ENGINEERING IDENTITY.

Adaptive re-use of the gallery flat roofscape as a catalyst for redefining the urban identity of generic Dutch post-war neighbourhoods and creating layered & resilient cities for the future.

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Argumentations of choice of the studio:	Technical approach, relevance to actual construction practice, freedom of choice, feasibility of genuine architectural solutions, societal value, possibilities for novel and innovative solutions, etc.
Title:	ENGINEERING IDENTITY: Adaptive re-use of the gallery flat roofscape as a catalyst for redefining the urban identity of generic Dutch post-war neighbourhoods and creating layered & resilient cities for the future.
Keywords:	Gallery flats, adaptive reuse, vertical extensions, urban identity, circularity, postwar neighbourhoods, densification, 1 million homes

Cover page: ‘Een groepje bewoners van het C240-complex aan de oostzijde van Schalkwijk’, (Stapel, 1994)

General Problem Statement

The Netherlands is suffering from a multi-faceted housing crisis. The primary, most pressing issue is the current shortage of suitable housing, especially in already urbanised and dense regions (BPD Hittekaart, 2021). To alleviate it, the government has set a goal to add 1 million new homes to the housing stock by 2030 (Groenemeijer, 2021). This translates to a requirement of 100.000 homes being added per year for 10 years, the majority of which is to be newly built. Two years have passed since, in both of which roughly 70.000 new houses were built (CBS, 2022). A total of 80.000 new dwellings may be reached in 2022, but an increase beyond that in 2023 is likely not possible (Architectenweb, 2022c).

The lack of capacity to build new housing stems from a number of problems, including the lack of affordable plots, slow permitting processes, rising material costs, nitrogen emission legislation and manpower shortages in the construction industry (Architectenweb, 2022a, 2022b, 2022c; NOS, 2022b). Because of this, experts are predicting that the goal of 1 million new homes by 2030 is impossible (Voermans, 2022). No more than 500.000 to 750.000 newly built houses can today be guaranteed by 2030 (Radar, 2022).

Secondly, rising quality standards mean that substantial work will also be needed for improving the existing housing stock as well. Both nationally and EU-wide has set a clear goal to create a fully circular economy by 2050 (Ministerie van Infrastructuur en Waterstaat, 2022; European Parliament, 2018). This goal has been set because current economic practices and habits are unsustainable for the future. An existential threat in the form of climate change is forcing society to adapt accordingly. For the built environment, this means that both in construction and usage of our buildings, all material and energy flows should be made circular and indefinitely sustainable.

Because at least 75% of the building stock extant in 2050 has already been built today it is vital to not only ensure that what is yet to be built is done sustainably, but that we divert equal attention to ensuring that our current stock is made sustainable as well (PBL. 2014).

In the Netherlands, a large part of this existing housing stock can be categorised in distinct periods of intensive housing programmes between 1945 and the 1990's. More than half of the current stock stems from this period, of which the period between 1965 and 1975 saw perhaps the fastest increase in housing (CBS,2020). Faced with a perpetual housing shortage and the prospect of greater than expected population growth, the Dutch government responded with the 'Tweede Nota over de Ruimtelijke Ordening in Nederland' in 1966, spurring extensive and rapid suburbanized housing programmes (Bruinsma & Koomen, 2018). Enabled by new industrialised production methods, the shortage of housing at the time was indeed quite quickly reduced, with construction peaking in 1973 with 155.412 new homes built in one year (CBS, 2022). From this impulse the industrialised gallery flat typology, built in the ubiquitous postwar neighbourhood was born. The housing shortage was alleviated, and the gallery flat became a very common typology in all of the Netherlands and indeed in most of Europe.

General Problem Statement

However, the consequences of their rapid construction are now apparent. Technical qualities such as thermal insulation, ventilation and acoustics do not conform to modern standards, and neither does functional performance (Brouwers et al., 2013; Harnack et al., 2021). More subjectively, gallery flats are often considered aesthetically unappealing and in an urban context social issues are often prevalent (Brouwers et al., 2013).

In this field lies an additional, but to me the most interesting and key issue to be addressed: the identity of the gallery flat and with it, the identity of the postwar neighbourhood. Both were built on very clear ideological principles such as democracy, equality, separation of functions and a single vision of what constituted one household. The result was equal and affordable housing for all, yet also the same housing for all. Combined with the urgency of housing, which justified methods of construction that were easily copied, scaled and repeated throughout the nation, the result was the building and planning of generic 'stamp' neighbourhoods, buildings and homes (Hereijgers & Velzen, 2002).

This, in turn, has led to the common complaint of postwar neighbourhoods being anonymous and, for many, undesirable to live in. It was during the site visit to the chosen context, Boerhaavewijk in Haarlem, that these issues started to resonate with me as I saw and felt this issue of identity from my own position as a human in the neighbourhood.

While the underlying ideological principles of the postwar paradigm are not inherently flawed, it has become clear that their translation into architecture and urbanism is not sufficient for contemporary life, let alone for a circular – and especially socially sustainable – way of living by 2050. Household sizes are decreasing while floor space usage per capita is increasing. The number of single-person households has multiplied by 8 compared to 60 years ago (NOS, 2022a). Streets are becoming emptier and those who remain are becoming lonelier as less people inhabit the postwar neighbourhood. Consequently, there is less justification for public functions like stores, public transport and schools, causing a negative feedback loop (Koöperatieve Architekten Werkplaats, 2020). The postwar neighbourhood is not built for contemporary human lifestyles, nor for those of the future; but how can we make it so?

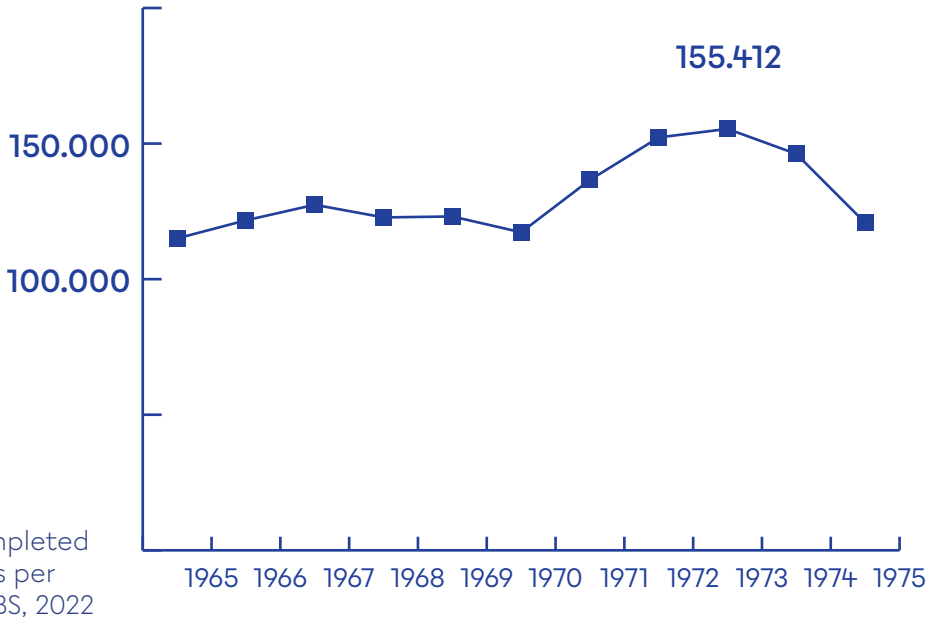


Figure 1: Total completed newly built houses per year, 1965-1975. CBS, 2022

Figure 2: (Uitleg Door Openbare Werken Over Schalkwijk, 1971)

Figure 3: De bouw van het winkelcentrum Schalkwijk, ziende naar het noordoosten (Boer, 1968)

Project Objective

Many of the aforementioned technical and housing issues already have quite clear solutions: insulating facades, new utility systems, densification, building transformation, etc. All are relevant issues, but already have known solutions. However, when we consider the issue of identity in the postwar neighbourhood it becomes much less obvious what we should do to improve it, yet equally clear that something should be done.What will our lifestyles be like when considering our common, circular future? How can and should our dwellings enable this? And more importantly, how should existing, problematic and out-dated dwellings like the gallery flat be not just technically improved, but be made suitable for this future? An incredibly exciting question; but an equally wicked problem!

It is in the prospect of addressing the question of living in the future that led me to choose redefining the identity of the gallery flat and the postwar neighbourhood as the guiding theme of my graduation project. With the working title of 'Engineering Identity' I wish to respond to the question of how, starting from an architectural engineering solution for the ubiquitous gallery flat, we can redefine the identity of the postwar neighbourhood and make it resilient and circular for the future, which in turn is based on the question of what a circular future will mean for people how live.

This objective is of course still simultaneously framed by other, more generic objectives: to help close the gap in the housing shortage before 2030, to help in improving technical quality of flats and to build in a way that is circular, sustainable and fast as to accommodate a circular economy in 2050. These generic objectives have established solutions, but I believe that in the combination of all of these objectives and with the specific objective of rethinking identity through engineering a new and novel approach for revaluation of the gallery flat can be found.

“

It’s about

never demolishing
never undoing

adding and strengthening the balance of existing urban organizations

removing housing from financial and social classifications

opposing the principle of housing as a financial product

providing housing with the generosity of use that has been missing for 50 years

Density:

to densify means providing more space without compromising individual space.

To give the ability to housing and residents to experience plenty of situations.
The ordinary as extraordinary.
“

Anne Lacaton & Jean-Philippe Vassal on their approach to renovation of public housing, in *Freedom of Use*, 2015 (Lacaton & Vassal, 2015)

Overall design question

The problem statement and the project objective have led me to the following overall design question:

'How can the circular transformation and densification of a typical post-65 gallery flat in Boerhaavewijk be used to enable new models of living suitable for the future, while also serving to redefine the identity of a typical postwar neighbourhood?'

How can transformation and densification lead to a new identity? Contrary to the original vision of the postwar neighbourhood, which prescribed a clear separation of functions and led to buildings surrounded by anonymous leftover spaces, the solution may lie in creating 'cities for people', as authors like Jane Jacobs and Jan Gehl advocated for. An approach to design should be taken from the point of view of the human as that is instrumental for the creation of what David Sim calls the 'layered city' (Sim, 2019).

It is in embracing the complexity and diversity of life that I believe the key lies in the successful redefining of the identity of the gallery flat. The design process will thus be a search for an architectural engineering solution to the existing monofunctional flat. In this process, I have concluded that the catalyst for the entire redevelopment will be the adaptive re-use of the existing rooftop. Preliminary research has shown me much of its potential is going to waste. The rooftop has the potential for, at the very least, generating energy, buffering rainwater & increasing biodiversity. But plenty of examples show that roofs can be used for housing densification as well. This can amount multiple new layers on top of the existing, thus giving much needed density and diversity to a monofunctional building: an opportunity to give new individual and collective identity.

As the housing crisis is most critical in urban areas, densifying postwar neighbourhoods is both quicker and more effective. The urgency of the housing and climate crises mean that we need to build fast and with little waste. While postwar neighbourhoods often have open green spaces where we could build quickly, further sacrifice of green spaces is undesirable as well. We should always first consider using existing buildings and structures to densify. And in almost all cases expansion from the roof is possible.

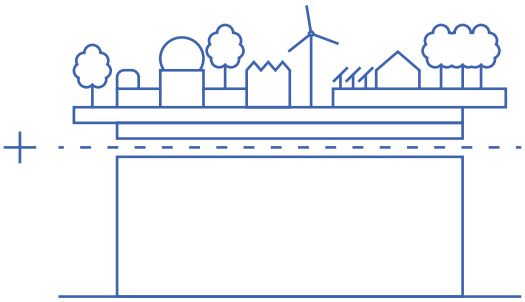
Furthermore, when considering extensive transformation, inhabitants will likely have to move elsewhere for some period of time, if they even agree to do so in the first place. I believe this to be fundamentally opposite to the goal of wanting to quickly decrease the housing shortage. Instead, by first creating new housing on top of an existing flat a buffer is made with which it is made possible to temporarily house people and then work systematically from one layer to the next, renovating the whole building extensively, increasing quality for all, enabling new living and all of that without anyone having to move out.

I envision this process to be complex and difficult. In this design question, factors such as the ownership model of the whole flat are an instrumental part in enabling a transformation that is much more than just regular maintenance. Nevertheless, there exist multiple examples of unconventional but successful cooperative ownership models (Hofmeister, 2019). The gallery flat, often owned by housing corporations, is a great subject for this visionary experiment. It will be necessary to investigate which model best fits the vision during the design phase.

0

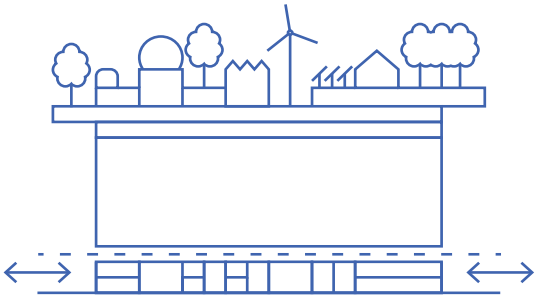
Existing flat:
Not adjusted for life in the future,
lacks identity

1



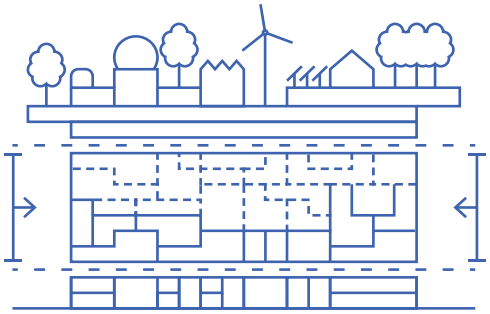
Catalyst: Vertical extension of new housing and a collective roofscape

2



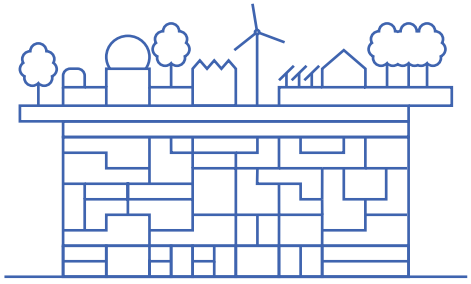
Public Connection:
Re-connecting the flat to the neighbourhood through the plinth

3



Individual Identity:
Adapting and improving individual houses, from bottom to top

4



Result: A layered flat, with a strong identity, fit for living in the future

Figure 4: Proposed overall design strategy. Own work.

Thematic Research Question

The vertical expansion of the gallery flat has been established as the catalyst for the entire design. Because of the importance I have allocated to that specific aspect, a deep and thorough understanding of vertical expansions justifies an academic research paper. It leads me to the following thematic research question:

How can the vertical expansion of existing gallery flats be used to simultaneously densify and enable new collective ways of living?

This question is still quite broad. The scope must be further narrowed in sub-questions, which cover all aspects of the vertical expansion to be fully understood to enable this vision (see below).

Main questions

How does the feasibility of extensive vertical expansions on gallery flats relate to load-bearing capacity of existing structures?

How can vertical expansions be made as adaptable and flexible as possible to allow for future changes to the roofscape be made?

How can the creation of collective rooftop spaces for gallery flat inhabitants increase social sustainability?

Sub questions

How can margins for load-bearing capacity in existing gallery flats be found?

How can the load-bearing capacity of existing gallery flats be increased?

How can extensive vertical expansions be made as light as possible?

How can demountable connections be adapted to existing structures?

How should new vertical additions be designed to allow new systems to be easily connected to existing services?

How can collective spaces increase social sustainability?

To what extent should inhabitants be able to dictate the design and infill of collective spaces?

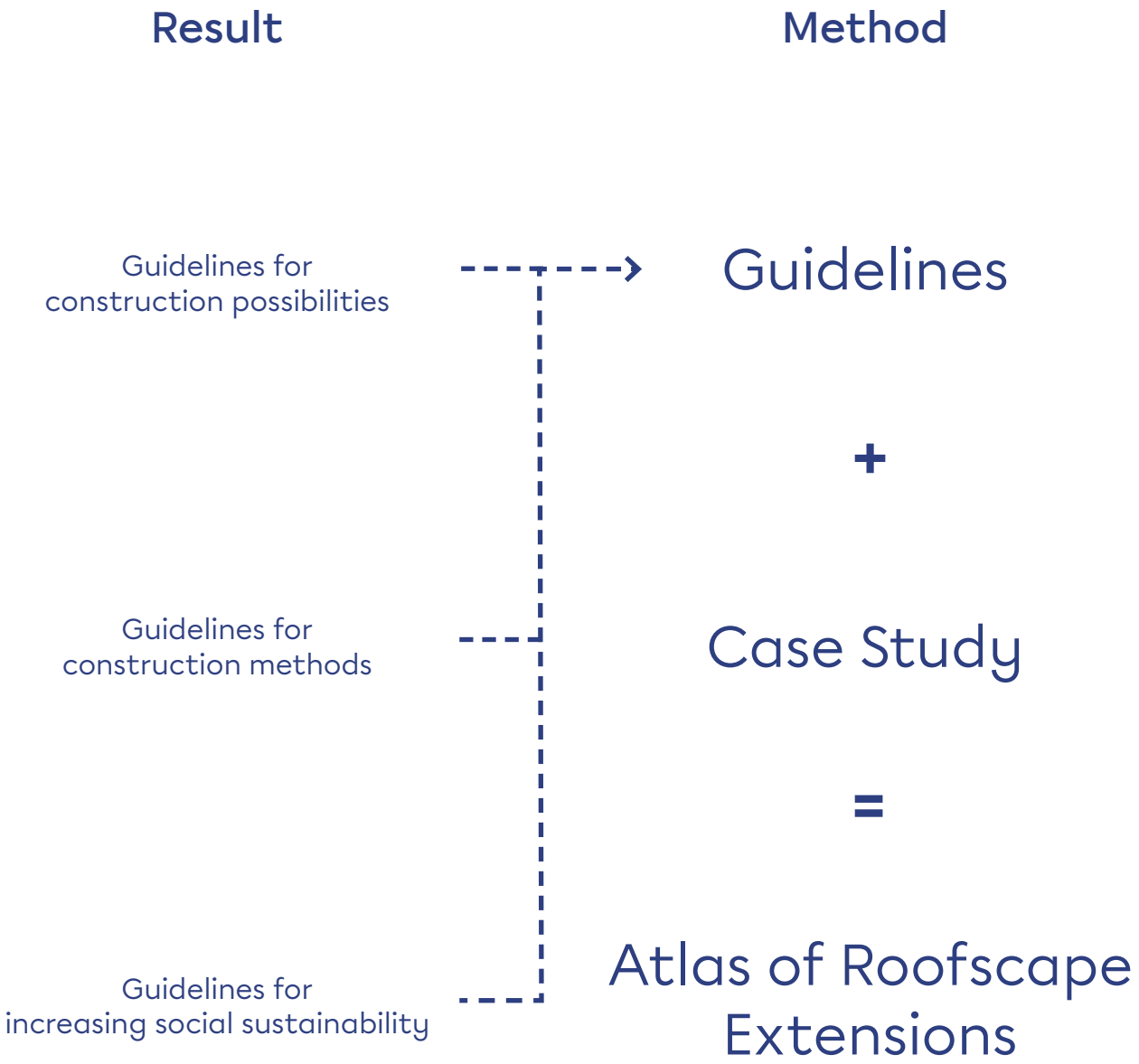
How can participatory processes in construction improve social sustainability?

Thematic Research Methodology

The methodology of the research is split in two main parts. First, a literature study will be done to establish a scientific framework around the main aspects outlined in the research question. This will be done by answering one thematic sub-question per chapter. Because each sub-question could warrant an entire paper by itself, the emphasis should be on getting concise answers. Second, to support those answers, a case-study will be done as an appendix to explore existing examples of roofscape expansions, comparing them to metrics, such as existing structure, size, dwellings and functions added and flexibility.

I would like to combine the results in an 'Atlas of Roofscape Extensions', which can serve as a reference work for creating vertical extensions for gallery flats.

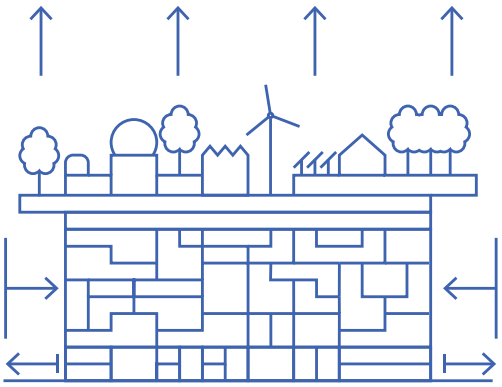
By doing so, I will gain specific technical insight into possibilities for my own case and I will create a generic reference work which other people may find valuable by using it to analyse other cases and evaluating possibilities for roofscape extensions.



Relevance

Both the design and research question of this graduation project intended to provide both generic and specific value to the social and scientific framework. In a generic sense, it can provide a novel solution to the question of how to reduce housing shortage in the Netherlands and technically improve the typical gallery flat. Furthermore, it will propose a valuable solution to the complex question of identity in the postwar neighbourhood, and even further so in the specific context in Boerhaavewijk, Haarlem.

By creating an atlas of case studies a clear and concise reference work can be made. This can both help myself and others interested in doing similar projects to rapidly weigh possibilities of roofscape transformations of postwar housing, which is a very relevant topic considering the increasing interest in utilising the roofscape for new functional additions. It can serve to guide users both in terms of architectural & functional possibilities and corresponding technical possibilities and requirements. This is valuable when considering the limited timeframe available to reach both housing and CO2 reduction goals by 2030 and circularity goals by 2050.



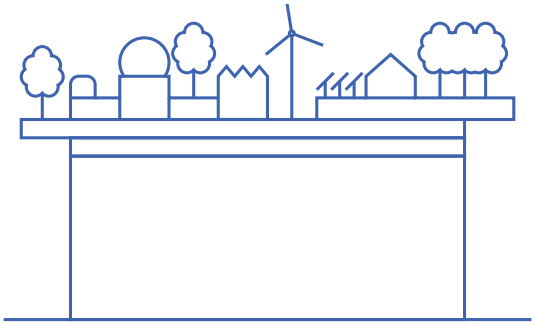
Upward: Collective identity

Inward: Individual identity

Outward: Public identity

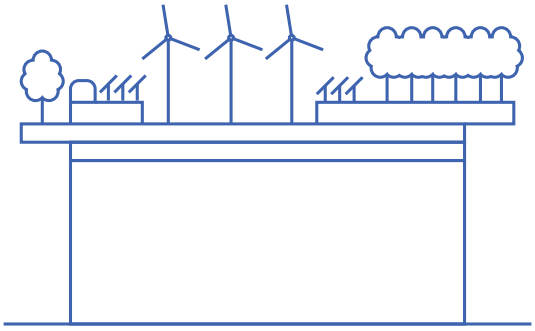
Figure 5: Relationship between space and Identity. Own work.

2025



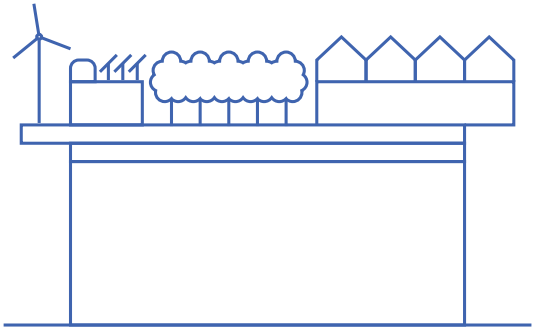
Generation 1

2050



Generation 2

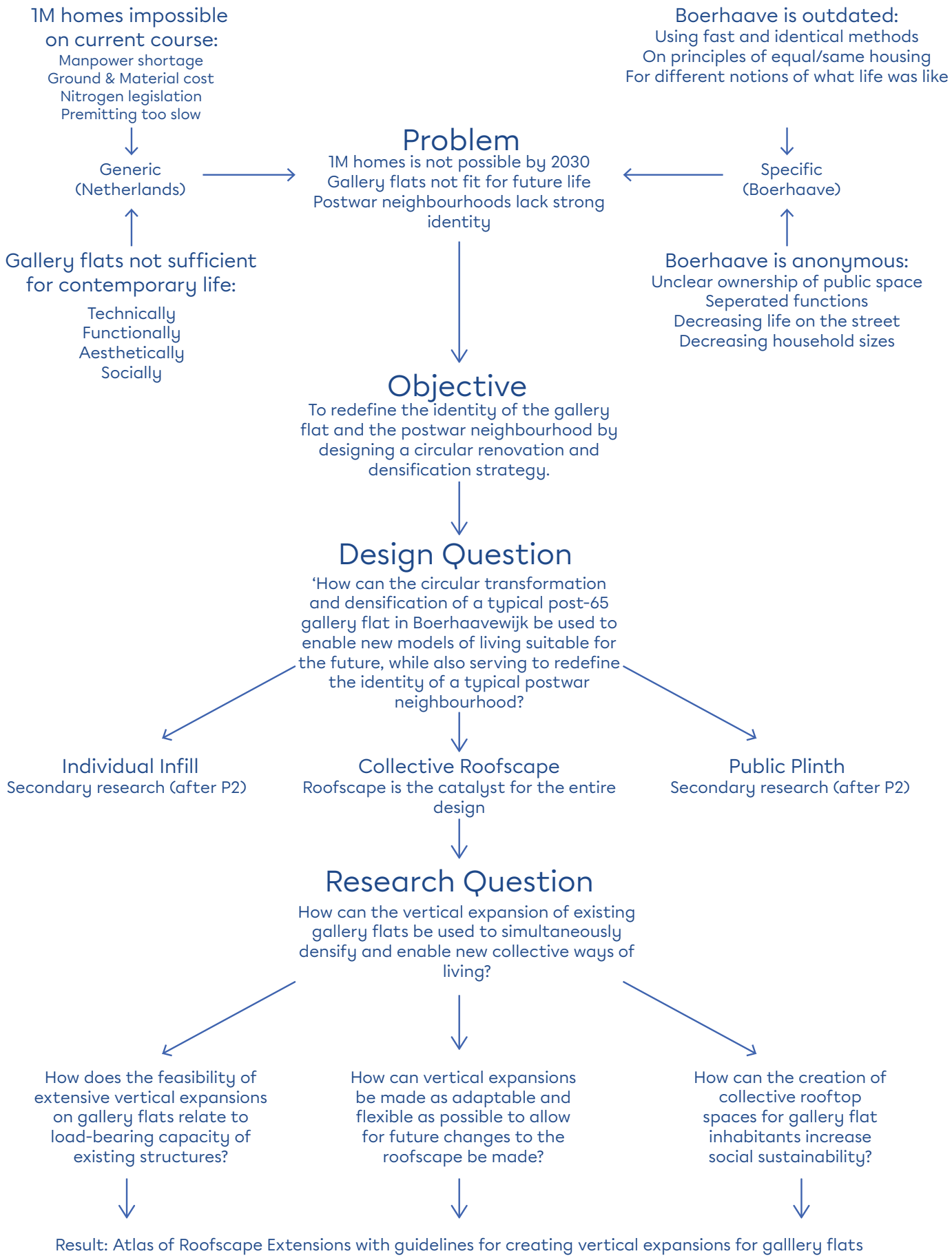
2075



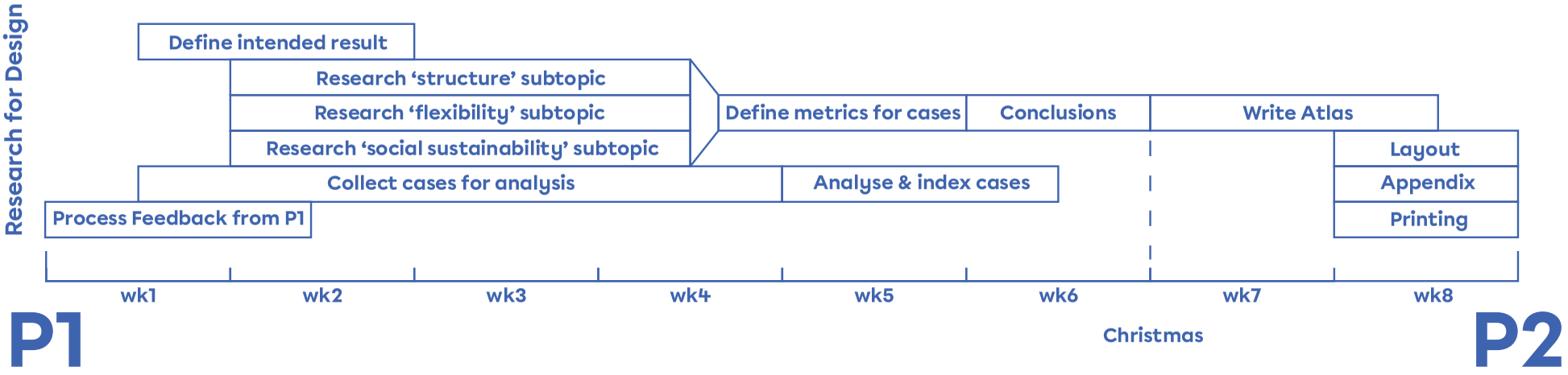
Generation 3

Figure 6: Proposed flexible roofscape variations. Own work.

Research Plan Diagram



Planning


Research for Design
Define intended result
Research ‘structure’ subtopic
Research ‘flexibility’ subtopic
Research ‘social sustainability’ subtopic
Define metrics for cases
Conclusions
Write Atlas
Layout
Appendix
Printing
Collect cases for analysis
Analyse & index cases
Process Feedback from P1
wk1
wk2
wk3
wk4
wk5
wk6
wk7
wk8
P1
Christmas
P2

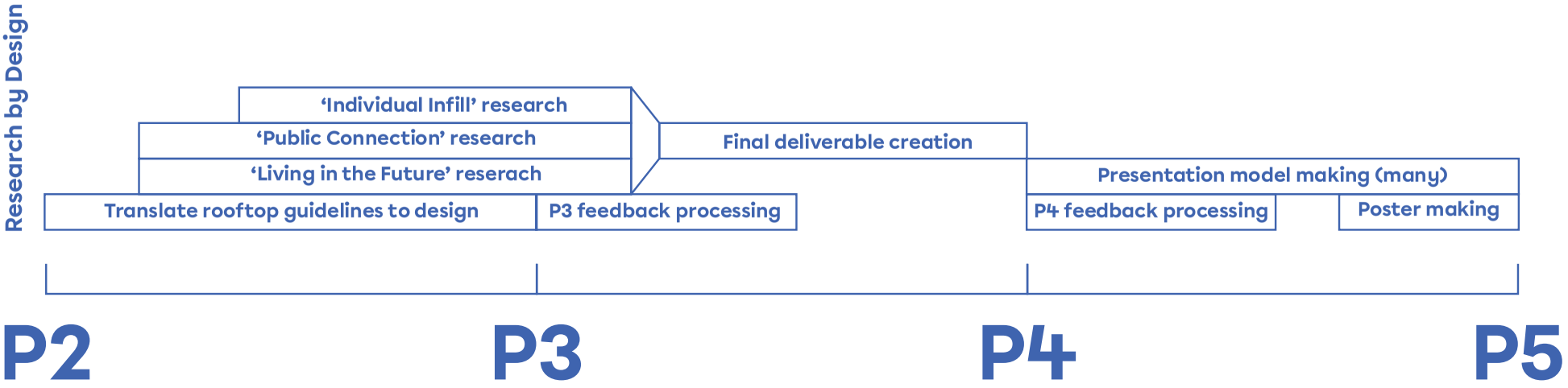

Research by Design
‘Individual Infill’ research
‘Public Connection’ research
‘Living in the Future’ reserach
Final deliverable creation
Presentation model making (many)
Translate rooftop guidelines to design
P3 feedback processing
P4 feedback processing
Poster making
P2
P3
P4
P5

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Figure 7: Schalkwijk, Groene Zoom (Fielmich, 1986)