



UNIVERSITEIT VAN AMSTERDAM



Amstelhaege

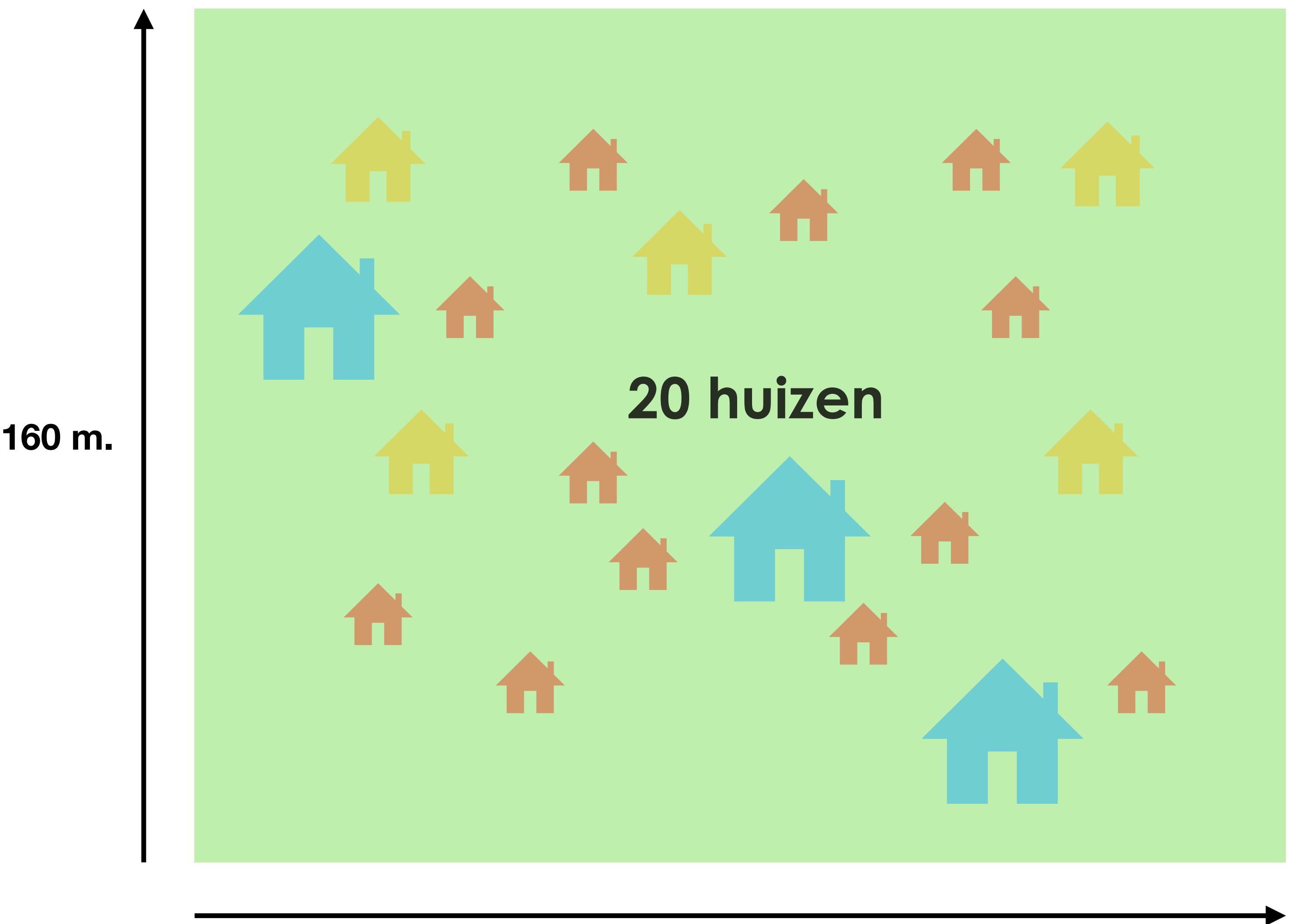
Christoffel Doorman, Tim Jansen & Jaap Meesters

21 december 2017

Case description

3 varianten:

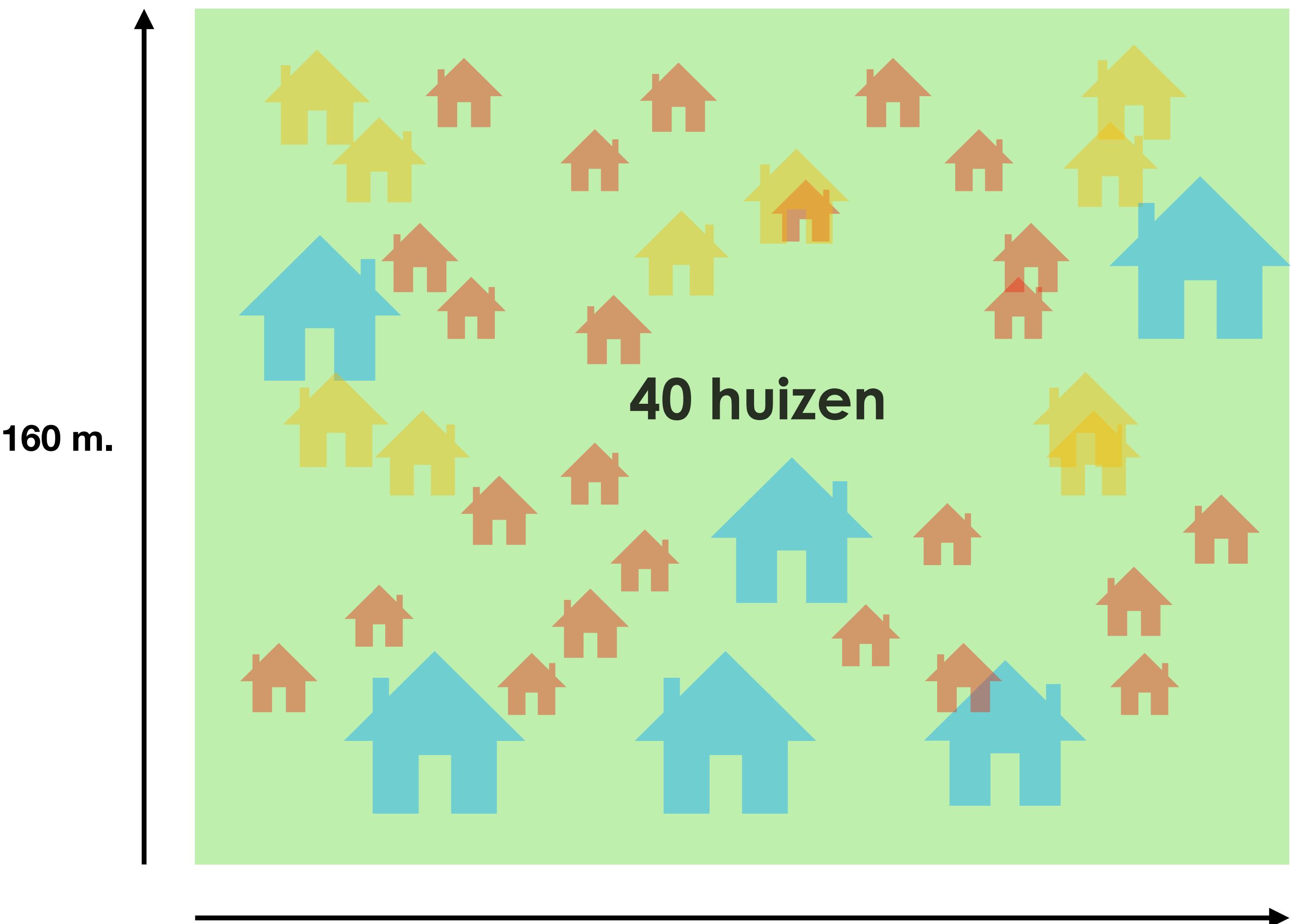
- **20 huizen**



Case description

3 varianten:

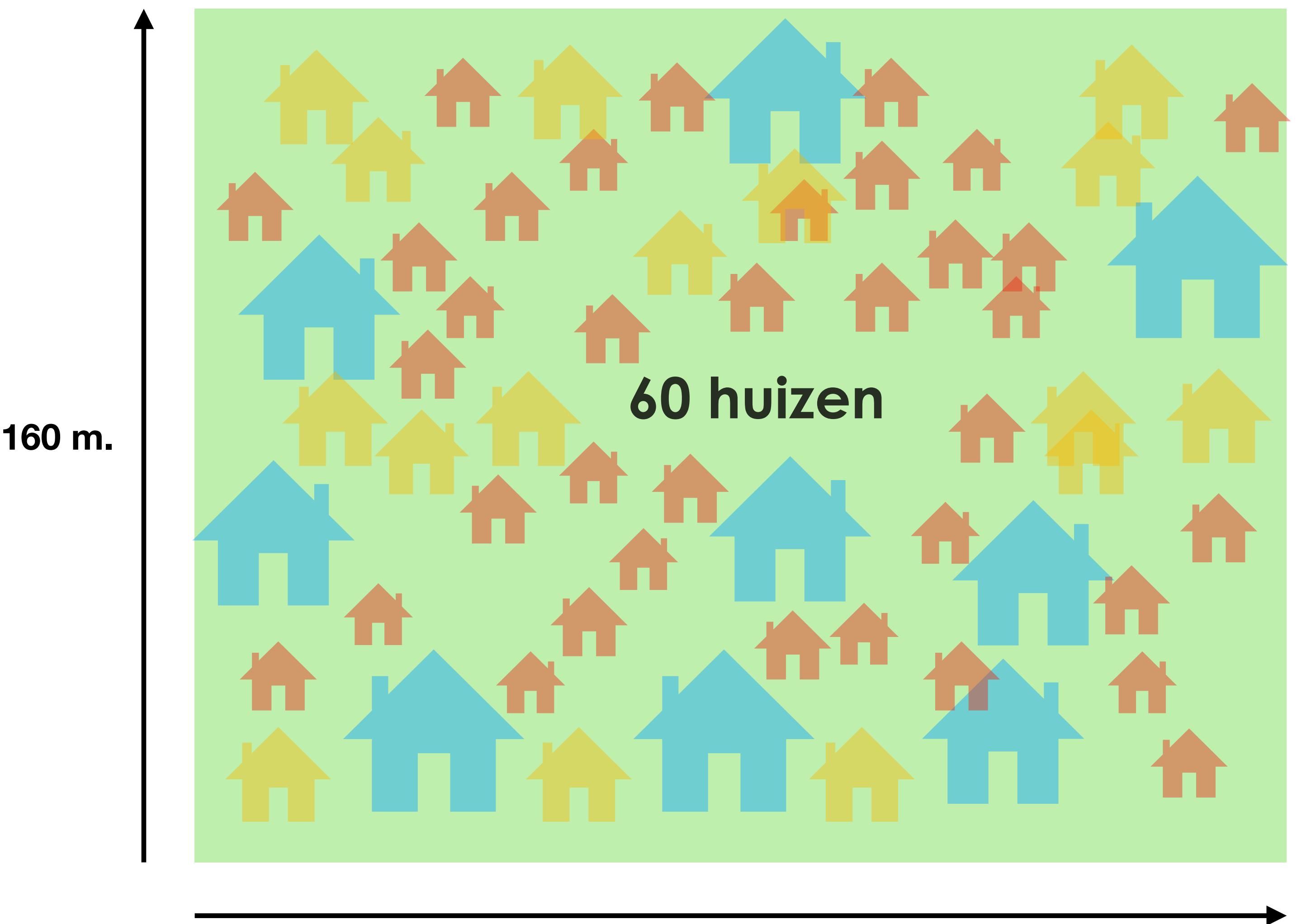
- **20 huizen**
- **40 huizen**



Case description

3 varianten:

- 20 huizen
- 40 huizen
- 60 huizen



Case description

3 varianten:

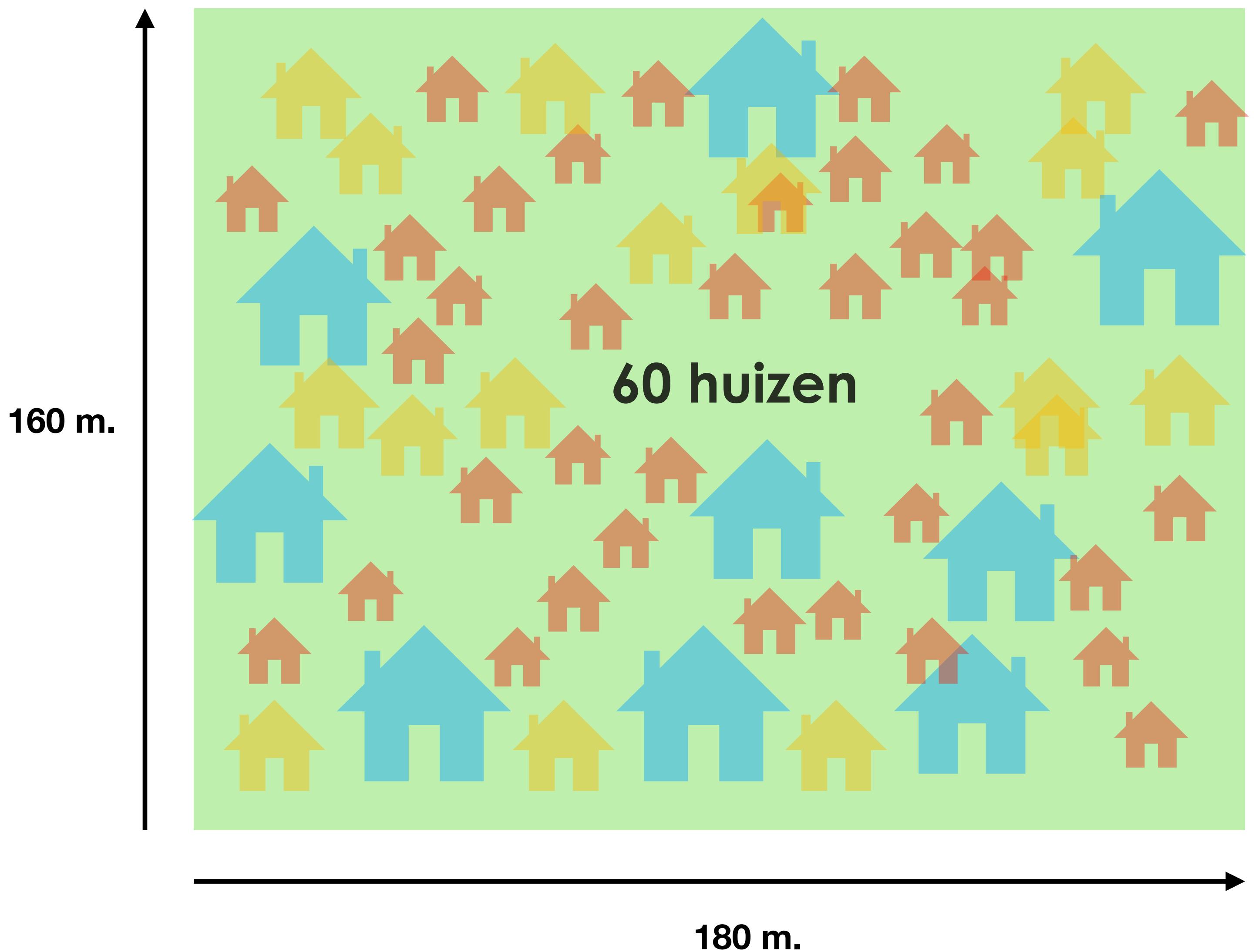
- 20 huizen
- 40 huizen
- 60 huizen

Waarvan:

 **60% studio's (8 x 8m)**

 **25% bungalows (10 x 7.5m)**

 **15% maisons (11 x 10.5m)**



Case description

- Vaste waarde verschilt per huis



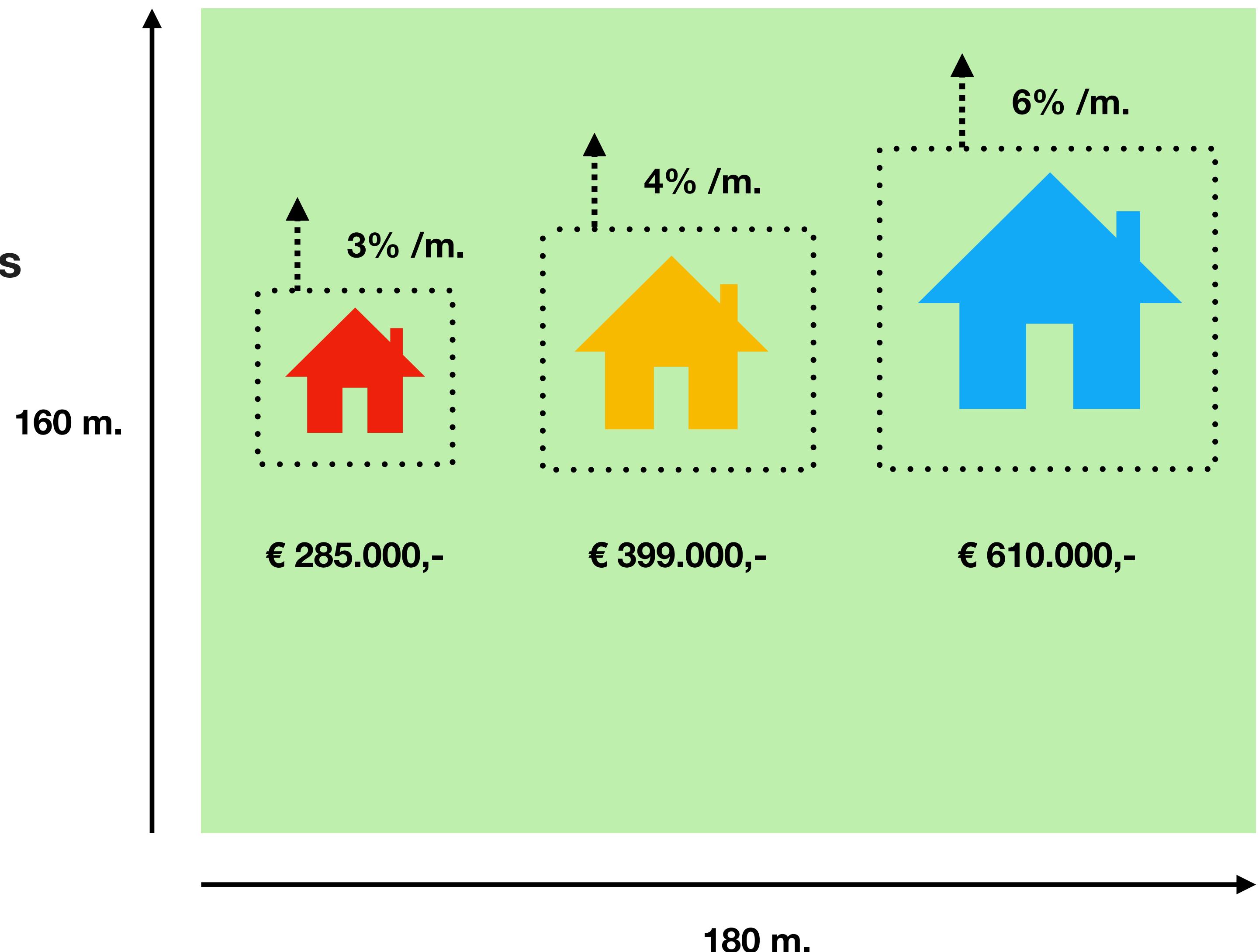
Case description

- **Vaste waarde verschilt per huis**
- **Verplichte vrijstand verschilt per huis**



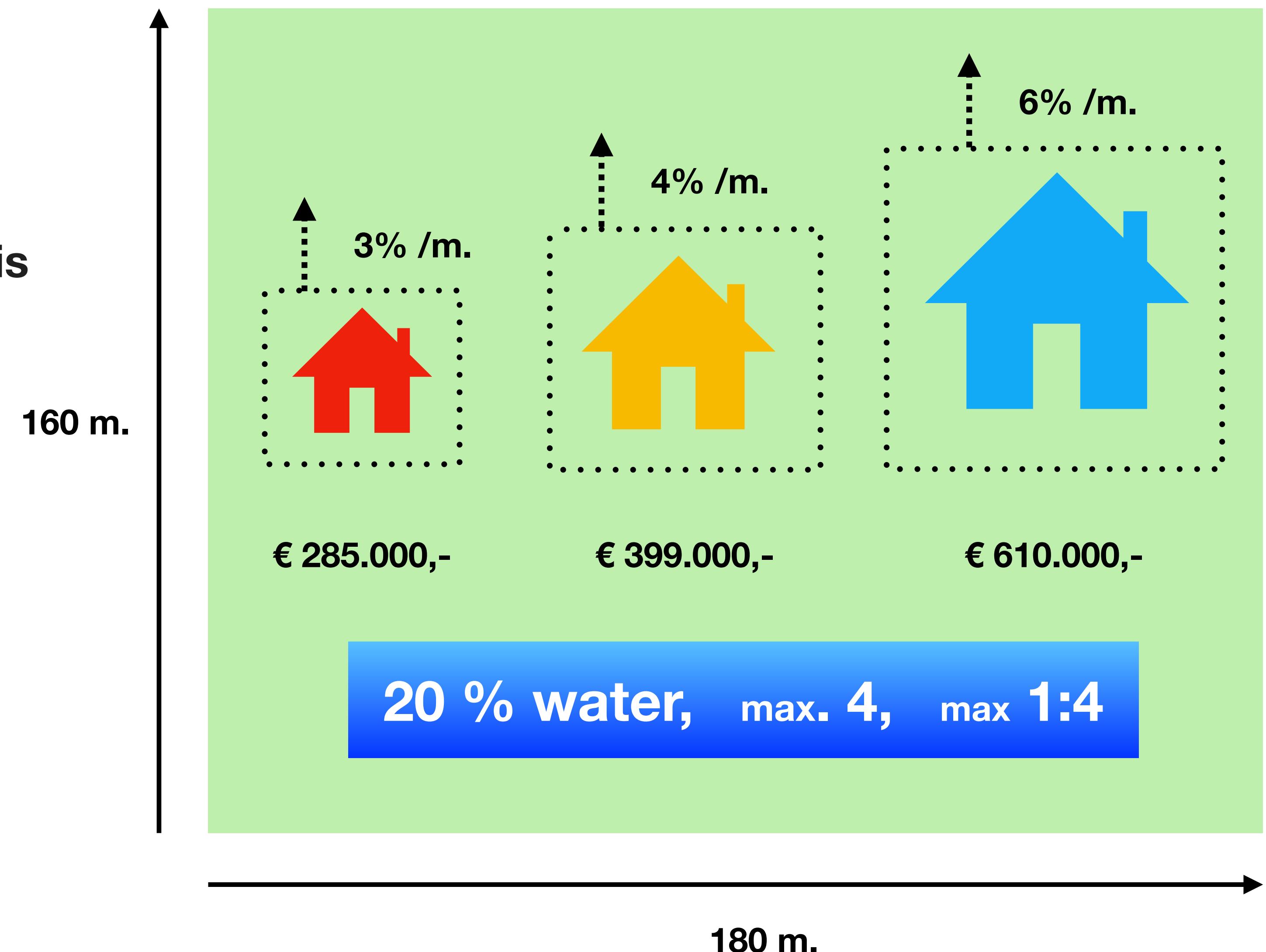
Case description

- **Vaste waarde verschilt per huis**
- **Verplichte vrijstand verschilt per huis**
- **Elke meter extra vrijstand zorgt voor hogere waarde**



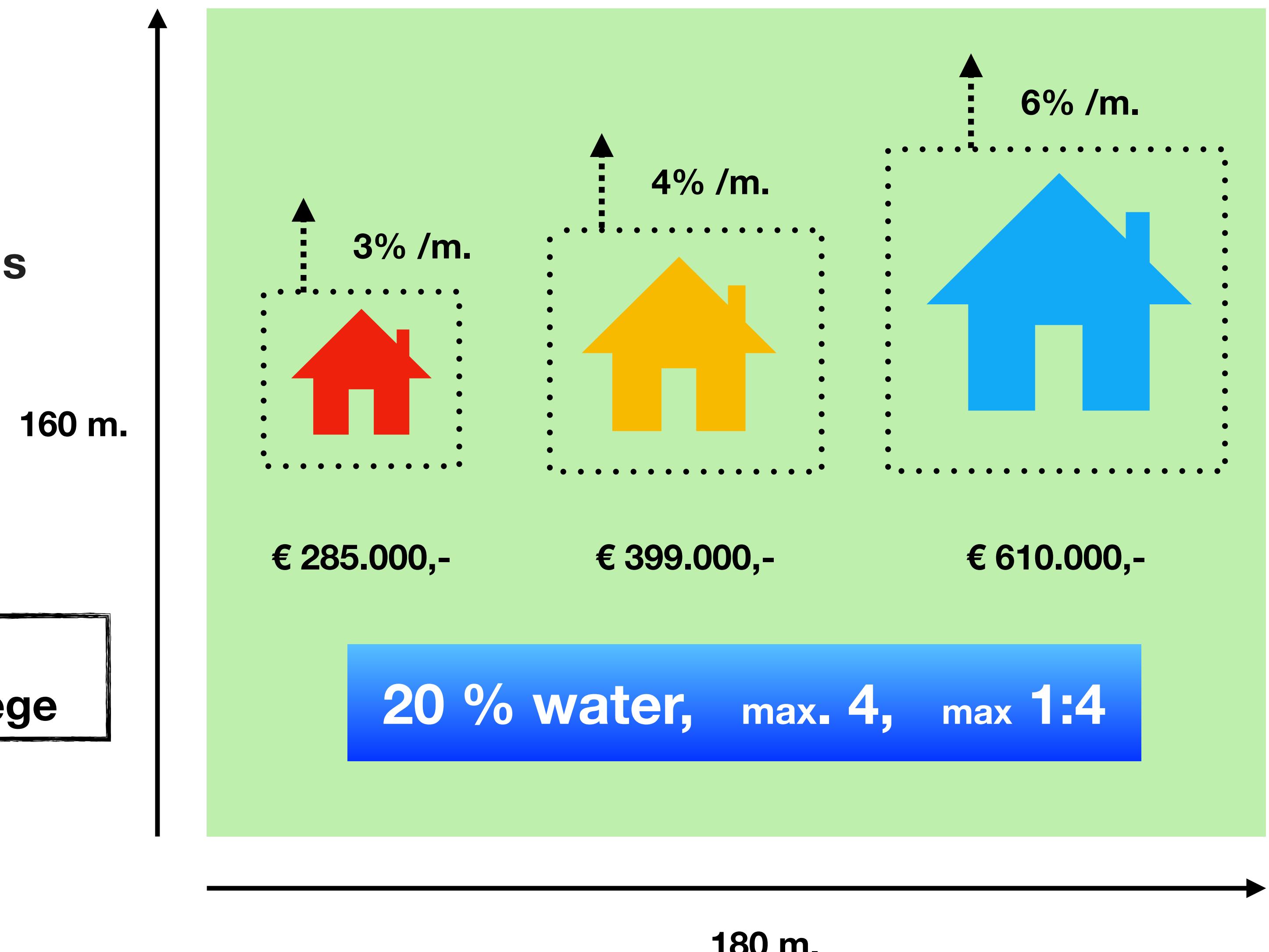
Case description

- **Vaste waarde verschilt per huis**
- **Verplichte vrijstand verschilt per huis**
- **Elke meter extra vrijstand zorgt voor hogere waarde**



Case description

- **Vaste waarde verschilt per huis**
- **Verplichte vrijstand verschilt per huis**
- **Elke meter extra vrijstand zorgt voor hogere waarde**



Doel:
Hoogst mogelijke waarde Amstelhaege

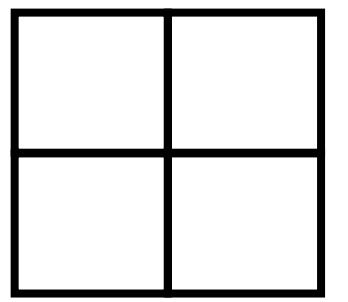
- **Classes**
- **User interface**
- **Visualisation**

[afbeeldingen]

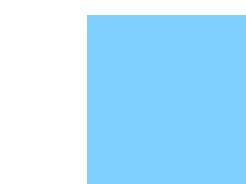
- 2 huizen



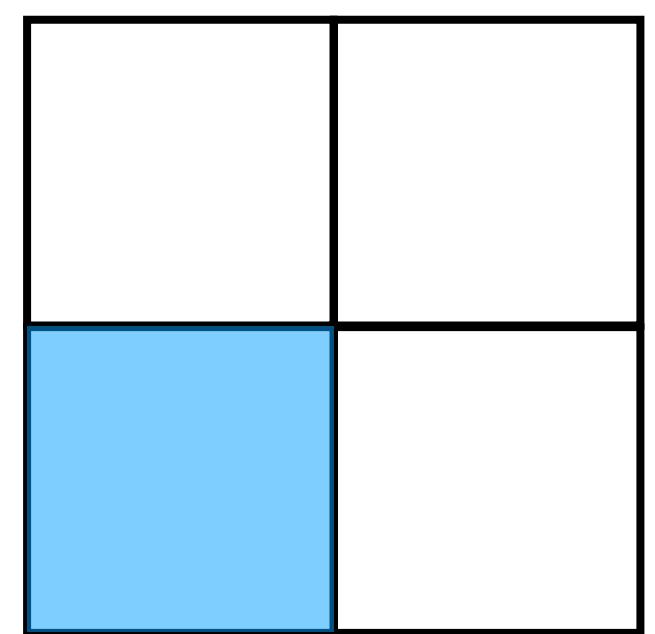
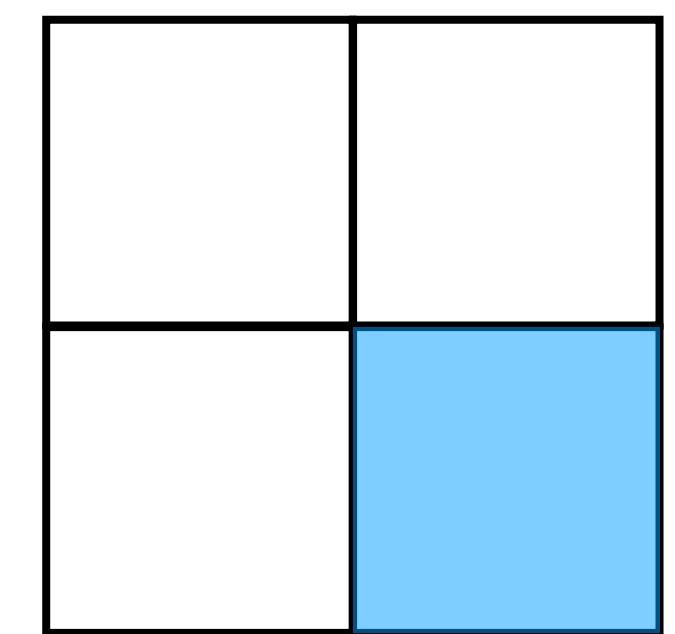
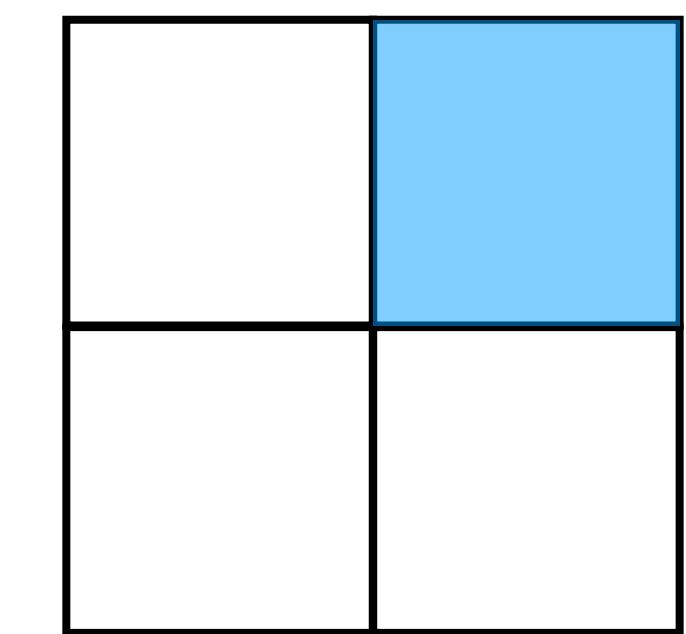
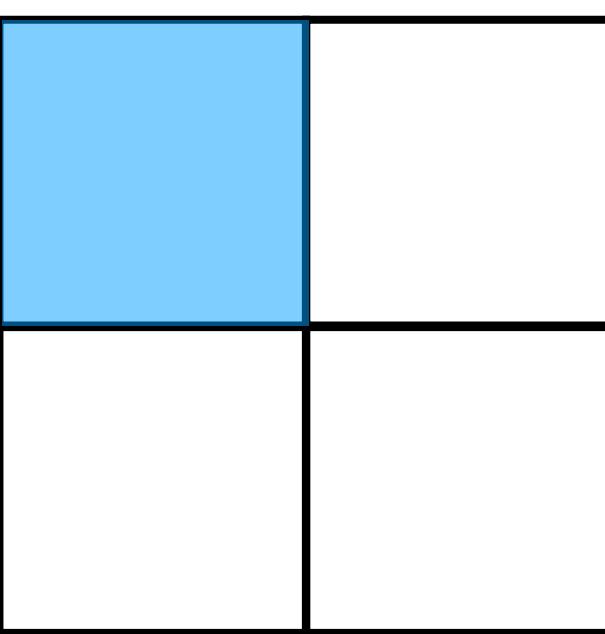
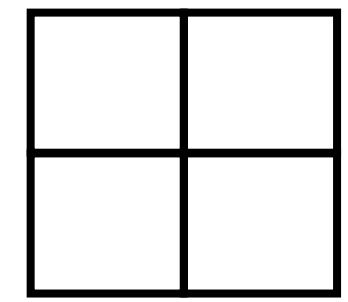
- 4 locatie's (n)



- 2 huizen



- 4 locatie's (n)



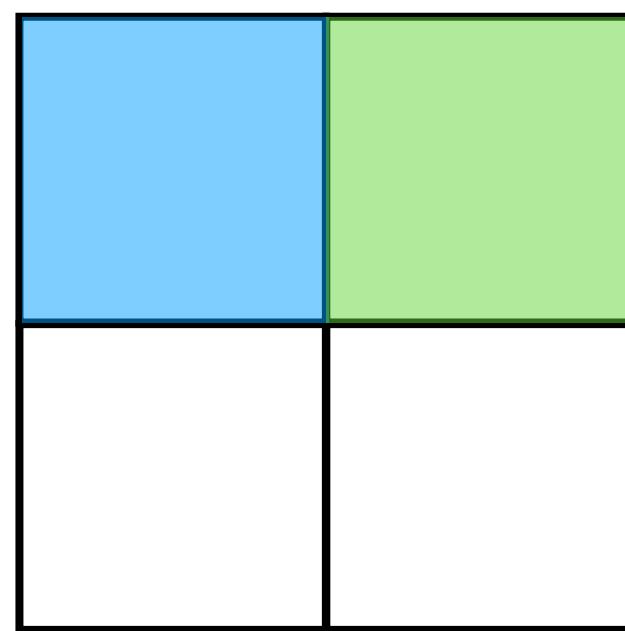
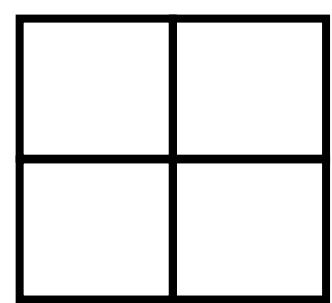
Aantal mogelijkheden:

$$n(1) = 4$$

- 2 huizen

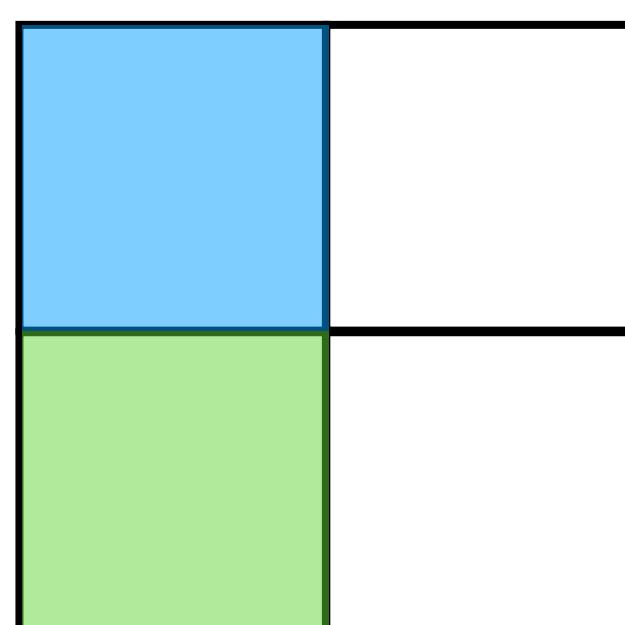
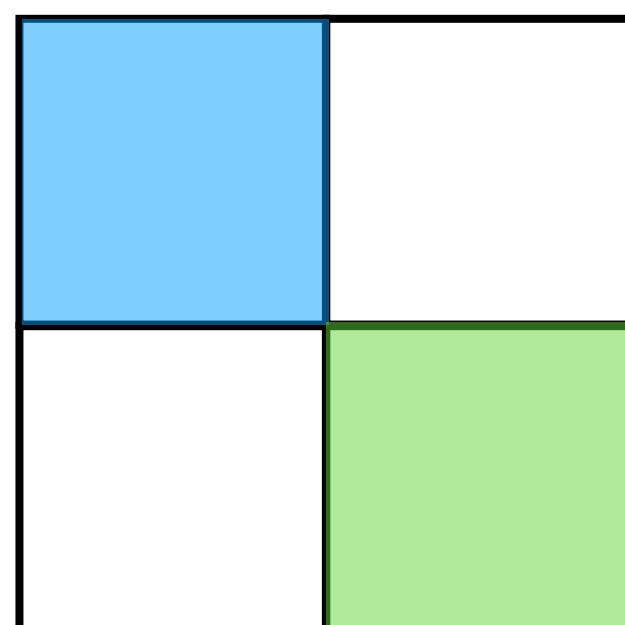


- 4 locatie's (n)



Aantal mogelijkheden:

$$n(2) = 3$$

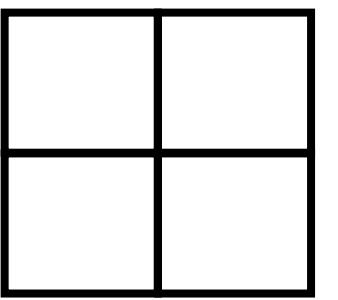


State-space

- 2 huizen



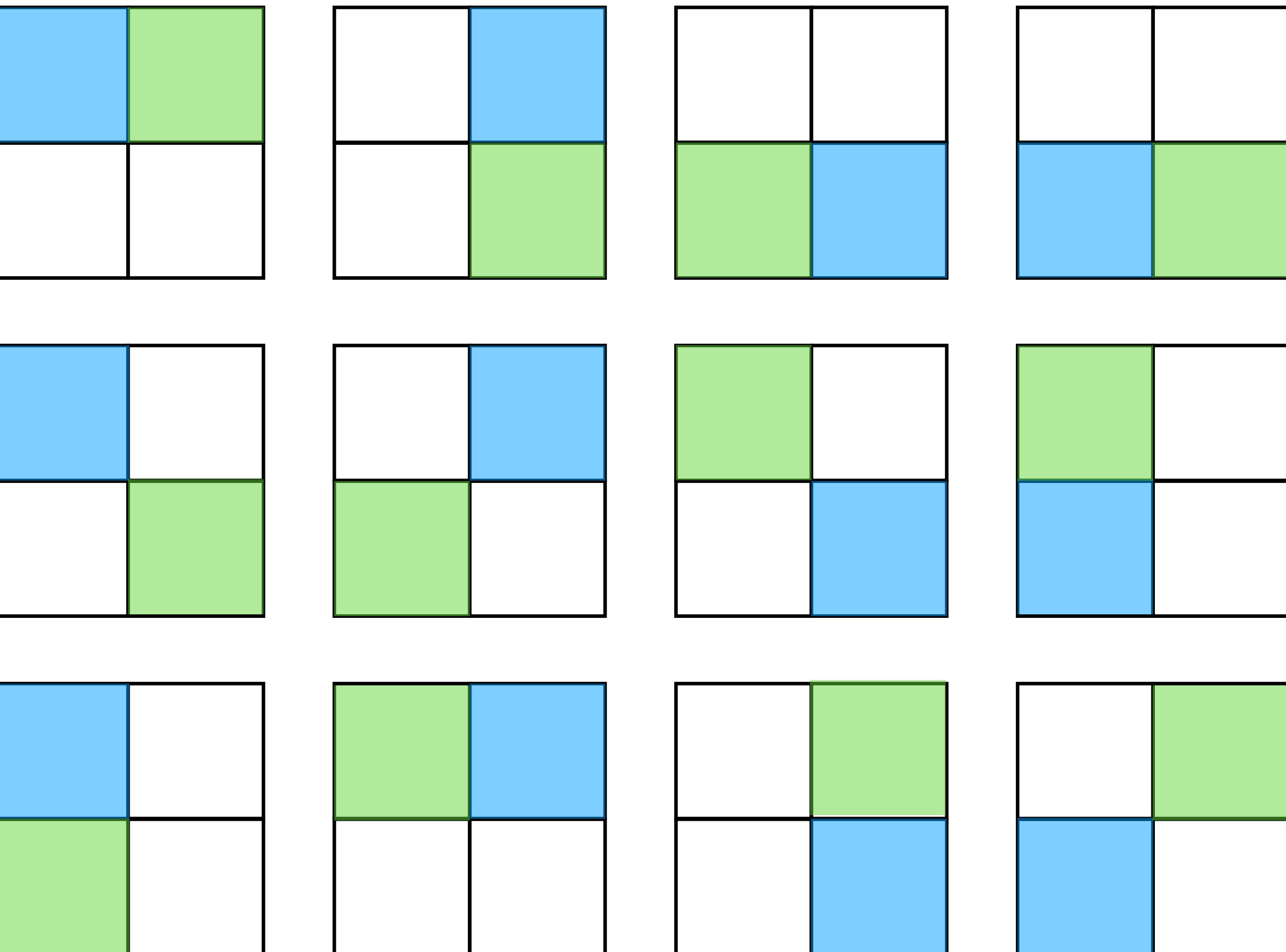
- 4 locatie's (n)



Aantal mogelijkheden:

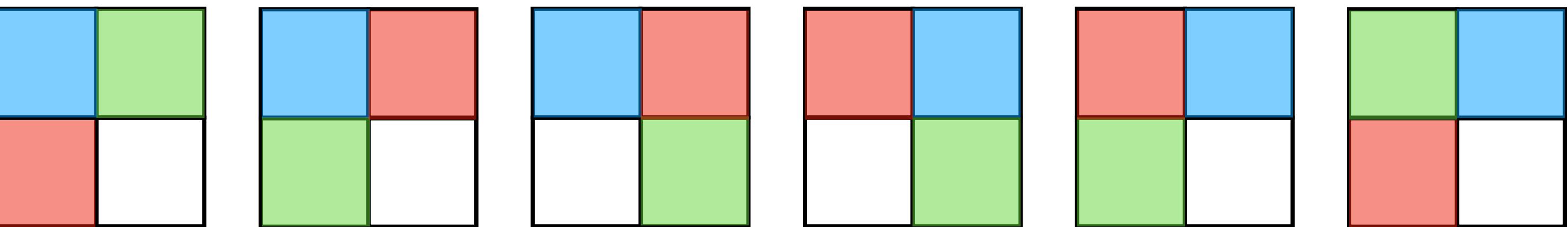
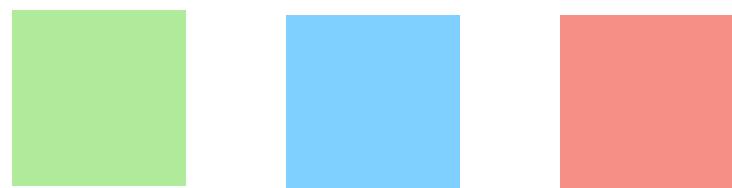
$$N = n(1) \cdot n(2)$$

$$N = 4 \cdot 3 = 12$$

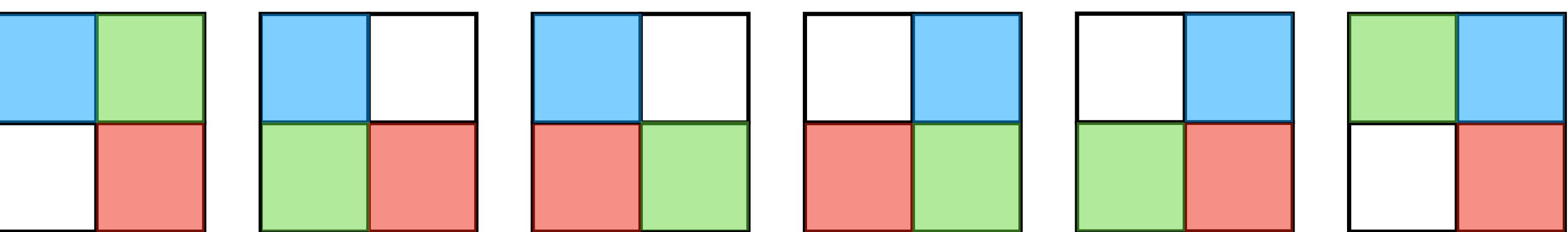
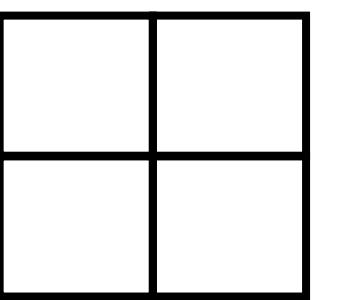


State-space

- 3 huizen

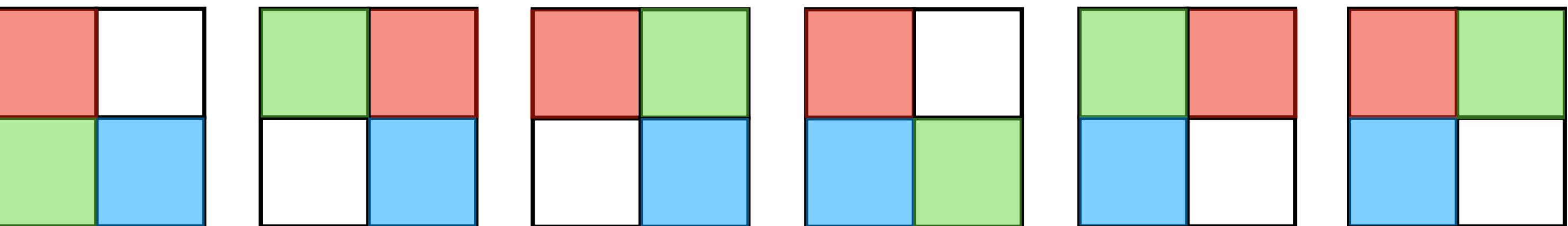


- 4 locatie's (n)

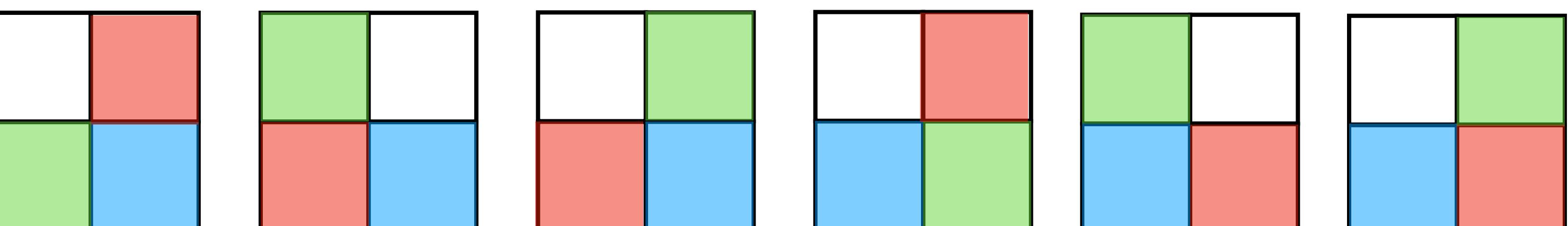


Aantal mogelijkheden:

$$N = n(1) \cdot n(2) \cdot n(3)$$



$$N = 4 \cdot 3 \cdot 2 = 24$$



- 20 huizen
- 287 • 327 locatie's (n)

$n(1) = 93.849$ locatie's

Aantal mogelijkheden:

$$N = n(1) \cdot n(2) \cdot n(3) \cdot \dots$$

$$N = 115.200 \cdot (n(1) - O(huis))$$

$$\cdot (n(2) - O(huis)) \cdot \dots$$

- 20 huizen

- 287 • 327 locatie's (n)

$n(1) = 93.849$ locatie's

Aantal mogelijkheden:

$$N = n(1) \cdot n(2) \cdot n(3) \cdot \dots$$

$$N = 115.200 \cdot (n(1) - O(huis)) \cdot (n(2) - O(huis)) \cdot \dots$$

Input:

93 849 × 92 760 × 91 671 × 90 582 × 89 493 × 88 404 × 87 315 × 86 226 × 85 137 × 84 048 ×
82 959 × 81 870 × 80 781 × 79 692 × 78 603 × 77 514 × 76 425 × 75 336 × 74 247 × 73 158

[Open code](#) 

Result:

256 689 633 963 456 291 798 741 233 389 754 512 659 565 878 391 762 733 215 795 :
197 735 404 534 738 848 222 181 474 043 494 400 000

Decimal approximation:

2.5668963396345629179874123338975451265956587839176273... × 10⁹⁸

[More digits](#)



Number name:

256 untrigintillion ...

~ 10^{98}

[Full name](#)

Number length:

99 decimal digits



Lower-bound state-space:

- 20 huizen: $\sim 10^{98}$

- 40 huizen: $\sim 10^{11000}$

- 60 huizen: $\sim 10^{1000200000}$

Upper-bound state-space:

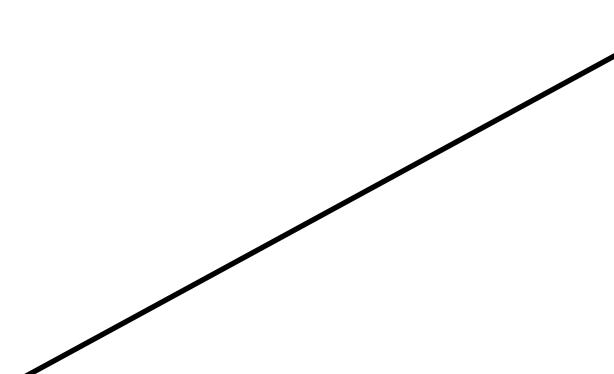
Drie algoritmes:

- Random algoritme

Drie algoritmes:

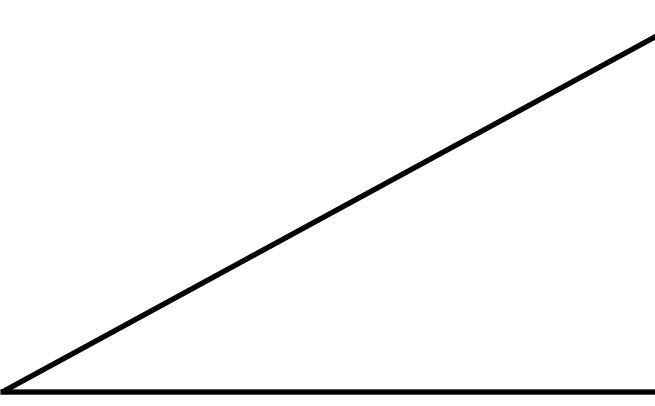
- Random algoritme
- Hillclimber algoritme

Drie algoritmes:

- Random algoritme
 - Hillclimber algoritme
- 
- Random Hillclimber

Drie algoritmes:

- Random algoritme
- Hillclimber algoritme

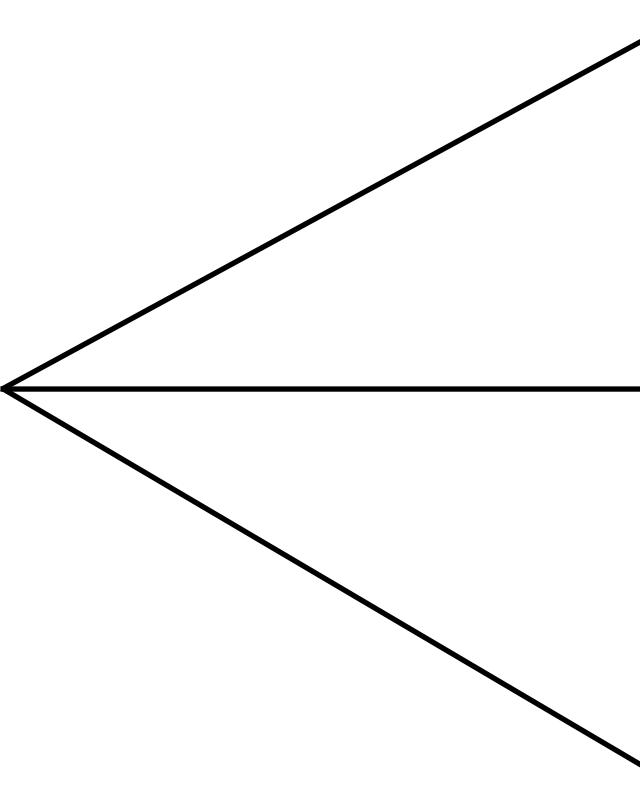


Random Hillclimber

Systematic Hillclimber

Drie algoritmes:

- Random algoritme
- Hillclimber algoritme



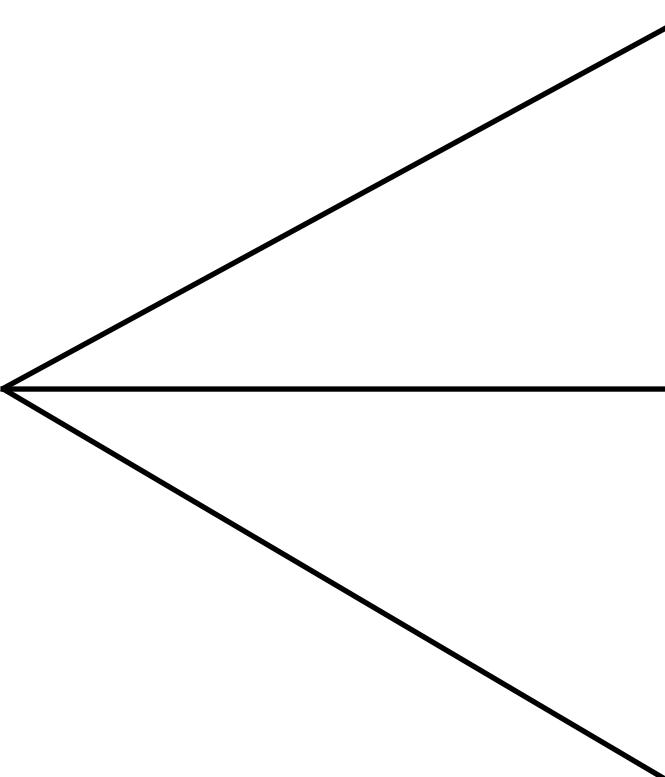
Random Hillclimber

Systematic Hillclimber

Extended Hillclimber

Drie algoritmes:

- Random algoritme
- Hillclimber algoritme
- Greedy algoritme

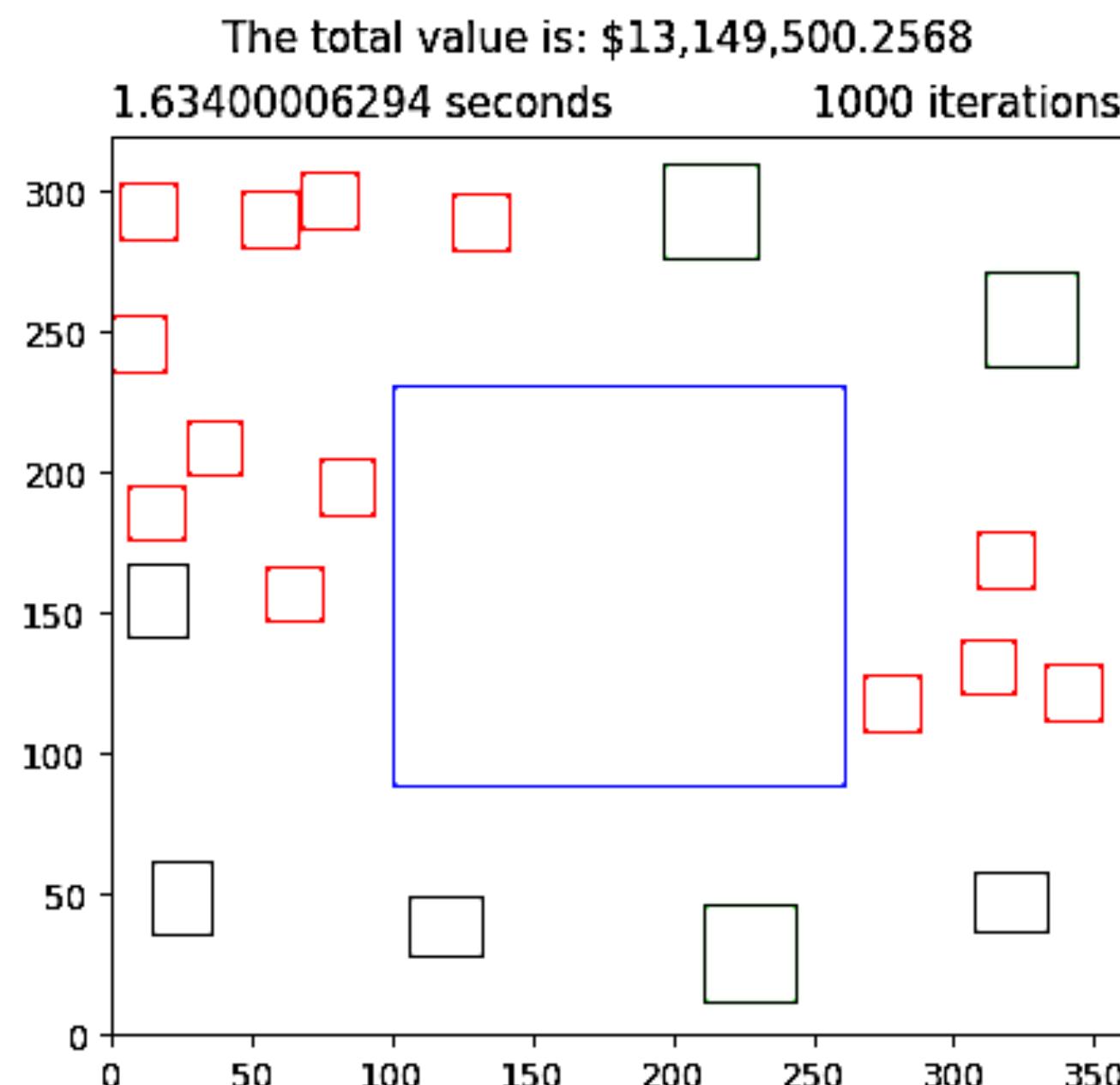


Random Hillclimber

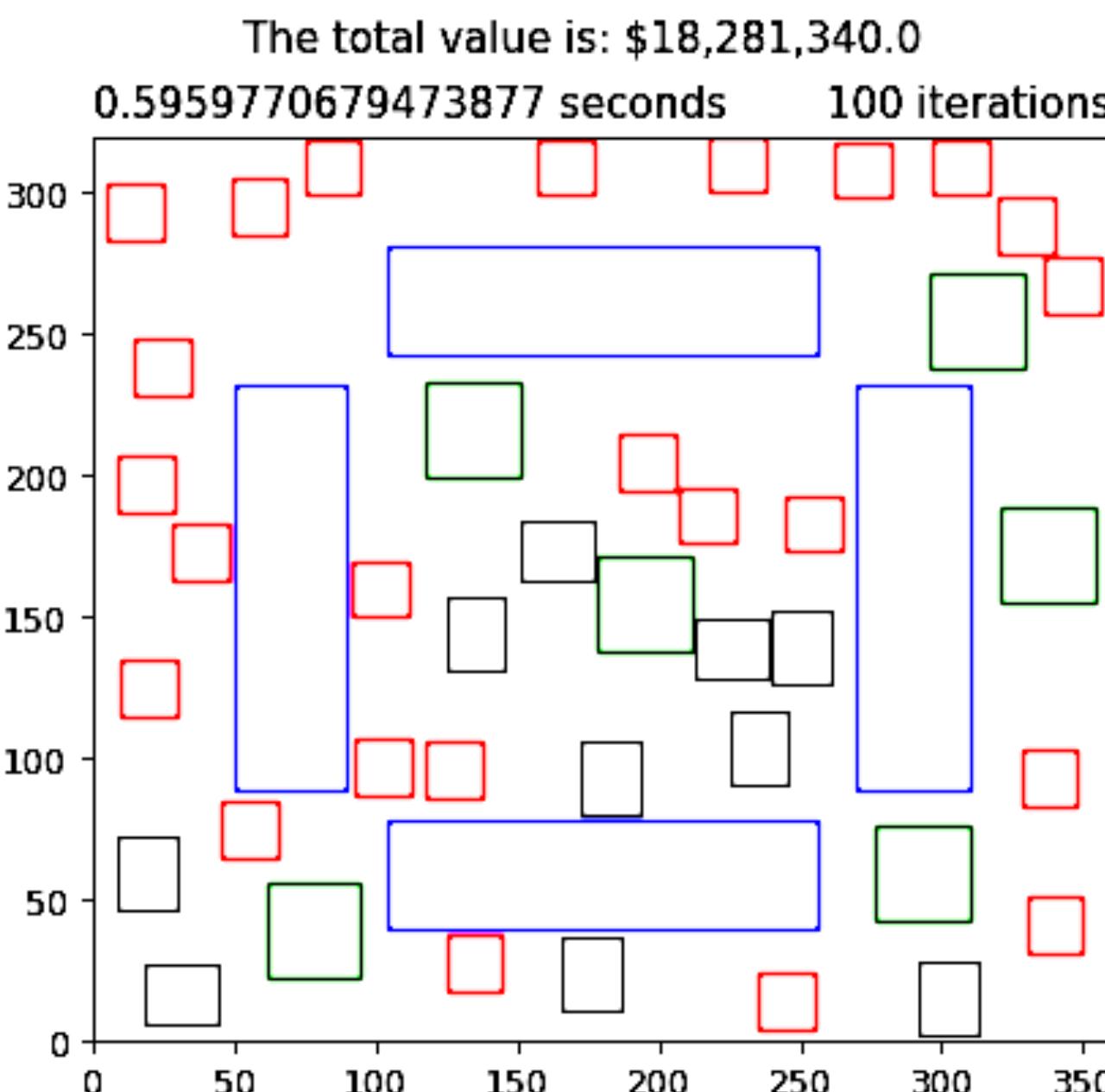
Systematic Hillclimber

Extended Hillclimber

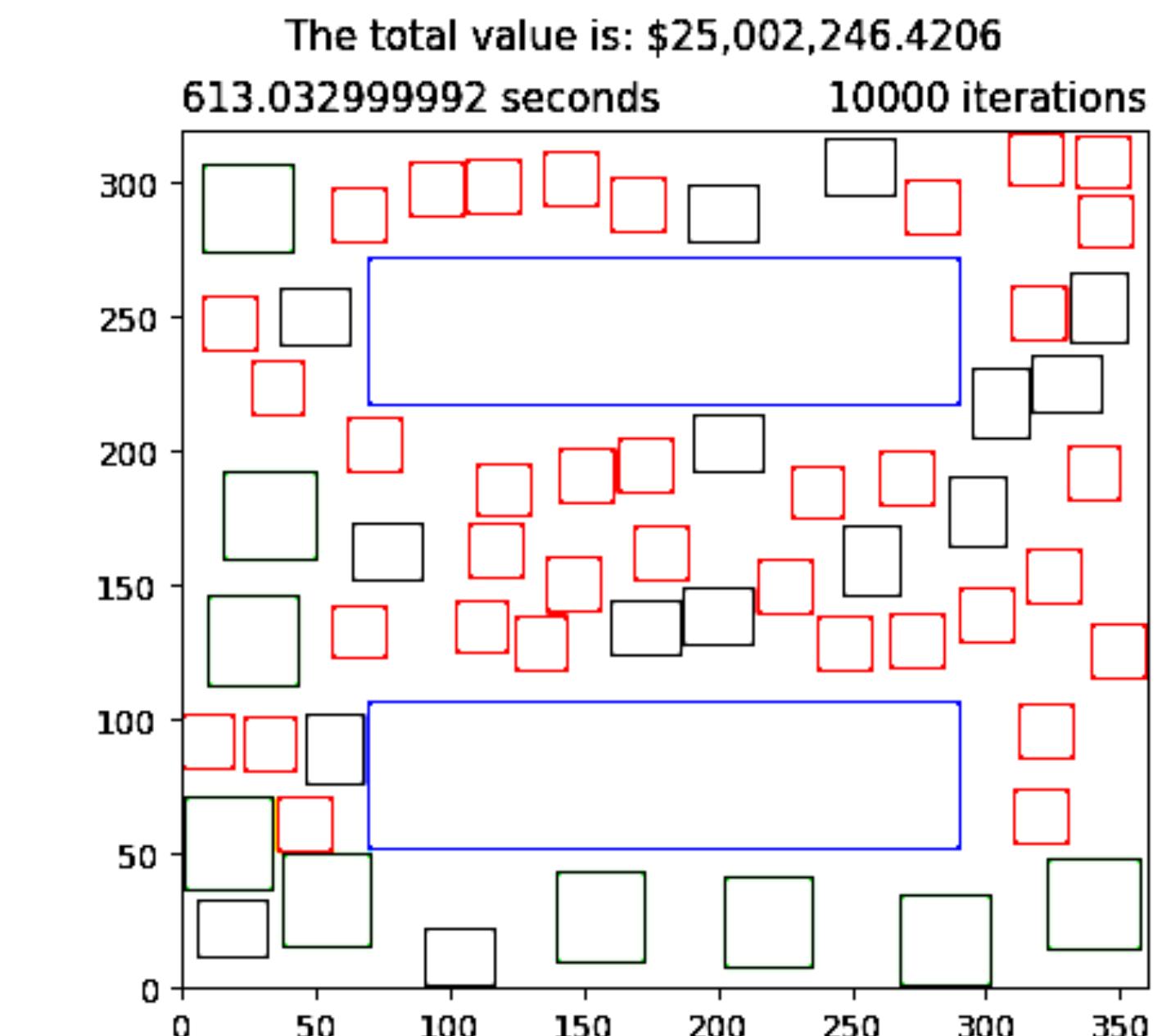
Random algoritme



20 huizen



40 huizen



60 huizen

Hillclimber algoritmes

- **Random Hillclimber:**

Hillclimber algoritmes

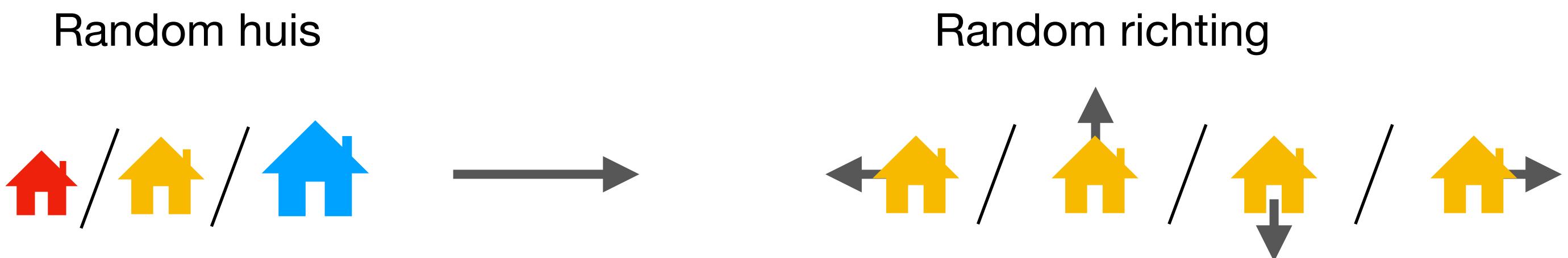
Random huis

- Random Hillclimber:



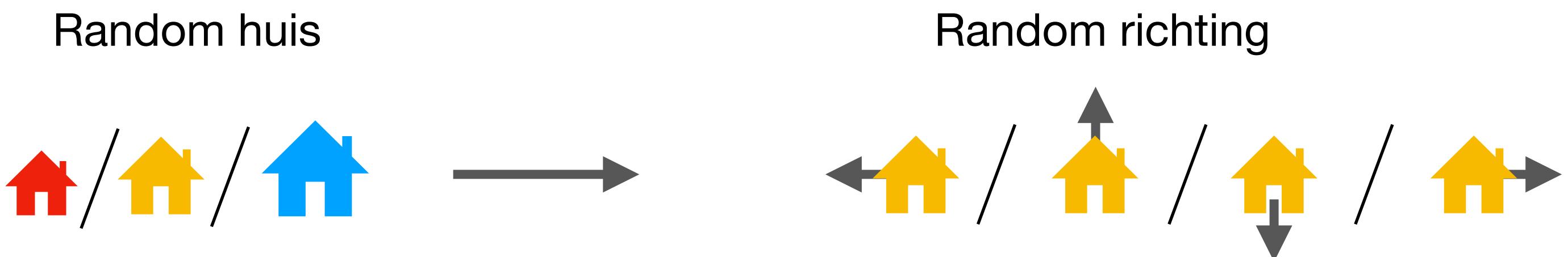
Hillclimber algoritmes

- **Random Hillclimber:**



Hillclimber algoritmes

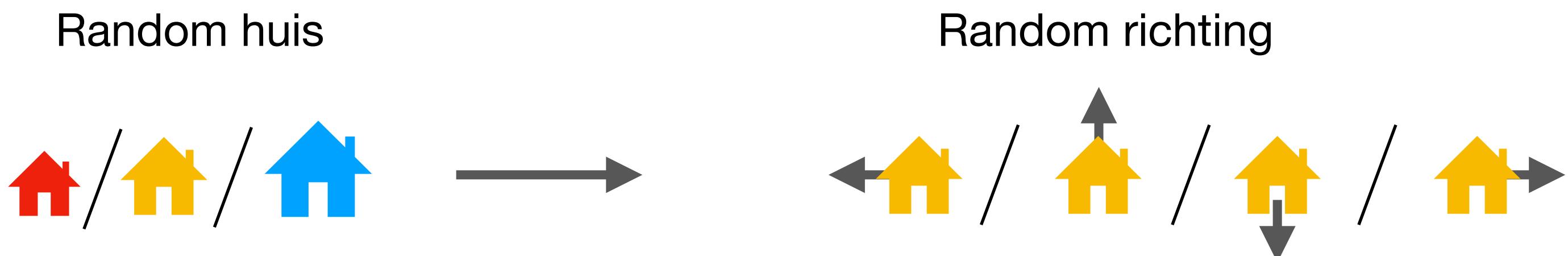
- **Random Hillclimber:**



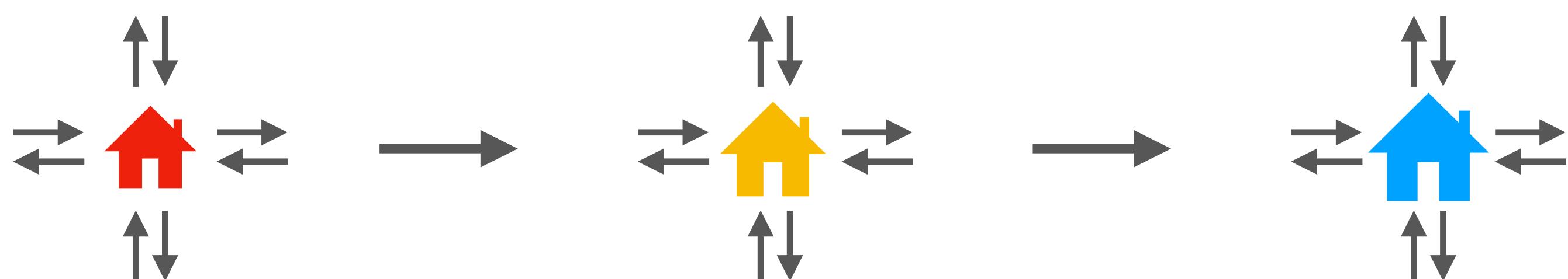
- **Systematic Hillclimber:**

Hillclimber algoritmes

- **Random Hillclimber:**

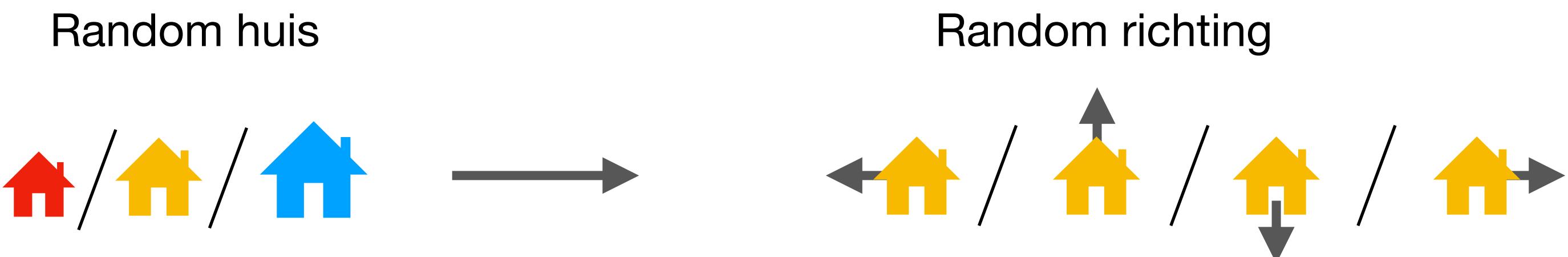


- **Systematic Hillclimber:**

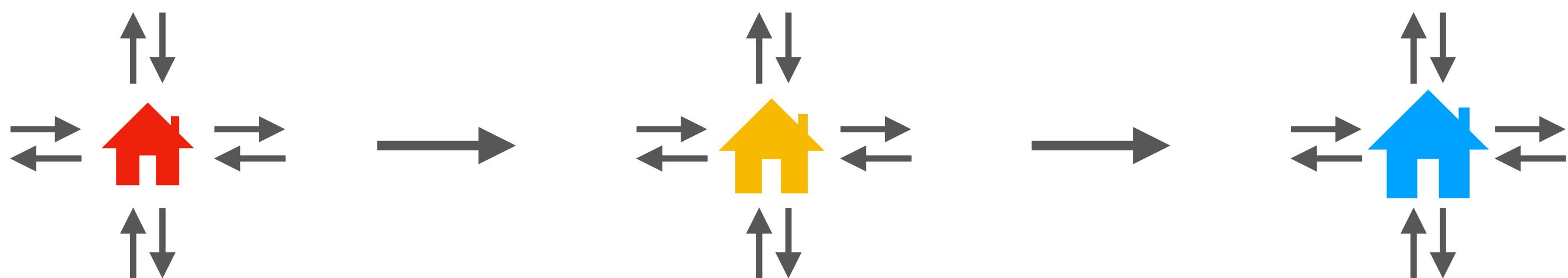


Hillclimber algoritmes

- **Random Hillclimber:**



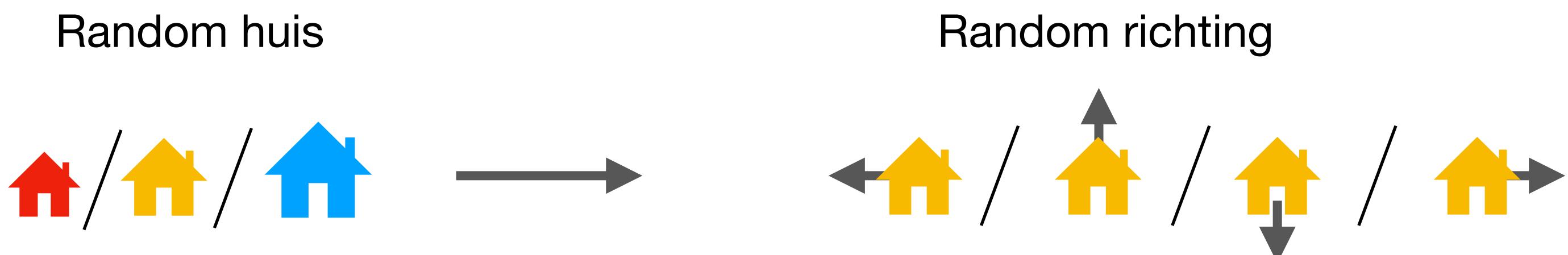
- **Systematic Hillclimber:**



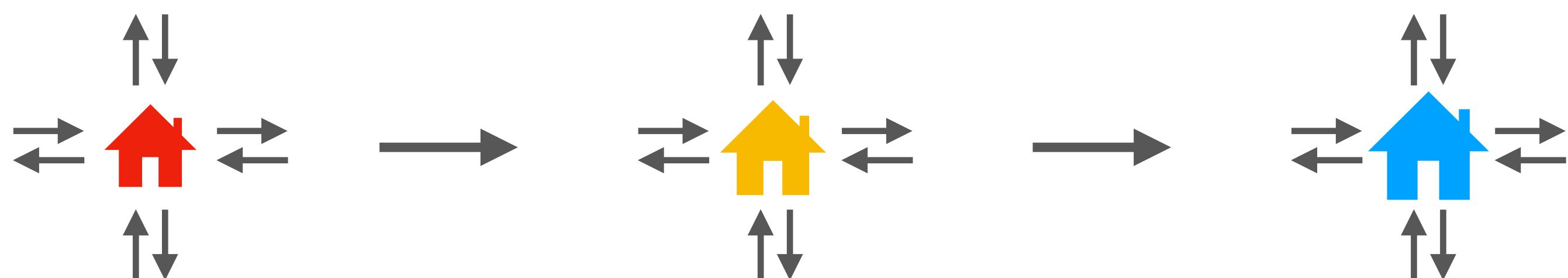
- **Extended Hillclimber:**

Hillclimber algoritmes

- **Random Hillclimber:**



- **Systematic Hillclimber:**

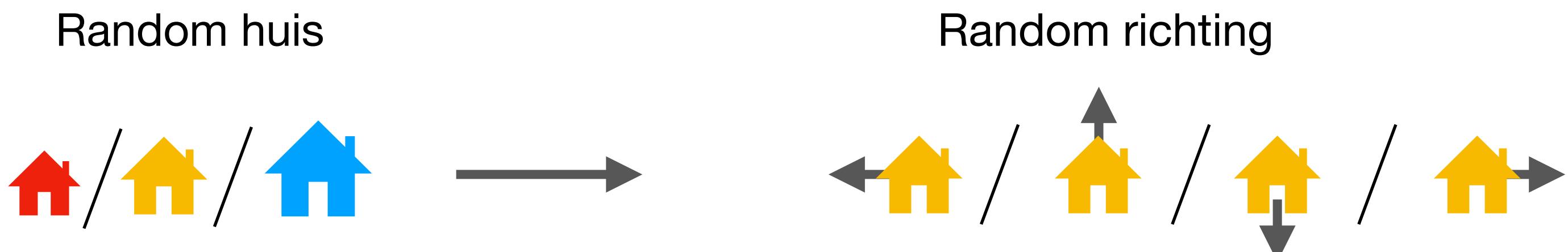


- **Extended Hillclimber:**

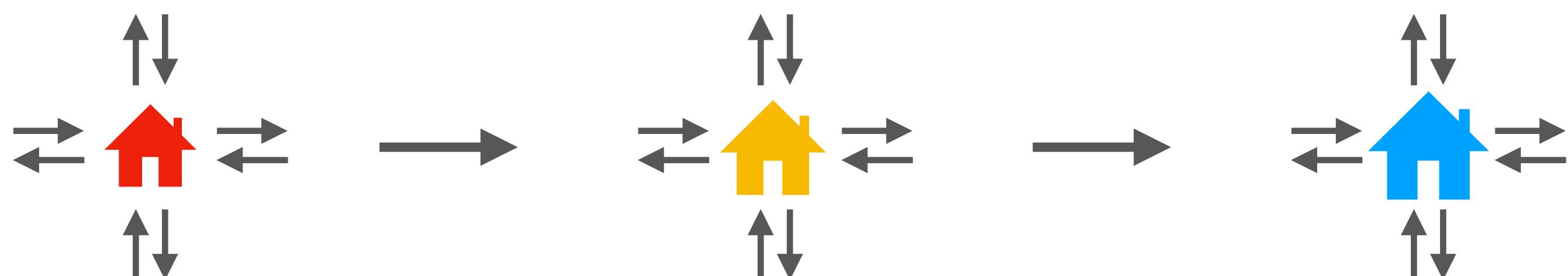


Hillclimber algoritmes

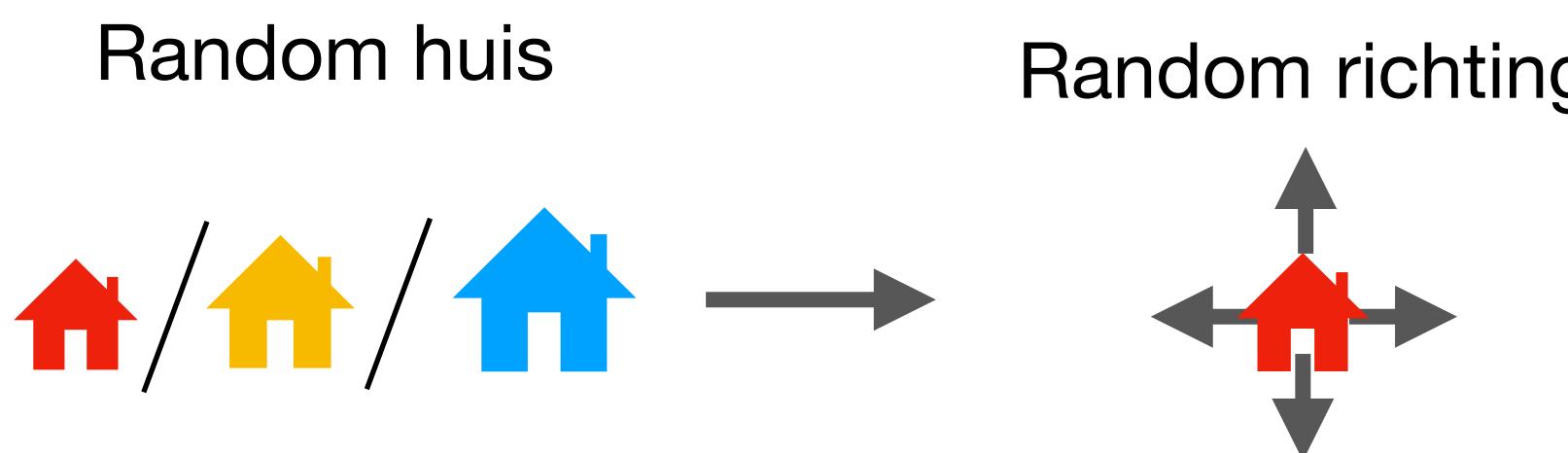
- **Random Hillclimber:**



- **Systematic Hillclimber:**

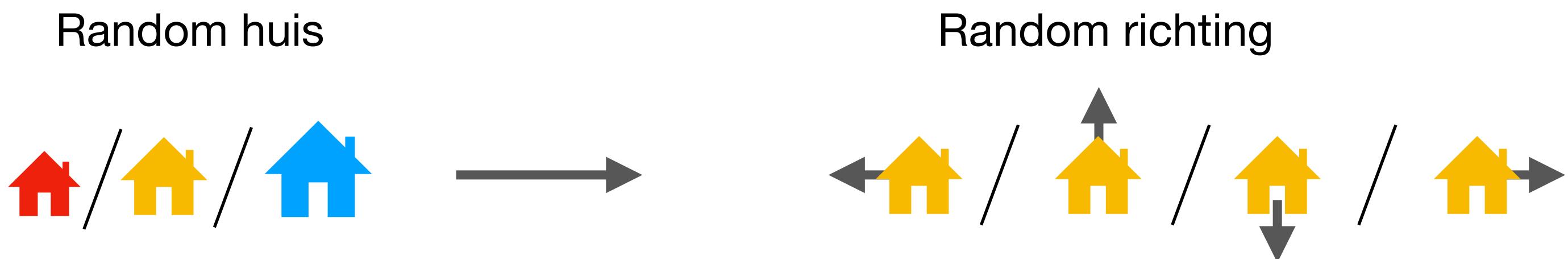


- **Extended Hillclimber:**

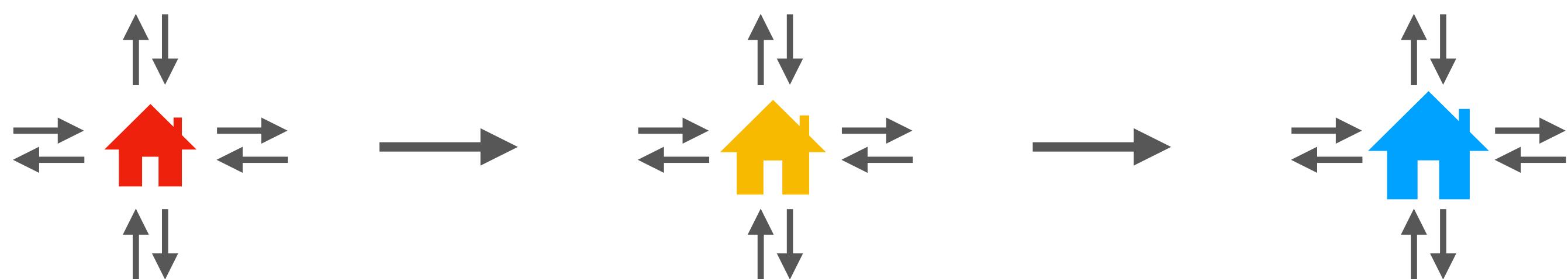


Hillclimber algoritmes

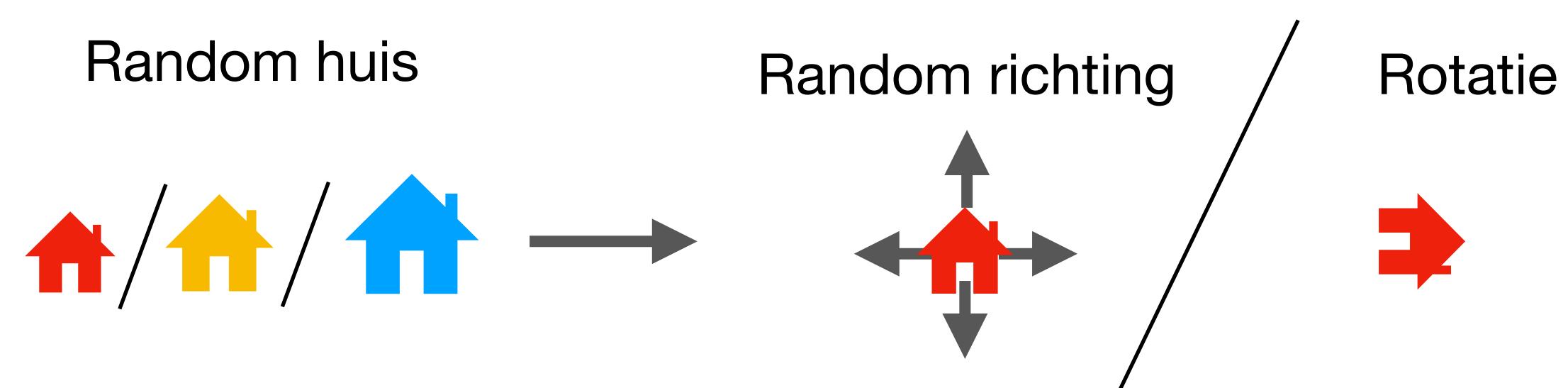
- **Random Hillclimber:**



- **Systematic Hillclimber:**

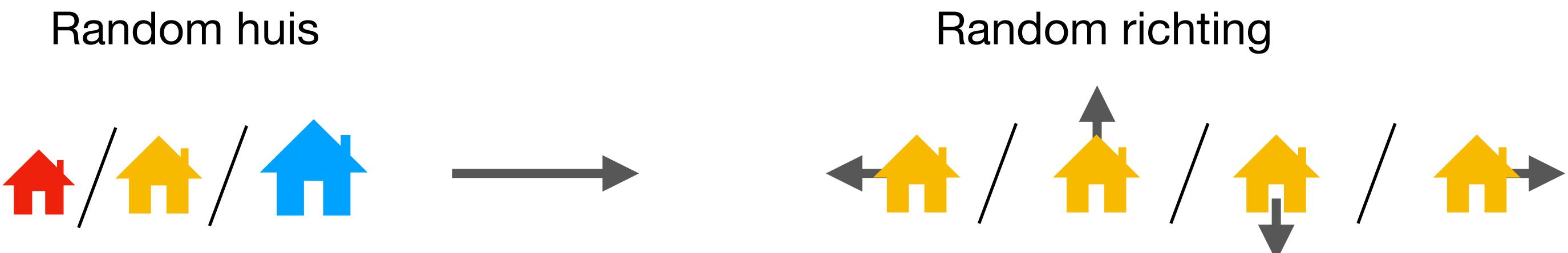


- **Extended Hillclimber:**

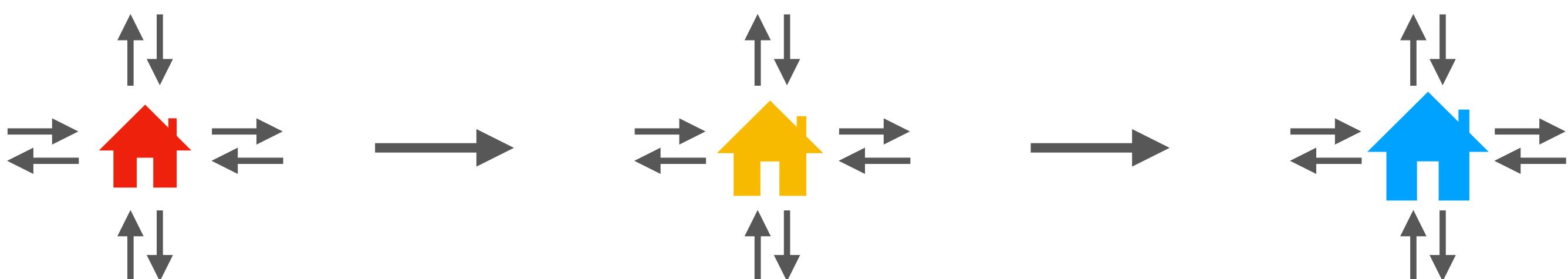


Hillclimber algoritmes

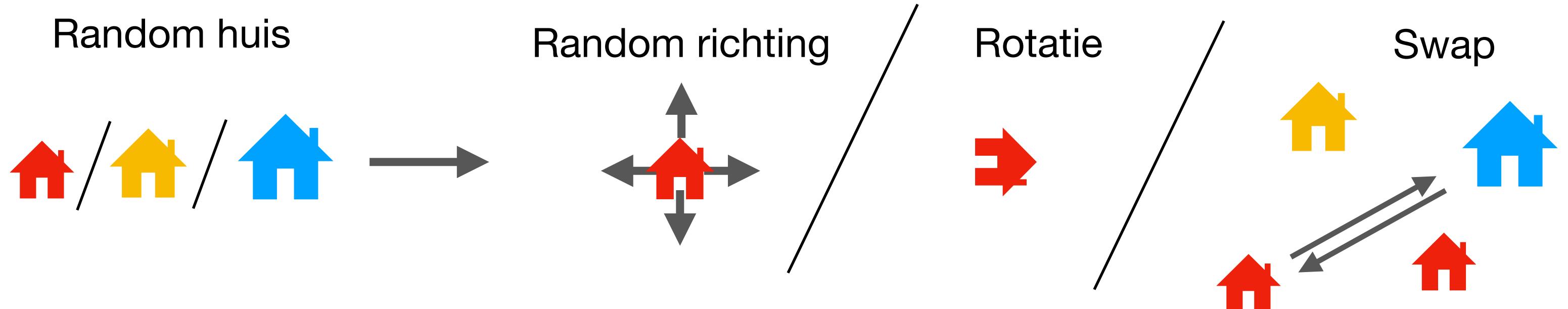
- **Random Hillclimber:**



- **Systematic Hillclimber:**



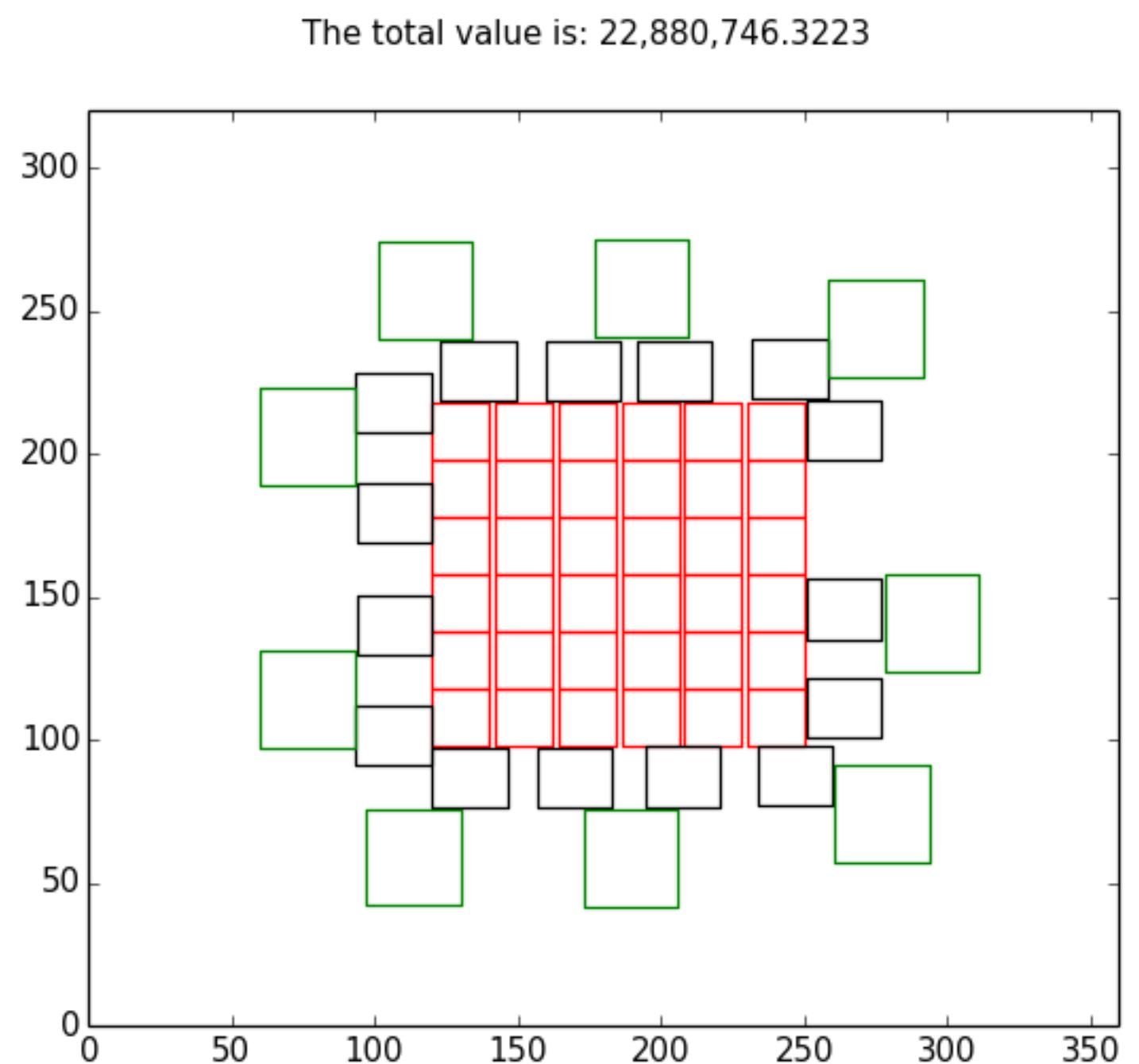
- **Extended Hillclimber:**



Hillclimber algoritmes + heuristiek

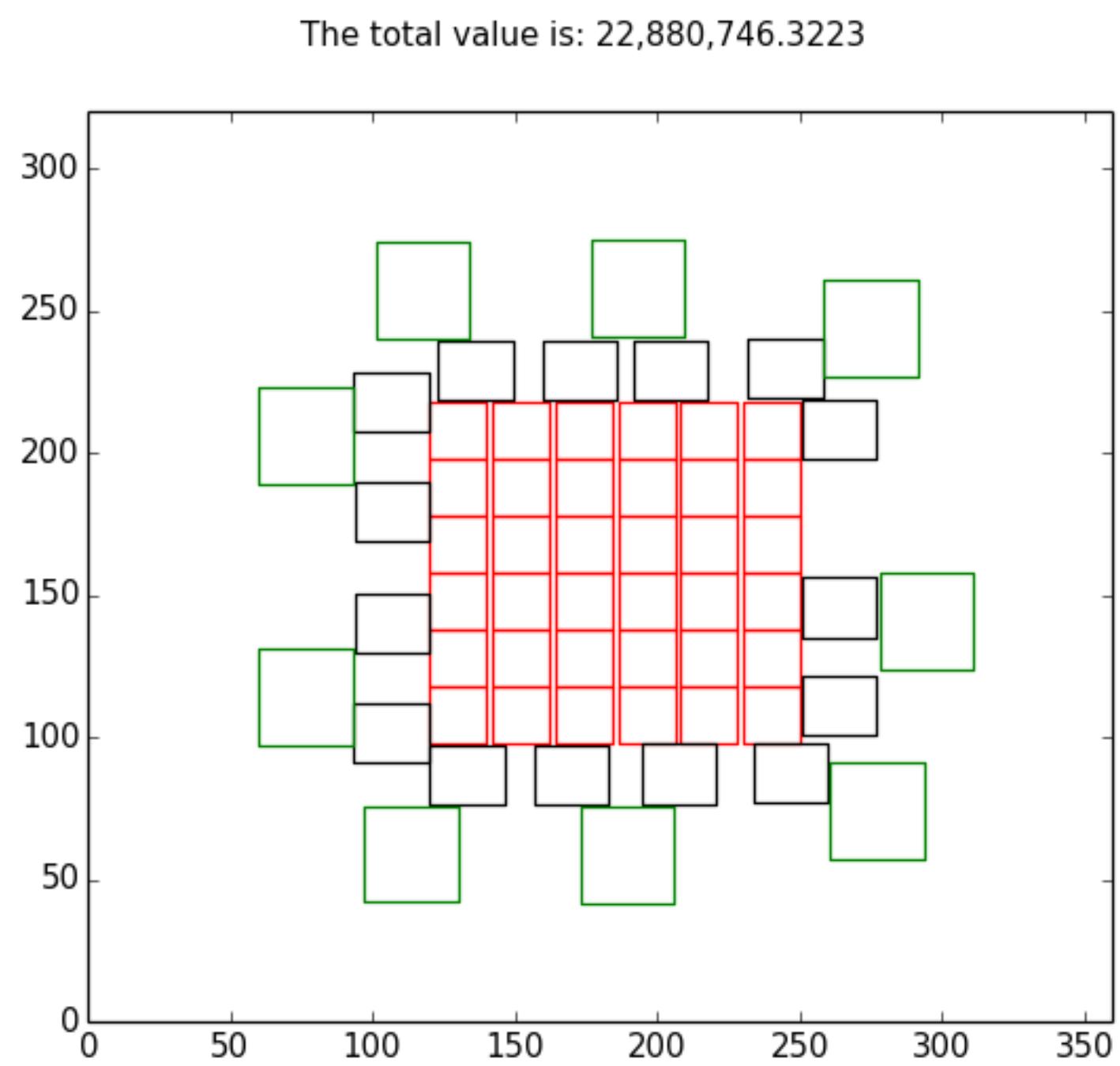
Hillclimber algoritmes + heuristiek

Expanding universe

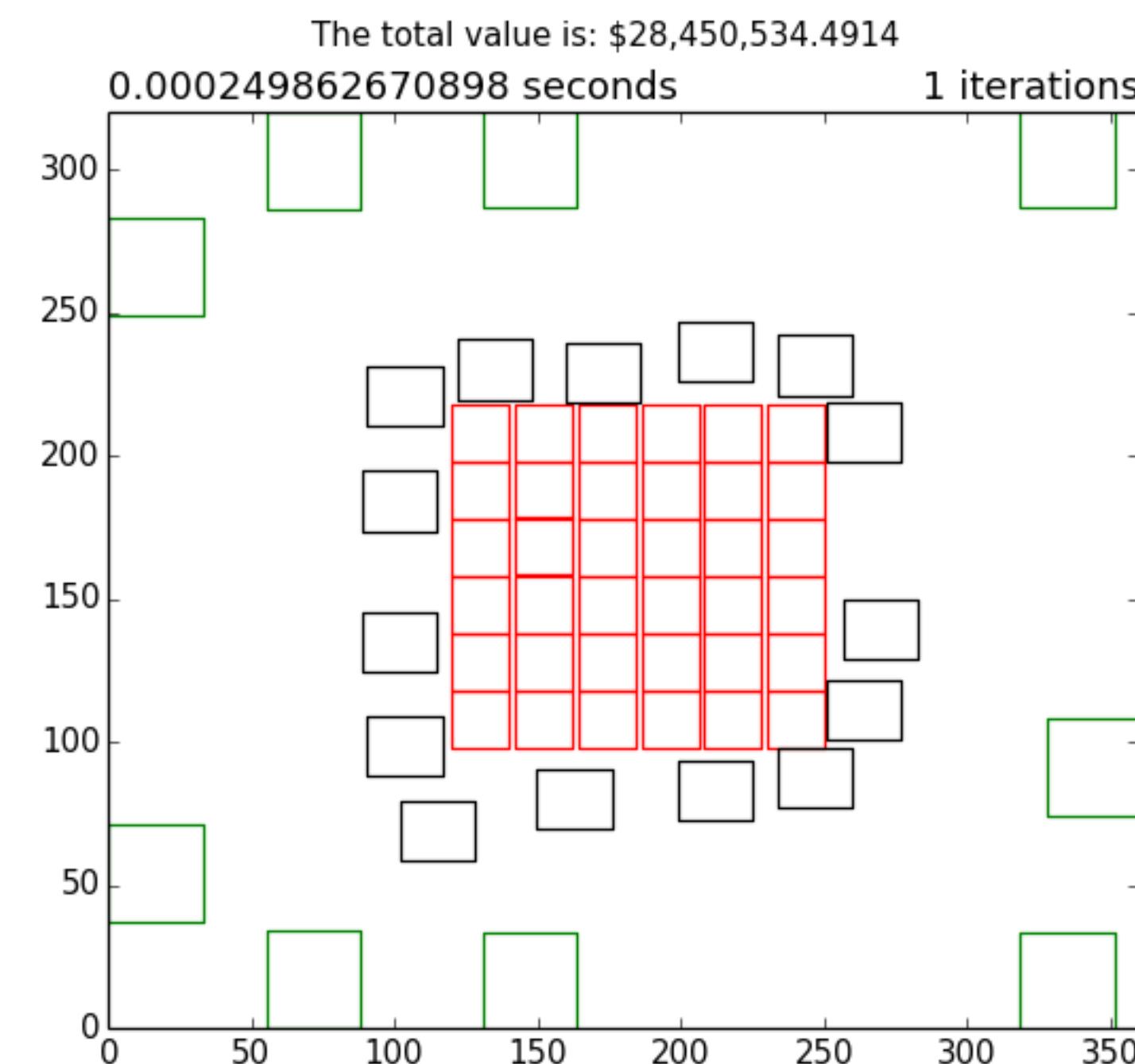


Hillclimber algoritmes + heuristiek

Expanding universe



Collapsing universe



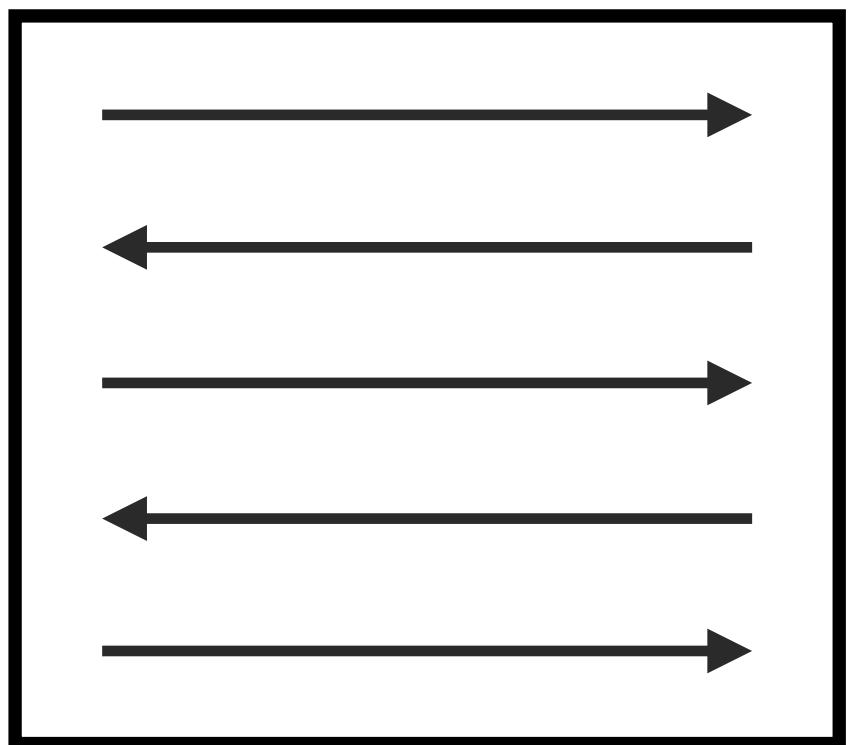
Greedy algoritme

- Waardevolste huis

Greedy algoritme

- Waardevolste huis
- Waardevolste plek

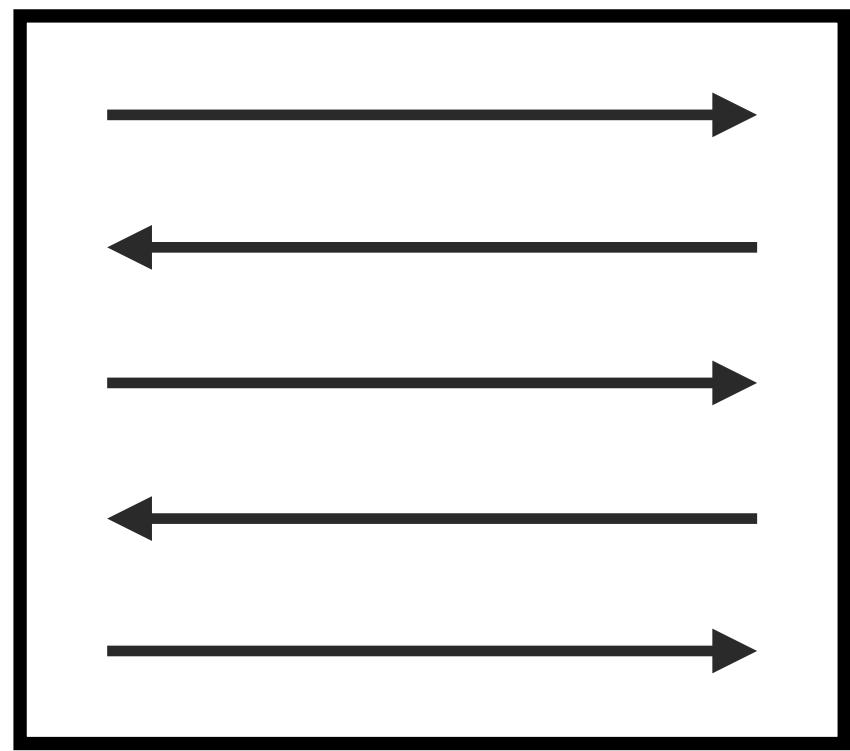
*Code loopt de hele map af,
en onthoudt de beste plek*



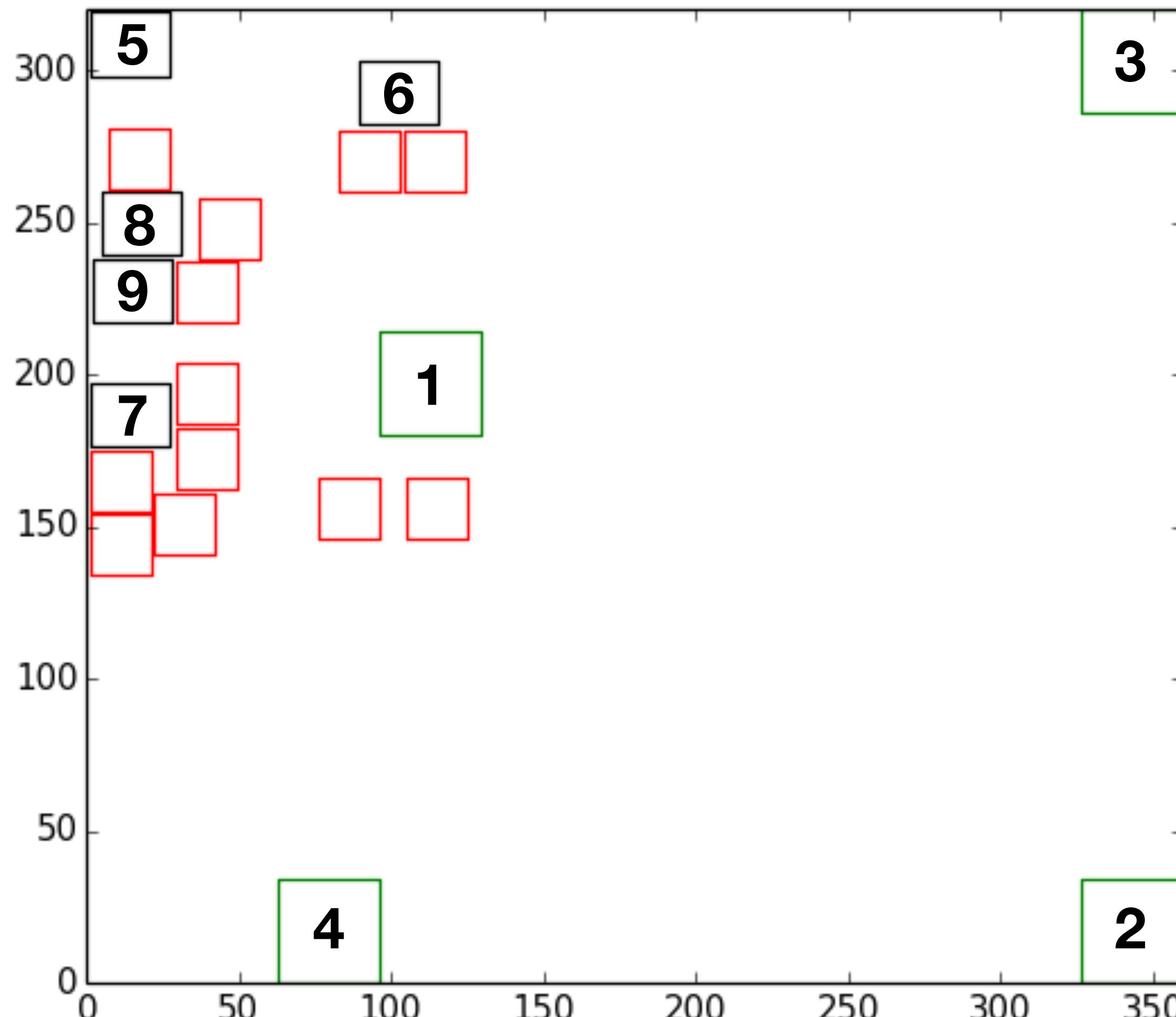
Greedy algoritme

- Waardevolste huis
- Waardevolste plek

*Code loopt de hele map af,
en onthoudt de beste plek*



The total value is: 19,405,062.7435

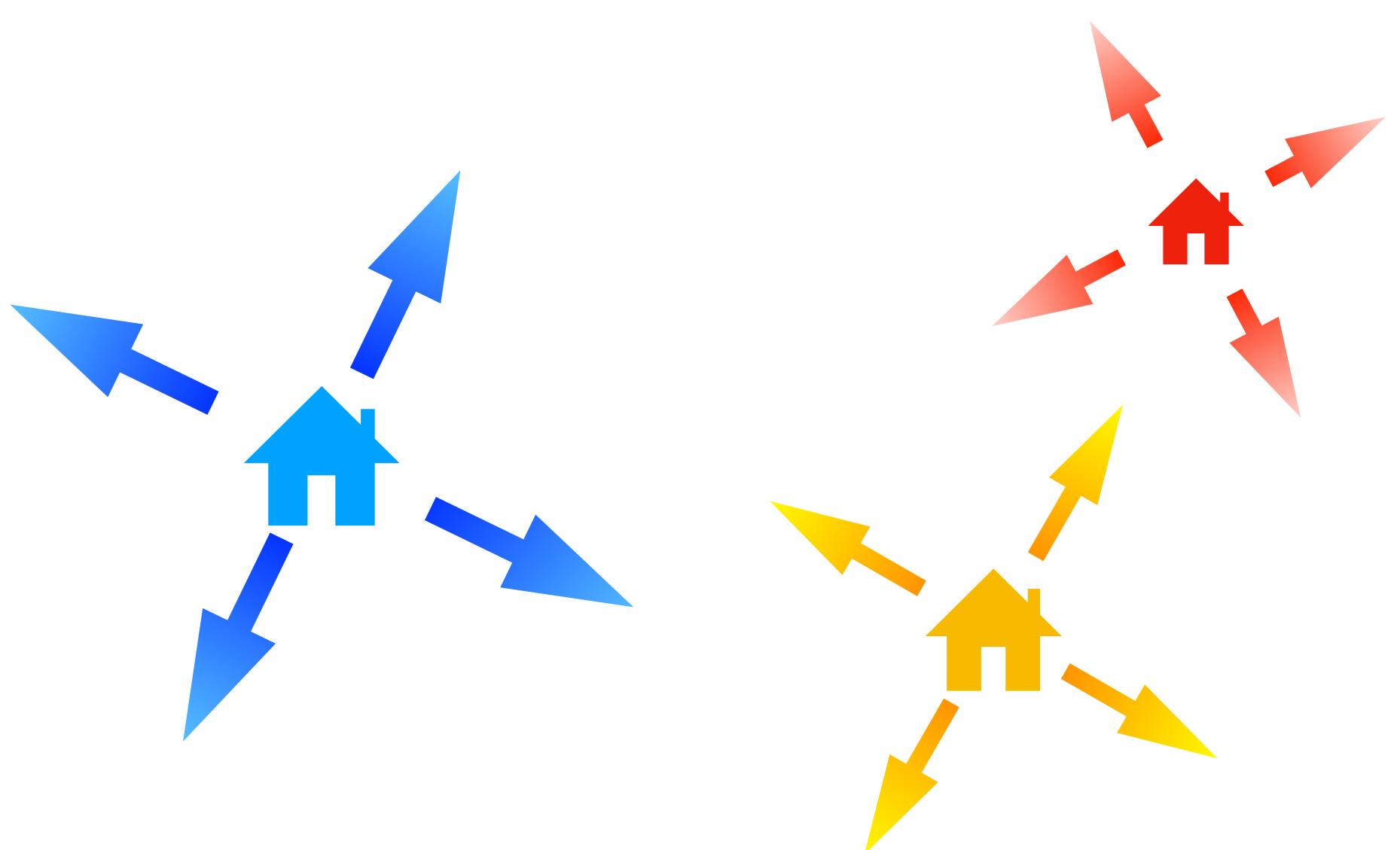


Resultaten

- **Conclusies**

- Plant propagation

- Plant propagation
- Magnetic poles



- Plant propagation
- Magnetic poles
- Use different water allocations

