



# Chapter 8

## Appendix

Appendix A. **Pattern Booklet**

# **Rooftop Pattern Book**

*Retrofitting Rotterdam - Thomas Bollen*



**SCAN ME**

**For the full booklet**

or go to

<https://tinyurl.com/2fr3mrmr>





# Appendix B. **Transforming Dutch Rooftops**

## *THE EFFECTS OF TRANSFORMING WASTESCAPES TO GREENSPACES IN AN OPEN CITY MODEL*

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### **Abstract**

The spatial pressure on Dutch cities is high, which makes it more difficult to reserve space for well needed functions such as greenspaces. Yet, rooftops in cities and their vast summated surface can provide the space needed for these functions. Therefore, Dutch cities are promoting the use of rooftop as new (semi-)public spaces to alleviate the spatial pressure. In their current state, they are a by-product of the built environment, and can be considered a wastescape, but there is often room for transformation.

By utilising rooftops for other public and private functions, they can contribute to the open city model proposed by Richard Sennett (2006), as they provide a new, hybrid space between the public and private realm. This ambiguity can be a catalyst for spontaneous, unplanned developments.

Moreover, creating greenspaces on top of buildings comes with added benefits, such as a strengthened ecological network and the promotion of restorative experiences that lower stress and fatigue.

All in all, it becomes clear that roofs might house untapped qualities that can enrich urban life.

### **Introduction**

Regarding the housing crisis in the past years in the Netherlands (Lennartz, 2018), it is evident that the already high spatial pressure on Dutch cities is rising even more so. Not only does it increase the symptoms of the housing crisis, as the scarcity of houses and space increases an increase in value (Lennartz, 2018), but it is also putting more pressure on public space. Especially greenspaces suffer from this, as is apparent from a study conducted by the University of Amsterdam (Balikçi, Giezen, & Arundel, 2021). Lack of- or reduced greenspaces do not only affect the urban ecology, but also have a negative effect on mental health of the city's citizens (Nutsford, Pearson, & Kingham, 2013), not to mention the negative effect on other urgencies that may occur in these cities.

In a nutshell, it can be said that the high pressure on space does not only affect the housing market but incites a chain reaction that affects a multitude of factors that determine quality of life in the city.

Simultaneously, in many Dutch cities, there is a vast surface in the form of underused rooftops that have the potential to alleviate this spatial pressure. Given their unique locations and homogenous distribution over the city's structure, they form an excellent device to promote the qualities of an open city, a model described by Richard Sennett (2006).

The essay will present a theoretical approach, regarding rooftops as a wastescape and analyses their possibilities for functions that suffer under the high spatial pressure. Moreover, it will address their potential to complement the qualities of a porous, open city model. Finally, it will look at the effects of incorporating rooftops as urban greenspaces.

### **Motives and Initiatives**

First, let us look at the current state of rooftops in Dutch cities. It is evident that, especially in the larger cities, there is a paradigm shift. Cities like Amsterdam, with Amsterdam Rainproof<sup>\*</sup>, and Rotterdam are currently promoting the more intensive, multifunctional use of rooftops. In fact, Rotterdam hosts an annual event, the Rotterdamse Daken Dagen that is all about the city's rooftops and their potential use. With 2022's Rooftop Walk, a pedestrian route across several roofs connected by a large temporary bridge hosted a variety of rooftop solutions. With a ticket sale over 200.000 (De Havenloods, 2022), this event exposed the possibilities on top of

buildings to a large crowd. All in all, it shows great willingness from municipalities and social institutions to transform the current roofscape. Moreover, these types of roofs are quite often (partly) subsidised.

### **Rooftops as a wastescape**

Considering the high spatial pressure, it becomes even more remarkable to see that rooftops are relatively underused. In Rotterdam alone, more than 18km<sup>2</sup> of usable roofs are currently not used (Gemeente Rotterdam, n.d.). As it stands right now, the rooftops of cities are mostly established as bordered enclaves within tissue of a city, not participating in its dynamics and metabolism.

In fact, these spaces could be addressed as being a waste landscape, one of wasted space. We could treat space, similar to how we treat biomass, water or raw materials in a material flow analysis, as a resource that can be used, wasted and reused. By doing this, leverage points can be identified in how to repurpose the wasted space on top of the buildings and reactivate them within their context.

In his book "Drosscape: Wasting Land in Urban America", Berger (2006) describes "the creation of a new condition in which vast, wasted, or wasteful land surfaces are modelled in accordance with new programs or new sets of values that remove or replace real or perceived wasteful aspects of geographical space...". This is a principal that could be applied to

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\* Amsterdam Rainproof is an initiative by the municipality of Amsterdam that promotes interventions in the built environment (including rooftops) to decrease the effects of pluvial floodings and urban heat stress (Amsterdam Rainproof, sd).

rooftops, transforming them from 'isolated islands', or enclaves, to something more like a heterotopia: "...a type of hybrid space embedded within the larger system" (Shane, 2005). By adding elements whose qualities contribute to the metabolism of the city, like how a green roof contributes to biodiversity, these former wastescapes can be transformed into useful space, essentially alleviating the spatial pressure for these metabolic processes.

### **Rooftops as a porous device**

Without rooftops, a condition is created in which private and public approaches an almost binary state. On the one hand, the private realm, which is composed of private homes and corridors. On the other hand, the public realm, composed of streets, parks and other infrastructure. These form a controlled environment where certain rules apply. These realms are separated a harsh boundary in the form of the front door and are regulated by the structure and plan of a city, which can be regarded as a top-down approach. Moreover, this boundary creates an obstacle for citizens to project their identity on a public level, like their streets, and confines it to their private retreats.

Yet, by transforming rooftops into these new, hybrid spaces that exist between the public and the private realm, the structure of the city changes. Where the rooftop enclaves outlined by the buildings and their walls first marked a strong boundary between the public and the private realm, functional rooftops now open up these cell-like structures for a variety of elements,

and the boundaries are transformed into borders: an edge where realms intersect (Sennett, 2006). For example: ecological habitats are extended in a vertical space, stormwater draining and water retention are no longer strictly bound to public space and infrastructure and the harsh boundary between indoor private life and outdoor public life is now supplemented with a new hybrid territory in the vertical space.

The fabric of the city becomes, in a way, more porous. Allowing activity and function to exist with the intermediate spaces of the urban structure and interact with each other. Moreover, it allows for citizens to give their own identity to these new places, offering them with a place where they have power and can decide. By allowing spontaneous adaptations on rooftops to happen and react on the dynamics of the urban metabolism, the spaces become fluid. These principles closely relate to the theoretical approach of 'the open city' by Sennett (2006), which aim for a more people-oriented way of designing. Sennett pleads for a new type of urban 'system' that is open, creating a condition in which the voices of different people attend to one another and interact, rather than remaining isolated in their own bubbles. This promotes inclusivity and an active and dynamic street life.

Additionally, the enclave properties of rooftops create a protected space in which urban experiments can be conducted. In contrast to larger ground floor spaces, these small enclaves provide a 'container', which

is conditioned to be “safe to fail”, meaning that the consequences of interventions have no catastrophic effects on the urban environment. This is above all, a great platform for innovation within the discipline, in which new pilots can be easily integrated (Ahern, Cilliers, & Niemelä, 2014).

### **Rooftops as green services**

By incorporating functions on top of buildings, as the fine mesh within the urban tissue, several problems can be addressed. In this section, the effects of using rooftops as green services will be regarded. As stated before, the high spatial pressure on Dutch cities may result in a loss of greenspaces, which may be a good motivator for placing new greenspaces on rooftops.

These come with a set of benefits. First, the positive effects of urban greenspaces are highly dependent on their accessibility and distribution throughout the city (Atiqul, 2011). This is especially true when using the greenspaces and ecological services, as their equal distribution can help to increase the strength of the ecological network, making it more resilient (Hong, Guo, Li, & Liao, 2022).

Moreover, given the generally equal distribution of usable roofs, these new, high greenspaces might be relatively small, but are extremely accessible to those living in the building or potentially around it.

As a result, these highly accessible green spaces stimulate restorative experiences, which reduce stress and fatigue (Kaplan, 1995). But the benefits to mental health

are not limited to those who have access to the spaces. Especially when the rooftop is relatively low and exposed to nearby buildings, the benefits of green and nature are shared, as visual contact with green and nature already are proven to reduce stress (Pretty, Peacock, Sellens, & Griffin, 2005).

### **Conclusion**

To summarise, it is evident that there is a great incentive to transform the current wastescapes on top of buildings, as they are beneficial for multiple facets of the urban environment. Not only does transformation alleviate the spatial pressure, but also generates a new hybrid space between the public and the private realm. It functions and the intersection between the realms. This creates opportunities for citizens to project their identity within the public realm, while providing the comforts and authority associated with the private realm. Moreover, adding greenspaces on roofs increases the resilience of the ecological network and promotes restorative experiences which reduce stress and fatigue. All in all, it can be concluded that the transformation of rooftops into greenspaces should be promoted, as they may form the foundation for a new, positive paradigm within designing urban environments.

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# Appendix C. **Summary Digital Rooftops Symposium**



**Gemeente  
Rotterdam**

**Consultatie rondom  
Digitale Daken  
15 februari 2023**



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**Key-note spreker Deborah Nas:** Bij de implementatie van nieuwe technologie, moet er goed nagedacht worden over het meenemen van mensen. Mensen hebben van nature angst voor nieuwe technologie, dus de balans tussen het tonen van de voordelen en het weghalen van weerstand vraagt continue aandacht. Met betrekking tot daken leidt dat tot twee systemsprongen: 1) Het dak als kans en oplossing beschouwen 2) Technologie toepassen voor complexiteitsreductie.

4 tips hoe het kan:

- Bouw een community
- Geef inzicht en advies
- Breng functionaliteit dichterbij de eindgebruiker
- Verwijder frictie

**Presentatie van Gemeente Rotterdam** over het proces van tooling voor Multifunctionele Daken

Uitkomsten van het voorgaande proces Rob Schmidt, Projectmanager Smart City & Digitale Economie:

- Initiële behoefte voor het opschalen van tooling komt uit Smart City, het dak is daarvoor een geschikte proeftuin.
- Na 2-4 jaar praten vanuit koplopersgroep (groep van gemeenten) over wensen en ideeën is het nu tijd voor actie.
- De consultatie over digitale daken is een eindproduct van opgebouwde kennis tot nu toe.

Uitkomsten onderzoek Anna Bänffer, trainee bij Gemeente Rotterdam:

- Consensus over:
  - o Organisatie: Consortium als meest passende vorm. Dit onderbrengen in een nationaal platform, met het advies dit bij het Nationaal Dakenplan te doen.
  - o Financiering: Veel opties beschikbaar. EU-subsidies bieden het meest kansen, dit past ook goed bij een consortium.
- Denkrichting:
  - o Data: aantal onderwerpen waar keuzes over gemaakt moeten worden. Eerste aanzet in de praattafels tijdens de consultatie.
  - o Inhoud/beleid: aantal onderwerpen waar keuzes over gemaakt moeten worden. Eerste aanzet in de praattafels tijdens de consultatie.



**Presentaties marktpartijen** van bestaande daken tools ter inspiratie voor het publiek van wat de techniek kan.

De bedrijven die hun tool presenteerden: (slides in de bijlage)

- MVRDV & Superworld
- Rooftop Revolution & Matrixian
- Sobolt
- Consolidated & Daklab: helaas vanwege omstandigheden konden zij niet aanwezig zijn.

**Praattafels** over de onderwerpen (organisatie, financiering, data en inhoud & beleid), die aandacht vereisen voor het vervolgproces van de opschaling van dakentooling. De onderwerpen voor de praattafels komen voort uit het marktonderzoek. Hieronder vind je de input van de genodigden dat is opgehaald tijdens de praattafels, leidend tot conclusies per onderwerp en samenhangend conclusie.

### **1. Organisatie (Samenwerking & Eigenaarschap)**

- Eén persoon of partij moet de regie behouden, bijv. semioverheid (onafhankelijk, denkt aan maatschappelijk belang) Je hebt gelijkgestemde mensen nodig om dit van de grond te krijgen, gemotiveerd
- EU-subsidie zorgt voor (bij EU-subsidie word je gedwongen om hierover na te denken):
  1. Samenwerking
  2. Deliverables
  3. Financiering
  4. Kennisdeling
- Wie is de doelgroep? In het begin al vaststellen voordat je product bouwt
  - Bewoner
  - Gemeente
  - Kennisinstituten (hbo/universiteiten)
- Wat voor tool gaan we bouwen met eventuele financiering? 1 tool alles in één, maar eigenlijk zijn de vragen te specifiek voor één [tool], benaderen vanuit je doel en vanuit de doelgroep
- Tool bij voorkeur landelijk bouwen, dan kan elke gemeente/bedrijf er gebruik van maken
- Het consortium is tijdelijk, wie wordt eigenaar, als tool eenmaal bestaat, wie onderhoudt de tool?
- Te snel standaardiseren is contraproductief → tool en data scheiden

Conclusie: Samenwerking is hét vertrekpunt voor het vervolgproces. Een onafhankelijk persoon moet dit proces trekken en leden moeten bestaan uit een mix van markt en overheid. In deze groep moet commitment bestaan voor het initiële doel: opschalen van digitale dakentools. Van hieruit wordt gekeken naar de meest passende organisatievorm met bijbehorende eigenaarschapsmodellen. Om tot een samenwerkingsovereenkomst te komen moeten afspraken over doelen, doelgroep, rolverdeling, eigenaarschap, doorontwikkeling en financiering gaandeweg aangescherpt worden. Afspraken over data kan vroeg in het proces contraproductief zijn, waardoor we organisatie en data scheiden van elkaar.





## 2. Financiering

- Organisatie en financiering gaan gelijk op. Als je het over financiering hebt, heb je het ook over organisatie.
- Wat ga je dan financieren? Eerst het product en proces vaststellen, daarna met subsidieadviseur passende subsidie zoeken. Door het product dat we kiezen en de subsidie die erbij past, worden we gedwongen keuzes te maken qua organisatie.
- Voor wie is de tool? Professionals, bewoners en bestuurders. Voor verschillende doelgroepen moet er verschil zitten in wie kan wat zien. Bewoners betrekken is cruciaal.
- Wie betaalt bepaalt. Bijv. verzekeraars. We moeten oplettend blijven dat de richting van het traject kan veranderen door de belangen van investeerders.
- Opties voor financiering:
  - Open source crowdfunding
  - Google en Microsoft aanstellen om tool te maken, met data als mogelijk verdienmodel voor hen
  - Data partijen kunnen financieren, met data als verdienmodel

Conclusie: Geld vanuit subsidies is beschikbaar voor innovatieve initiatieven op het gebied van duurzaamheid en digitaal. Het gaat dan ook niet over de vraag of hier mogelijkheden liggen, maar op welke manier hier optimaal gebruik gemaakt van kan worden. Een subsidieaanvraag dwingt daarbij om zaken te specificeren, aangezien aan allerlei voorwaarden voldaan moet worden. Organisatie en financiering gaan de ook hand in hand samen. Aanbeveling is om dit te organiseren vanuit een iteratief proces met gecommiteerde en gemotiveerde partijen die aan de voorkant bereid zijn om, op basis van een generiek vertrekpunt, uit te zoeken wat we nodig is om tot de financiering te komen. Uiteindelijk moet financiering ertoe leiden dat er gekomen kan worden tot het opschalen van de inhoud en het bereik van digitale dakentooling.

## 3. Data

- Interdisciplinariteit staat centraal, hierdoor staat onder andere gebruikersgemak (data gebruiken en begrijpen/kennen) centraal. Gebruikers hebben training nodig om te begrijpen (datageletterdheid). Hierdoor is het gebruik van de tool niet afhankelijk van een expert en hebben alle betrokkenen hetzelfde niveau van data kennis.
- Open source is niet altijd wenselijk. Er kan misbruik worden gemaakt van data of het kan verkeerd geïnterpreteerd worden. Wel kunnen veel gegevens open source zijn, als ze geanonimiseerd zijn. Ook door alle data beschikbaar te stellen, verdwijnt het verdienmodel voor datapartijen.
- Een aantal vragen voor het vervolgproces:
  - Wie beheert de data en wie update de data?
  - Hoe democratisch moeten de standaarden voor data zijn?
  - Hoeveel mensen van elke partij moeten erbij betrokken zijn?
  - Hoe is iedereen betrokken?

Conclusie: Data bepaalt als input de kwaliteit van de output uit de applicaties. Veel data is generiek toepasbaar en uitwisselbaar, maar zonder nadere afspraken ontstaan individuele eilanden. In de samenwerking tussen marktpartijen en gemeenten, zijn transparantie en datageletterdheid belangrijke voorwaarden. Vanuit de samenwerking is het wenselijk om te komen tot datastandaarden, waardoor data uitwisselbaar en toegankelijk wordt. Open source wordt als basis onderschreven, maar



is niet in alle situaties gewenst. Vanuit de vorm te geven samenwerking moeten ook verdere afspraken gemaakt worden over data-eigenaarschap en databeheer. Data is een gespecialiseerde tak van sport en vraagt daarom om een losse samenwerking ten opzichte van een samenwerking die leidt tot het opschalen van digitale dakentooling (organisatie/financiering/inhoud&beleid).

#### 4. Inhoud & Beleid

- Integrale beleidsvorming is en blijft een centraal element van de tool
- Het doel (prestatie) vs. middel (product) heeft invloed op de uitkomst en dus de gebruiker
- Moeten, willen, kunnen is een belangrijk uitgangspunt in logica van model
- Doelgroep van tool is niet alleen interne (ambtelijke) gebruikers, moet ook kunnen aanpassen aan meerdere gebruikers zoals: bewoners/bedrijven.
- Stap voor stap moet gekomen worden tot een 'Minimal Viable Product (MVP)', ofwel met kleine sprints bepalen wat meest essentiële specificaties zijn.
- In de toekomst is het wellicht mogelijk om alles 3D en integraal te digitaliseren
- Voor nieuwe gebouwen is het eenvoudiger om gelijk goede randvoorwaarden mee te geven
- Een 'black box', waarbij output niet herleidbaar is, moet voorkomen worden
- Applicatie kan heel groot gemaakt worden, prioriteren op basis van ambitie en budget
- Eventuele gebreken zoals draagkracht en stedelijke ontwikkelingen vragen om doorontwikkeling
- Juridische kaders voor gemeente geven beperkte ruimte + AVG
- Uitkomsten van digitale dakentools afstemmen met andere onderdelen van de fysieke ruimte zou optimaal zijn

Conclusie: Voor de inhoud van de tool staan de opgaven van de multifunctionele daken centraal. Aangezien dit tot een veelvoud aan afwegingen leidt wordt dit al snel complex, een tool kan helpen om die complexiteit te reduceren en de potentie en kansen van multifunctionele daken eenvoudig weer te geven. Moeten, willen, kunnen staat hierbij centraal. Dit leidt vanuit verschillende invalshoeken tot betere beleidsafwegingen. Integraliteit staat daarbij ten alle tijden centraal. Uiteindelijk kan de tool gebruikt worden voor meerdere doelgroepen en gebruikers: bijvoorbeeld bewoners en bedrijven. Het is belangrijk dat de inhoud van de tool aangepast wordt op basis van de gebruiker. Het ruimtelijke vertrekpunt is daarbij vooralsnog het dak, maar op den duur is het goed mogelijk dat de tool(s) ook bruikbaar zijn voor andere onderdelen in de fysieke leefomgeving.



## Eindconclusie

### **Algemene conclusie van de dag:**

Drie onderwerpen sluiten erg op elkaar aan en moeten op korte termijn worden en tegelijkertijd worden opgepakt. Dit zijn organisatie, financiering en inhoud & beleid. Om dit proces te doorlopen hebben we een onafhankelijke trekker nodig (Organisatie). Consortium lijkt meest wenselijk, maar hier wel veel afspraken voor nodig om het officieel te maken. Voorwaarden opstellen, daarna over tot aanvragen subsidie (Financiering). De werkwijze is een iteratieve samenwerking, waar een kleine groep zich aan een basisdoel committeert. In het iteratieve proces kunnen nieuwe leden komen en anderen gaan. Nieuwe onderwerpen kunnen bijkomen of afvallen. Ook worden de gebruikers en bewoners altijd betrokken in het proces (Inhoud & beleid). Data loopt parallel maar is niet geïntegreerd in de andere drie sporen. Kan eventueel wel vanuit het consortium, maar nog geen uitsluitsel hoe dat georganiseerd moet worden (Data).

### **Wat betekent dit voor het vervolg**

Op korte termijn wordt door een procesbegeleider contact met jullie gezocht om een begin te maken aan de samenwerking. Om vervolgens met elkaar stap voor stap het proces te doorlopen, met de nodige afspraken, om uiteindelijk te komen tot een uitvraag voor financiering.



Appendix D. **Pattern Identification**

# Overview

## Programme Patterns

<b>Pattern</b>	<b>Associated Values</b>	in Cases	in Catalogue
Rooftop Bar	Public Function, Profitable Space	2	0
Allotment Garden	Food Production, Outdoor Activity, Connection to Nature	1	0
Playground	Outdoor Activity, Public Function	2	2
Urban Farm	Food Production, Outdoor Activity, Connection to Nature	1	5
Polderdak	Water Retention, Cooling	1	0
Rooftop Terrace	Domestic Space Expansion	2	3
Shared Garden	Public Function, Domestic Space Expansion, Connection to Nature	1	7
Added Building Layer	Profitable Space	1	9
Private Terrace	Domestic Space Expansion	1	0
Powernest	Renewable Energy Generation	1	1
Park	Public Function, Outdoor Activity, Connection to Nature	2	9
Private Garden	Domestic Space Expansion, Connection to Nature	1	6
Dunescape	Connection to Nature, Ecological Habitat, Native Ecosystem	1	0
Forest	Ecological Habitat, Cooling	0	4
Maze	Public Function, Water Retention	0	1
Grass Field	Cooling, Green Views	1	1
Livestock Pasture	Food Production, Connection to Nature	0	1
Housing Expansion	Domestic Space Expansion, Profitable Space	0	1
Outdoor Cinema	Public Function, Profitable Space	0	1
Parking	Profitable Space	0	2

## Feature Patterns

Pattern	Associated Values	in Cases	in Catalogue
Grass	Outdoor Activity, Cooling	1	0
Fountain	Outdoor Activity, Cooling	1	0
Lookout Point	Aesthetic Views, Public Function	1	2
Herbs and Bushes	Ecological Habitat, Native Ecosystem	5	3
Lounge Area	Domestic Space Expansion	3	0
Canopy	Cooling	2	1
Sedum Moss	Cooling, Insulation	2	0
Terrace	Domestic Space Expansion	2	0
Greenhouse	Cooling, Insulation	1	3
Pond	Cooling, Water Retention, Ecological Habitat	1	5
Pergola	Cooling	1	1
Wire & Ivy Pergola	Cooling, Connection to Nature	1	0
Swimming Pool	Cooling, Outdoor Activity	1	0
Shed		1	1
Flower Field	Ecological Habitat, Native Ecosystem	0	5
Helophite Filter	Water Treatment, Cooling, Water Retention	0	1
Aviary	Outdoor Activity	0	1
Dormer Expansion	Domestic Space Expansion	0	2
Domestic Unit	Domestic Space Expansion	0	5
Fitness Equipment	Outdoor Activity	0	1
Mural	Aesthetic Views	0	1
Billboard	Profitable Space	0	1
Wind Turbine	Renewable Energy Generation	0	1
Data Centre	Profitable Space Expansion	0	1
Energy Storage	Renewable Energy Storage	0	1

## Detail Patterns

Pattern	Associated Values	in Cases	in Catalogue
Beehive	Ecological Habitat	1	1
Picnic Tables	Domestic Space Expansion	2	3
BBQ Spot	Domestic Space Expansion	1	1
Planters	Connection to Nature	2	0
Sunbeds	Outdoor Activity	3	0
Potted Trees	Ecological Habitat, Cooling	2	0
Hedges		1	1
Solar Panel	Renewable Energy Generation	2	0
Tiled Terrace	Domestic Space Expansion	2	0
Insect Habitat	Ecological Habitats	1	0
Tiled Paths		1	0
Stepping Stones		1	0
Composter	Outdoor Activity, Food Production	1	0
Vegetable Planter	Outdoor Activity, Food Production	2	2
Trees	Ecological Habitat, Cooling	0	1
Solar Tree	Renewable Energy Generation, Cooling	0	1
Bird Nesting	Ecological Habitat	0	3
Wooden Decking		0	2
Climbing Ivy		0	1
Gravel Paths		0	2
Seating	Domestic Space Expansion	0	1
Falcon Nest	Ecological Habitat	0	1
Art Installation	Art & Culture	0	1
Laundry Rack	Domestic Space Expansion	0	1



## Dakpark

Rotterdam (2014)



### Found Patterns

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- Park  
Programme
- Rooftop Bar  
Programme
- Allotment Garden  
Programme
- Playground  
Programme
- Grass Field  
Feature
- Fountain  
Feature
- Lookout Point  
Feature
- Herbs and Bushes  
Feature
- Picnic Table  
Detail
- BBQ Spot  
Detail

### Open Values

---

- Connection to Nature
- Ecological Habitats
- Outdoor Activity
- Public Function
- Profitable Space
- Cooling

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Dakakker

Amsterdam (2012)



### Found Patterns

---

- Urban Farm  
Programme
- Rooftop Bar  
Programme
- Polderdak  
Programme
- Beehives  
Detail
- Herbs and Bushes  
Feature

### Open Values

---

- Public Function
- Outdoor Activity
- Food Production
- Water Retention
- Cooling
- Green Views
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Timmerhuis

Rotterdam (2015)



### Found Patterns

---

- Rooftop Terrace  
Programme
- Shared Garden  
Programme
- Lounge  
Feature
- Planters  
Detail
- Sunbeds  
Detail
- Potted Trees  
Detail

### Open Values

---

- Connection to Nature
- Outdoor Activity
- Public Function
- Domestic Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Jan Prins en Willibrordschool

Rotterdam (2009)



### Found Patterns

---

- Playground  
Programme
- Canopy  
Feature
- Potted Trees  
Detail
- Hedges  
Detail

### Open Values

---

- Public Function
- Outdoor Activity

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity



## Pakhuismeesteren

Rotterdam (2015)



### Found Patterns

---

- Added Building Layer  
Programme
- Private Terraces  
Programme
- Sunbeds  
Detail

### Open Values

---

- Domestic Space Expansion
- Efficient Space Usage
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Lloydkade

Rotterdam (2021)



### Found Patterns

---

- Powernest  
Programme
- Sedum Moss  
Feature
- Rooftop Terrace  
Feature
- Solar Panel  
Detail

### Open Values

---

- Domestic Space Expansion
- Renewable Energy Generation
- Water Retention
- Insulation

### Technical Restrictions

---

- Medium Accessibility & Safety
- High Structural Capacity

## De Vindplaats

Amsterdam (2022)



### Found Patterns

---

- Greenhouse  
Feature
- Herb and Bushes  
Feature
- Tiled Terrace  
Detail
- Insect Habitat  
Detail

### Open Values

---

- Connection to Nature
- Ecological Habitats
- Domestic Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity

## The Student Experience Park

Amsterdam (2022)



### Found Patterns

---

- Park  
Programme
- Pond  
Feature
- Herbs and Bushes  
Feature
- Canopy  
Feature
- Stone Paths  
Detail

### Open Values

---

- Public Function
- Water Retention
- Cooling
- Native Ecosystem
- Green Views

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity



## Roof Gardens Houthavens

Amsterdam (2021)



### Found Patterns

---

- Private Garden  
Programme
- Pergola  
Feature
- Wire & Ivy Pergola  
Feature
- Stepping Stones  
Detail
- Planters  
Detail

### Open Values

---

- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Public Function
- Water Retention

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Groenmarkt Amsterdam (2021)



### Found Patterns

---

- Dunescape  
Programme
- Swimming Pool  
Feature
- Wooden Shed  
Feature
- Wooden Terrace  
Feature
- Lounge  
Feature
- Sunbeds  
Detail

### Open Values

---

- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Water Retention
- Cooling
- Native Ecosystem

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Neptunus school IJburg

Amsterdam (2020)



### Found Patterns

---

- Sedum Moss  
Feature
- Composter  
Detail
- Vegetable Planters  
Detail
- Solar Panels  
Detail

### Open Values

---

- Renewable Energy Production
- Outdoor Activity
- Water Retention
- Insulation

### Technical Restrictions

---

- Medium Accessibility & Safety
- Medium Structural Capacity

## Roof Garden

Haarlem (2019)



### Found Patterns

---

- Roof Terrace  
Programme
- Herbs and Bushes  
Feature
- Lounge Area  
Feature
- Wooden Terrace  
Detail
- Picnic Table  
Detail

### Open Values

---

- Ecological Habitats
- Native Ecosystem
- Outdoor Activity
- Domestic Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity



## Silent garden

The city (centre) is busy and full of noise. The rooftops lend themselves well to establishing silent gardens – places to enjoy peace, greenery and silence in the heart of the city.

**Stilletuin** De (binnen)stad is druk en vol lawaai. De daken lenen zich er goed voor om stilletuinen in te richten. Plekken om midden in de stad te genieten van rust, groen en stilte.



## Found Patterns

---

- Park  
Programme
- Pond  
Feature
- Trees  
Feature

## Open Values

---

- Silent Sanctuary
- Water Retention
- Connection to Nature
- Ecological Habitats
- Public Function
- Cooling

## Technical Restrictions

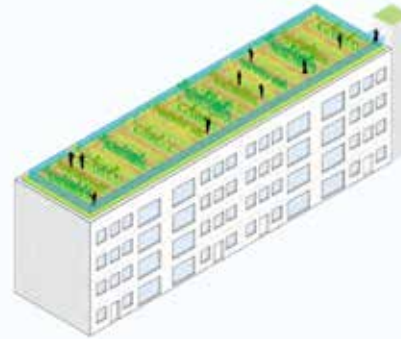
---

- High Accessibility & Safety
- High Structural Capacity

## Vineyard

Vineyards are becoming increasingly more common in the Netherlands. Rooftops especially get a lot of heat, so this could be where the first 'city wines' or 'rooftop wines' will come from.

**Wijngaard** Wijnngaarden komen steeds meer voor in Nederland. Just op de daken is veel warmte. Hier kunnen de eerste 'stadswijnen' of 'dakwijnen' vandaan komen.



## Found Patterns

---

- Urban Farm  
Programme

## Open Values

---

- Food Production
- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Water Retention

## Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Park with solar trees

A green park on a rooftop that also generates energy. The solar trees provide a beautiful, light and shadow play for visitors.

**Park met solar bomen** Een groen park op het dak dat tevens energie opwekt. De solar bomen zorgen voor een prachtig licht en schaduw spel voor de bezoekers.



### Found Patterns

---

- Park  
Programme
- Utility Shed  
Feature
- Solar Trees  
Detail

### Open Values

---

- Renewable Energy Production
- Cooling (shade)

### Technical Restrictions

---

- Sufficient sun exposure
- High Accessibility & Safety
- High Structural Capacity

## Urban farming

Agriculture takes up a lot of space. Urban agriculture on rooftops would allow us to grow crops in cities. The produce can be sold locally.

**Urban farming** Landbouw kost veel ruimte. Door stadslandbouw op het dak kunnen we landbouw in de stad realiseren. De producten kunnen direct lokaal verkocht worden.



### Found Patterns

---

- Urban Farm  
Programme
- Greenhouse  
Feature

### Open Values

---

- Food Production
- Outdoor Activity
- Connection to Nature

### Technical Restrictions

---

- Medium Accessibility & Safety
- High Structural Capacity

## Private gardens

The rooftops of residential buildings can be arranged as private gardens for the residents. Having a garden is a common desire and is often the reason for people to move away, but that could be overcome with rooftop gardens.

**Private tuinen** De daken van woongebouwen kunnen ingericht worden als private tuinen voor de bewoners. Het hebben van een tuin is een veelgehoorde wens van mensen en vaak de reden voor een verhuizing uit de stad. Dat kan hiermee ondervangen worden.



### Found Patterns

---

- Private Garden  
Programme
- Tiled Terrace  
Detail

### Open Values

---

- Domestic Space Expansion
- Connection to Nature
- Outdoor Activity
- Ecological Habitats

### Technical Restrictions

---

- Medium Accessibility & Safety
- Medium Structural Capacity

## Private vegetable gardens

In the city, gardens are often small – and sometimes people only have a balcony. In particular, the rooftops of residential buildings could provide space to grow vegetables for private use.

**Private groentetuinen** In de stad zijn tuinen vaak klein, of mensen hebben zelfs enkel een balkon. Met name de daken van woongebouwen kunnen plek bieden om groente te verbouwen voor privégebruik.



### Found Patterns

---

- Urban Farm  
Programme
- Private Garden  
Programme
- Vegetable Planters  
Feature

### Open Values

---

- Food Production
- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Water Retention

### Technical Restrictions

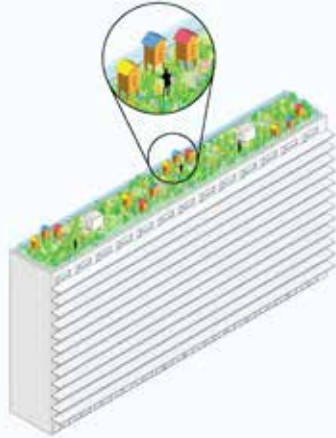
---

- Medium Accessibility & Safety
- High Structural Capacity

## Bee rooftop

This type of rooftop is specifically meant for bees (and other small insects), is full of flowers and other plants and is not accessible to people (except for beekeepers). That way, this rooftop contributes to enhancing biodiversity in the city.

**Bijzndck** Dit is een dak speciaal voor bjen (en andere kleine insecten) vol bloemen en anderen planten en niet toegankelijk voor mensen (op een imker na). Doarmee draagt dit dak bij aan versterking van de biodiversiteit in de stad.



### Found Patterns

---

- Flower Field  
Feature
- Beehives  
Detail

### Open Values

---

- Ecological Habitat
- Water Retention
- Insulation
- Connection to Nature
- Native Ecosystem

### Technical Restrictions

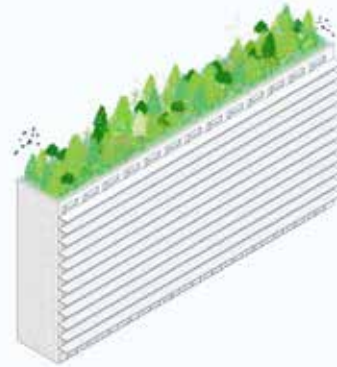
---

- Not too high & windy
- Medium Accessibility & Safety
- Medium Structural Capacity

## Urban jungle

The urban jungle is a dense forest in the heart of the city. It is not meant for people, but for plants, trees and animals. This creates a new ecosystem on the rooftop.

**Urban jungle** De urban jungle is een dicht bos midden in de stad. Niet voor mensen maar voor de planten, bomen en dieren. Zo ontstaat een nieuw ecosysteem op het dak.



### Found Patterns

---

- Forest  
Programme
- Flower Field  
Feature
- Bird Nesting  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Cooling

### Technical Restrictions

---

- Low Accessibility & Safety
- High Structural Capacity



## Tiny Forest

A Tiny Forest is a dense native forest the size of a tennis court. It enhances the city's biodiversity and provides a place for children to learn about nature.

**Tiny Forest** Een Tiny Forest is een dichtbegroei'd inheems bos ter grootte van een tennisbaan. Het versterkt de biodiversiteit van de stad en biedt een plek aan kinderen om te leren over de natuur.



### Found Patterns

---

- Forest  
Programme
- Flower Field  
Feature
- Bird Nesting  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Public Function
- Green Views
- Cooling

### Technical Restrictions

---

- Medium Accessibility & Safety
- High Structural Capacity

## Pond

A pond on a rooftop acts as water storage during heavy rainfall. It cools the rooftop down and has a relaxing effect for anyone who looks out on it.

**Vijver** Een vijver op het dak fungeert als waterberging bij hevige regenval. Het koelt het dak en heeft een ontspannende werking voor wie erop uitkijkt.



### Found Patterns

---

- Park  
Programme
- Pond  
Feature
- Wooden Decking  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Public Function
- Green Views

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- Low Building Height

## Viewing garden

A viewing garden is a beautiful garden that aims to give people in higher apartments a nice view over greenery. Therefore, it must be located on a lower rooftop. It is not accessible to people and is well-maintained.

**Kijktuin** De kijktuin is een mooie tuin die als doel heeft mensen in hoger gelegen appartementen een fijn groen zicht te geven. Daarom ligt deze op een lager gelegen dak. Deze is niet toegankelijk voor mensen en wordt goed onderhouden.



### Found Patterns

---

- Park  
Programme
- Pond  
Feature
- Bird Nesting  
Detail

### Open Values

---

- Water Retention
- Cooling
- Ecological Habitat
- Connection to Nature
- Green Views

### Technical Restrictions

---

- Low Accessibility & Safety
- High Structural Capacity
- High Maintenance Costs

## Green maze

The green maze is greenery and entertainment all in one: a green setting to wander through and play in.

**Groen doolhof** Het groene doolhof is groen en entertainment in één. Een plek om te dwalen en spelen in een groene omgeving.



### Found Patterns

---

- Hedged Maze  
Programme
- Hedges  
Detail

### Open Values

---

- Water Retention
- Public Function

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Themed garden (for example a Japanese garden)

There are several themed gardens, such as historical gardens, botanical gardens, Japanese gardens or English landscape gardens. These gardens are ideal for public rooftops and can also teach visitors about the different plant species.

**Thematische tuin (bijvoorbeeld een Japanse tuin)** Er zijn verschillende thematische tuinen, zoals de historische tuin, de botanische tuin, een Japanse tuin of een Engelse landschapstuin. Deze tuinen lenen zich voor daken met een meer publiek karakter. Bezoekers kunnen hier iets leren over de verschillende plantensoorten.



### Found Patterns

---

- Park  
Programme
- Lookout Tower  
Feature
- Pond  
Feature
- Wooden Decking  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Public Function
- Green Views

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Helophite filter

A helophyte filter is a filter that uses helophytes (a plant) to purify wastewater and making it harmless to the environment. Helophyte filters are installed to filter ponds, domestic wastewater or runoff from roads, for example.

**Helofytenfilter** Een helofytenfilter is een filter dat met behulp van helofyten (een type plant) afvalwater zuivert tot een kwaliteit die onschadelijk is voor het milieu. Helofytenfilters worden aangelegd om bijvoorbeeld vijvers, huishoudelijk afvalwater of afstromend water van wegen te filteren.



### Found Patterns

---

- Grass Field  
Programme
- Helophite Filter  
Feature
- Pond  
Feature

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Green Views
- Water Treatment

### Technical Restrictions

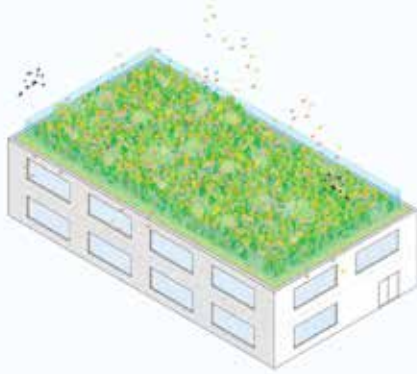
---

- Low Accessibility & Safety
- High Structural Capacity

## Butterfly garden

This type of rooftop is specifically meant for butterflies (and other small insects), is full of flowers and other plants and is not accessible to people. That way, this rooftop contributes to enhancing biodiversity in the city. As butterflies don't fly very high, the rooftop should be low enough.

**Vlinderuin** Dit is een dak speciaal voor vlinders (en andere kleine insecten) vol bloemen en anderen planten en niet toegankelijk voor mensen. Daarmee draagt dit dak bij aan versterking van de biodiversiteit in de stad. Voor vlinders mag dit dak niet te hoog liggen.



### Found Patterns

---

- Flower Field  
Feature

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Green Views
- Insulation

### Technical Restrictions

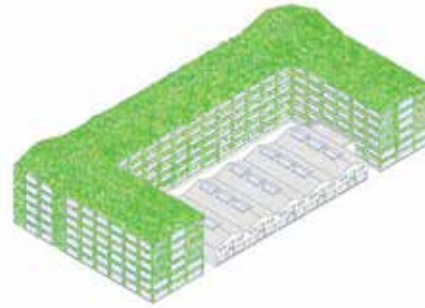
---

- Low Accessibility & Safety
- Medium Structural Capacity
- High Maintenance Costs
- Low Building Height

## Green monument

Allowing a building to be overgrown by nature – which turns it into a beautiful green ruin – is a way of preservation: a green monument. This is a strategy for buildings that have some type of value (historical or emotional), but where no future use is possible.

**Overgroeid monument** Een gebouw laten overgroeien door de natuur tot een groene ruïne is een manier van behoud, een groen monument. Dit is een strategie voor gebouwen die een bepaalde waarde hebben (historisch of emotioneel), maar waar geen toekomstige gebruiksfunctie voorhanden is.



### Found Patterns

---

- Climbing Ivy  
Detail

### Open Values

---

- Connection to Nature
- Green Views

### Technical Restrictions

---

- Low Accessibility & Safety
- Low Structural Capacity
- Medium Maintenance Costs
- Requires little to no renovation

## Zoo or petting zoo

A petting zoo or a small zoo can be built on a rooftop. It is a place where (city) children can learn about animals and animal care.

**Dierentuin of kinderboerderij** [en kinderboerderij] of een kleine dierentuin kan prima op het dak. Het is een plek waar (stads)kinderen kunnen leren over dieren en dierenverzorging.



### Found Patterns

---

- Park  
Programme
- Livestock Pasture  
Programme
- Aviary  
Feature

### Open Values

---

- Connection to Nature
- Public Function
- Food Production

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- High Maintenance Costs

## Nature cemetery

A nature cemetery is a place where people are buried surrounded by nature. The graves are scattered seemingly at random, as there is no arrangement of graves by means of hedges or fences and there are no specially made headstones. These cemeteries are also places of contemplation in the bustling city centre.

**(Natuur)begraafplaats** Een natuurbegraafplaats is een plek waar mensen begraven worden in de natuur. De graven liggen schijnbaar willekeurig verspreid, er is geen ordening door heggen en er zijn geen speciaal vervaardigde grafstenen. Het zijn tevens plekken van contemplatie in de veelal drukke binnenstad.



### Found Patterns

---

- Park  
Programme
- Gravel Paths  
Detail
- Seating  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Connection to Nature
- Public Function

### Technical Restrictions

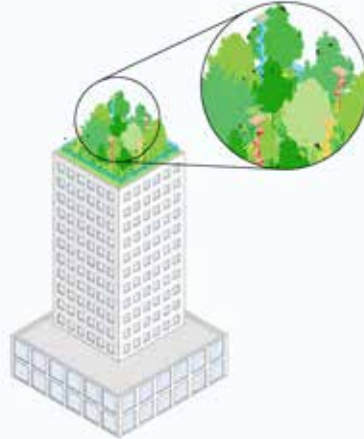
---

- High Accessibility & Safety
- High Structural Capacity
- Low Building Height

## Peregrine falcon spot (and other birds)

For birds, rooftops are no different than mountains tops. They provide shelter and space to make nests. This rooftop can also be used by other birds of prey seeking a high, quiet nesting spot.

**Slechtvalkspot (en andere vogels)** Voor vogels zijn de daken niet anders dan de toppen van bergen. Ze bieden beschutting en ruimte om nesten te maken. Dit dak is ook voor andere roofvogels die een hoge, rustige nestplaats zoeken.



### Found Patterns

---

- Forest  
Programme
- Bird Nesting - Falcon  
Detail

### Open Values

---

- Water Retention
- Ecological Habitat
- Cooling

### Technical Restrictions

---

- Low Accessibility & Safety
- High Structural Capacity
- High Maintenance Costs
- High Building Height

## Palm house

The palm house is a small exotic oasis on a rooftop. Visitors who take the elevator all the way to the top floor will emerge into a completely green world. The glass provides warmth and protects the plants from the wind.

**Palmhuis** Het palmhuis is een kleine exotische oase op het dak. Wie de lift helemaal tot de bovenste verdieping neemt, komt uit in een andere groene wereld. Het glas zorgt voor een warme omgeving en beschermt de planten tegen de wind.



### Found Patterns

---

- Park  
Programme
- Greenhouse  
Feature

### Open Values

---

- Public Function
- Connection to Nature
- Insulation

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Private expansion on a rooftop

A simple way of densification: the upper apartment expands to the rooftop. This creates space for additional bedrooms or a study, for example, and reduces the need for people to move. There is also room for a green rooftop garden.

**Private uitbreiding op het dak** Een eenvoudige manier van verdichteren: de bovenste woning breidt zich uit op het dak. Zo ontstaat ruimte voor bijvoorbeeld extra slaapkamers of een werkruimte en hoeven mensen minder snel te verhuizen. Daarnaast is er plek voor een groene daktuin.



### Found Patterns

---

- Housing Expansion  
Programme
- Private Garden  
Feature

### Open Values

---

- Water Retention
- Domestic Space Expansion
- Connection to Nature

### Technical Restrictions

---

- High Structural Capacity
- High Renovation Costs

## Single-family homes

These single-family homes are placed on top of apartment buildings. Like 'normal' homes, they are located on a street with a small front garden where children can play outside. This application will make more space for families in the city.

**Eengezinswoningen** Deze eengezinswoningen worden geplaatst op een appartementsgebouw. Niet als 'gewone' woningen liggen ze aan een straat met kleine voortuin waar de kinderen buiten kunnen spelen. Door deze toepassing komt er meer ruimte voor gezinnen in de stad.



### Found Patterns

---

- Added Building Layer  
Programme

### Open Values

---

- Profitable Space

### Technical Restrictions

---

- High Structural Capacity
- High Renovation Costs



## Apartments and community garden

This option involves a rooftop expansion for new apartments. Since these apartments do not have (large) gardens, a community garden has been added. It is a place where current and new residents can meet.

**Appartementen en buurttuin** Deze optie betreft een uitbreiding op het dak met nieuwe appartementen. Omdat deze appartementen geen (grote) tuinen hebben, is er een gemeenschappelijke tuin toegevoegd. Hier kunnen de huidige en nieuwe bewoners elkaar ontmoeten.



### Found Patterns

---

- Added Building Layer  
Programme
- Shared Garden  
Feature
- Vegetable Planters  
Detail

### Open Values

---

- Domestic Space Expansion
- Public Function
- Connection to Nature
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## Bridge building

The bridge building not only adds more space (such as apartments or offices) but also literally connects multiple rooftops. The building activates multiple existing rooftops while giving the new building its own identity.

**Bruggenbouw** Het bruggenbouw voegt niet enkel programma toe (zoals woningen of kantoorvloeren) maar verbindt ook letterlijk meerdere daken. Het gebouw maakt het mogelijk om meerdere bestaande daken te activeren én geeft de nieuwbouw een eigen identiteit.



### Found Patterns

---

- Added Building Layer  
Programme
- Connecting Bridges  
Feature
- Shared Garden  
Feature

### Open Values

---

- Domestic Space Expansion
- Public Function
- Connection to Nature
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs
- Requires 2 Rooftops



## Overhang with common intermediate layer

A separate construction allows for more volume to be added (also see the section on construction). The rooftop between the new construction and the existing one will be a community garden where everyone can come together.

**Overbouw met gemeenschappelijke tussenlaag** Een aparte constructie maakt het mogelijk om meer volume te bouwen. (Zie ook constructie hoofdstuk). Het dak tussen de nieuwbouw en bestaande bouw wordt een gemeenschappelijk (buur)tuin waar iedereen samen komt.



### Found Patterns

---

- Added Building Layer  
Programme
- Shared Garden  
Feature

### Open Values

---

- Domestic Space Expansion
- Public Function
- Connection to Nature
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## Dormer

A dormer is a kind of denification. The dormer is most commonly known in a certain standard shape and appearance, but it can also be a special object that gives the home an air of spaciousness.

**Dakkapel** Een dakkapel is een vorm van verdichting. De dakkapel kennen we in een bepaalde standaard vorm en uiterlijk, maar kan ook een bijzonder object zijn die de woning een nieuwe ruimtelijkheid mee geeft.



### Found Patterns

---

- Dormer Expansion  
Feature
- Herbs and Bushes  
Feature

### Open Values

---

- Domestic Space Expansion
- Water Retention
- Insulation

### Technical Restrictions

---

- Low Accessibility & Safety
- Low Structural Capacity
- Requires Slanted Roof

## Outdoor room

The outdoor room will be the most special room in the house. It can, for example, be used as a study, a guest room or a playroom – a room that overlooks the green rooftop in peace.

**Buitenkamer** De buitenkamer wordt de meest bijzondere kamer van het huis. Deze kan bijvoorbeeld ingezet worden als werkkamer, logeerkamer of speelkamer. Een kamer die in alle rust uitkijkt op het groene dak.



### Found Patterns

---

- Private Garden  
Programme
- Domestic Unit  
Feature
- Picnic Table  
Feature

### Open Values

---

- Domestic Space Expansion
- Connection to Nature

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## Winter garden

The winter garden is a room without heating. It is sufficiently warm to be used in the spring and autumn, which would encourage people to be more in tune with the seasons: withdrawn in winter and outside in summer.

**De wintertuin** De wintertuin is een kamer zonder verwarming. Deze is in de lente en herfst voldoende warm om te gebruiken. Zo leven mensen meer met de seizoenen: in de winter teruggetrokken en in de zomer meer buiten.



### Found Patterns

---

- Greenhouse  
Feature

### Open Values

---

- Domestic Space Expansion
- Insulation

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## Filling up a pitched roof

'Filling up' a pitched roof to make it flat provides additional square metres. A new large roof can provide space for a garden or a vegetable garden.

**Uitvulling schuin dak** Het 'uitvullen' van een schuin dak, zorgt voor extra vierkante meters. Een nieuw groot dak kan ruimte bieden aan tuin of het verbouwen van groentes.



### Found Patterns

---

- Added Building Layer  
Programme
- Urban Farm  
Programme

### Open Values

---

- Food Production
- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Water Retention
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Working from home

We have started working from home more due to COVID-19. After a while, people get tired of their boring attic rooms. Why not create a special space on your own rooftop, where you can work quietly and still be in a different environment?

**Thuiswerkbubbel** Door corona zijn we meer gaan thuiswerken. Na een tijd werden mensen hun saaie zolderkameretjes zat. Waarom geen bijzondere ruimte op je eigen dak, waar je rustig -maar toch in een andere omgeving- kan werken.



### Found Patterns

---

- Dormer Expansion  
Feature
- Domestic Unit  
Feature

### Open Values

---

- Domestic Space Expansion

### Technical Restrictions

---

- Low Accessibility & Safety
- Low Structural Capacity

## Private housing expansion, horizontal

The lower rooftops provide space to expand adjacent apartments and give them an extra room and garden, so that people are less likely to have to move to a larger home. It is possible to expand several apartments that are stacked on top of each other (with terraces).

**Private woninguitbreiding horizontaal** De lagere daken bieden ruimte om naastgelegen appartementen te vergroten met een extra kamer en tuin, opdat mensen minder snel hoeven te verhuizen naar een grotere woning. Het is mogelijk om meerdere appartementen boven elkaar uit te breiden (met terrassen).



### Found Patterns

---

- Housing Expansion  
Programme
- Private Garden  
Programme

### Open Values

---

- Domestic Space Expansion
- Connection to Nature

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## Work units

Combining living and working has become increasingly more relevant since the pandemic started. Creating work units on a rooftop allows people to work from home and still be at a literal distance from their actual home. These separate units also make it easier to receive customers or colleagues.

**Werk-units** Het combineren van wonen en werken is sinds corona steeds meer actueel. Door op het dak werk-units te maken wordt een letterlijke afstand tot de woning gecreëerd. In de aparte units kunnen klanten of collega's gewoon thuis worden ontvangen.



### Found Patterns

---

- Private Garden  
Programme
- Domestic Unit  
Feature

### Open Values

---

- Domestic Space Expansion
- Connection to Nature

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## New neighbourhoods

Instead of adding one volume, multiple volumes are created - each of which can have its own identity to make each block out as a neighbourhood. Between them and on top of them, gardens are located for the residents.

**Nieuwe buurten** In plaats van één volume toe te voegen worden meerdere volumes gemaakt, die elk een eigen identiteit kunnen hebben om elk blok als een buurt te laten fungeren. Ertuinen en erop bevinden zich tuinen voor de bewoners.



### Found Patterns

---

- Added Building Layer  
Programme
- Forest  
Programme
- Shared Garden  
Feature

### Open Values

---

- Public Function
- Connection to Nature
- Profitable Space
- Cooling

### Technical Restrictions

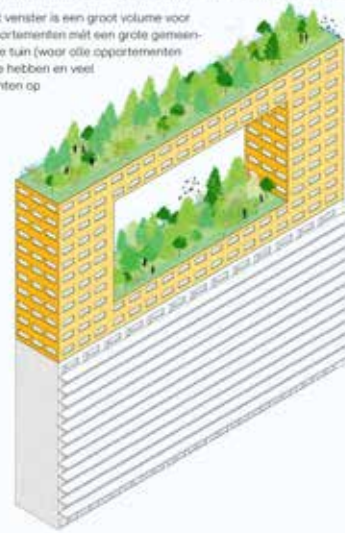
---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## Window

Window is a large volume for new apartments with a large community garden (to which all apartments have access and where many apartments look out on).

**Venster** Het venster is een groot volume voor nieuwe appartementen met een grote gemeenschappelijke tuin (waar alle appartementen toegang toe hebben en veel appartementen op uit kijken).



### Found Patterns

---

- Added Building Layer  
Programme
- Forest  
Programme
- Shared Garden  
Feature

### Open Values

---

- Public Function
- Connection to Nature
- Profitable Space
- Cooling

### Technical Restrictions

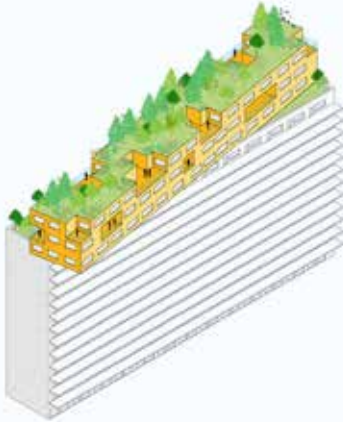
---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## The Twist

A new apartment building can be neatly placed on a rooftop within the contours of the rooftop surface underneath, but it can also be given a different twist, creating a contrast with the existing building below.

**De Twist** Een nieuw appartementsgebouw kan keurig op het dak geplaatst worden binnen de contouren van het onderliggende dakvlak, maar kan ook een heel meekrijgen waardoor het een contrast vormt met het bestaande pand eronder.



## Found Patterns

- Added Building Layer  
Programme
- Forest  
Programme
- Shared Garden  
Feature

## Open Values

- Public Function
- Connection to Nature
- Profitable Space
- Cooling

## Technical Restrictions

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## Holiday homes

Due to the pandemic, most of us now go on holiday in our own country. The cities offer hotels and short-stay apartments, and outside of the cities there are holiday parks. However, rooftops could also offer holiday parks surrounded by greenery in the heart of the city.

**Vakantiehuusjes** We gaan meer in eigen land op vakantie. In de stad zijn er hotels en short stay appartementen, daarbuiten liggen de parken met vakantiehuusjes. Echter, het dak biedt de mogelijkheid om ook in de stad vakantieparken in het groen aan te leggen.



## Found Patterns

- Domestic Unit  
Programme

## Open Values

- Profitable Space

## Technical Restrictions

- High Accessibility & Safety
- High Structural Capacity

## Elevated apartments

This option involves lifting the apartments to allow sufficient sunlight on the inside of the building block, on the one hand, and to give the apartments a view over the rooftops on the other. Below the elevated volume, the publicly accessible community courtyard garden is located.

**Opgelide appartementen** in deze optie is het volume met appartementen opgetild om enerzijds voldoende zonlicht toe te laten aan de binnenzijde van het bouwblok en anderzijds om de appartementen uitzicht te geven over de daken. Onder het opgetilde volume bevindt zich de gemeenschappelijke binnentuin die publiek toegankelijk is.



### Found Patterns

---

- Added Building Layer  
Programme
- Shared Garden  
Feature

### Open Values

---

- Domestic Space Expansion
- Public Function
- Connection to Nature
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- High Development Costs

## Office block

Other functions can be added to the inside of a building block. That way, the building block becomes more diverse and is livelier during the day. Next to the office block, there will be a community garden.

**Kantoorblok** Aan de binnenzijde van het bouwblok kunnen andere functies toegevoegd worden. Op deze manier wordt het bouwblok meer divers en is overdag meer levendig. Naast het kantoorblok komt een tuin voor de buurt.



### Found Patterns

---

- Added Building Layer  
Programme
- Shared Garden  
Feature

### Open Values

---

- Domestic Space Expansion
- Public Function
- Connection to Nature
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity



## Roof shed

The roof shed is a flexible structure that can be easily closed off if there is a need for a larger space. The structure can also be used for covered outdoor activities (for example Physical Education) when it's raining.

**Dakschuur** De dakschuur is flexibele structuur die eenvoudig dichtgezet kan worden als er behoefte is aan een grotere ruimte. De structuur kan tevens gebruikt worden voor overdekte buitenactiviteiten (bijvoorbeeld gym) wanneer het regent.



## Found Patterns

---

- Playground  
Feature
- Canopy  
Feature

## Open Values

---

- Domestic Space Expansion
- Cooling (shelter)
- Outdoor Activity

## Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity

## Outdoor fitness

On this rooftop, there is a wide range of fitness equipment surrounded by greenery that allows people to exercise. Preferably, this would be located on an easily accessible, lower rooftop so that the outdoor fitness area can become part of someone's morning run.

**Outdoor fitness** Op dit dak staan fitness toestellen in de buitenlucht omringd door groen waar mensen hun oefenen kunnen doen. Bij voorkeur zijn dit lager, gefogedaken die goed bereikbaar zijn. Zo kan de outdoor fitness onderdeel zijn van een hardlooperdijkje.



## Found Patterns

---

- Outdoor Fitness Equipment  
Feature

## Open Values

---

- Outdoor Activity

## Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity



## Rooftop mural

Murals on walls are very well known. But why not also make them on a rooftop? Especially rooftops that are a little lower so that many people can look out on them from their windows.

**Dak mural** De murals voor wanden zijn bekend. Maar waarom ook niet op het dak? Met name daken die iets lager liggen waar veel mensen op uit kijken.



## Found Patterns

---

- Mural  
Feature

## Open Values

---

- Aesthetic Views

## Technical Restrictions

---

- Low Accessibility & Safety
- Low Structural Capacity

## Sculpture garden

Art can also be placed on a rooftop - preferably on rooftops that are easily accessible. The sculpture garden can be part of a larger city walk.

**Beeldentuin** Kunst kan ook op het dak geplaatst worden. Bij voorkeur daken die makkelijk toegankelijk te maken zijn. De beeldentuin kan onderdeel zijn van een grotere stadswandeling.



## Found Patterns

---

- Park  
Programme
- Gravel Paths  
Detail
- Art Installation  
Detail

## Open Values

---

- Water Retention
- Connection to Nature
- Public Function
- Aesthetic Views
- Art & Culture

## Technical Restrictions

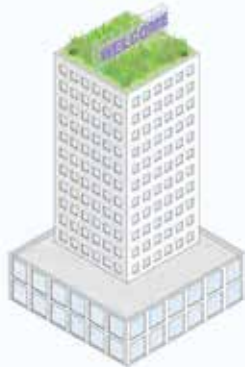
---

- High Accessibility & Safety
- High Structural Capacity
- Low Building Height

## City branding

Some rooftops are very visible in the city. Therefore, they are perfect for city branding and can be used to welcome people to the city or alert them to certain events that are going to take place in the city.

**City branding** Sommige daken zijn erg zichtbaar in de stad. Daarom lenen ze zich voor 'citybranding' om mensen welkom te heten in de stad of ze te wijzen op bepaalde evenementen die in de stad gaan plaatsvinden.



## Found Patterns

---

- Herbs and Bushes  
Feature
- Billboard  
Feature

## Open Values

---

- Profitable Space
- Water Retention
- Ecological Habitats

## Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## Lookout point

A high rooftop is a logical place for a lookout point over the city. Preferably, it would be surrounded by greenery so that it becomes a peaceful place to be.

**Uitzichtpunt** Een hoog dak is een logische plek voor een uitzichtpunt over de stad. Bij voorkeur omringd door groen, opdat het een prettige plek wordt.



## Found Patterns

---

- Lookout Tower  
Feature
- Herbs and Bushes  
Feature

## Open Values

---

- Public Function
- Aesthetic Views
- Ecological Habitats

## Technical Restrictions

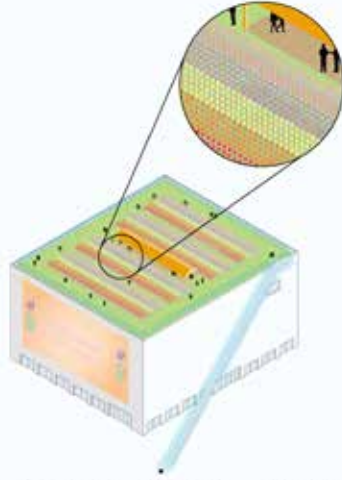
---

- High Accessibility & Safety
- Medium Structural Capacity

## Tulip field

Many tourists come to the Netherlands to see our beautiful tulip fields. Such a field can also be constructed on a rooftop.

**Tulpenveld** Veel toeristen komen naar Nederland voor de prachtige tulpenvelden. Z'n veld kan ook op het dak aangelegd worden.



### Found Patterns

---

- Flower Field  
Feature

### Open Values

---

- Water Retention
- Connection to Nature
- Outdoor Activity
- Ecological Habitats
- Public Functions
- Aesthetic Views

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Outdoor cinema

A rooftop is an ideal place for an outdoor cinema. Preferably, this is a rooftop that is sheltered by other, higher rooftops. Noise pollution for nearby residents must be taken into account.

**Outdoor cinema** Het dak is een ideale plek voor een buitenbioscoop. Bij voorkeur betreft dit een dak dat beschermt wordt door andere hoger gelegen daken. Er moet rekening worden gehouden met geluidsoverlast voor omwonenden.



### Found Patterns

---

- Outdoor Cinema  
Programme

### Open Values

---

- Public Function
- Profitable Space

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity

## Allotment gardens

Allotment gardens are often located on the outskirts of the city. There is a great demand for them and there are long waiting lists. The larger rooftops in the city could also be turned into allotment gardens.

**Volkstuinen** De volkstuincomplexen bevinden zich vaak aan de rand van de stad. Er is veel behoefte aan. De complexen rond de stad kunnen lange wachtlijsten. De grotere daken in de stad kunnen hier ook voor ingericht worden.



## Found Patterns

- Urban Farm  
Programme
- Private Garden  
Feature
- Vegetable Planters  
Detail

## Open Values

- Food Production
- Ecological Habitats
- Outdoor Activity
- Connection to Nature
- Water Retention

## Technical Restrictions

- Medium Accessibility & Safety
- High Structural Capacity

## Block terrace

Block terraces are green terraces specifically made for the residents of the apartment block below. There is space for gardening, sunbathing and children to play. A quiet place to get to know your neighbours better.

**Blok terras** Het blok terras is een groen terras speciaal voor alle bewoners van het ondergelegen appartementenblok. Er is ruimte om te tuinieren, te zonnen en kinderen te laten spelen. Een rustige plek om je buren beter te leren kennen.



## Found Patterns

- Rooftop Terrace  
Programme
- Picnic Tables  
Detail

## Open Values

- Public Function
- Domestic Space Expansion

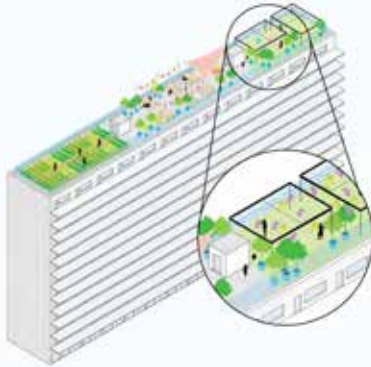
## Technical Restrictions

- High Accessibility & Safety
- Medium Structural Capacity

### Flat rooftop (for residents)

This rooftop is made for all the residents of the flat. There is a vegetable garden, a community area, a BBQ area and a laundry rack. It is a place where residents can meet up.

**Flat dak (voor de bewoners)** Dit dak is ingericht voor alle bewoners van de flat. Er is een groentetuin, buurt ruimte, BBQ plaats en een wasrek. Hier kunnen bewoners elkaar ontmoeten.



### Block rooftop (for residents)

This option involves a garden and a community area on a rooftop that were created specifically for the residents of the apartment block below. The space can be rented out (for birthday parties, for example) and can be used for community activities.

**Blok dak (voor de bewoners)** In deze optie is een tuin en een gemeenschappelijke ruimte op het dak gemaakt speciaal voor de bewoners van het ondergelegen appartementenblok. De ruimte kan verhuurd worden (bij een verjaardagfeest bijvoorbeeld) of kan gebruikt worden voor activiteiten voor alle bewoners.



### Found Patterns

---

- Rooftop Terrace  
Programme
- Laundry Rack  
Detail
- BBQ Spot  
Detail
- Picnic Tables  
Detail

### Open Values

---

- Public Function
- Domestic Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity

### Found Patterns

---

- Rooftop Terrace  
Programme
- Domestic Unit  
Feature

### Open Values

---

- Public Function
- Outdoor Activity
- Domestic Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity

## Playground

This playground is only accessible to the children of the adjacent apartment building, so they can play safely.

**Speeltuin** Deze speeltuin is enkel toegankelijk voor de kinderen van het omliggende appartementsgebouw. Zo kunnen ze veilig spelen.



### Found Patterns

---

- Playground  
Programme

### Open Values

---

- Outdoor Activity

### Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity

## Wind turbines

This option involves smaller wind turbines on a rooftop.

**Windturbines** Deze optie betreft kleinere windturbines op het dak



### Found Patterns

---

- Wind Turbine  
Feature

### Open Values

---

- Renewable Energy Production

### Technical Restrictions

---

- Low Accessibility & Safety
- Medium Structural Capacity

## Parking rooftop (and green streets)

Is it possible to reverse our ideas about parking? Park your car on the roof and keep the streets free of cars, allowing them to become much greener. The parking spaces will, of course, be 'hidden' under green pergolas.

**Parkeerdak (en groen maaiveld)** Is het mogelijk om parkeren om te draaien? Parkeren op het dak, waardoor het maaiveld vrij van parkeren blijft en veel groener kan worden. De parkeerplekken worden uiteraard 'verstop' onder groene pergola's.



### Found Patterns

---

- Rooftop Parking  
Programme

### Open Values

---

- Profitable Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- High Structural Capacity
- Low Building Height

## Bicycle parking

There is a great shortage of bicycle parking spaces in the city. Provided proper accessibility is created, rooftops can also provide space to accommodate bicycles. The bike racks would be surrounded by green pergolas.

**Fietsenstalling** Er is een groot tekort aan fietsenstallingen in de stad. Mits een goede toegankelijkheid wordt ontworpen, biedt het dak ook ruimte om fietsen te kunnen plaatsen. De fietsenrekken zijn omgeven met groene pergola's.



### Found Patterns

---

- Bike Parking  
Programme
- Pergola  
Feature

### Open Values

---

- Profitable Space Expansion

### Technical Restrictions

---

- High Accessibility & Safety
- Medium Structural Capacity
- Low Building Height



## Data centre

Nowadays, data is often stored outside the city, but it could also find a place on rooftops. The heat that is released could be used to heat the building below.

**Datocentrum** Dataopslag wordt nu vaak buiten de stad gedaan, maar kan ook op de daken een plek vinden. De warmte die vrijkomt, kan gebruikt worden om het onderliggende gebouw te verwarmen.



### Found Patterns

---

- Data Centre  
Feature

### Open Values

---

- Profitable Space Expansion

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity

## Neighbourhood battery

As we use more and more electricity in our homes and for mobility, there is an increasing demand for urban electricity storage. In fact, we need large neighbourhood batteries. There is no reason these could not be placed on rooftops.

**Buurt batterij** Omdat we steeds meer elektriciteit gebruiken in woningen en voor mobiliteit, is er steeds meer vraag naar opslag van elektriciteit in de stad. Eigenlijk zijn er grote buurtbatterijen nodig. Deze kunnen prima op de daken geplaatst worden.



### Found Patterns

---

- Energy Storage  
Feature

### Open Values

---

- Profitable Space Expansion
- Renewable Energy Storage

### Technical Restrictions

---

- Medium Accessibility & Safety
- Low Structural Capacity



**Figure 243. Overview of Patterns with values and changelog**

**CHANGELOG**

- Renamed "Urban Farm" to "Vegetable Farm" because I want to avoid the words 'Urban' and 'Rooftop' to prevent repetitive names
- Renamed "Livestock Pasture" to "Chicken Coop" as chickens, in contrast to most cattle, actually *can* be kept on a rooftop quite easily. The small sized and impact also helped to replace it to 'feature'
- Added "Edible Herbs" as a detail to "Urban Farming"
- Renamed "Stormwater Harvesting" to "Rain Harvesting" as it is more compact and relatable.
- Added "Rainbarrel" & "Rainwater Tank" to "Water Systems"
- Changed "Park" to "Neighbourhood Park" to stress the public nature
- The different kind of "-terraces" were a bit confusing, for now, it was split up into different things:
  - "Garden" as a programme, as it pretty much determines the new construction and use of the building. The garden is a form of 'accessible green roof', to counteract, a new pattern for non-accessible green roofs like sedum or flower fields was added under the name: "Nature Preserve" this was replaced to the theme: "Natural Habitats"
  - "Shared-" and "Private Terrace", as they can be both applied as a standalone thing, or on top of another programme (like a garden or a flower field)
- "Lounge Area" is now classified as a 'detail', since it can be placed on basically any walkable surface, similar to the picnic tables.
- "Trellis" replaced "Wire & Ivy Pergola" as it is the actual term for it.
- "Shed" was renamed to "Tool Shed" to be more in line with the 'rhythm' (meter) of the other words.
- Added "Football Field" to "Sports and Playing" as it is a pattern I have seen before but wasn't found in the case studies or catalog.
- "Fitness Equipment" was moved to 'detail'
- "Living Module" replaced "Domestic Unit" as it was a bit vague.
- "Dunes" replaced the former "Dunescape" and was moved to 'feature'
- "Grass" and "Grass Field" and were merged into "Lawn" and replaced to 'feature'
- "Herbs and Bushes" was split into 2 categories: "Herbs & Grasses" and "Shrubs"
- "Insect Habitat" was renamed to "Insect Hotel" as it is more oriented towards an object instead of a concept.
- "Bird Nesting" and "Falcon Nest" were split into "Nest Boxes" (for sparrows, falcons, bats) and "Nesting Zones" (protected nesting zones for 'ground' nesting) to identify different types of bird nesting
- "Fruit Tree" replaces "Potted Tree" as it was a bit of a duplicate.
- "Sculpture" replaces "Art Installation" for a more practical approach
- "Aviary" was removed as I find it way too specific..
- Merged "Tiled Terrace" and "Tiled Paths" into "Tiles" under the theme "Materials"
- "White Painted Roof" was added as a 'feature' in "Materials", I've found some cases where it (with limited effort) could reduce Heat Island Effect.

**BREAKING**

- Limited the amount of 'values' of the details to 2, removed the least applicable value
- Limited the amount of 'values' of the features to 3, removed the least applicable value
- Added the new category "Accessibility" to also capture patterns that provide access to the roof and what values they use.
- I actually found the different types of access in each of the cases (not so much in the catalog) but have not classified them as 'patterns'. Yet, I think they can be added, because they do have an impact on the design and possibilities of the rooftop!

	PROGRAMME 16	FEATURE 30	DETAIL 28	Theme
	Vegetable Farm Allotment Garden	Greenhouse Chicken Coop	Composter Beehive Vegetable Planter Edible Herbs	Urban Farming
	Polderdak	Helophite Filter Rainwater Tank	Rainbarrel	Water Systems
	Rooftop Bar Outdoor Cinema Neighbourhood Park	Lookout Point		Urban Bustle
	Garden	Pergola Canopy Shared Terrace Private Terrace Shed Trellis	Seating BBQ Spot Lounge Area Picnic Table Laundry Rack	Living Rooftop
	Playground Fountain Maze Football Field	Swimming Pool	Fitness Equipment	Sports and Playing
	Powernest	Energy Storage Wind Turbine	Solar Panels Solar Tree	Energy
	Housing Expansion Added Building Layer	Living Module Dormer Expansion		Expansion & Densification
	Forest Nature Preserve	Flower Field Pond Dunes Herbs and Grasses Shrubs	Insect Hotel Nest Boxes Nesting Zones Trees Climbing Ivy	Natural Habitats
		Lawn	Fruit Tree Sculpture Planters Hedges Sunbeds	Outdoor Leisure
	Parking	Billboard Data Centre		Leasing Space
		White Painted Roof Mural Sedum Moss	Tiles Stepping Stones Gravel Paths Wooden Decking	Materials
		Elevator Stairwell External Staircase	Ladder Rooftop Hatch	Accessibility

# Workshop Structure

## Why this workshop?

I'm doing my thesis on developing "intensive-use" rooftops, like green roofs, rooftop bars or rooftop farms. After doing my research and talking to several experts, the conclusion was that a lot of things are possible on rooftops, but often the stakeholders (those who make the decisions) are not very eager to use them. In this workshop, I try to figure out what type of rooftops appeal to which stakeholders and how they correspond with their beliefs and ideals. This can help to build a more convincing case for using rooftops!

## Workshop setup

Each of you are assigned a role for today, varying from inhabitants to people from the municipality. You will be briefed about what your role means and what is expected from you. You are asked to play this part throughout the workshop and react from the perspective of your role.

### Round 1 - Introduction (±15 minutes)

In this round, you will be informed about today's workshop and introduced to each other. You will also be given your roles.

- Personal Introductions
- Explaining the structure of today's workshop
- Handing out the roles and introducing the roles to each other

### Round 2 - Pattern Assessment (±30 minutes)

When the roles are clear you will look at the patterns (different types of rooftops) on the window and assess them using the colored stickers. You will get 12 stickers in red and green colors. The green ones represent the patterns you like and the red ones you dislike. Save the big stickers for the pattern you absolutely LOVE or HATE! There is also room on the patterns to leave a comment.

- Explaining the patterns
- Handing out the stickers and explaining their meaning
- Assessing the patterns



### BREAK (±15 minutes)

### Round 3 - Discussion (±45 minutes)

In this final round, we will take a look at the patterns that were liked and disliked the most and discuss why they were chosen. We will look specifically at which patterns were liked or disliked the most, and those where we see a lot of conflict.

Together, we will select a set of 5 patterns that the majority of participants is happy with and discuss why you like or dislike it.

## BORREL

With beer and snacks!

# Urban Ecologist - Emiel

Your role is that of the urban ecologist\*! Your job is to ensure that the nature in the city is of a high quality. Rooftops have proven to be an excellent surface in the city to help with just that.

An important element of your job is to help owner associations to choose rooftop designs that promote nature in the city, by adding new ecological habitats, stimulating biodiversity or creating awareness for nature in the city.



*\*typo on the patterns... it says "biodiversity"*

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# Municipality - Charalampos

Your role is that of the municipality! As a representative from the municipality Rotterdam, your number one priority is to make the city livable. This means you are stimulating development on rooftops that make the neighborhood a better place to live in.

But you are also concerned about the climate adaptivity of the city. Making sure that rooftops can store rainwater during heavy rainfall, the urban heat island effect is reduced and biodiversity is stimulated.

On top of that, you are aware that there is a big housing shortage in the city, which you are planning to tackle with densification.



---

# Inhabitant - Loes

Your role is that of an inhabitant! You rent an apartment in the building and the owner association has asked you to join in on their discussion about the rooftop. The apartment is a bit small and you don't have a balcony or a garden, so outdoor recreation has to be done in the city.

The building is old and badly insulated, which is costing you quite some money.





# Landlord - Eva

Your role is that of a landlord! The apartment you are renting out is one you lived in before. Although you moved to a different area, as a landlord and part of the owners association, you still get to make decisions regarding the building.

This means you are concerned about the profit the building is making you and the costs (like maintenance and energy bills). But as a proud Rotterdammer, you also want the city to be as beautiful as can be! You are interested in replacing the old rooftop, which is in a bad shape and poorly insulated, with something that makes the city nicer!



---

# Owner Occupier - Theo

Your role is that of an owner occupier! You have bought an apartment in this building block and live here. You have planned to live here for at least a couple of years, but not your entire life. This means it is important to you that the building has a good property value.

But of course, you also want a comfortable apartment. Living comfort and space are important, as well as a decent insulation, as it can save you some money on your energy bill.

Along that, you know that the rooftop needs to be renovated within the next 10 years, as it is in a bad shape and is poorly insulated.



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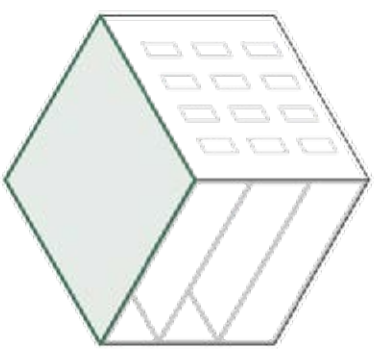
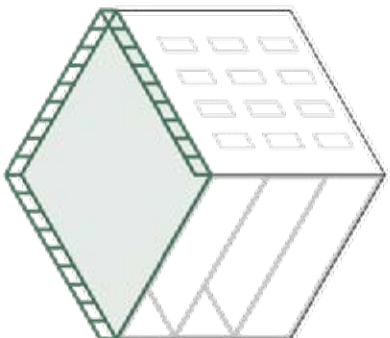
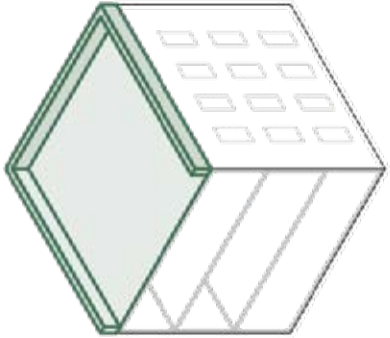
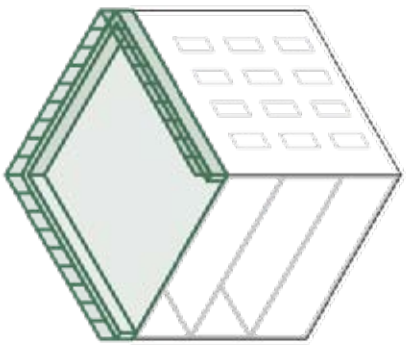
# Real Estate Group - Pavlos

Your role is that of a real estate group! Your office owns a big chunk of rental houses in the inner city and are building new towers every year. These rental apartments are part of a mixed group of owners and are quite old. As the area is gentrifying, you see an opportunity to invest in the building and create new, expensive apartments that are going to create a lot of revenue.

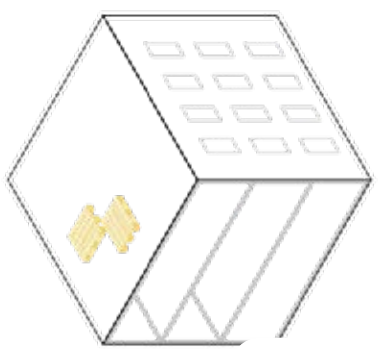
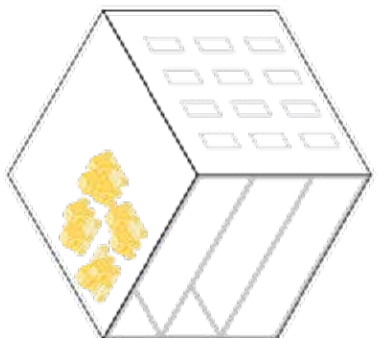
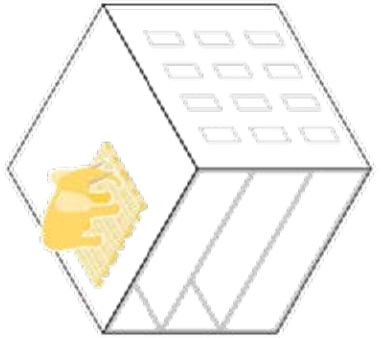
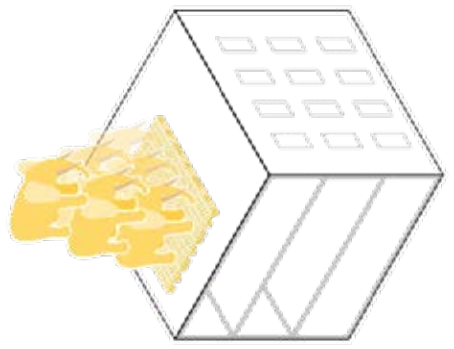
But you also don't want to spend too much.. Making sure the apartments stay profitable and (maintenance) costs are kept low is very important.



# SAFETY

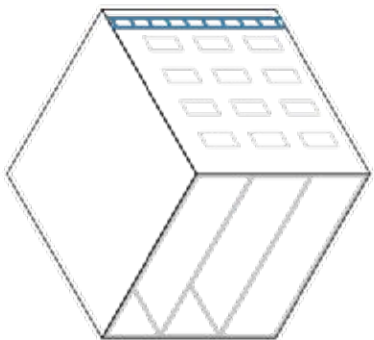
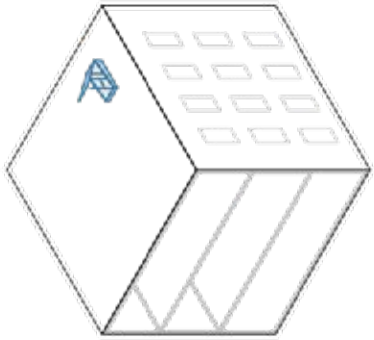
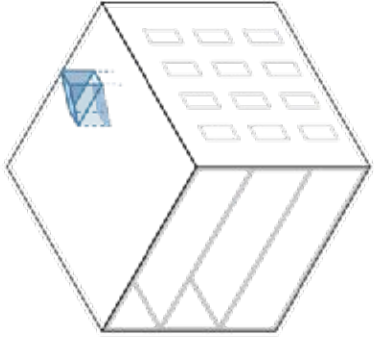
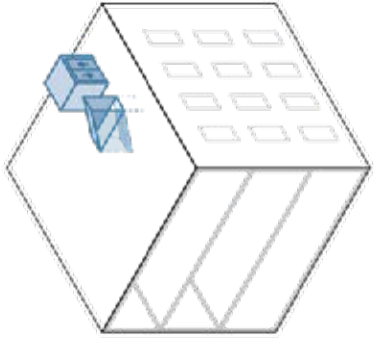


# STRUCTURE





# ACCESSIBILITY



# Sedum Moss



## Description

A sedum moss roof, sometimes also referred to as an extensive green roof adds green to rooftops that otherwise would be empty. They increase the **durability** and **insulation** of the rooftop and allow more **rainwater** to be stored on the roof, which in it's turn helps to **cool** the surrounding.

They do not contribute to the **biodiversity** however, as the moss forms a monoculture.

## Building Structure



## Safety



## Accessibility



## Technical Details

Sedum roofs can often be placed atop existing rooftops, but might need some structural reinforcement. The rooftop does not need to be accessible, only for maintenance, so safety and accessibility are not an issue.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

## Comments

# Urban Farm



## Description

By putting an urban farm on top of a building, residents and neighbors have a place to enjoy an **outdoor activity**, connecting with nature and growing their own food. Meanwhile, the greens can hold **rainwater** during heavy rain and offer a nice **view** to the people living around and above it.

This type of rooftop increases its **durability** and **cools** the area. Moreover, the variety of plants and crops contribute to the **biodiversity** of the city.

## Building Structure



## Safety



## Accessibility



## Technical Details

An urban farm can become quite heavy, so the building structure often needs to be completely renovated or reinforced. As the rooftop will be semi-public, safety needs to be in order by having strong barriers or walls around it. As the farm is expected to have a decent amount of logistics, accessibility in the form of a (cargo-) elevator and a stairwell needs to be in place.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

## Comments



# Connected Routes



## Description

Rooftops that are adjacent can be connected with bridges and paths to form a route atop the rooftops. This can form an alternative route for pedestrians avoiding heavy traffic while having a great **view** of the city.

This type of roof can be placed on lower roofs with good access to public spaces as an extension of a square, street or park. Moreover, these new open spaces can offer opportunities for **outdoor activities**.

## Building Structure



## Safety



## Accessibility



## Technical Details

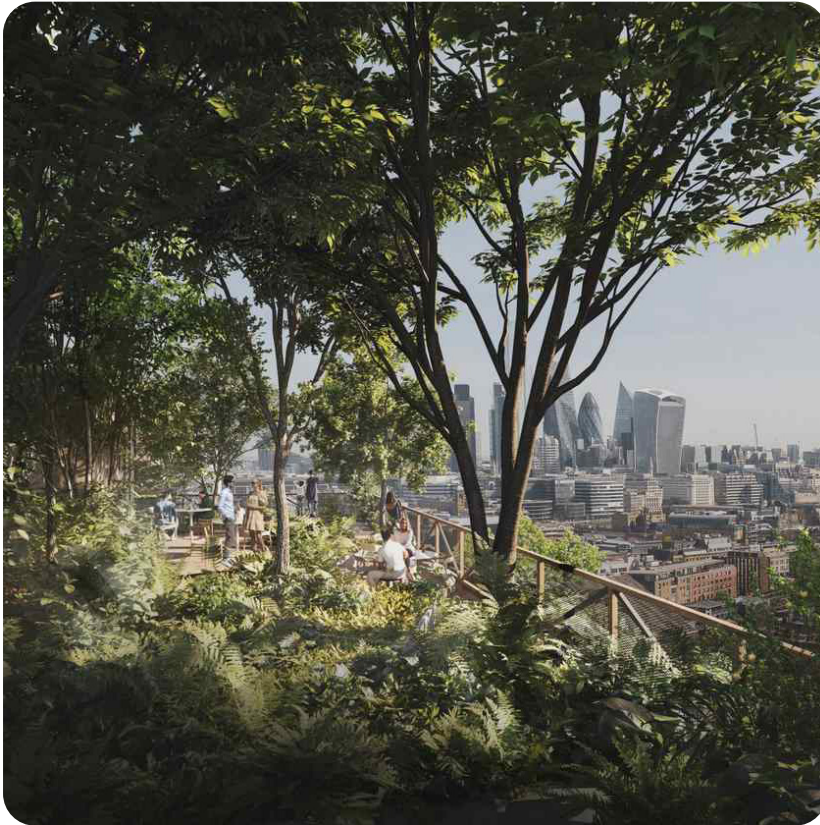
The routes can have a high amount of pedestrian activity, so the building structure needs to be very rigid. As it is publicly accessible, safety is very important so additional safety measures are required. Moreover, the space should be public to everyone and easy to maintain so the roofs need to be access by elevators and multiple stairwells.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

## Comments

# Forest



## Description

Forests are generally not found often in the city, but rooftops offer a great place for them. An area densely packed with plants offers a great habitat for animals and increases **biodiversity**. Besides that, the plants and soil can hold a lot of **rainwater** and help to **cool** the environment and increase air quality.

The forest can be accessible but doesn't have to be. Nonetheless, the added biotope atop a roof can add a pleasant **view** for surrounding inhabitants.

### Building Structure



### Safety



### Accessibility



## Technical Details

The trees and soil add a significant weight to the building, so the rooftop needs to be sufficiently strong. As the rooftop does not need to be accessible, safety regulations and accessibility only concern maintenance.

## Participant Rating

Inhabitant  
Loes

Owner-occupier  
Theo

Landlord  
Eva

Real Estate Group  
Pavlos

Biodiversity  
Emiel

Municipality  
Jampos

342

### Comments

Empty comment box for user input.



# Outdoor Cinema



## Description

Turning a rooftop in a public facility such as a cinema may work great for rooftops in dense areas with little amenities, especially when there is a large surface available.

The cinema offers a great scenic location with **views** of the city and causes only little nuisance. Moreover, it can offer a source of **income** for the operators.

In some locations, the cinema can offer just the **outdoor activity** needed in the neighborhood.

## Building Structure



## Safety



## Accessibility



## Technical Details

Since the cinema will house multiple people, the structure and the safety of the roof should be good enough. Although accessibility should be good, it doesn't have to meet the highest standards as logistics can be kept to a minimum.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

## Comments

# Home Extension



## Description

Houses can be extended 'vertically', by placing a new floor on top of the existing building. This adds **living space** and increases the property value, as well as **living comfort**.

### Building Structure



### Safety



### Accessibility



## Technical Details

Although vertical home extensions are quite heavy, they can be built atop the existing structure. As they have safety measures already, no addition safety measures are needed. The tops need to be accessible, but a simple stairwell will do.

## Participant Rating

Inhabitant  
Loes

Owner-occupier  
Theo

Landlord  
Eva

Real Estate Group  
Pavlos

Biodiversity  
Emiel

Municipality  
Jampos

344

### Comments



# Adding Layers



## Description

By adding layers on top of existing buildings, more houses can be built in the city. This provides a solution for investors to generate **revenue** while addressing the housing shortage in urban areas.

### Building Structure



### Safety



### Accessibility



## Technical Details

The structure of the building needs to be strong enough to support extra floors. No additional safety measures are required as the new layers should be safe enough themselves. However, the layers need to be very accessible, as new inhabitants need to get there easily.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments

# Work-from-home Units



## Description

Rooftops can provide the space some houses need in a time where working from home is becoming more popular. These units provide a comfortable space where residents can work, giving them a nice **view** of the city and the space needed, as well as an escape from their homes while having the benefits of reduced commuting times.

Moreover, these new units can effectively increase the amount of available **living space**.

## Building Structure



## Safety



## Accessibility



## Technical Details

The units can be lightweight and strategically placed on the stronger points of the building structure, so the building does not need to be heavily reinforced. Safety and accessibility are more important as the users should be able to safely and easily reach the units.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

346

## Comments

# Wooden Decking



## Description

A relative simple option is to place paths of wooden decking. This creates a accessible space for **outdoor activities**, for example by placing some furniture on it or a (fire safe) BBQ. It can also help to make a path to an adjacent accessible rooftop.

Adding wooden decking also increases the **durability** of the roof.

## Building Structure



## Safety



## Accessibility



## Technical Details

The decks can be relatively lightweight but the structure needs to support this as people and objects will be placed on top of it. The roof needs to be safe enough for people, but accessibility can be simple, like with a ladder or a hatch.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

## Comments



# Winter Garden



## Description

A winter garden can be a perfect intervention for **outdoor activities** on colder days. This can offer a semi-outdoor space on the roof to keep plants, have dinner or simply enjoy the **view** of the city.

### Building Structure



### Safety



### Accessibility



## Technical Details

The winter garden can be, similar to the work-from-home units, tactically placed on areas of the roof that are stronger, so the roof can be more lightweight. Although accessibility can be kept simple, the safety of the users going from and to the winter garden should be ensured.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

348

### Comments

# Flower Field



## Description

Similar to a sedum roof, a flower fields offers a green layers on top of the building that increases its **durability** and **insulation**, **cools** the area and offers a nicer **view** to surrounding residents. Yet, by adding wildflowers and grasses on roofs, the **biodiversity** of the neighborhood can be stimulated.

### Building Structure



### Safety



### Accessibility



## Technical Details

Although relatively lightweight, the plants, soil and water add a weight on the rooftop, so it needs to be strong enough to hold it. As the roof does not need to be accessible, safety and accessibility are not an issue.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments

# Water Treatment Wetland



## Description

A water treatment wetland can provide a good solution to clean wastewater, so that it can be re-used to flush the toilets or water the plants. This helps to reduce water usage or even go completely off the grid!

In addition, the wetland adds **rainwater** storage on top of the roof as well as a slight boost to **biodiversity** and a **cooling** effect on the neighborhood.

This option also increases the **durability** and **insulation** of the roof.

## Building Structure



## Safety



## Accessibility



## Technical Details

A wetland is quite heavy, as it should hold a substantial amount of water. It only needs to be accessed for maintenance so safety and accessibility are not an issue.

## Participant Rating

Inhabitant  
Loes

Owner-occupier  
Theo

Landlord  
Eva

Real Estate Group  
Pavlos

Biodiversity  
Emiel

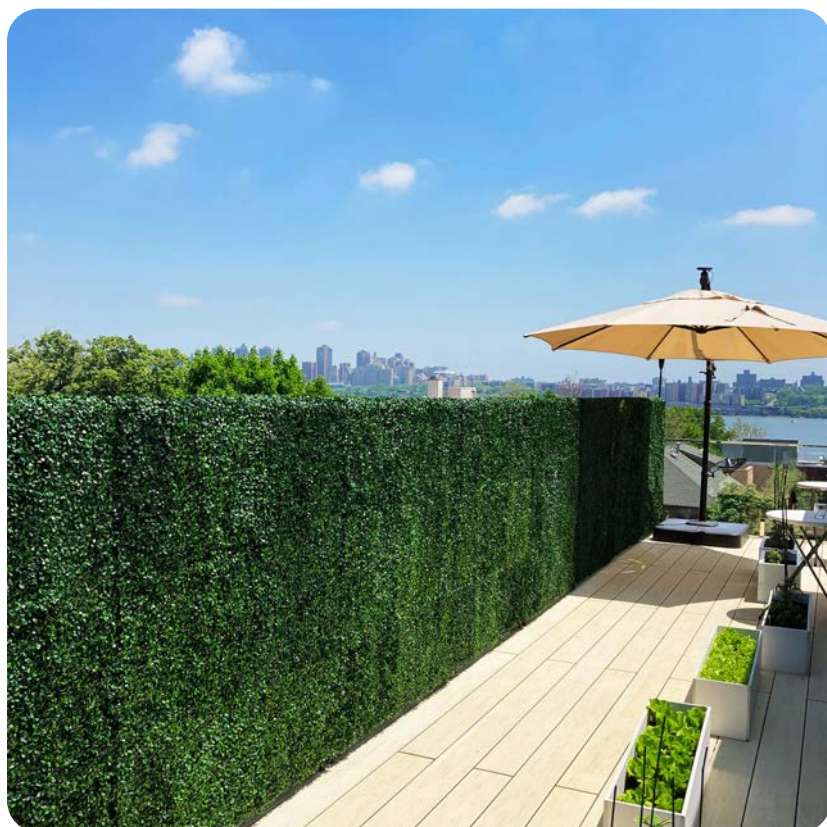
Municipality  
Jampos

350

## Comments



# Hedged Garden



## Description

Simple hedges around the edges of a rooftop can provide some protection against heavy winds and offer a great nesting spot for some birds.

### Building Structure



### Technical Details

[placeholder]

### Safety



### Accessibility



## Participant Rating

**Inhabitant**  
Loes

**Owner-occupier**  
Theo

**Landlord**  
Eva

**Real Estate Group**  
Pavlos

**Biodiversity**  
Emiel

**Municipality**  
Charalampos

### Comments

[Empty comment box]



# Solar + Green



## Description

By combining solar panels with green, like sedum moss, the efficiency of the solar panels can be increased. Moreover, some of the benefits of a green roof also apply, but to a slightly lesser extent. This includes a small storage for **rainwater**, increased **durability** and added **insulation** for the roof.

## Building Structure



## Safety



## Accessibility



## Technical Details

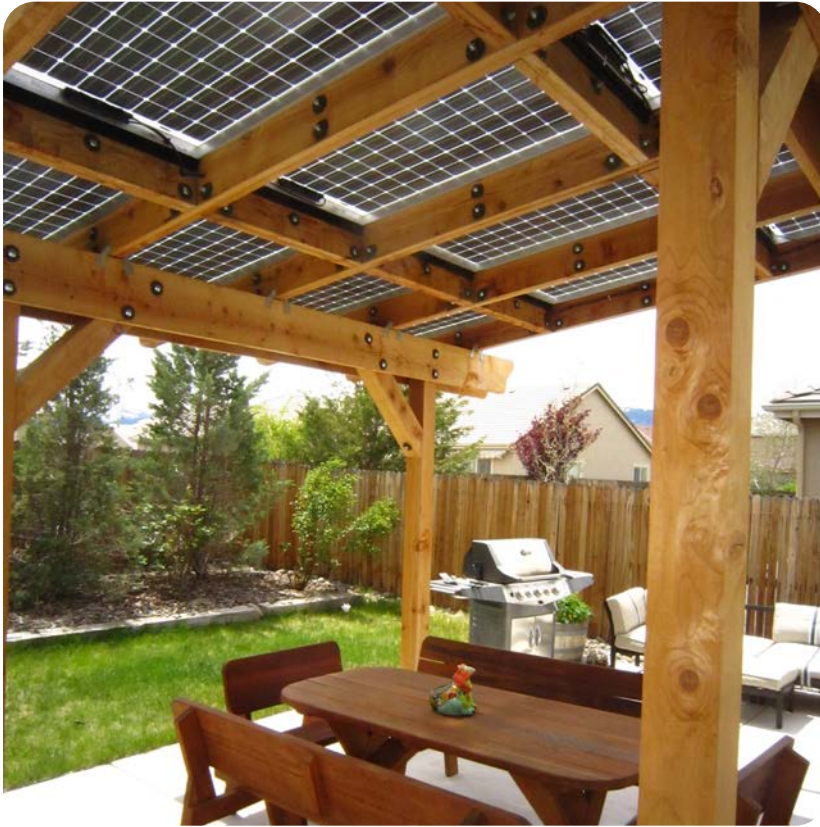
As this option combines solar panels with sedum, it will be a bit heavier. Therefore the structure needs to be strong enough. As it only needs to be accessed for maintenance though, safety and accessibility are not an issue.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

## Comments

# Solar Pergola



## Description

This lightweight options uses solar panels that generate **energy** to create a **cool**, shaded spot for the users of the rooftop underneath. Great for warm summers!

This adds some **living space** on top of the building and

## Building Structure



## Safety



## Accessibility



## Technical Details

This option is lightweight and doesn't require a strong structure. However, as the pergola catches wind from below, it needs to be firmly anchored to the roof. Since it will be used by people, safety and accessibility should also be in order.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

## Comments

# Picnic Tables



## Description

Without renovating too much, things like picnic tables can easily be placed on top of the rooftop. This small change turns an otherwise boring and unused rooftop into something the residents can enjoy. It can add to the **living comfort** of the building and offer a spot for good **views** of the city.

### Building Structure



### Safety



### Accessibility



## Technical Details

This lightweight option doesn't need a very strong structure, but since the roof shall be frequently accessed by people, safety needs to be in order. Accessibility should be decent, but a simple ladder or hatch will do.

## Participant Rating

**Inhabitant**  
Loes

**Owner-occupier**  
Theo

**Landlord**  
Eva

**Real Estate Group**  
Pavlos

**Biodiversity**  
Emiel

**Municipality**  
Jampos

354

### Comments



# Lightweight Planters



## Description

By placing lightweight planters on the rooftop, green can be introduced without the costs of a big, new green roof. These can help to make the rooftop safer and offer a nicer **view** to those looking down on the roof.

### Building Structure



### Safety



### Accessibility



## Technical Details

Almost any roof as is will be able to hold a couple of lightweight plants like this, especially when placed above structural walls that hold the roof. Placed around the edges, they can be used to increase the safety of the rooftop. For watering and maintaining the plants, some form of accessibility is required.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments

# Wild Greens



## Description

A cheap and effective method to put green on top most roofs are plants like succulents and some herbs. These do not need a lot of water and easily grow on gravels with some slight modifications. Although their contribution to the **biodiversity** is not great, all small bits help! Moreover, they slightly improve the **view** of surrounding buildings.

### Building Structure



### Safety



### Accessibility



## Technical Details

These plants can often be placed on existing rooftops without adding a significant weight. As they do not require maintenance very often, accessibility and safety are less of a concern.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

356

### Comments

# Bird Nesting



## Description

Another way to contribute to **biodiversity** with little effort is to add bird habitats and nesting places on roofs. Certain types of stones or some logs and branches can already provide a place where birds can find shelter and a place to nest.

### Building Structure



### Safety



### Accessibility



## Technical Details

Creating nests and small scale bird habitats can often be added to existing rooftops without adding a significant weight. As they do not require maintenance very often, accessibility and safety are less of a concern.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments



# Water Retention Field



## Description

By combining a sedum roof with specialised technology, more **rainwater** can be stored on rooftops in an efficient way. Although the contributions to **biodiversity** are limited, the water greatly adds a **cooling** effect on the surrounding and provides decent **insulation** for the building.

### Building Structure



### Safety



### Accessibility



## Technical Details

A water retention field adds a significant weight to the rooftop, require reinforcement. The rooftop does not need to be accessible, only for maintenance, so safety and accessibility are not an issue.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

358

### Comments



# Rooftop Bar



## Description

By utilizing the rooftop surface for something like a rooftop bar, a new and interesting spot with great **views** can be created. Besides providing new amenities for the neighborhood, the rooftop bar can offer a new source of **revenue** for the operators of the building.

### Building Structure



### Safety



### Accessibility



## Technical Details

The rooftop bar needs to meet all the technical criteria, as it should be strong and safe enough to hold many visitors and requires a very good accessibility for all the logistics involved.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments

# Lookout Point



## Description

Especially on high lying rooftops, the **view** of the city is amazing! Why not utilize this in the form of a public lookout point. It can form a great touristic attraction and creates relatively low nuisance. Moreover, a fee to access the lookout point can form a new source of **revenue** for the operators of the building.

### Building Structure



### Safety



### Accessibility



## Technical Details

By controlling the amount of visitors on the lookout point, structural interventions can be kept to a minimum. Safety and accessibility however, need to be in order as it can be publicly available.

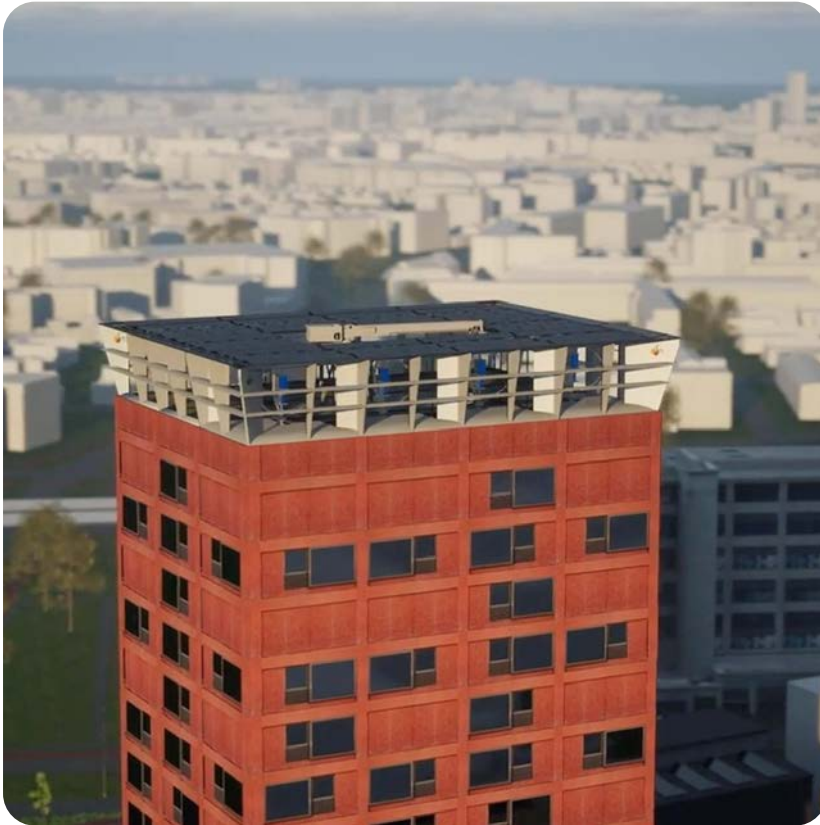
## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

360

### Comments

# Wind Turbines



## Description

Wind turbines (sometimes combined with solar panels) can offer a much more efficient method on generating **energy** compared to solar panels. However, a high building or a windy location is required in order to make this work.

Moreover, the wind turbines can cause more nuisance than the solar panels.

### Building Structure



### Safety



### Accessibility



## Technical Details

As the wind turbines will generate higher forces than most rooftop solutions, the structure needs to be able to support this. Frequent maintenance is important so the roof needs to be decent when it comes to safety and accessibility.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments



# Sports Field



## Description

Sport fields require a lot of space, but by placing these on empty rooftops, there is room for **outdoor activities** in every neighbourhood. Moreover, they provide an entertaining **view** for surrounding buildings.

### Building Structure



### Safety



### Accessibility



## Technical Details

The structure needs to be able to hold multiple people jumping and running around and meet the standards of any public function. This also goes for safety and accessibility, as we do not want people running into the fences and falling off...

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Diampos

362

### Comments

# Workout Space



## Description

An empty roof with some sunlight can offer a perfect place for a workout! Away from the nuisance of the street, with all the space required and some nice **views** of the city, this option adds a new and unique type of **outdoor activity** to the area.

### Building Structure



### Safety



### Accessibility



## Technical Details

The rooftop needs to be able to hold some people, but it doesn't have to be too complex. Safety and accessibility need to be decent however.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments

# Data Center



## Description

Data centers typically take up a lot of space in natural areas. But by placing them on empty surfaces in the city, this space can be kept for nature! These data centers can be compact and lightweight so they can be easily placed on many vacant roofs.

Combine them with some solar panels to generate their own **energy!**

### Building Structure



### Safety



### Accessibility



## Technical Details

As the structures are lightweight and only need to be accessed for maintenance, the standards for structure, safety and accessibility can be kept to a minimum.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Jampos

364

### Comments



# Livestock Pasture



## Description

Why not bring rural life into the city!? By adding livestock pastures on rooftops, the wasted space can be used for food production. Moreover, the soil and vegetation added will contribute to the city's **biodiversity** and provide a good **insulation** for the building below.

### Building Structure



### Safety



### Accessibility



## Technical Details

As the livestock and the vegetation is very heavy, the building structure needs to be sufficient. Moreover, the rooftop needs to be safe enough for the livestock and their caretakers, and accessibility is important as it will see a lot of logistic movements.

## Participant Rating

- Inhabitant  
Loes
- Owner-occupier  
Theo
- Landlord  
Eva
- Real Estate Group  
Pavlos
- Biodiversity  
Emiel
- Municipality  
Charalampos

### Comments



IMAGE

### Description

#### Building Structure



#### Technical Details [placeholder]







#### Safety



#### Accessibility



### Participant Rating

-  **Inhabitant**  
Loes
-  **Owner-occupier**  
Theo
-  **Landlord**  
Eva
-  **Real Estate Group**  
Pavlos
-  **Biodiversity**  
Emiel
-  **Municipality**  
Lampos

#### Comments



IMAGE

### Description

#### Building Structure



#### Technical Details [placeholder]

#### Safety



#### Accessibility



### Participant Rating

- Inhabitant**  
Loes
- Owner-occupier**  
Theo
- Landlord**  
Eva
- Real Estate Group**  
Pavlos
- Biodiversity**  
Emiel
- Municipality**  
Charalampos

#### Comments

## Retrofitting Rotterdam Questions

Hey there! Thanks for helping me out with my thesis!! Hopefully you have enjoyed the workshop. I've prepared some questions for you that will help to improve the patterns and target which points require some more attention.

The questionnaire consists of 5 sections in which we go over the results of the game, the impact (and clarity) of the goals that were given to you and finally, the general setup and structure of the game.

When did you play the game?

DD MM YYYY

12 / 04 / 2023

How many players were in the game? \*

4

Which selection of patterns did you end up with? \*

Please use the numbers on the patterns separated by commas (for example: 1,4,16 etc.)

5,19,25,21,10,17,11

Did you feel involved in the discussions?

Not very involved

1

2

3

4

5

Very involved

How would you rate your level of knowledge/expertise about rooftops and the different options provided?

I am new to this subject

1

2

3

4

5

I am very well-informed



Generally speaking, how much impact do you think your goals have made on the end result?

Very little impact

1

2

3

4

5

A lot of impact

Goal 1

Questions regarding your 1st goal

What was your 1st main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- Other: .....

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

.....

How much impact do you think your 1st goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 1st goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

25,21,10,17

.....

Could you explain why you think your 1st goal made this impact and why the selected patterns were interesting?

.....

Goal 2

Questions regarding your 2nd goal

What was your 2nd main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- I only had 1 goal (skip this section)

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

---

How much impact do you think your 2nd goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 2nd goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

5

---

Could you explain why you think your 2nd goal made this impact and why the selected patterns were interesting?

The two goals I had where conflicting to me (comfort and revenue) which made it a bit difficult to bring both to life. In the end the comfort came to front more

---

Questions about the patterns and their provided information



Was it generally clear what kind of interventions the patterns proposed?

Not clear at all

1

2

3

4

5

Very clear

Which (additional) information did you need to make a well-informed decision?

- Costs
- Subsidies
- Compatibility with other patterns
- Space needed
- Structural requirements
- Impact on biodiversity
- Water retention capacity
- Generated revenue
- Maintenance and responsibility
- Other: The impact on the network

Which patterns did you think were interesting and why?

The combination of 5,19,25,21 because i think that this recipe would best bring my values to life

Which patterns did you think were NOT interesting and why?

18,13 they would cause nuisance to me and would mean me spending money but not making any or enough

Did the collection of patterns have enough options that were interesting for you (and your goals)?

No not at all

1

2

3

4

5

Yes, plenty to pick from

What other patterns could be added or changed?

Network patterns, community garden

Other comments on the patterns

Feedback on the workshop itself

A couple of questions that reflect on the setup and content of the workshop

Was the structure and setup of the workshop clear?

Not clear at all

1

2

3

4

5

Very clear

What points could the setup of the workshop be improved upon?

---

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# Retrofitting Rotterdam Questions

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When did you play the game?

DD MM YYYY

12 / 04 / 2023

How many players were in the game? \*

4

Which selection of patterns did you end up with? \*

Please use the numbers on the patterns separated by commas (for example: 1,4,16 etc.)

19,25,21,10,17,11

Did you feel involved in the discussions?

Not very involved

1

2

3

4

5

Very involved

How would you rate your level of knowledge/expertise about rooftops and the different options provided?

I am new to this subject

1

2

3

4

5

I am very well-informed



Generally speaking, how much impact do you think your goals have made on the end result?

Very little impact

1

2

3

4

5

A lot of impact

Goal 1

Questions regarding your 1st goal

What was your 1st main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- Other: .....

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

Per patroon een indicatie aangeven hoeveel onderhoud het zou zijn

---

How much impact do you think your 1st goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 1st goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

9,20,12,24,6,15,18,2,16,26,22,17,10,11,21,19,5

---

Could you explain why you think your 1st goal made this impact and why the selected patterns were interesting?

De geselecteerde patronen zouden op elk dak in principe kunnen aangezien ze niet veel onderhoud vergen voor de bewoners zelf

---

Goal 2

Questions regarding your 2nd goal

What was your 2nd main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- I only had 1 goal (skip this section)

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

---

How much impact do you think your 2nd goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 2nd goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

6,3,12,4,13,20,18,2,14,5,15

---

Could you explain why you think your 2nd goal made this impact and why the selected patterns were interesting?

Ik denk dat het niet veel impact had omdat het een vergadering was tussen meerdere eigenaren van het dak, dus was het doel van 'value' teveel in conflict met meer ecologisch-georiënteerde doelen. Uitzondering was de PV panelen

---

Questions about the patterns and their provided information

Was it generally clear what kind of interventions the patterns proposed?

Not clear at all

1

2

3

4

5

Very clear

Which (additional) information did you need to make a well-informed decision?

- Costs
- Subsidies
- Compatibility with other patterns
- Space needed
- Structural requirements
- Impact on biodiversity
- Water retention capacity
- Generated revenue
- Maintenance and responsibility
- Other: Grootte van dak, potentie van netwerk tussen daken



Which patterns did you think were interesting and why?

Connecting routes (om een strategie te maken tussen daken en een 'community' te creëren), Outdoor cinema (nog nooit eerder gezien), urban farm (om zelf-voorzienend te zijn in voedsel)

---

Which patterns did you think were NOT interesting and why?

Workout space, data center, livestock pasture, forest; deze zouden beter ergens anders op het maaiveld kunnen

---

Did the collection of patterns have enough options that were interesting for you (and your goals)?

No not at all

1

2

3

4

5

Yes, plenty to pick from

What other patterns could be added or changed?

---

Other comments on the patterns

---

## Feedback on the workshop itself

A couple of questions that reflect on the setup and content of the workshop

Was the structure and setup of the workshop clear?

Not clear at all

1

2

3

4

5

Very clear

What points could the setup of the workshop be improved upon?

---

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# Retrofitting Rotterdam Questions

Hey there! Thanks for helping me out with my thesis!! Hopefully you have enjoyed the workshop. I've prepared some questions for you that will help to improve the patterns and target which points require some more attention.

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When did you play the game?

DD MM YYYY

12 / 04 / 2023

How many players were in the game? \*

4

Which selection of patterns did you end up with? \*

Please use the numbers on the patterns separated by commas (for example: 1,4,16 etc.)

5,19,25,21,10,17,11

Did you feel involved in the discussions?

Not very involved

1

2

3

4

5

Very involved

How would you rate your level of knowledge/expertise about rooftops and the different options provided?

I am new to this subject

1

2

3

4

5

I am very well-informed

Generally speaking, how much impact do you think your goals have made on the end result?

Very little impact

1

2

3

4

5

A lot of impact

Goal 1

Questions regarding your 1st goal

What was your 1st main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- Other: .....

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear



What aspect of the goal itself could be improved upon?

Is duurzame energie ook onderdeel van deze goal?

---

How much impact do you think your 1st goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 1st goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

19,25,21,16,1,7,8

---

Could you explain why you think your 1st goal made this impact and why the selected patterns were interesting?

De goal was duidelijk en ik kon goed de andere stakeholders meenemen. De patterns waren vooral interessant als biodiversiteit met regenwater werd gecombineerd

---

Goal 2

Questions regarding your 2nd goal

What was your 2nd main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- I only had 1 goal (skip this section)

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

Ik dacht eerst dat het meer ging over functies, maar pas later werd mij duidelijk dat het echt ging over de discussie publiek-prive

---

How much impact do you think your 2nd goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 2nd goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

20,23,24,3,18,14

---

Could you explain why you think your 2nd goal made this impact and why the selected patterns were interesting?

Ze waren interessant als er een publieke functie werd geïmplementeerd, echter kreeg ik deze patterns er niet door heen, vanwege de 'vve'heid van deze meeting. Bewoners willen geen publieke functies op hun dak

---

Questions about the patterns and their provided information

Was it generally clear what kind of interventions the patterns proposed?

Not clear at all

1

2

3

4

5

Very clear

Which (additional) information did you need to make a well-informed decision?

- Costs
- Subsidies
- Compatibility with other patterns
- Space needed
- Structural requirements
- Impact on biodiversity
- Water retention capacity
- Generated revenue
- Maintenance and responsibility
- Other: .....

Which patterns did you think were interesting and why?

14: een deze pattern wordt veel gecombineerd en leverde daarom denk ik de meest interessante discussie op

15: is er iets van een netwerk mogelijk?

---

Which patterns did you think were NOT interesting and why?

8 en 7: te onrealistisch, ik denk dat het sterker is om alleen echt mogelijke functies te bespreken

---

Did the collection of patterns have enough options that were interesting for you (and your goals)?

No not at all

1

2

3

4

5

Yes, plenty to pick from

What other patterns could be added or changed?

lets meer over een netwerk van daken? Ik denk community garden, meer prive- functies voor het gebouw zelf

---

Other comments on the patterns

---

## Feedback on the workshop itself

A couple of questions that reflect on the setup and content of the workshop

Was the structure and setup of the workshop clear?

Not clear at all

1

2

3

4

5

Very clear

What points could the setup of the workshop be improved upon?

Misschien een duidelijke case geven> bijv. Jullie zijn een VvE, of jullie zijn de gemeente

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# Retrofitting Rotterdam Questions

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How many players were in the game? \*

4

Which selection of patterns did you end up with? \*

Please use the numbers on the patterns separated by commas (for example: 1,4,16 etc.)

5,19,25,21,10,17,11

Did you feel involved in the discussions?

Not very involved

1

2

3

4

5

Very involved

How would you rate your level of knowledge/expertise about rooftops and the different options provided?

I am new to this subject

1

2

3

4

5

I am very well-informed

Generally speaking, how much impact do you think your goals have made on the end result?

Very little impact

1

2

3

4

5

A lot of impact

Goal 1

Questions regarding your 1st goal

What was your 1st main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- Other: .....

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear

What aspect of the goal itself could be improved upon?

Hazards in house where not as clear in a first read

---

How much impact do you think your 1st goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 1st goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

11

---

Could you explain why you think your 1st goal made this impact and why the selected patterns were interesting?

When safety is a huge concern, many patterns seem to disruptive or dangerous. But sometimes it's unclear how but this impact would be

---

Goal 2

Questions regarding your 2nd goal

What was your 2nd main goal as described on one of your cards? \*

- Comfort
- Efficiency
- Revenue
- Value
- Climate
- Public
- Safety
- Maintenance
- I only had 1 goal (skip this section)

Was the goal on the card clear?

Not clear at all

1

2

3

4

5

Very clear



What aspect of the goal itself could be improved upon?

---

How much impact do you think your 2nd goal has made on the end result (selection)?

Very little impact

1

2

3

4

5

A lot of impact

Which patterns did you think were interesting for your 2nd goal?

Please use the numbers separated by commas (1,4,16 etc.) Leave empty if none

19,25,21,17

---

Could you explain why you think your 2nd goal made this impact and why the selected patterns were interesting?

Many of the more public or cost increasing patterns did not make the selection. Most patterns add some upgrade into the efficiency of the existing building like insulation or energy production

---

Questions about the patterns and their provided information

Was it generally clear what kind of interventions the patterns proposed?

Not clear at all

1

2

3

4

5

Very clear

Which (additional) information did you need to make a well-informed decision?

Costs

Subsidies

Compatibility with other patterns

Space needed

Structural requirements

Impact on biodiversity

Water retention capacity

Generated revenue

Maintenance and responsibility

Other: How bit the increase for efficiency is for the current building.

Which patterns did you think were interesting and why?

21, A pattern I haven't seen much on buildings but definitely can have a great impact opposed to the traditional water roof or green roof

Which patterns did you think were NOT interesting and why?

Workout space. Boring and doesn't have a lot of added value

Did the collection of patterns have enough options that were interesting for you (and your goals)?

No not at all

1

2

3

4

5

Yes, plenty to pick from

What other patterns could be added or changed?

Solar pannels alone. For combining with different type of roofs.

Other comments on the patterns

Some pictures might give a wrong or different intention. Like windturbines or solar pergola with the bench.

## Feedback on the workshop itself

A couple of questions that reflect on the setup and content of the workshop

Was the structure and setup of the workshop clear?

Not clear at all

1

2

3

4

5

Very clear

What points could the setup of the workshop be improved upon?

Difficult to not discuss in the first round. Maybe a speed round might help in some way. Difficult to imagine if there is not a roof. The type of roof will influence the chosen options

---

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Appendix G. **Results of Workshop 3**

# Form

Name **Loes**

---

Location **Maasstraat 4D, 3016DC**

---

Rooftop Size **Large (100m²)**

*delete the ones that do not apply*

---

Structural Category **Midweight (flexible)**

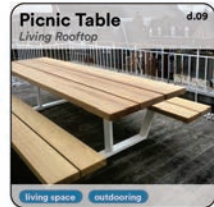
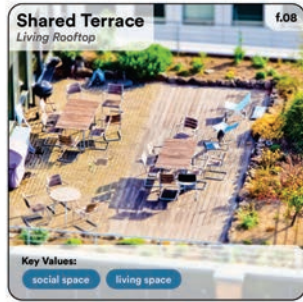
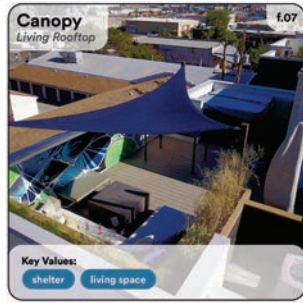
*delete the ones that do not apply*  
*Tip: you can test this by jumping a little bit.*

**Why did you pick your patterns?**

Since our roof is not suitable for heavy things, I tried to only select light weight stuff. Since this is only a rental apartment, I do not want to spend serious amount of money, so renovating the roof so it can handle more load is not worth it. Overall I would like to have a part terrace, with enough space to invite friends over. I want rather a public than a private terrace because now I can make more contact with our neighbours. Since it's a big roof, there is plenty of space left for a big flower field and solar panels, which supports ecology and clean energy. Being a fan of gardening I would like some space for my hobby! since a farm is to heavy and expensive, the planters are a good alternative.

Trellis and hedges: our roof is a bit lower than all the other surrounding roofs. This will give a little more privacy.

the staircase and tool shed could be merged into 1 building?



# Form

**Name** Bart en Yvonne

---

**Location** Lucas van Leijdenlaan 2

---

**Rooftop Size** Small (<30m²)

delete the ones that do not apply

---

**Structural Category** >75kg/m² (Wooden) 75 (50kg/m²) steel >100kg/m² (Concrete)

delete the ones that do not apply  
Tip: you can test this by jumping a little bit.

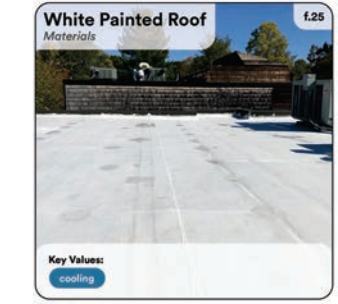
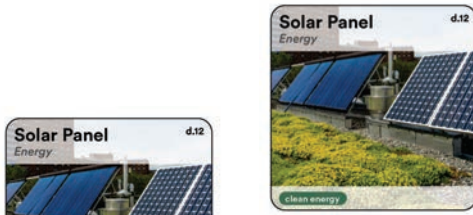
**Why did you pick your patterns?**

In our backyard we have a Garage with an extended roof and a half open lounge corner.

We want to use our this roof for Solar Panels.

To expand the use of the roof, optimize the panels and add cooling systems to the roof, its nice to add a white underground and some green. these changes can also provide spaces for the birds to nest.

Some edible herbs can be placed on the sides that can be picked with a ladder or small stairs.





# Form

Name **Bart & Yvonne**

---

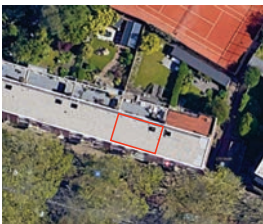
Location put your address/zipcode here

---

Rooftop Size **Medium (30-100m²)**  
delete the ones that do not apply

---

Structural Category **no change**  
delete the ones that do not apply  
 Tip: you can test this by jumping a little bit.



Why did you pick your patterns?

---

The house we rent has een rooftop terras.  
 It would be nice if we can expand our roof with extra garden and outdoor living.

**Garden**  
 Living Rooftop p.07

**Key Values:**  
 stormwater retention living space outdooring  
 insulation

**Vegetable Farm**  
 Urban Farming p.01

**Key Values:**  
 outdooring urban nature food production  
 co-responsibility

**Shrubs**  
 Natural Habitats f.19

**Key Values:**  
 urban nature native ecology attractiveness

**Wooden Decking**  
 Materials d.26

**Key Values:**  
 living space attractiveness

**Private Terrace**  
 Living Rooftop f.09

**Key Values:**  
 living space co-responsibility

**Rainbarrel**  
 Water Systems d.05

**Key Values:**  
 rain harvesting stormwater retention

**Edible Herbs**  
 Urban Farming d.04

**Key Values:**  
 food production outdooring

**Ladder**  
 Accessibility d.28

**Tip:** This options is very likely already fitted to your building.

**White Painted Roof**  
 Materials f.25

**Key Values:**  
 cooling

# Form

Name Jill

Location 3015CH

Roof Size Medium (30-50sqm)  
delete the ones that do not apply

Structural Category see design program  
delete the ones that do not apply  
 Tip: you can test this by jumping a little bit.

**Why did you pick your patterns?**

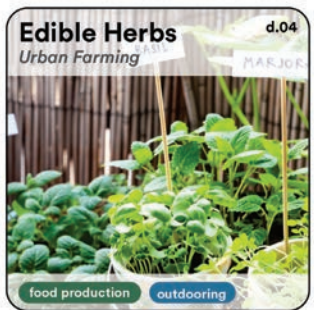
I imagine my rooftop as my only outdoor space I own. Therefore I choose my mijn key programme to be a "garden". My moodboard represents my priorities: the bigger the picture the more important I think the programma, features ,and/or details are to me. My second programme would be a vegetable farm. I would like to combine my two programmes into one: a garden where I can actually garden in ;)

So in my garden I imagine to have a corner devoted to gardening: including edible herbs, a composter, rainbarrel, planter boxes and a vegetable planter to save up some space for all my other wishes.....

Next, i would like a small private terrace on a wooden decking with some place to have dinner and a lounge area.

Then, I hope there's some small spot left just for some space: a lawn.

It will be my own private spot on the roof where I can enjoy the sun, have dinner with friends and be outside to do some gardening.





# Form

Name Anna

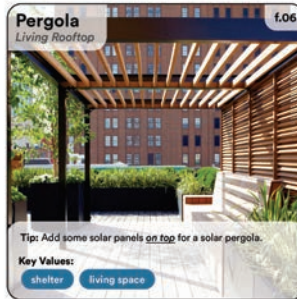
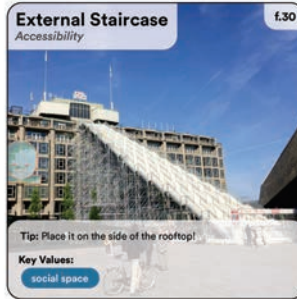
Location Schonenvaart Almere

Rooftop Size Medium (30-50m²)  
delete the ones that do not apply

Structural Category no damage to structure  
delete the ones that do not apply  
 Tip: you can test this by jumping a little bit.

## Why did you pick your patterns?

I choose an external staircase as this is a corner house and an external staircase would be cheaper than adding indoor staircase. For this roof a shared terrace would be functional to combine with neighbouring houses. Adding removable things like planter boxes, beehives, vegetable planters makes the space more interchangeable. When selling the home this will be a flexible element that will make the sell easier. As new habitants can create their own space. The flowerfield with steppingstones seem like a nice combination to me and also add to the insect hotel and beehive. Having a pergola on a terrace seems like a must, as there is no other protection from sunlight. With this combination the roof can be a place to relax but also act as an extension of the garden and add to biodiversity. To the top of the pergola I would add solar panels, to save space.



# Form

Name **Stijn**

---

Location 's-Hertogenbosch, 5216XA

---

Rooftop Size **Small (<30sqm)**  
Delete the ones that do not apply

---

Structural Category **Medium (100sqm)**  
Delete the ones that do not apply  
Tip: you can test this by jumping a little bit.

---

Why did you pick your patterns?

The housing crisis has hit many young people like myself. I imagined that - if I could afford a house or apartment in time - it wouldn't be very big or structurally impressive. On the upside however, it is said that limitation breeds creativity.

As a hobbyist cook, varied food is an integral part of my life. Therefore I chose to revolve my design around a vegetable garden. The structural requirement is not met per se, but as the text says, a small-scale garden will lower its structural requirement. I wish for my farm to be about 4 square meters. The other space should be filled up with produce plants in planters, pots, and on the wall.

The main drawback of a rooftop garden in my eyes is its accessibility: any ground that is taken up by soil and plants can't be traversed with ease. Gravel paths are the perfect solution, not only because they provide grip and eye candy, but also because it allows water to seep into the adjacent soil.

To care for the more needy plants in the garden, a rain barrel and composter are absolute necessities. It is also nice to have gardening tools stored somewhere nearby. I chose to represent this with a tool shed, but a tool rack would have my preference.

Finally I added three solar panels on one side of the roof, facing the South at a 37 degree angle. This is widely considered the most optimal placement. The reason I added these is that placing them is untaxed, and my employer helps to pay for them as well. They will even pay themselves back after some time! All in all, their net cost should be negligible.

Looking back at what I've created, my roof's theme came to be sustainability, generating one's own energy and food. The goal here is to become less reliant on fossil fuels and reduce my carbon footprint to zero (or even negative). It's a future we could all strive for!



# Form

Name Peter

Location Maasstraat, Rotterdam

Rooftop Size Large (+100m²)  
*delete the ones that do not apply*

Structural Category Medium (100m²)  
*delete the ones that do not apply*  
*Tip: you can test this by jumping a little bit.*

## Why did you pick your patterns?

I want to have a rooftop that does not cost too much money and has a big economic return. I considered a wind turbine, but there was not enough clarity on its production and payback period, so I went for solar panels.

I also don't have a direct view on the rooftop so the value of sedum is a lot less for me. I did pick the white painted roof because it is very cost efficient and can cool my roof a bit.

The image displays five pattern cards arranged in a grid. Three cards are titled 'Solar Panel' under the 'Energy' category, each with a 'd.12' label and a 'clean energy' tag. These cards show a photograph of solar panels installed on a roof with sedum. One card is titled 'White Painted Roof' under the 'Materials' category, with an 'f.25' label and a 'Key Values: cooling' tag, showing a photograph of a white-painted roof. The fifth card is another 'Solar Panel' card, identical to the others, showing solar panels on a roof with sedum.