A neighbourhood for a better sense of home
Adaptable dwellings & social cohesion in Amsterdam Nieuw-West

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PROBLEM STATEMENT
A. Aging building stock
B. Emerging prosumer
A. Aging building stock

Example: age of buildings in Amsterdam

Waag Society (2016) code.waag.org/buildings/
A. Aging building stock
Dutch building stock

1/3 built post World War II: **1945-1970**

Regulations have increased
User demands have risen

A. Aging building stock
To demolish, or not to demolish

Disadvantages
- Destroy existing **communities**
- **Financial** value of existing stock
- A lot of **invested energy**
- A lot of **wasted** material
- Heritable values
A. Aging building stock

1945-1970: Rapid population growth

A. Aging building stock
Mass housing

Large production volume
Cheap dwellings

Repetition necessary
Low quality housing
A. Aging building stock
Mass housing

Large production volume
Cheap dwellings
Repetition necessary
Low quality housing

MASS HOUSING
Large volume of low quality, repetitive housing
A. Aging building stock

Effects of low quality mass housing

Low quality housing can lead to, for example: **boredom, fatigue, depression and anxiety**.

B. Emerging prosumer

Products matching needs better

Not only **choosing from options**

**Market of one**: personal production
B. Emerging prosumer

User involvement in built environment: **new build**
B. Emerging prosumer

User involvement in built environment: DIY
B. Emerging prosumer
User involvement in built environment
C. Summary

A. Aging building stock: **don’t demolish » revitalise**
   - Communities remain
   - Less wasted material & energy
   - Heritable values

B. Emerging prosumer: **consumer wants more influence**
   - Have a personal fitting product

Customisation in dwellings: **not satisfactory**
   - Only with **new built customisation possible**
   - DIY is for almost anyone **not suitable**
   - **How about renovation of buildings?**
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   ◦ How about renovation of buildings?
CONTEXT
Amsterdam Nieuw West
Algemeen Uitbreidings Plan

Plan designed by Van Eesteren
Garden city: light, air & space
Amsterdam Nieuw West

Nemavo-Airey blocks

13 building blocks
2 block types
255 dwellings
Nemavo-Airey blocks

Streetview
Amsterdam Nieuw West

Nemavo-Airey block: total
Amsterdam Nieuw West
Nemavo-Airey block: dwellings
Amsterdam Nieuw West
Nemavo-Airey block: shop
Amsterdam Nieuw West
Nemavo-Airey block: public green
Amsterdam Nieuw West

Nemavo-Airey block: **dwelling types**

A.0  42 m²
A.1  62 m²
A.2  62 m²

B.0  57 m²
B.1  72 m²
B.2  72 m²
Nemavo-Airey blocks
Rebuild period post World War II

- Mass produced
- Prefabricated
- Lightweight
- Small & modular parts
- Easy install
Nemavo-Airey blocks
Building system
Nemavo-Airey blocks
Building system

COLUMN
60X125MM
625MM SPACING
Nemavo-Airey blocks
Building system

CONCRETE PANEL
625X375MM
Nemavo-Airey blocks
Building system

HEA 140 COLUMNS
BEAMS
IPE 200
UNP 200
Nemavo-Airey blocks
Building system

CUSTOM BEAMS
250MM HIGH
Nemavo-Airey blocks

Urban problems

Empty shops  Poor state of greenery  Illogical urban plan
Nemavo-Airey blocks

Social problems

Above average serious loneliness

Little contact with neighbours

Unpersonal neighbourhood
Nemavo-Airey blocks

Functional/technical problems

Small dwellings    Low insulation    Sound nuisance
Design
Starting points

CLOSED
REPETITION
FIXED
CLOSED OUTSIDE

OPEN
VARIETY
FLEXIBLE
SEE INSIDE
Design
Overview: birds eye
Design
Overview: approach
Design
Overview: inner garden
Starting points

General

1. Enable user participation
   Make user ‘master of their home again’

2. Sense of home
   Prevent negative impact of mass housing

3. Improve state of dwellings
   Resolve technical & social problems
Reflecting on architectural history and using modern technology, it is now possible to implement the user in the building process.

YES

On demand production
Enhanced user interaction
Users want to participate
User participation

Research outcomes: **industrial paradigms**

1. Mass Production          All the same
2. Mass Customisation      Choose from range of options
3. Mass Personalisation    Unique, personalised product

![Graph showing adaptability and personal fit]

1  Mass Production  2  Mass Customisation  3  Mass Personalisation
User participation
Make own dwelling
User participation
Adapt communal garden
User participation
Share a community
Community
Starting points

Create community  Community center  Shared communal space
Community
Search for dwelling?

Search for a suitable dwelling, adapt to neighbourhood
Community
Search for community!

Search for a suitable dwelling, adapt to neighbourhood

Search for a suitable community, adapt dwelling as necessary
Community
Search for community!

Search for a suitable dwelling, adapt to neighbourhood

Search for a suitable community, adapt dwelling as necessary
Community
Community centre

Defined by community

Use for **communal activities**

For example: **urban farming, activity centre, work area**

**Adaptable building** to suit different needs
Community centres shared in neighbourhood
Community centres shared in neighbourhood
Urban
Starting points

REMOVE SHOPS
ENABLE COLLECTIVE USE OF GREENERY
Shared garden

Overview
Shared garden
Public: area

Shared with everyone
Parts filled in by community
Shared garden

Public: pathways

Gravel pathways

Main and sub paths
Shared garden

Public: **adaptable areas**

**Defined** by community

Large **freedom** to experiment

For **example**: urban farming, rose nursery, apple trees
Shared garden
Semi-private: in front of balconies

Shared space
In front of dwelling
Shared garden
Semi-private: *separation*

Vegetation *versus* building
High & lower plants
Unity in *several colours*
Dwelling

Modules: **adaptability**

**Extend** floorspace

**Personalised** dwelling

**Unity** through chaos
Dwelling
Modules: technical rules

Independent extensions

Professional installation

Demountable modules
Dwelling

Modules: **functional rules**

- Max. 3 modules/home
- Max. 59 modules total
- Contribute 25/75% money or socially
Dwelling
Plan development
Dwelling

Plan development: add default
Dwelling
Default layout: hallway
Dwelling

Default layout: toilet & bathroom
Dwelling
Default layout: master bedroom
Dwelling

Optional layout: choose desired configuration
Dwelling

Place *infill* pieces

Closed  Full window  Half window A  Half window B  Third window A
Dwelling

Place bonusses
Dwelling
Possible end result
Dwelling
App: splash screen

Loading app...
Dwelling

App: login

Login with credentials
Dwelling
App: **home screen**

Photo of user/family

Short **description**

Overview of **configurations**
Dwelling
App: **select community**

**Search** for community
**Select community** for more
Dwelling
App: community details

Information about community
Available dwellings for users
Face-to-face interaction needed before choosing to move to community
Dwelling
App: configuration, general data

Give config a **name**

**Amount** of people

**Number** of bedrooms

Desired living room **layout**
Dwelling

App: choose possible layouts
Dwelling
App: overview of dwelling

Overview of configured dwelling
Zoom & pinch to see more
Hint: configure more parts
Dwelling

App: **zoom in on dwelling**

**Overview** of places for infills/bonussess
Dwelling
App: add bonus #1

Add infill or bonus -> bonus
Dwelling
App: **search & select bonus #1**

Search for pigeon keeping bonus
Select preferred bonus
Finish action
Dwelling

App: **add bonus #2**

**Overview** of result so far

**Add** another bonus
Dwelling

App: search bonus #2

Search for photography bonus
No results found
Request creation of new bonus
Dwelling

App: submit bonus #2

Give bonus a name
Add tags for clarity
Door options
Window options
Optional: add sketches of references
Submit request
Dwelling

App: **add infill #3**

**Overview** of result so far

**Add** an infill
Dwelling

App: add infill #3

Select from predefined options
Submit option
Dwelling
App: add infill #4

Overview of result so far
Add an infill
Dwelling
App: configuration done

All optional spaces filled
Continue configuration
Dwelling

App: **check configuration**

Overview of result

List of **input data**
Dwelling

App: get VR impression

Overview of result in Virtual Reality
Submit configuration
Dwelling

App: all done!

Confirmation
Modules

Module database
Modules
Module types

- **Generic**
  (Mass Production)

- **Customise**
  (Mass Customisation)

- **Personalise**
  (Mass Personalisation)

Cyber connected
Digital driven
Modules

Generic

Platform modules

(Mass Production)

General functions
Master bedroom, toilet, bathroom
Connector module
Module
End window
Modules
Customisation

Customisated mod.
(Mass Customisation)
Infill options
Modules
Personalisation

Personalised mod.
(Mass Personalisation)

Bonussess
Modules

Personalisation: *paradigm parts*

Direct digital manufacturing

User involvement: personalisation

Demand driven

Open platform

Cyber connected

File to factory
Modules

Personalisation: production methods

Built environment & direct digital manufacturing?

3D printing plastics & concrete
- Plastic: unknown as building material
- Concrete for rough building parts

CNC milling: more advanced
- Proven technology
- Wood is common material
Modules

Personalisation: **production methods**

Built environment & direct digital manufacturing?

**3D printing** plastics & concrete
- Plastic: unknown as building material
- Concrete for rough building parts

**CNC milling**: more advanced
- Proven technology
- Wood is common material
Adaptability
Flexible building: modules, infills & bonusses

Friction fit, slim tolerances
Less permanent joints
Possible to disassemble
Store as smaller parts
Adaptability

Flexible building: **modules, infills & bonusses**

Adapt dwelling over lifetime

Evolving user can stay

More possible **target groups**

Re-use large portion of building
Materialisation

Overview: **combined colours**
Materialisation

Scheme #1: **outer facade**

Polished concrete

Milled plywood
Materialisation

Scheme #2: **inner facade**

- Tensioned fabric
- Milled plywood
- Bare steel, lacquered

Painted
Details

Connection: **building-module**

- **19MM Building board, finish layer**
- **65MM Inner wall, hemp panel insulated**
- **(Thermo Henep Combi Jute)**
- **20MM Clearance cavity**
- **Vapour barrier, foil**
- **175MM Hemp panel insulation**
- **(Thermo Henep Combi Jute)**
- **Water dam, foil**
- **35MM Clearance cavity**
- **Heavily ventilated**
- **30MM Plywood facade panels**
  - Prefab, 41x360MM

**Triple glazing, 42MM**

- **U = 0.6 W/m²K**
- **Nissink, 4MM Glazing, 15MM Argon cavity**
- **Wooden window frame, 50x80MM / 78x78MM**
- **Passive, U,<sub>ave</sub> = 0.79 W/m²K**
- **"Overbeek, Passiefkazijn EHP"**
Details
Corner: outside-inside

Triple glazing, 42MM
U = 0.6 W/m²K
Nisstik: 4MM glazing, 19MM Argon cavity
Wooden window frame: 95x88MM / 78x78MM
Passive, U_{pass} = 0.79 W/m²K

"Overbaek, Passeleukozy EHP"
17MM Plywood, lacquered
50MM PRI insulation
18MM Plywood
Water dam, foil
12MM Plywood, lacquered

30MM Plywood facade panels
Prefab, 61x365MM
35MM Clearance cavity
Heavily ventilated
Water dam, foil
175MM Hemp panel insulation [Thermo Hennep Combi Jute]
Vapour barrier, foil
20MM Clearance cavity
100MM Inner wall, hemp panel insulated [Thermo Hennep Combi Jute]
10MM Building board, finish layer

R_i = 10.05 m²K/W
UL = 0,6 W/m²K
Details

Window: pushed into facade
Climate design

Insulation: wall, floor

10MM Building board, finish layer
100MM Inner wall, hemp panel insulated
(Thermo Hennep Combi Auto)
20MM Clearance cavity
Vapour barrier, foil
175MM Hemp-panel insulation
(Thermo Hennep Combi Auto)
Water dam, foil
35MM Clearance cavity
Heavily ventilated
300MM Plywood facade panels
Pretab, 615x365MM

Floor covering
Dry floor finish
Integrated low temp. floor heating
138MM Underlayment
Floor dampering, sound reduction
Leveling layer

Vapour barrier, foil
100MM Insulation, flexible
Steel U-profile, existing
100x500MM, cold bend

12MM Building board, finish layer
65MM Acoustic insulation
Steel floor beam = 30MM wood joist

Rc = 10.05 m²K/W

Suspended connection, acoustic separation
Climate design

Sustainability: towards 2050

- Solar panels
- Natural ventilation
- Low temp. floor heating
- Mechanical extraction
- Heat pump
- District heating
- Backup boiler
Climate design

Sustainability: towards 2050
Reflection
Reflecting on problem statement

High quality, non repetitive housing for an affordable price

User participation in existing building, now and in the future
User participation with a sense of home