Zones
Circulation Routes
-Oversized spaces (vertical and Horizontal)
Dry connections
-Divisible support structure
Division of support/infill
-Minimise internal columns and load
bearing walls
Prefabricated-standardized components
Detailing
Double, modular facade (Nakib, n.d.)

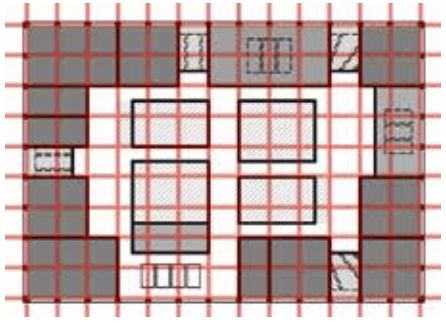
Configurable Stuff
Oversized space
Multi-functional Spaces
Over-design Capacity
Standardised components
Support space (Buffer Zones)
-Daylight

Schmidt and Adaptable Futures

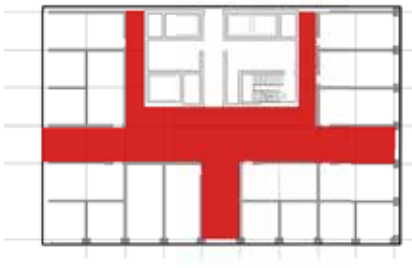
Re-arrange/ Change Function

Division Support-Infill
Access points
-Oversized building
Multifunctional Location
Multifunctional Building
Multifunctional Units

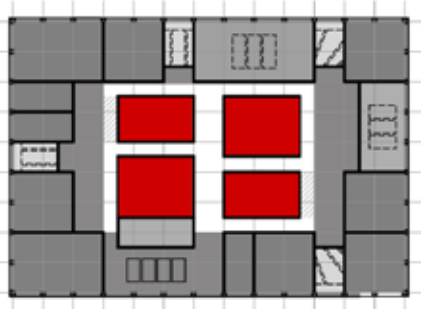

Sustainability
Re-use of
Skin
Structure
Services
Space Plan
Stuff
Site
Movable
Scalable
Convertible
Refitable
Versatile
Adjustable
Adaptability
Adaptable Buildings
Flexibility
Adaptive Capacity
Transformation-Potential



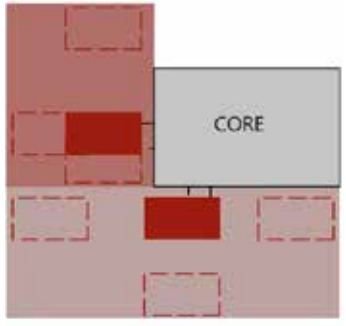
Modularity



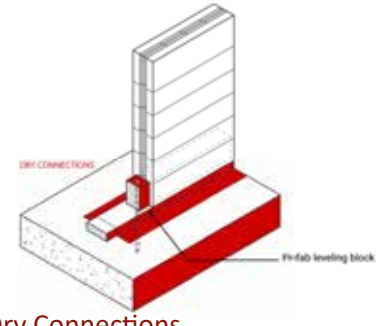
Buffer Zones



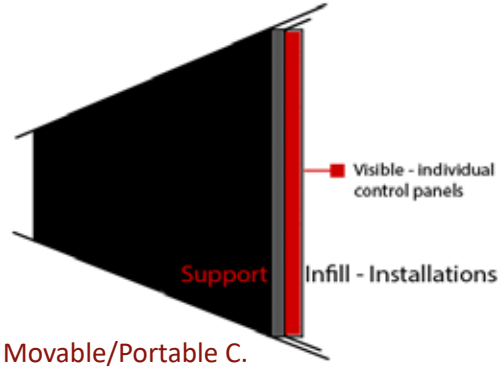
Accessibility



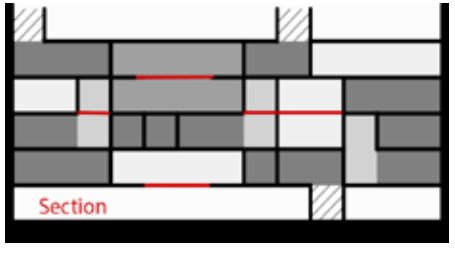
Zoning



Dry Connections



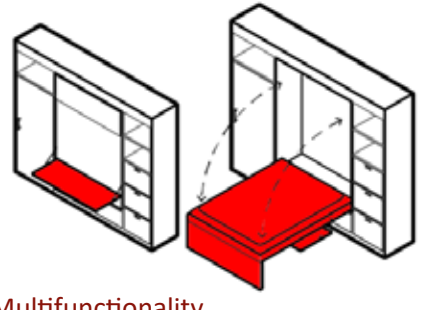
Movable/Portable C.



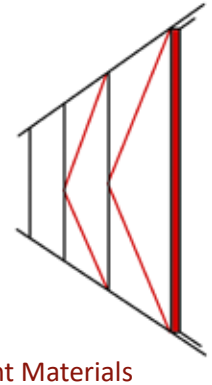
Raised Floors/Openings

Services Load Capacity

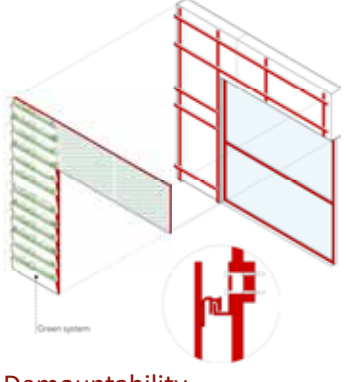
Oversupply



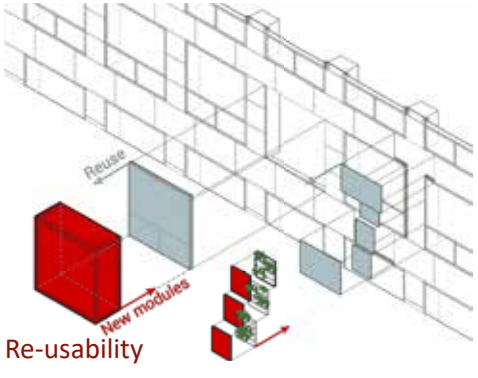
Multifunctionality



Lightweight Materials

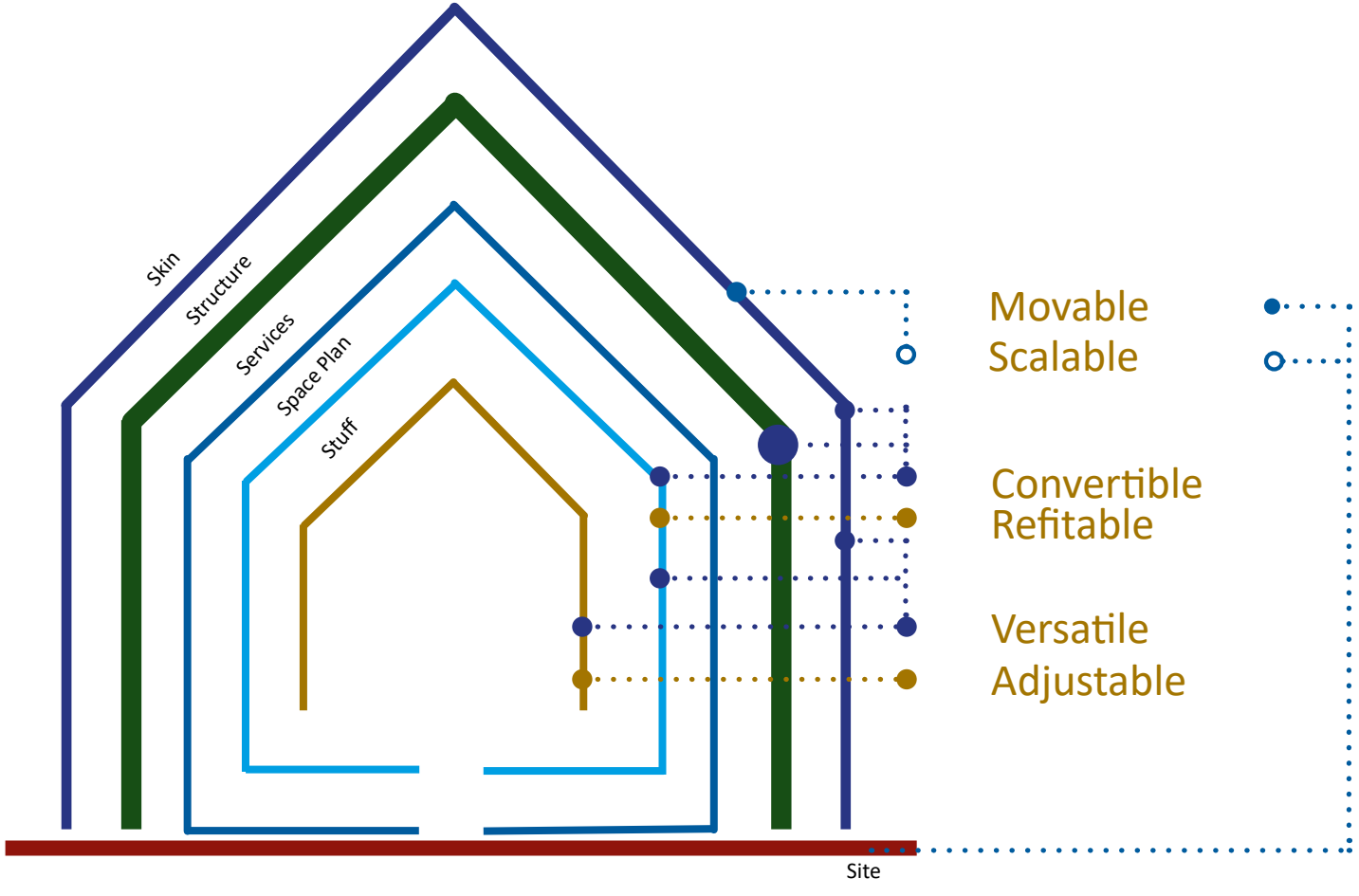


Demountability



Re-usability

Modularity
Zoning
Multifunctionality
Accesibility
Demountability
Loose-fit
Raised Floors
Oversupply
Re-usable Com.
Buffer Zones
Lightweight Materials
Movable/Portable Com.



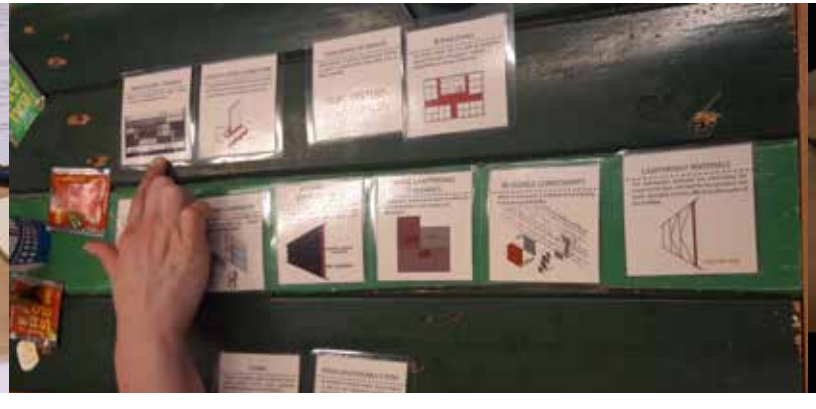
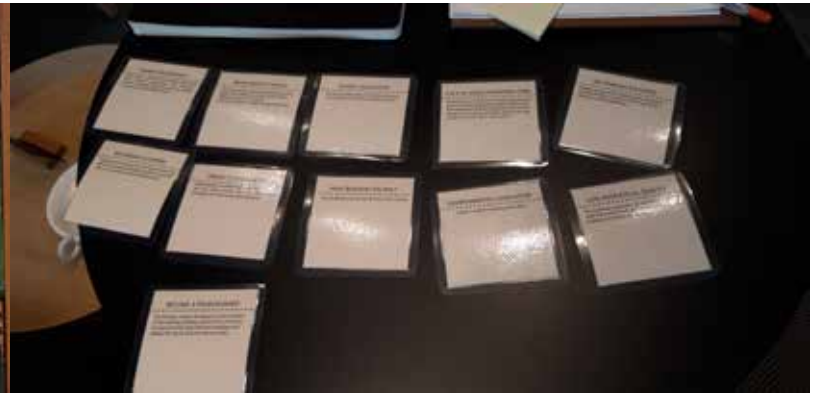
“Applied by Practitioners”

A. The Delphi Research

B. The interviews

Part A. Delphi Research

Panel of (17) experts

Drivers for Adaptability

Design Indicators

Design Indicators	Importance	Cost	Value
Modular and dividable system	1	Low	High
Zoning	2	Low	Moderate
Raised floors, openings	3	High	Moderate
Demountable units and modules	4	Moderate	Moderate
Loose fit connections	5	Moderate	Moderate
Buffer zones	6	High	Moderate
Oversupply of services, systems, facilities	7	High	Moderate
Accessibility to the control systems of components and installations	8	Low	Moderate
Multifunctionality	9	Low	Moderate
Reusable Components	10	Moderate	Moderate
Movable and portable components	11	Moderate	Moderate
Lightweight materials	12	Low	Low

Agreement: Kendall W 0.58
Moderate

Part B. The interviews

Objectives

- Decision Makers - Responsibilities
- **Uncertainties, Risks & Obstacles**
- Value of adaptability
- Characteristics of Adaptability
- Enrich the literature study

Costs-Barriers

Uncertainty of "payback time"
Time-lapse between the costs and benefits of flexibility
Higher Risk and higher Investment
Absence of financial models that can measure adaptability
Education
Industry conventions
Conventional mindsets

Benefits

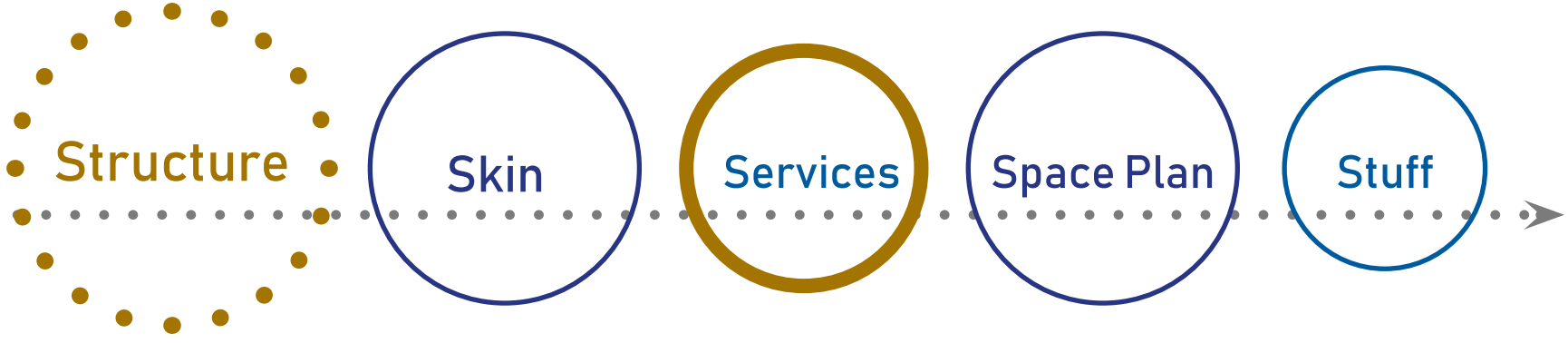
Improved investment value
Increased building's longevity
Reduced change impact
Improved oper. efficiency
Sustainability, durability etc
Higher re-sale value
Freedom of choice
Reduction of uncertainty due to technology, trends etc
Higher users' satisfaction

Adapt-Abilities

Adjustable
Versatile
Refitable
Convertible
Scalable Movable
Future Proof
Durable
Feasible

Lessons Learned

Uniqueness of each Project
Importance of Layers
Ability to remain Fit
Detailing
Multifunctionality
Adaptable Structure
Design Principles



"It is about freedom to use the space as you want. It is important that the buildings allow you to change, not the cost of it. A good structure, the frame." J.E

Criteria

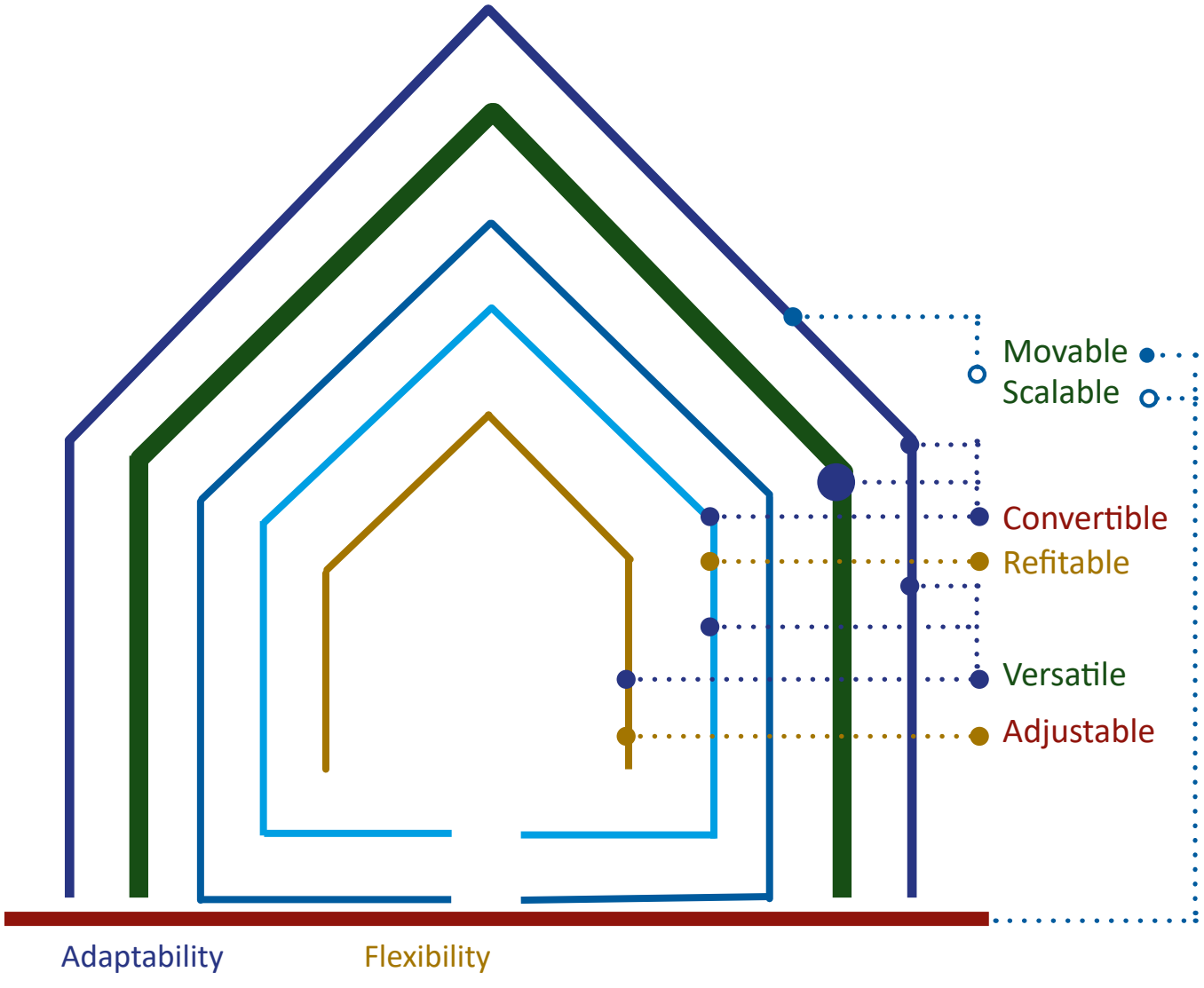
- Balance between **Cost-Value**
- **Analysis** of the **project**

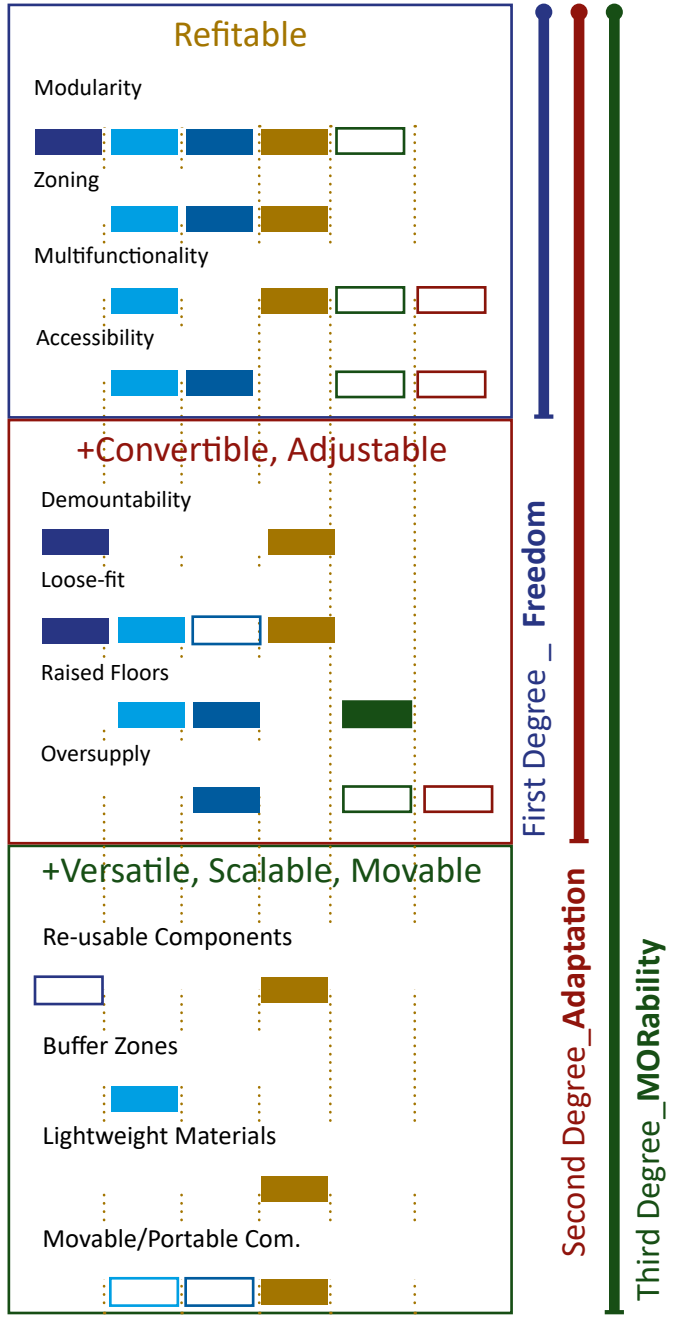
a. Transformation potential

b. Building's and environment's characteristics

- Desirable Accommodation Opportunities
- Impact on **Layers**

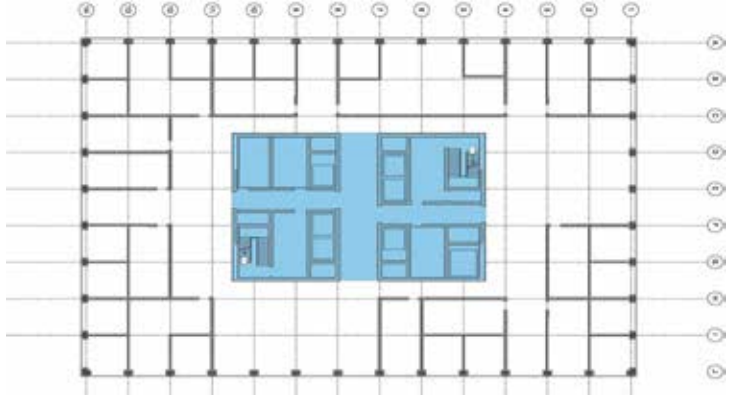
Design Framework

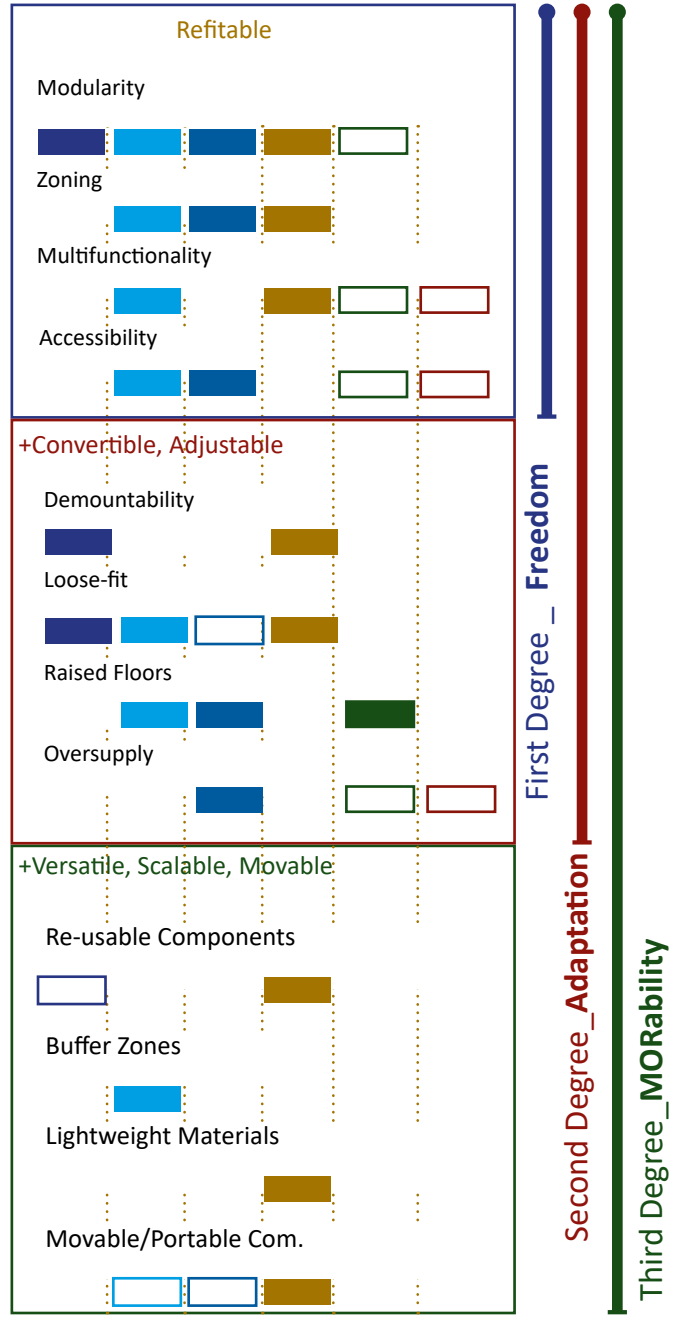




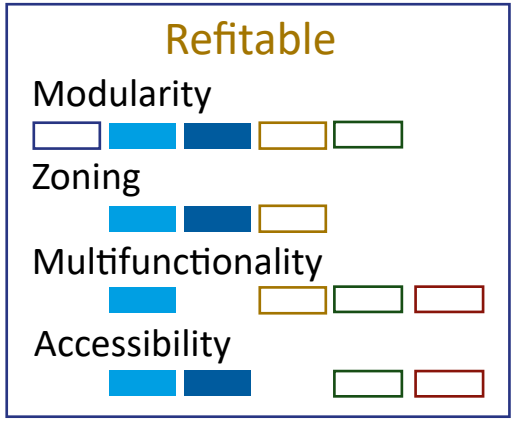
3 Steps

- Uniqueness
- Market & Area
- Vision
- Sequence of design actions





Design Framework



First Degree _ **Freedom**

Second Degree_Adaptation

Third Degree_MORability

Refitable

Modularity

Zoning

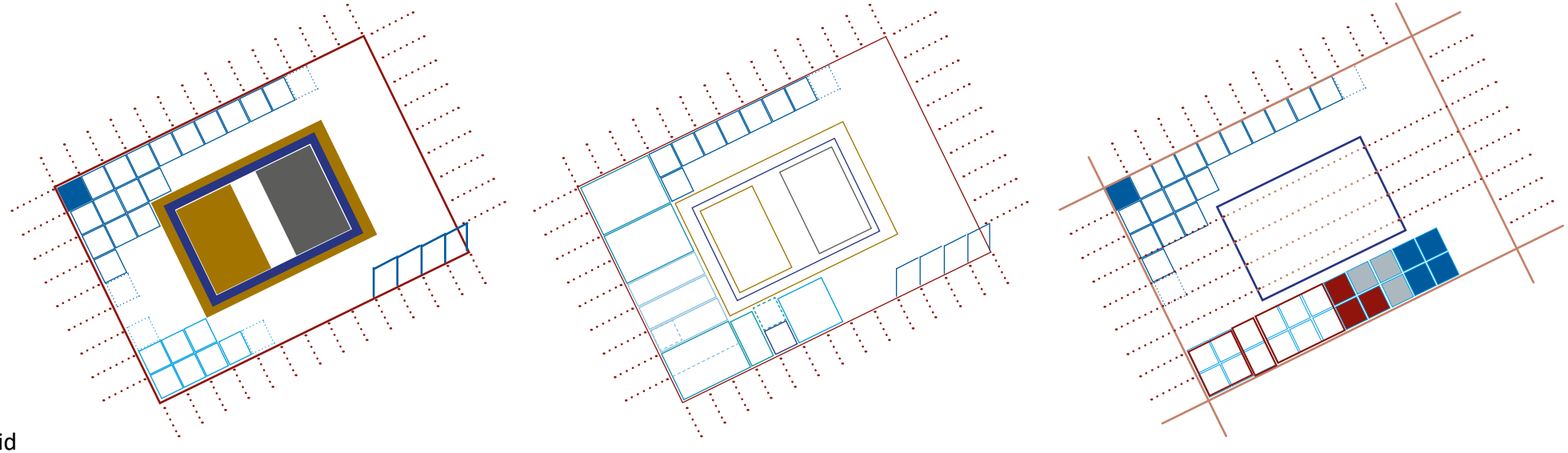
Multifunctionality

Accessibility

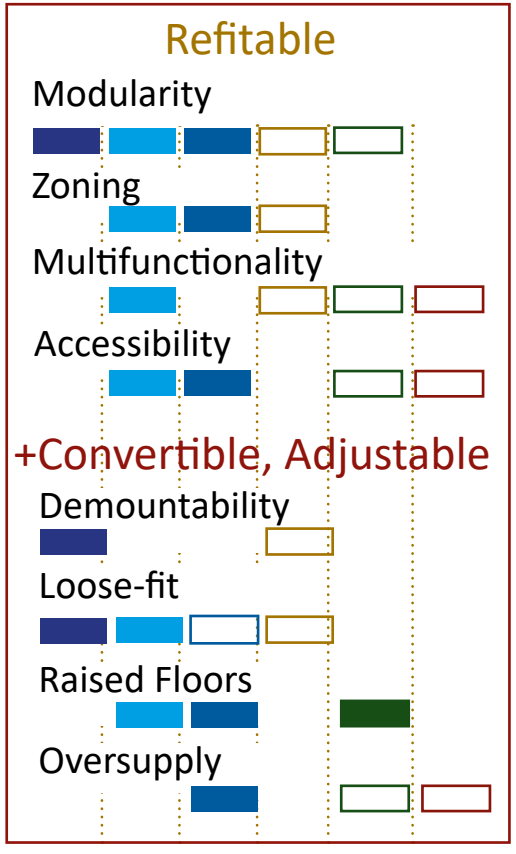
First Degree _ **Freedom**

Second Degree_Adaptation

Third Degree_MORability



Grid
Accessibility & Zoning
Modularity
Multifunctionality
Core
Spatial rearrangements



First Degree _ **Freedom**

Second Degree_**Adaptation**

Third Degree_**MORability**

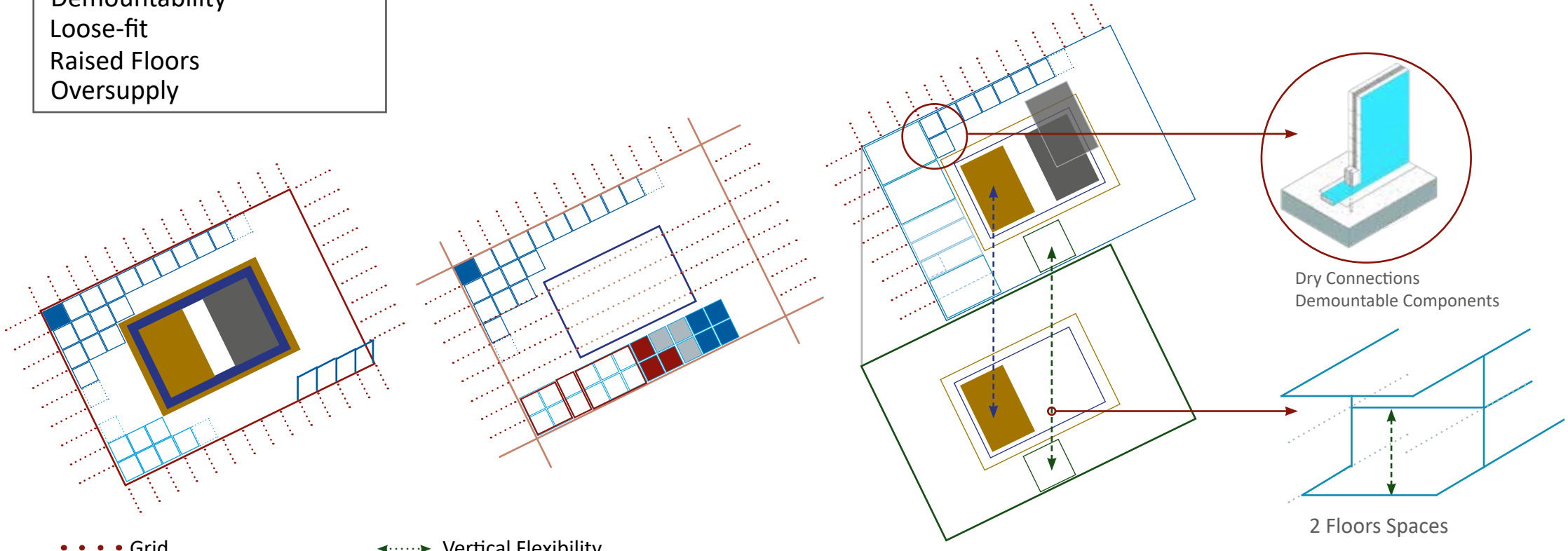
First Degree _ **Freedom**

Second Degree_**Adaptation**

Third Degree_**MORability**

Refitable

Modularity
Zoning
Multifunctionality
Accessibility
+Convertible, Adjustable
Demountability
Loose-fit
Raised Floors
Oversupply



Refitable

Modularity

Zoning

Multifunctionality

Accessibility

+Convertible, Adjustable

Demountability

Loose-fit

Raised Floors

Oversupply

+Versatile, Scalable, Movable

Re-usable Components

Buffer Zones

Lightweight Materials

Movable/Portable Com.

First Degree _ **Freedom**

Second Degree_**Adaptation**

Third Degree_**MORability**

First Degree _ **Freedom**

Second Degree_**Adaptation**

Third Degree_**MORability**

Refitable

Modularity
Zoning
Multifunctionality
Accessibility

+Convertible, Adjustable

Demountability
Loose-fit
Raised Floors
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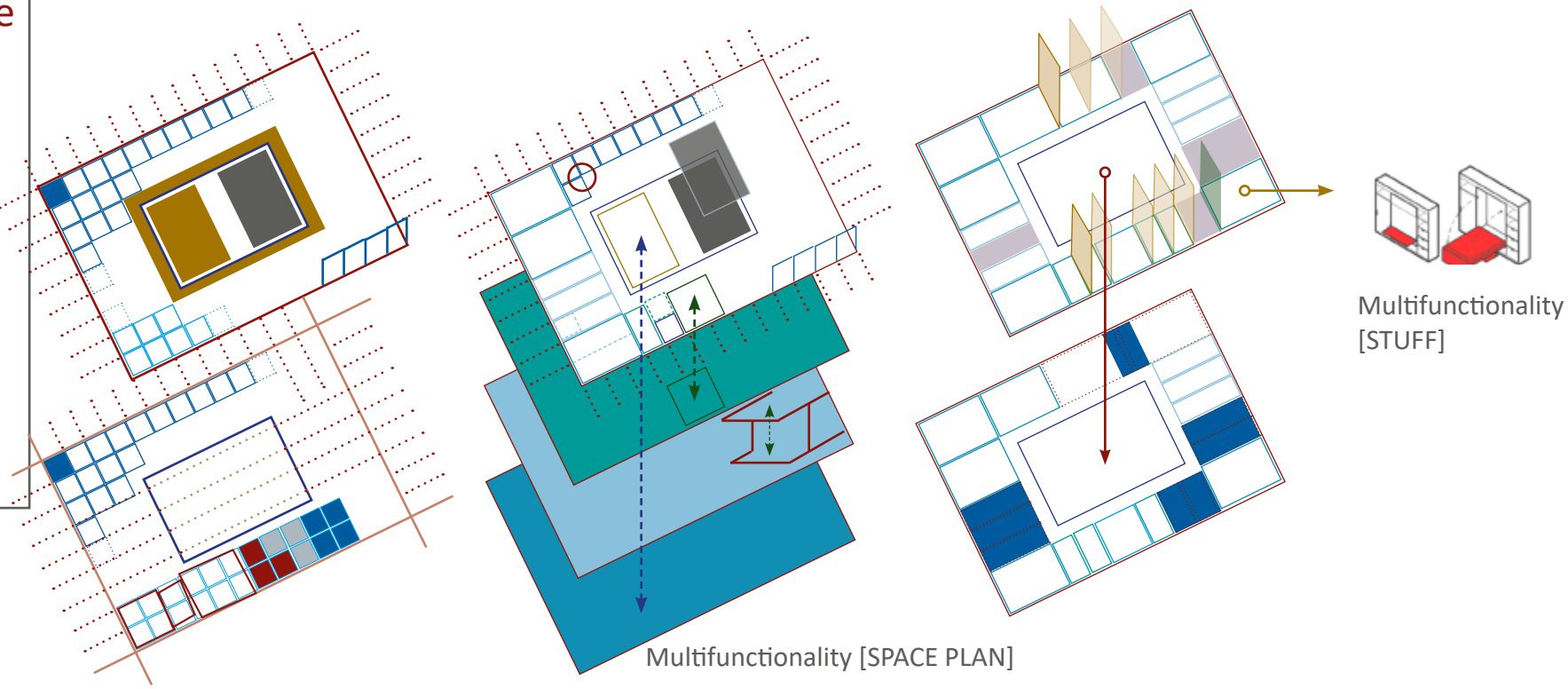
Re-usable Components
Buffer Zones
Lightweight Materials
Movable/Portable Com.



Multifunctionality [STUFF]

Multifunctionality [SPACE PLAN]

Grid
Accessibility & Zoning
Modularity
Multifunctionality
Core
Spatial rearrangements

Vertical Flexibility
Vertical Accessibility
Over-supply
Dry Connections & Demountable Com.

Dry Connections & De-mountable Com.
Buffer Zones
Speed Re-arrengements
Movable & Portable Com.

Multifunctional & Reusable Com.

“Implementation”

MOR_ Solar Decathlon Competition 2019

Characteristics

Target Group: Starters

Vision:
- Net Positive
- Efficient
- Dynamic
- FUTURE PROOF
- Affordable

Key Design Elements:
- Flexibility
- Circularity
- Energy Efficiency
- Modularity

Characteristics

Target Group: Starters

Vision:
- Net Positive
- Efficient
- Dynamic
- FUTURE PROOF
- Affordable

Key Design Elements:
- Flexibility
- Circularity
- Energy Efficiency
- Modularity

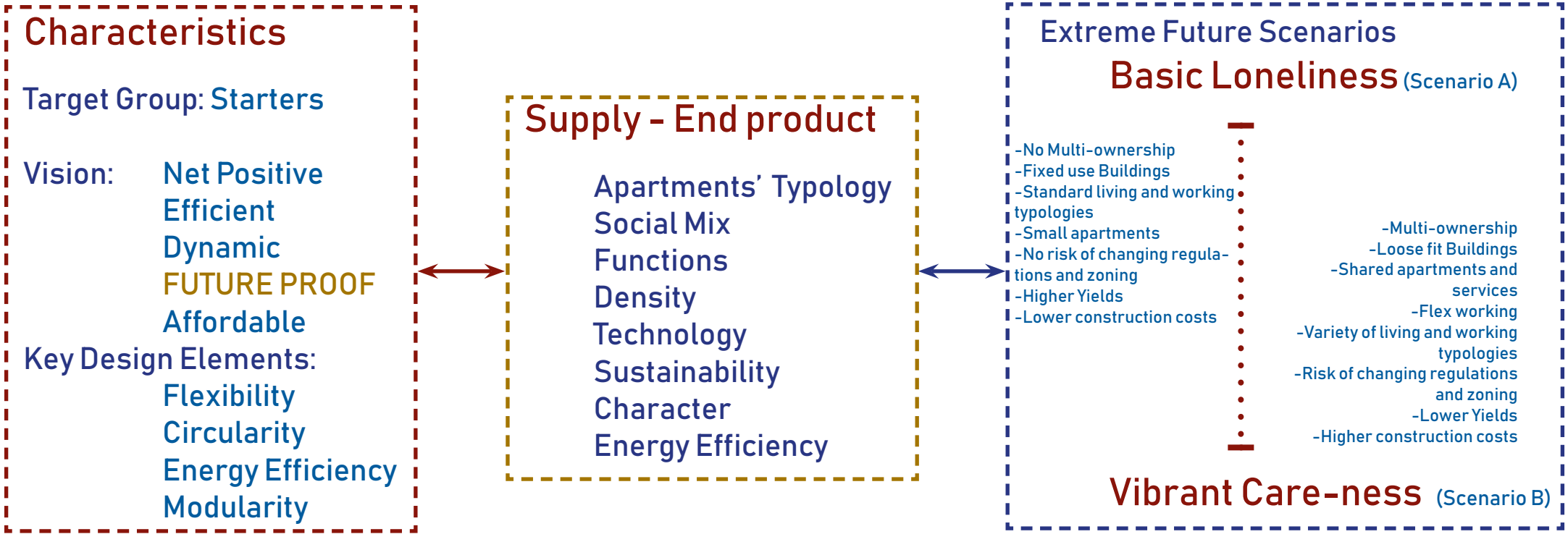
Extreme Future Scenarios

Basic Loneliness (Scenario A)

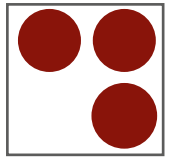
-No Multi-ownership
-Fixed use Buildings
-Standard living and working typologies
-Small apartments
-No risk of changing regulations and zoning
-Higher Yields
-Lower construction costs

Vibrant Care-ness (Scenario B)

-Multi-ownership
-Loose fit Buildings
-Shared apartments and services
-Flex working
-Variety of living and working typologies
-Risk of changing regulations and zoning
-Lower Yields
-Higher construction costs


Characteristics
Target Group: Starters
Vision:
Net Positive
Efficient
Dynamic
FUTURE PROOF
Affordable
Key Design Elements:
Flexibility
Circularity
Energy Efficiency
Modularity
Supply - End product
Apartments' Typology
Social Mix
Functions
Density
Technology
Sustainability
Character
Energy Efficiency
Extreme Future Scenarios
Basic Loneliness (Scenario A)
-No Multi-ownership
-Fixed use Buildings
-Standard living and working typologies
-Small apartments
-No risk of changing regulations and zoning
-Higher Yields
-Lower construction costs
-Multi-ownership
-Loose fit Buildings
-Shared apartments and services
-Flex working
-Variety of living and working typologies
-Risk of changing regulations and zoning
-Lower Yields
-Higher construction costs
Vibrant Care-ness (Scenario B)

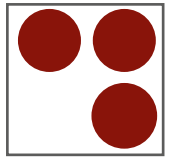
Cross Comparison



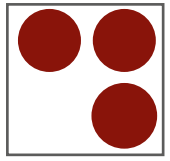
Basic Loneliness

Vibrant Care-ness

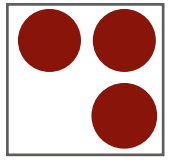
	Scenario A	Scenario B
Apartments' typology	Small	Variety
Functions	Single	Mixed
Ownership - Tenancy	One owner	Multi
Offices' Typology	Big offices	Flex/Co-working
Target Group	Standard	Multiple
Density	Standard	Dynamic
IOT, ICT	Basic	Innovative
Sustainability	No/Basic	Yes
Net positivity	2050 rule	More than 2050 rule
Quality, Character	Basic	Landmark



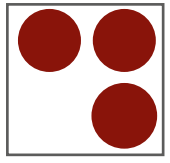
	Scenario A	Scenario B	NON-Dynamic
Apartments' typology	Small	Variety	A or B
Functions	Single	Mixed	A or B
Ownership - Tenancy	One owner	Multi	A or B
Offices' Typology	Big offices	Flex/Co-working	A or B
Target Group	Standard	Multiple	A or B
Density	Standard	Dynamic	A or B
IOT, ICT	Basic	Innovative	A or B
Sustainability	No/Basic	Yes	A or B
Net positivity	2050 rule	More than 2050 rule	A or B
Quality, Character	Basic	Landmark	A or B



	Scenario A	Scenario B	NON-Dynamic	Freedom
Apartments' typology	Small	Variety	A or B	Medium
Functions	Single	Mixed	A or B	A&B
Ownership - Tenancy	One owner	Multi	A or B	A&B
Offices' Typology	Big offices	Flex/Co-working	A or B	A&B
Target Group	Standard	Multiple	A or B	A&B
Density	Standard	Dynamic	A or B	A&B
IOT, ICT	Basic	Innovative	A or B	A&B
Sustainability	No/Basic	Yes	A or B	A&B
Net positivity	2050 rule	More than 2050 rule	A or B	A&B
Quality, Character	Basic	Landmark	A or B	A&B



	Scenario A	Scenario B	NON-Dynamic	Freedom	Adaptation
Apartments' typology	Small	Variety	A or B	Medium	A&B
Functions	Single	Mixed	A or B	A&B	A&B
Ownership - Tenancy	One owner	Multi	A or B	A&B	A&B
Offices' Typology	Big offices	Flex/Co-working	A or B	A&B	A&B
Target Group	Standard	Multiple	A or B	A&B	A&B
Density	Standard	Dynamic	A or B	A&B	A&B
IOT, ICT	Basic	Innovative	A or B	A&B	A&B
Sustainability	No/Basic	Yes	A or B	A&B	A&B
Net positivity	2050 rule	More than 2050 rule	A or B	A&B	A&B
Quality, Character	Basic	Landmark	A or B	A&B	A&B



MOR

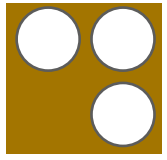
	Scenario A	Scenario B	NON-Dynamic	Freedom	Adaptation	MOR-Ability
Apartments' typology	Small	Variety	A or B	Medium	A&B	A&B
Functions	Single	Mixed	A or B	A&B	A&B	A&B
Ownership - Tenancy	One owner	Multi	A or B	A&B	A&B	A&B
Offices' Typology	Big offices	Flex/Co-working	A or B	A&B	A&B	A&B
Target Group	Standard	Multiple	A or B	A&B	A&B	A&B
Density	Standard	Dynamic	A or B	A&B	A&B	A&B
IOT, ICT	Basic	Innovative	A or B	A&B	A&B	A&B
Sustainability	No/Basic	Yes	A or B	A&B	A&B	A&B
Net positivity	2050 rule	More than 2050 rule	A or B	A&B	A&B	A&B
Quality, Character	Basic	Landmark	A or B	A&B	A&B	A&B

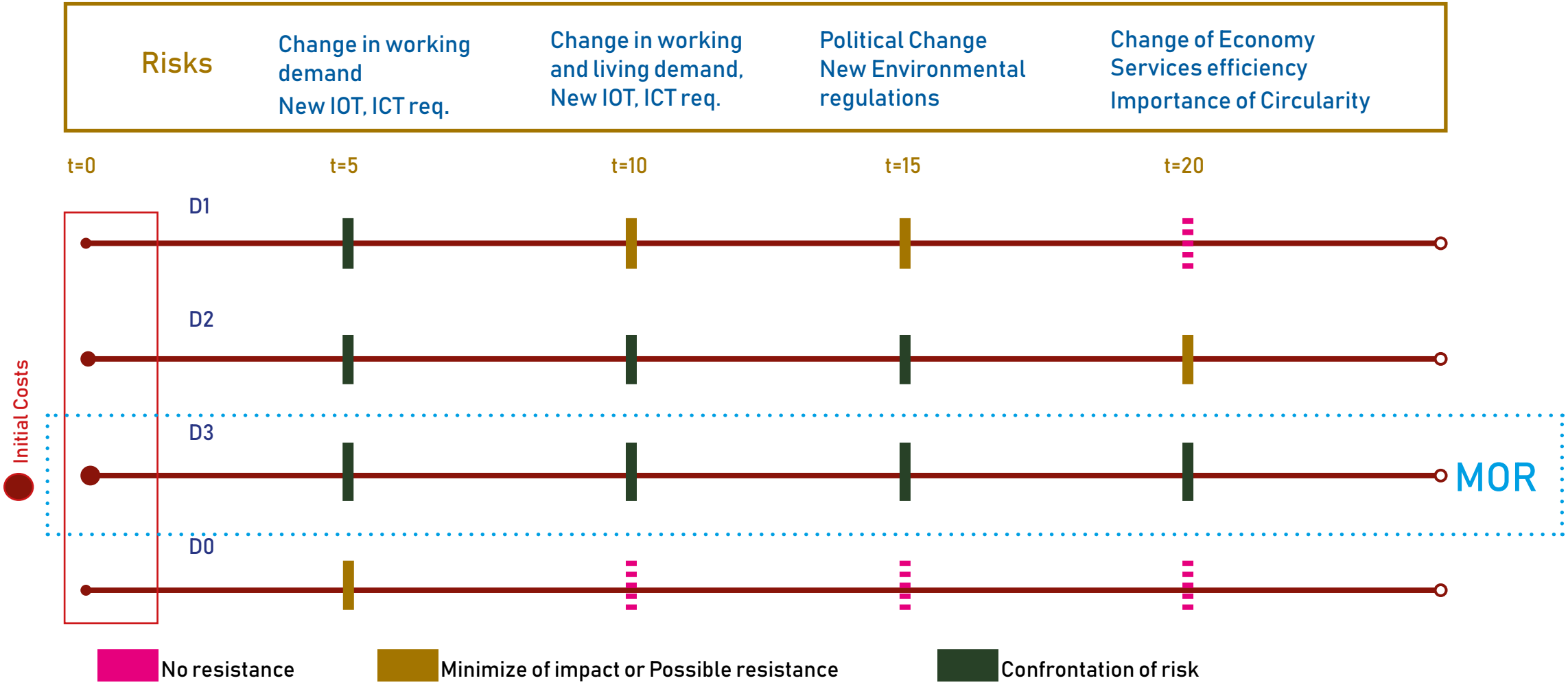
No resistance

With resrictions

Fully dynamic

Cross Comparison





End-Product

APARTMENT TYPOLOGIES

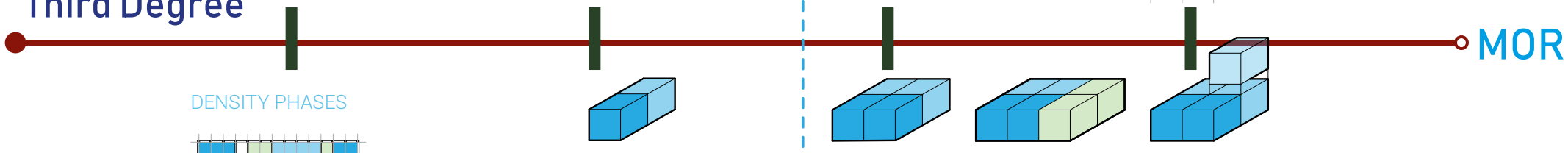
SMALL 2x

MEDIUM 4x +

MEDIUM 'LIVE'

MEDIUM 'LIVE x GROW'

MEDIUM 'LIVE x WORK'
LOWER AND UPPER FLOOR



Third Degree

MOR

LARGE 6x +

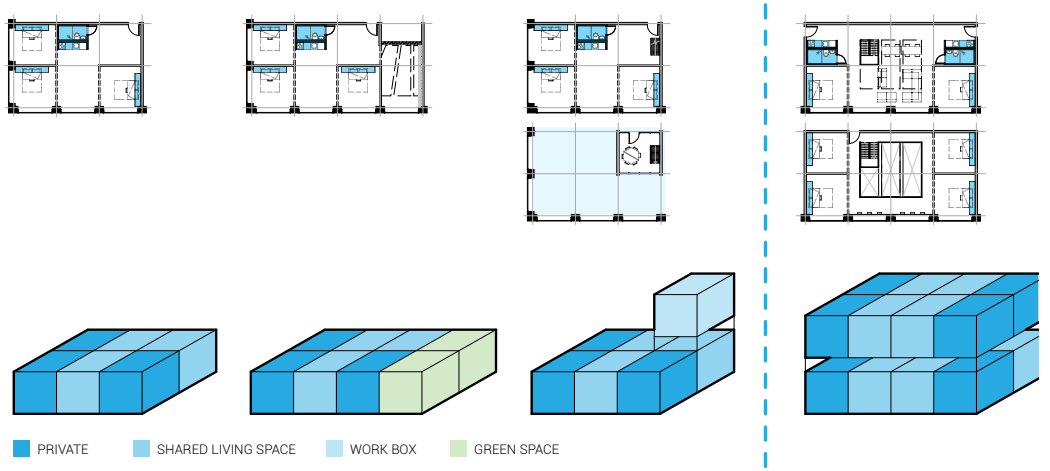
LARGE 'LIVE'

LARGE 'LIVE x GROW'

LARGE 'LIVE x WORK'

CO-LIVING 12x

LARGE 'LIVE x SHARE'
LOWER AND UPPER FLOOR



PRIVATE SHARED LIVING SPACE WORK BOX GREEN SPACE

DENSITY PHASES

LOW DENSITY (AVG 14 BEDROOMS)

MEDIUM DENSITY (AVG 19 BEDROOMS)

HIGH DENSITY (AVG 24 BEDROOMS)

APARTMENT

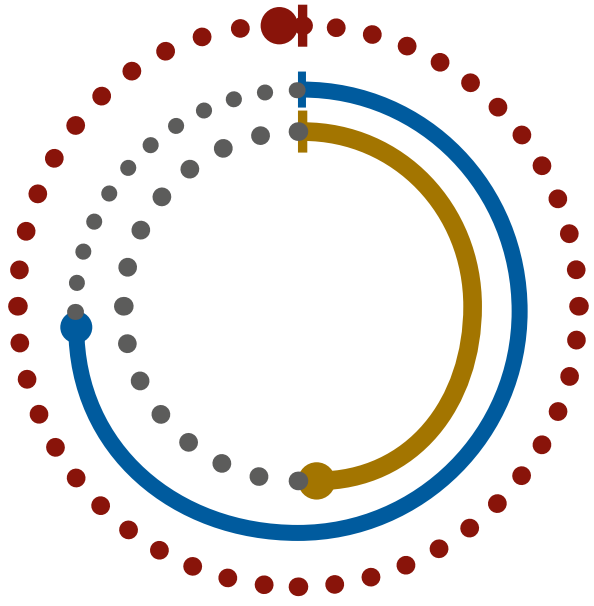
CO-LIVING UNIT

SIZE-ADAPTABLE WINTERGARDENS

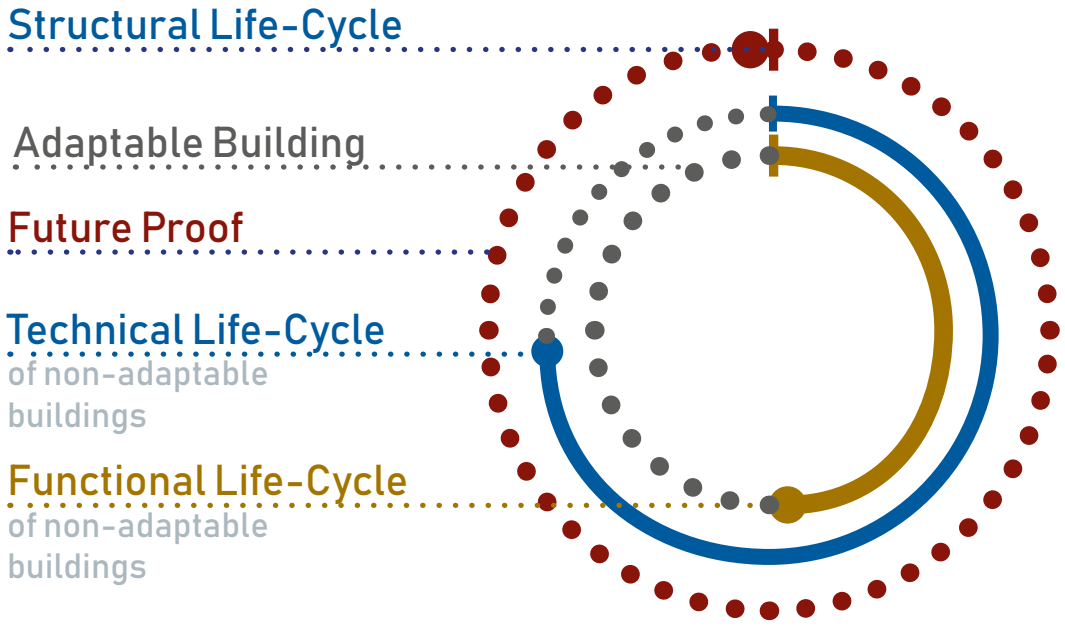
PERMANENT TERRACE AND FOOD PRODUCTION

CORE FUNCTIONS

Conclusions

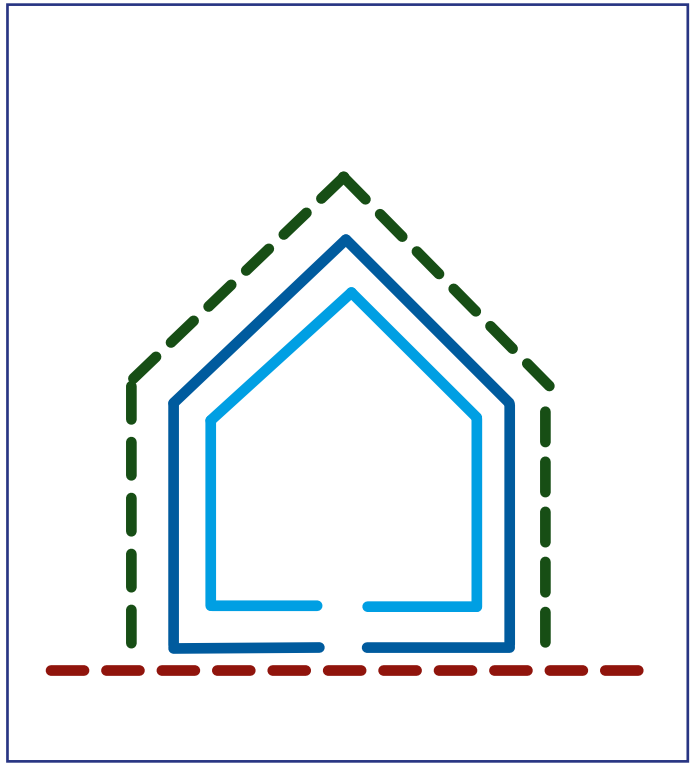


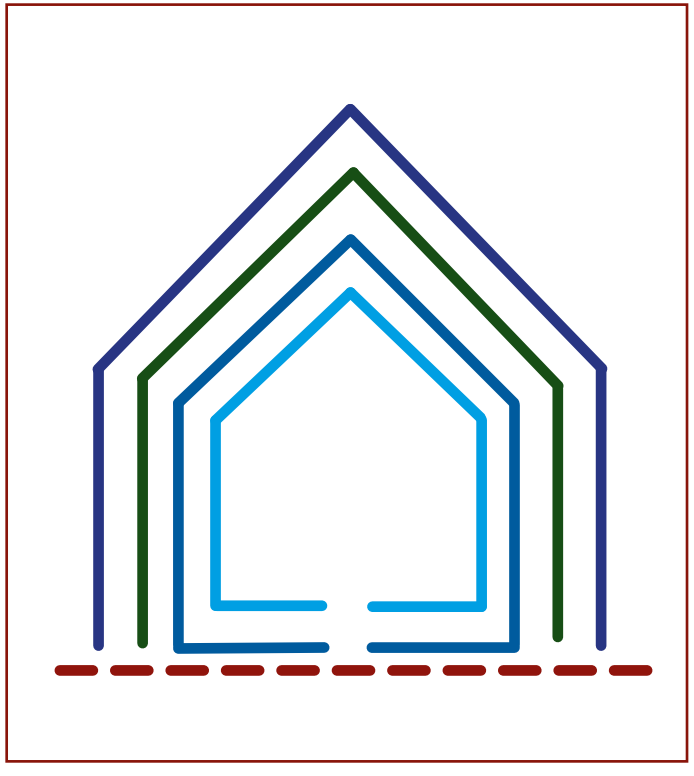
Conclusions

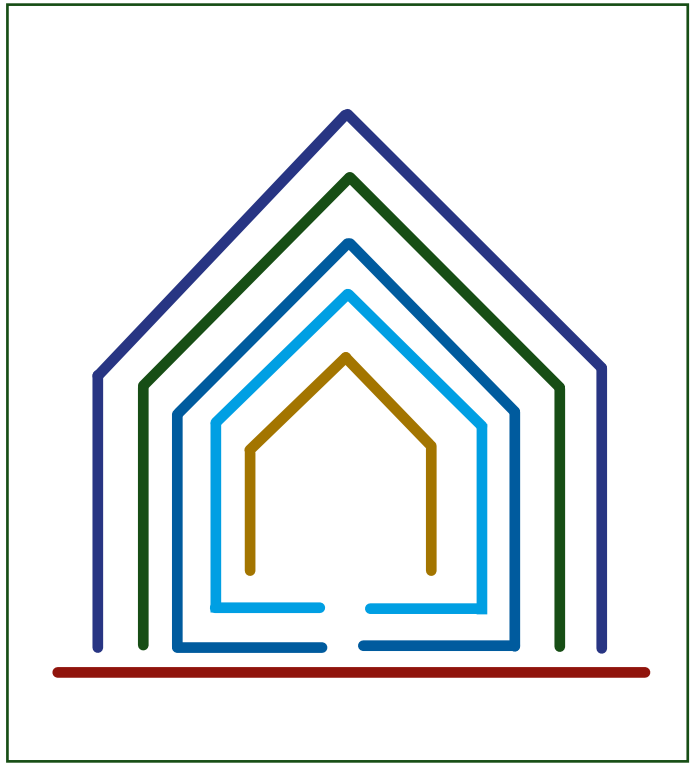


How can
Adaptability Design Strategies
be Applied
in order to develop a
Future-Proof transformation project?

Design Framework







First Degree _ **Freedom**

Second Degree_ **Adaptation**

Third Degree_**MORability**

Reflection

Reflection on the TOPIC

Reflection on the METHOD

Reflection on the END-Result

Reflection on the Limitations

Further Research

Scientific & Social Relevance

Reflection on the TOPIC

Reflection on the METHOD

Literature Research

Empirical Research

Reflection on the TOPIC

Reflection on the METHODOLOGY

Reflection on the END-Result

Design Framework

Time
Quantitative Data

Reflection on the TOPIC

Reflection on the METHODOLOGY

Reflection on the END-Result

Reflection on the Limitations

Recommendations for Further Research

Design Framework

Economic Considerations

Other Typologies

Adaptable Design

Thank you!!