

ROBO HOUSE



ROBOTS & FOOD



[@RoboHouseDelft](https://www.instagram.com/RoboHouseDelft)



[@RoboHouseDelft](https://twitter.com/RoboHouseDelft)



[RoboHouse](https://www.linkedin.com/company/RoboHouse)

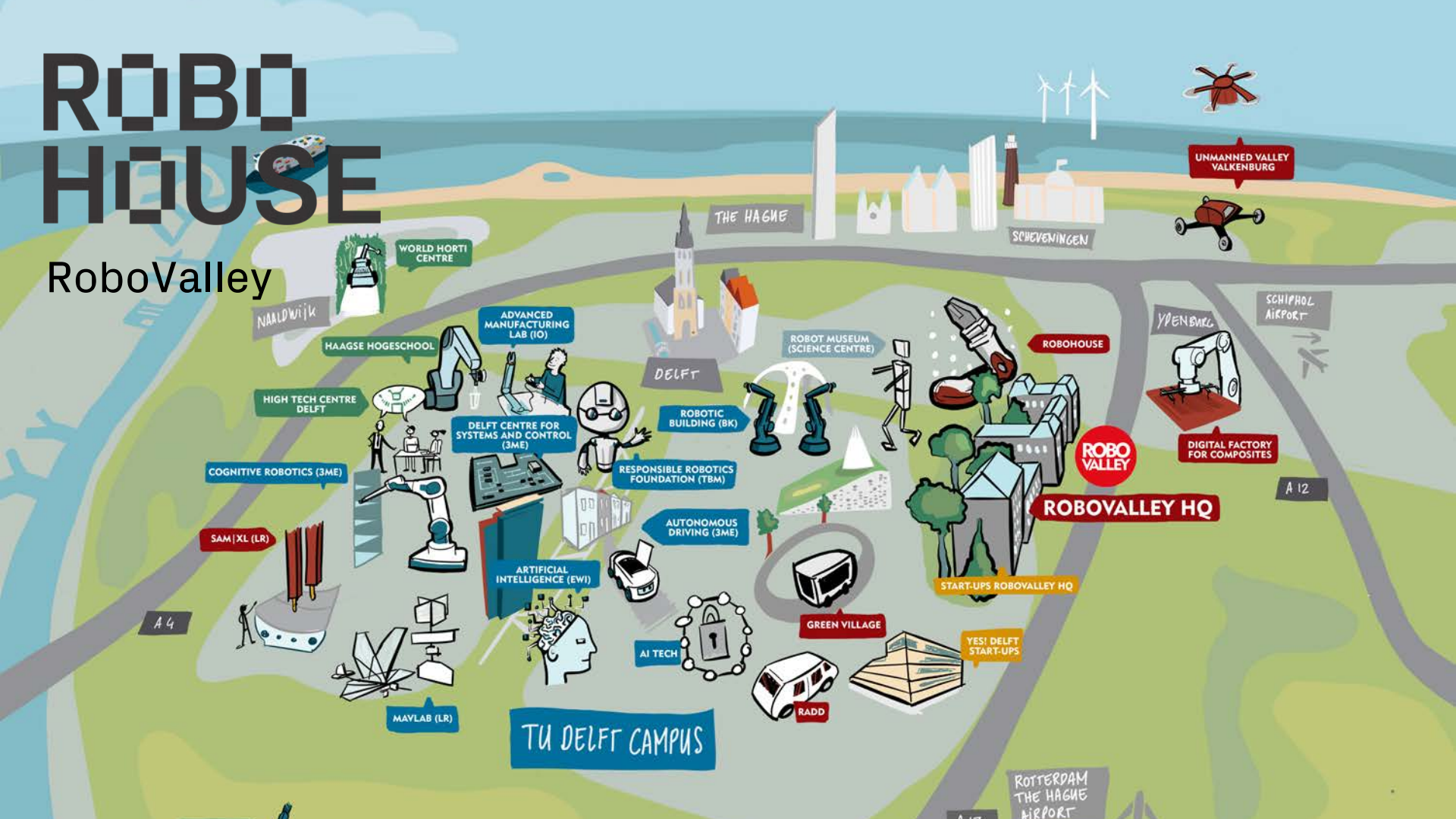


[Robohouse.nl](https://www.robohouse.nl)

ROBO HOUSE

ROBO HOUSE

RoboValley



NAALDWijk

WORLD HORTI CENTRE

HAAGSE HOGESCHOOL

ADVANCED MANUFACTURING LAB (IO)

HIGH TECH CENTRE DELFT

DELFT CENTRE FOR SYSTEMS AND CONTROL (3ME)

DELFT

ROBOT MUSEUM (SCIENCE CENTRE)

ROBOHOUSE

YPENBURG

SCHIPHOL AIRPORT

COGNITIVE ROBOTICS (3ME)

ROBOTIC BUILDING (BK)

RESPONSIBLE ROBOTICS FOUNDATION (TBM)

ROBO VALLEY

DIGITAL FACTORY FOR COMPOSITES

A 12

SAM | XL (LR)

AUTONOMOUS DRIVING (3ME)

ROBOVALLEY HQ

START-UPS ROBOVALLEY HQ

A 4

ARTIFICIAL INTELLIGENCE (EWI)

GREEN VILLAGE

YES! DELFT START-UPS

MAVLAB (LR)

AI TECH

RADD

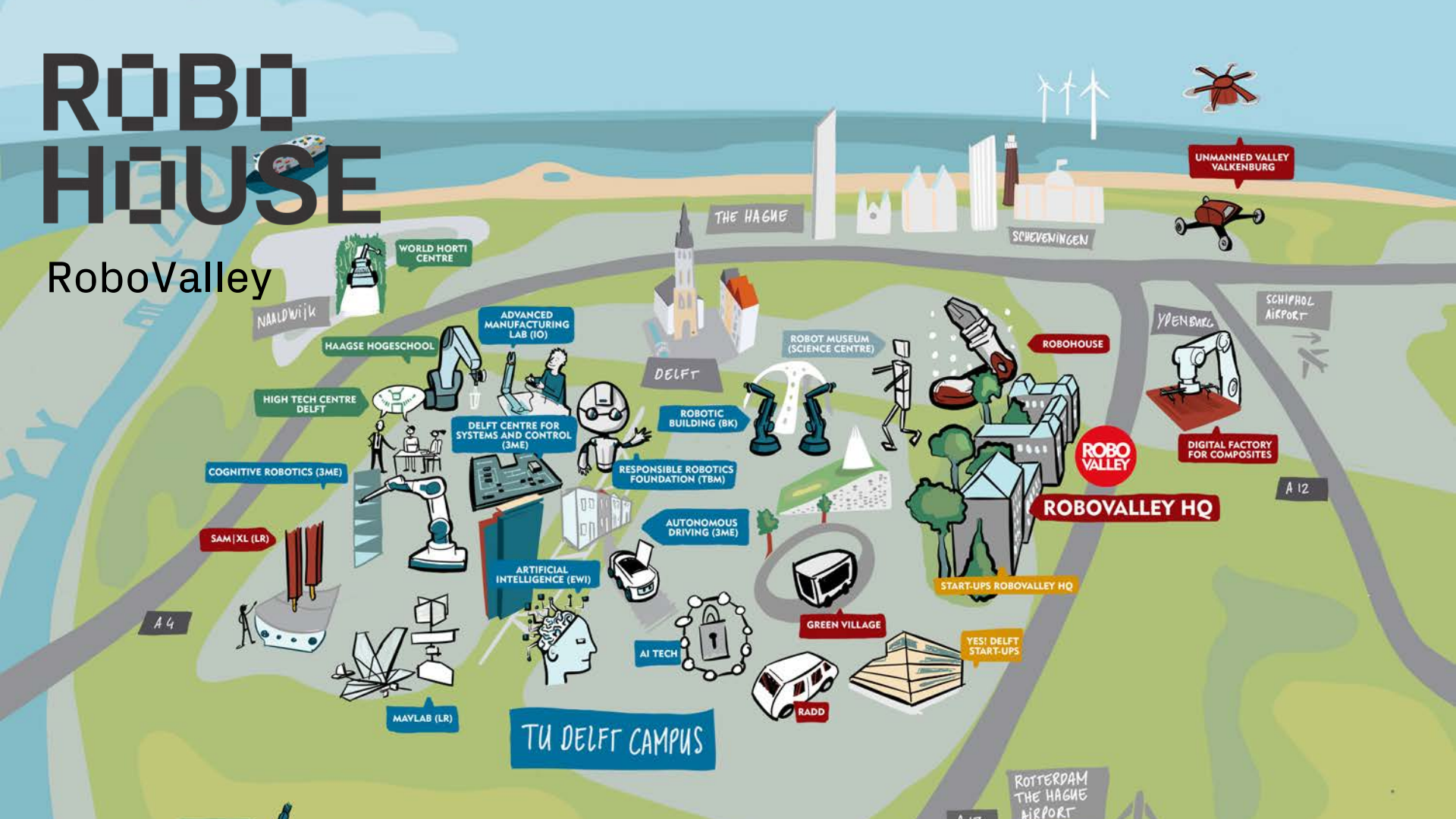
TU DELFT CAMPUS

ROTTERDAM THE HAGUE AIRPORT

We present the DelFly Nimble.

ROBO HOUSE

RoboValley



NAALDWijk

WORLD HORTI CENTRE

HAAGSE HOGESCHOOL

ADVANCED MANUFACTURING LAB (IO)

HIGH TECH CENTRE DELFT

DELFT CENTRE FOR SYSTEMS AND CONTROL (3ME)

DELFT

ROBOT MUSEUM (SCIENCE CENTRE)

ROBOHOUSE

YPENBURG

SCHIPHOL AIRPORT

COGNITIVE ROBOTICS (3ME)

ROBOTIC BUILDING (BK)

RESPONSIBLE ROBOTICS FOUNDATION (TBM)

ROBO VALLEY

DIGITAL FACTORY FOR COMPOSITES

A 12

SAM | XL (LR)

AUTONOMOUS DRIVING (3ME)

ROBOVALLEY HQ

A 4

ARTIFICIAL INTELLIGENCE (EWI)

START-UPS ROBOVALLEY HQ



MAVLAB (LR)

AI TECH

GREEN VILLAGE

YES! DELFT START-UPS

RADD

TU DELFT CAMPUS

ROTTERDAM THE HAGUE AIRPORT

ROBO HOUSE

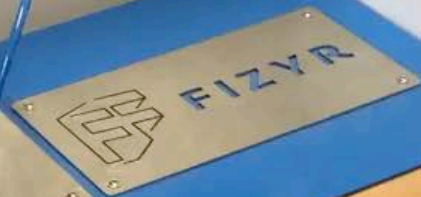


RoboValley HQ

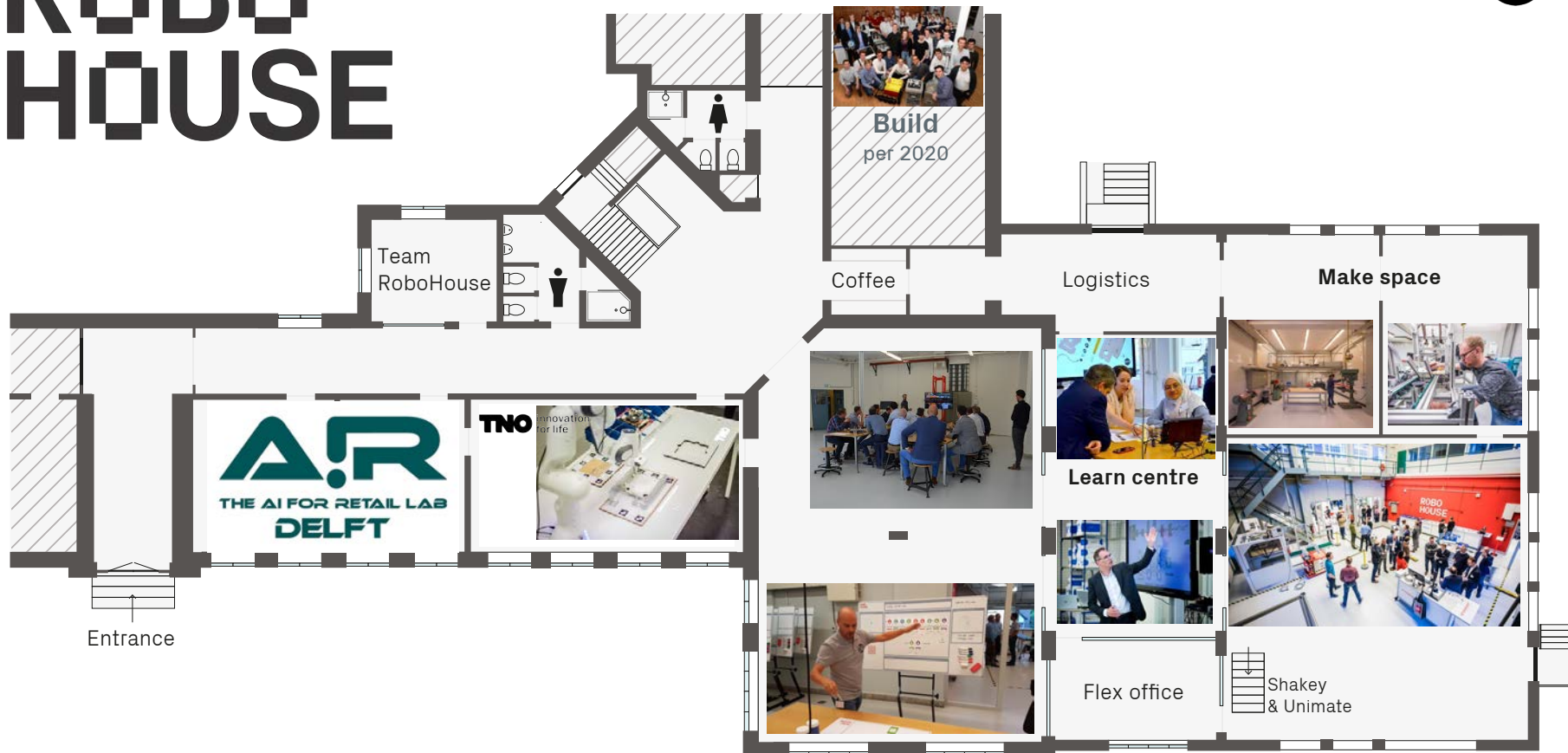
RoboHouse

ROBO HOUSE

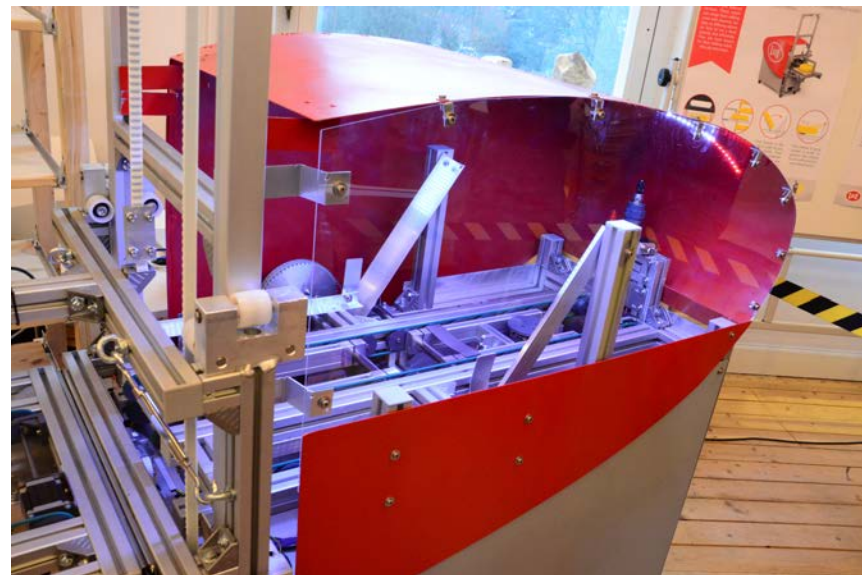
ROBO HOUSE



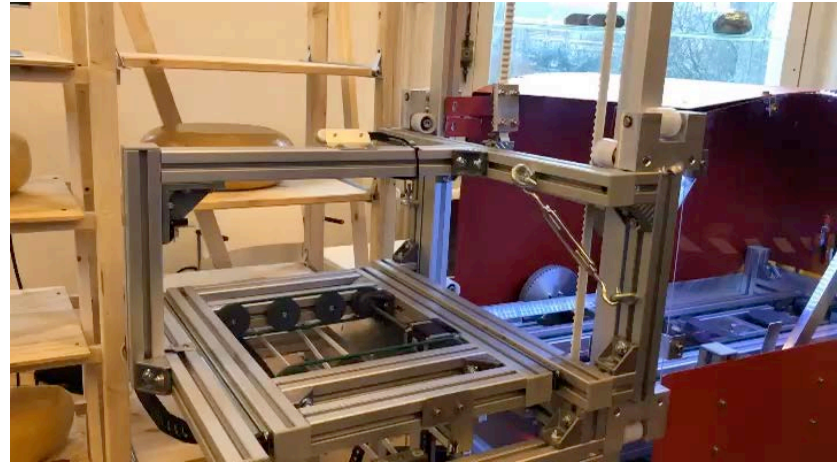
ROBO HOUSE



ROBO HOUSE



ROBO HOUSE



ROBO HOUSE



Partners



ROBO
HOUSE



ONTWIKKEL

ROBO HOUSE

Bepaal & Ontwerp

Krijg inzicht over eigen kansen met robotica:

- Robotica Applicatie Scan
- RoboHouse Canvas
- Design Sprint

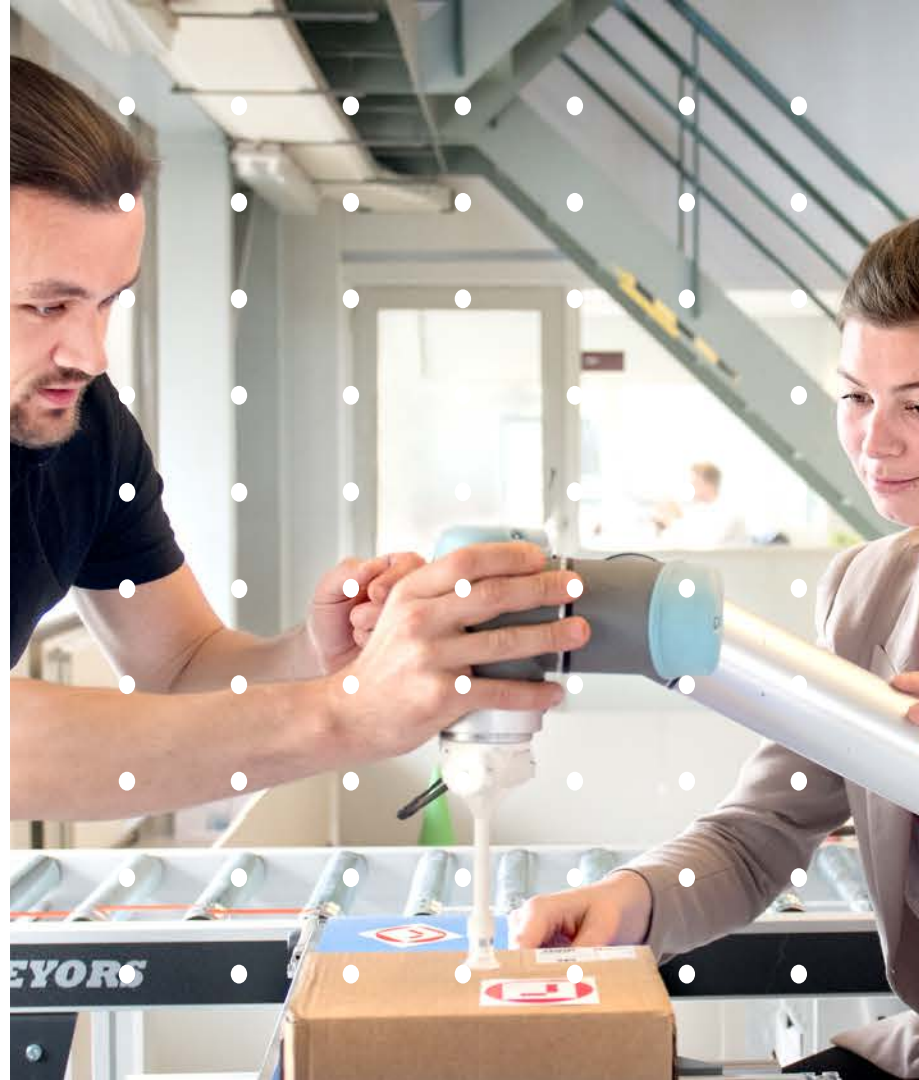


ROBO HOUSE

Build & Test

Bouw en test innovatieve robotica applicaties:

- Onderzoek
- Student
- Talent



ROBO HOUSE

Learn & Develop

Leer zelf robotica applicaties maken:

- Cursussen voor engineers
- Toegang tot robotica hardware platforms

ROBO HOUSE



ROBO HOUSE



ONTDEK & ONTWIKKEL



[@RoboHouseDelft](https://www.instagram.com/RoboHouseDelft)



[@RoboHouseDelft](https://twitter.com/RoboHouseDelft)



[RoboHouse](https://www.linkedin.com/company/RoboHouse)



[Robohouse.nl](https://www.robohouse.nl)

ROBO HOUSE

ROBO
HOUSE



ROBOTS

ROBO HOUSE



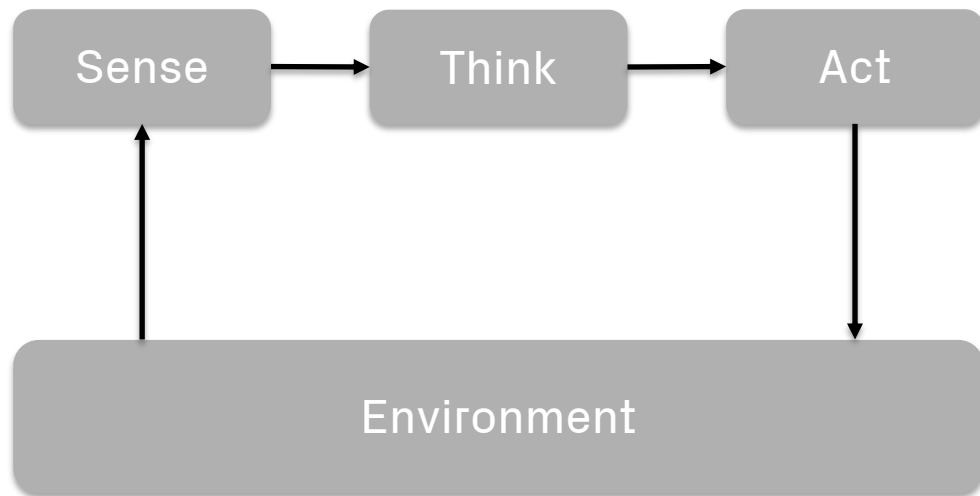
**"I can't define a robot,
but I know one when I see one."
~ Joseph Engelberger**

ROBO HOUSE

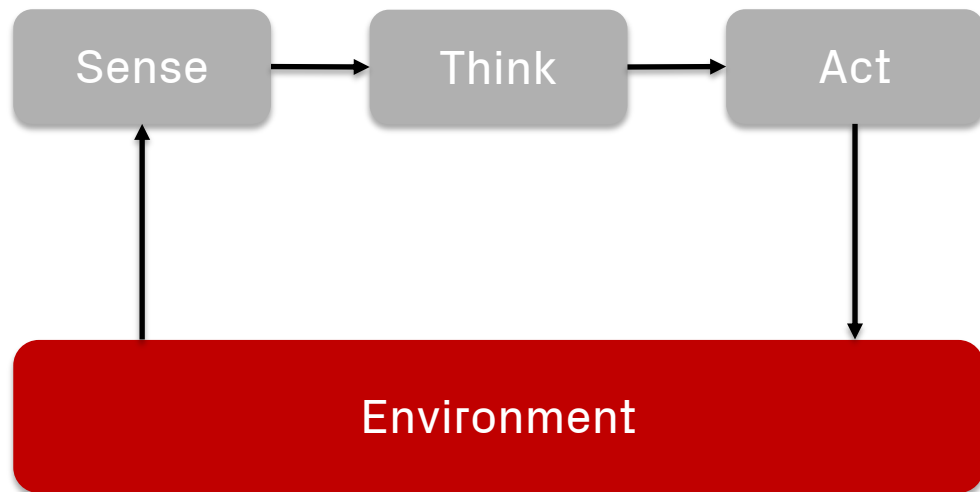


A non biological *physical system*
that **senses** the world around it
and **acts** on this world

ROBO HOUSE



ROBO HOUSE



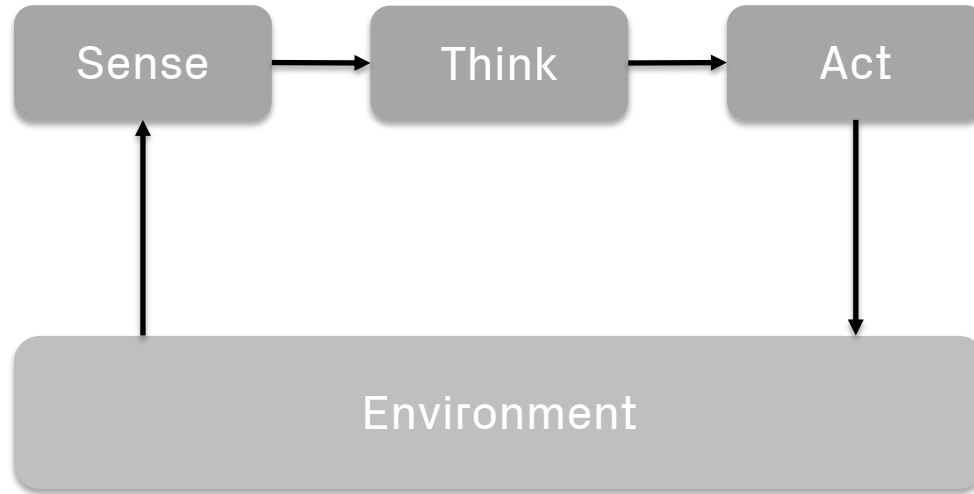
ROBO HOUSE



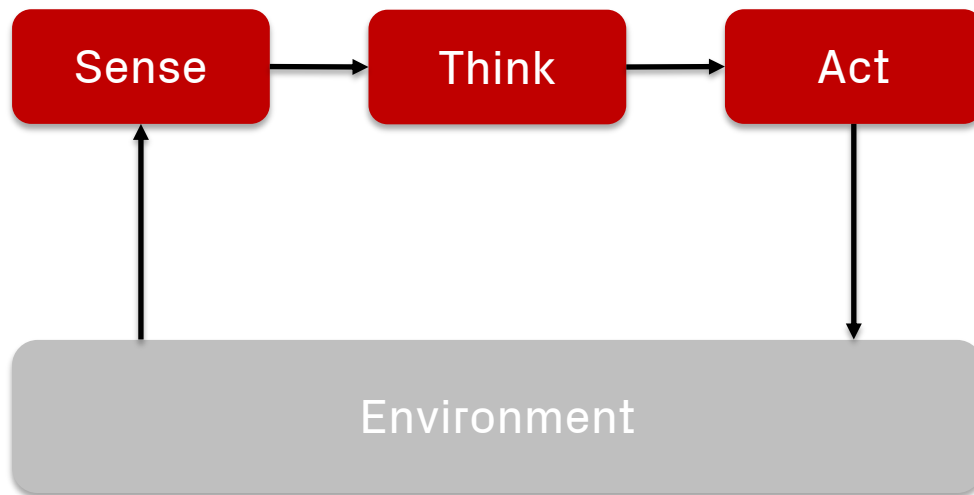
ROBO HOUSE



ROBO HOUSE



ROBO HOUSE



ROBO HOUSE

Sense



Nature	Technology
Vision	(Multispectral) Camera
Sound	Microphone
Taste	-
Smell	-
Touch	Bumper
Vestibular	IMU
Ultrasonic	(Ultra) Sonar
-	Lidar
-	Radar
-	Depth (Camera)
-	GPS

ROBO HOUSE



Sense

Structured light
Stereo vision



ROBO HOUSE

Think

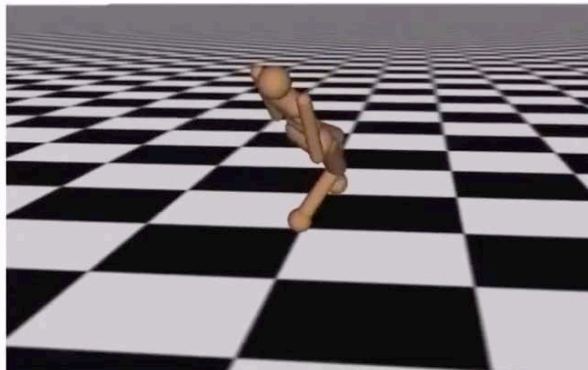
SLAM / Deep Learning
Modular Software

ROBO HOUSE



Deep RL Success Stories

Iteration 0
Episode terminated early :(



^ **TRPO** Schulman et al, 2015 + **GAE** Schulman et al, 2016

See also: **DDPG** Lillicrap et al 2015; **SVG** Heess et al, 2015; **Q-Prop** Gu et al, 2016; **Scaling up ES** Salimans et al, 2017; **PPO** Schulman et al, 2017; **Parkour** Heess et al, 2017;

ROBO HOUSE

Act

New Materials
Rapid prototyping



ROBO
HOUSE



APPLICATIE

ROBO HOUSE

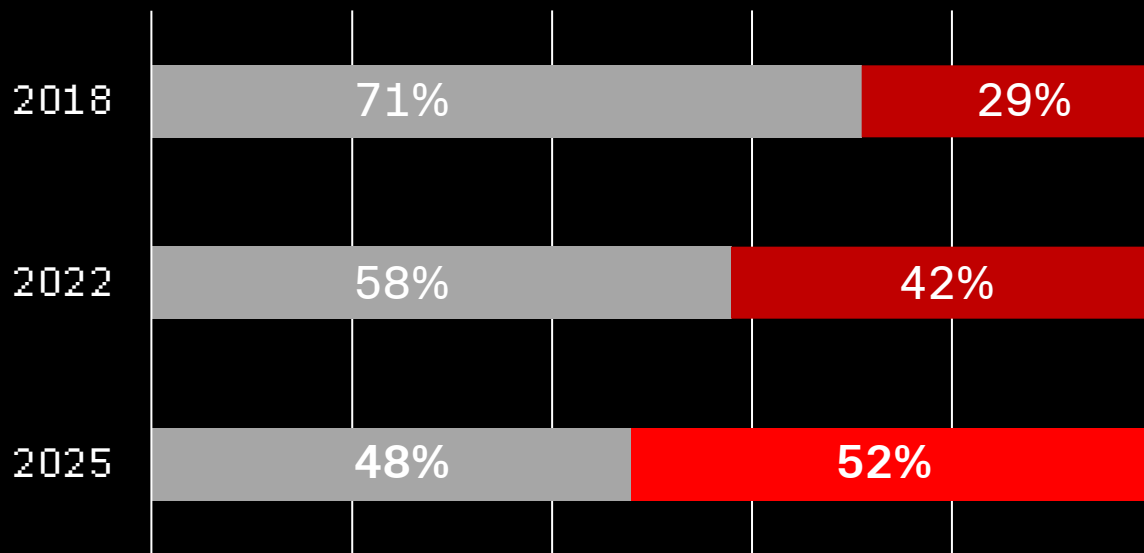
Applicatie

RATE OF AUTOMATION



■ HUMAN

■ MACHINE



percentage of task hours performed

ROBO HOUSE

Applicatie



135 miljard geïnvesteerd in robots in 2019.

Met name Automotive en Elektronica, slecht 2% in food industry.

ROBO HOUSE

Waar?



ROBO HOUSE

Waar?

HOME KITCHEN ROBOTS

BRANDED DELIVERY

LOGISTICS & FULFILLMENT

ROBOT-POWERED RESTAURANT PLATFORM

STANDALONE STOREFRONTS

thesoon

The Food Robotics Market

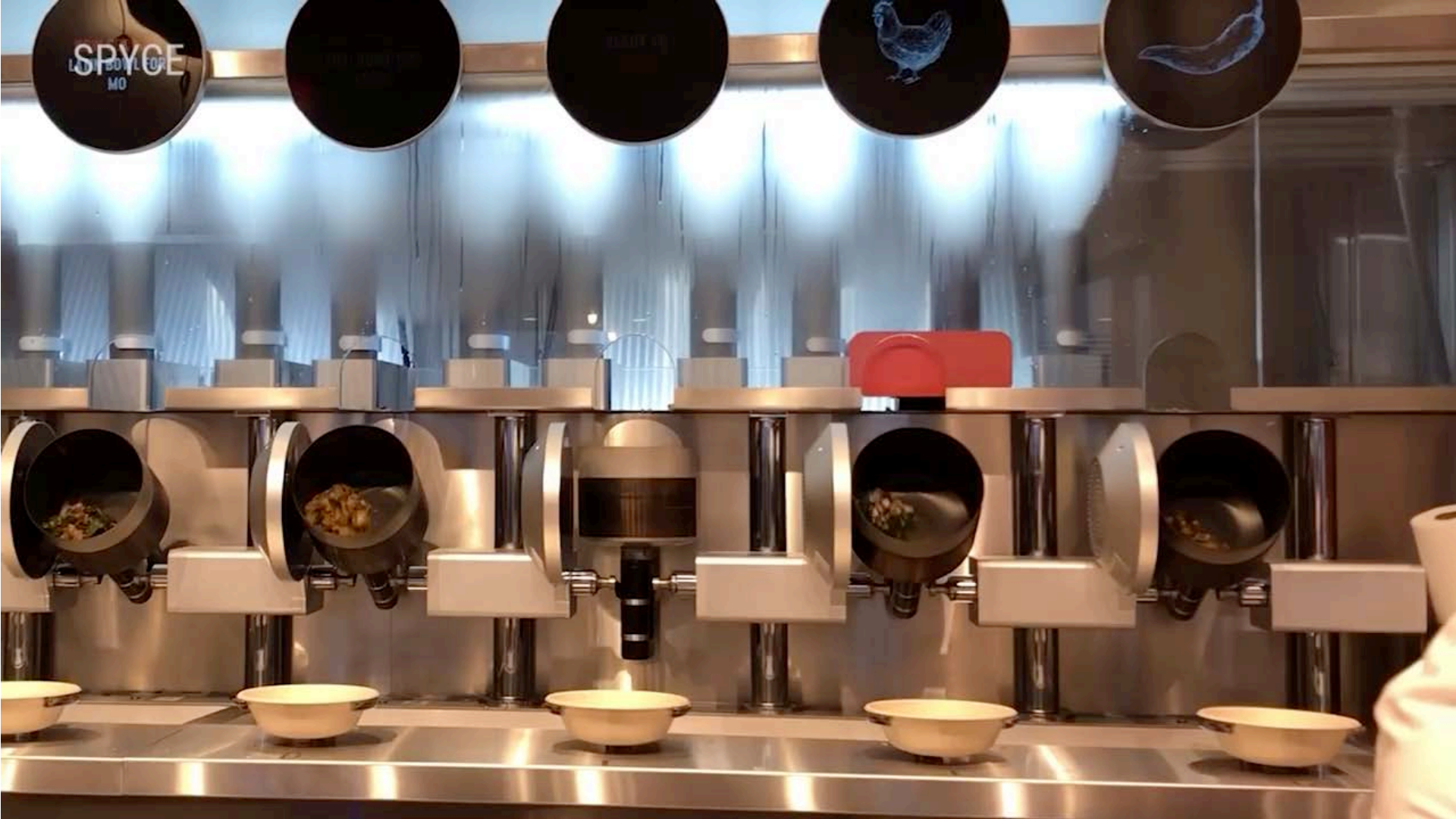
Version 1.0: 2019

AUTONOMOUS MOBILE STOREFRONT

DELIVERY PLATFORM

RESTAURANTS USING ROBOTS

TIPS:ROBOT HUMANBAR



SPYCE
L
BOYL FOR
MO



**ROBO
HOUSE**



Waar?

FYSIEKE HERHALENDE TAKEN

ROBO HOUSE



Waar?

FYSIEKE HERHALENDE TAKEN

snelheid

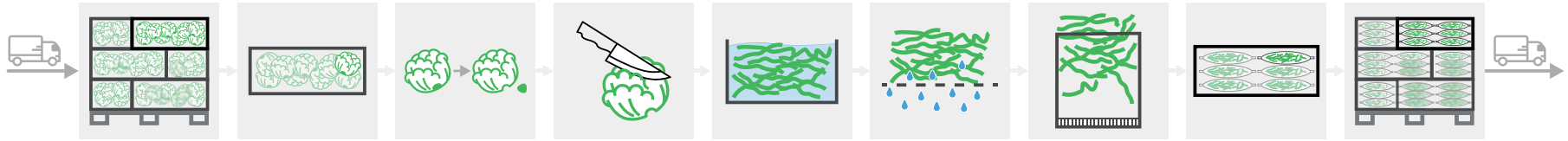
consistentie

veiligheid

ROBO HOUSE



Waar?



snelheid

consistentie

veiligheid

Shift = 7.5 uur
 FTE totaal = 5 pers
 Total min /shift = 2250min



Freq per shift	
Time per cycle (min)	
Total time per shift (min)	
Area used (m2)	
Amount of FTE	
As % of total shift min	
Improve ergonomics? (1-10)	
Improve safety?	
Improve product consistency?	
Improve digital proposition?	
Repeatability of task?	
Repeatability of the object?	
Repeatability of environment?	

Shift = 7.5 uur
 FTE totaal = 5 pers
 Total min /shift = 2250min



Freq per shift	
Time per cycle (min)	
Total time per shift (min)	
Area used (m2)	
Amount of FTE	
As % of total shift min	
Improve ergonomics? (1-10)	
Improve safety?	
Improve product consistency?	
Improve digital proposition?	
Repeatability of task?	
Repeatability of the object?	
Repeatability of environment?	



Shift = 7.5 uur
 FTE totaal = 5 pers
 Total min /shift = 2250min



Freq per shift	
Time per cycle (min)	
Total time per shift (min)	
Area used (m2)	
Amount of FTE	
As % of total shift min	
Improve ergonomics? (1-10)	
Improve safety?	
Improve product consistency?	
Improve digital proposition?	
Repeatability of task?	
Repeatability of the object?	
Repeatability of environment?	



Shift = 7.5 uur
 FTE totaal = 5 pers
 Total min /shift = 2250min



Freq per shift	
Time per cycle (min)	
Total time per shift (min)	
Area used (m2)	
Amount of FTE	
As % of total shift min	
Improve ergonomics? (1-10)	
Improve safety?	
Improve product consistency?	
Improve digital proposition?	
Repeatability of task?	
Repeatability of the object?	
Repeatability of environment?	



	kratten	verenkelen	ontkernen	snijden	wassen	drogen	verpakken	inpakken	stapelen
Freq per shift		99	6		99		99	60	12
Time per cycle (min)		3	55		2		2	5	12
Total time per shift (min)		297	330		198		198	300	144
Area used (m2)		5	3		5		4	8	20
Amount of FTE		1	2		1		1	2	1
As % of total shift min		13%	30%		9%		9%	27%	6%
Improve ergonomics? (1-10)		7	8		7		7	7	8
Improve safety?		5	8		8		7	8	6
Improve product consistency?		6	9		7		8	6	4
Improve digital proposition?		8	5		7		10	7	4
Repeatability of task?					9		9	8	8
Repeatability of the object?					4		6	10	10
Repeatability of environment?					7		7	9	8



Freq per shift	16	99	6	99	99	60	12
Time per cycle (min)	8	3	55	2	2	5	12
Total time per shift (min)	128	297	330	198	198	300	144
Area used (m2)	20	5	3	5	4	8	20
Amount of FTE	1	1	2	1	1	2	1
As % of total shift min	6%	13%	30%	9%	9%	27%	6%
Improve ergonomics? (1-10)	8	7	8	7	7	7	8
Improve safety?	6	5	8	8	7	8	6
Improve product consistency?	4	6	9	7	8	6	4
Improve digital proposition?	2	8	5	7	10	7	4
Repeatability of task?	8	9	7	9	9	8	8
Repeatability of the object?	10	4	4	4	6	10	10
Repeatability of environment?	8	7	7	7	7	9	8

ROBO
HOUSE



DECORING

ROBO HOUSE

Decorating



ROBO HOUSE

Decorating



ROBO HOUSE



DISCUSSIE



ROBO HOUSE

[@RoboHouseDelft](#)



[@RoboHouseDelft](#)



[RoboHouse](#)



[Robohouse.nl](#)