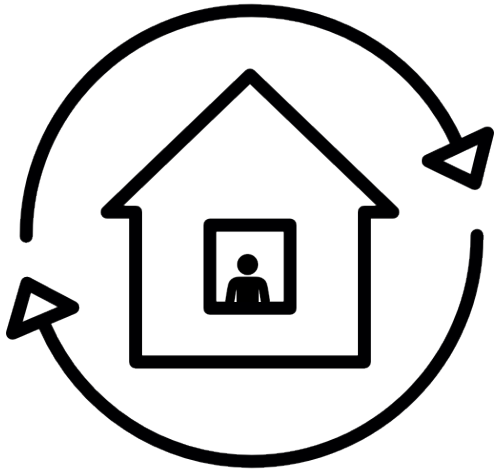
THE NEXT STEP IN CIRCULAR HOUSING

An exploratory user-centred research into the relationship between design and circular behaviour of students living in student housing complexes.



Main mentor: Gerard van Bortel (REM)
Second mentor: Karel Van den Berghe (UDM)

Management in the Built Environment, Delft University of Technology 21/22

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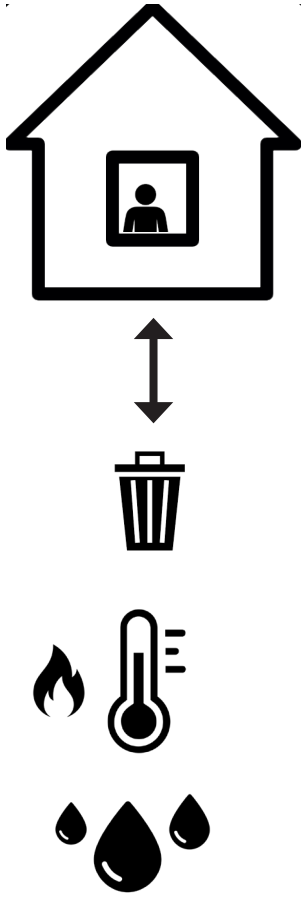
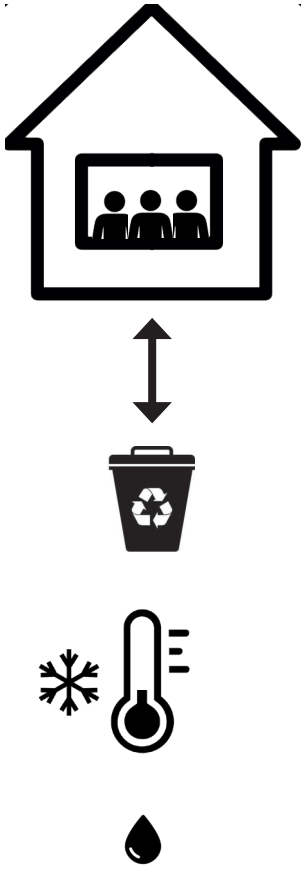
TU Delft

Introduction

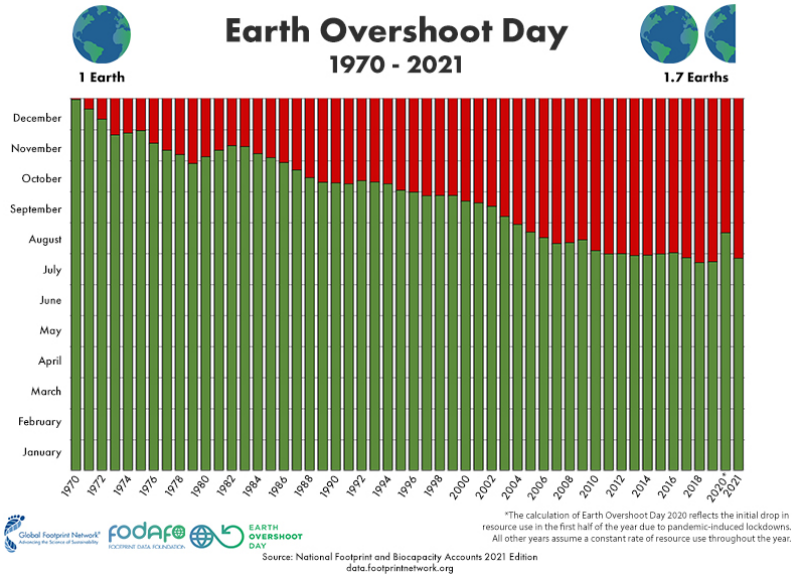
Studio

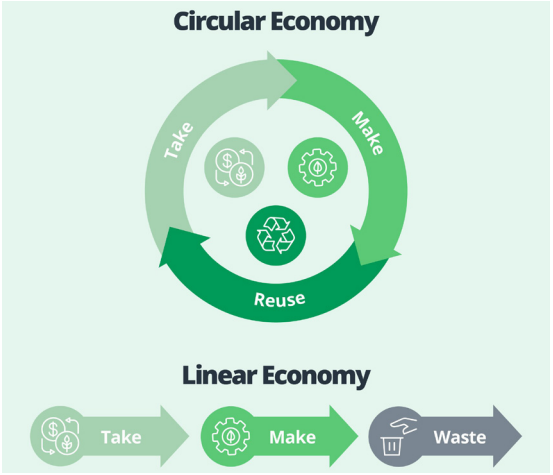


Grouped housing



Problem statement





- Circular Economy requires new behaviours

Main Question: “What is the relation between design and circular behaviour?”

Relevance

Societal:

- Lower environmental impact in user phase
- Easier for people to show circular behaviour
- 56.000kg of waste with two cases, 400 inhabitants
- Transferable and replicable to any other context

Scientific:

- User is not yet the focus in circular economy (Wastling, Charnley & Moreno, 2018)
- Lack of interest from businesses into the daily life practises in a circular economy (Selvefors et al., 2019)

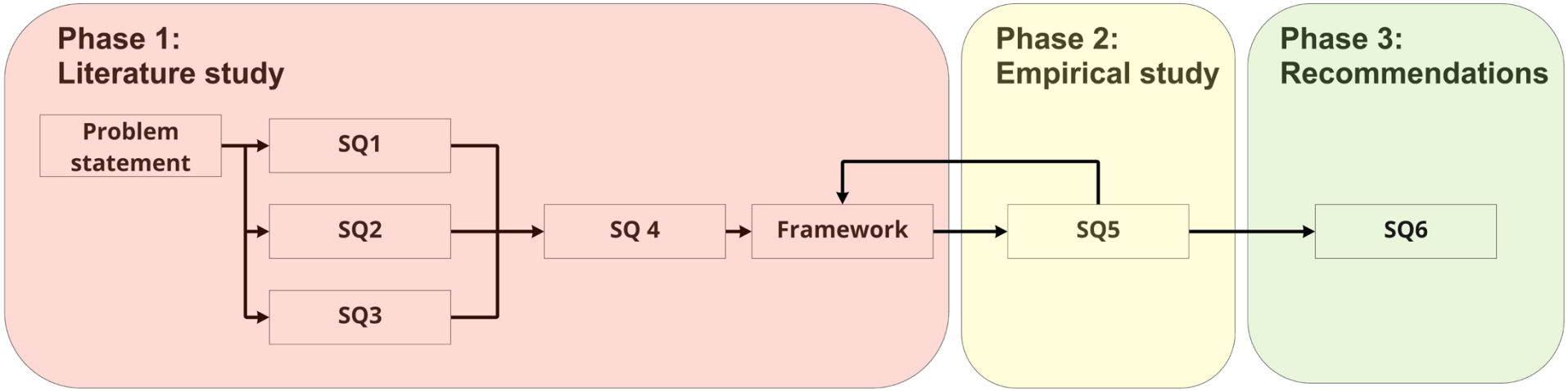
Research output

- Understanding of relation between design and circular behaviour

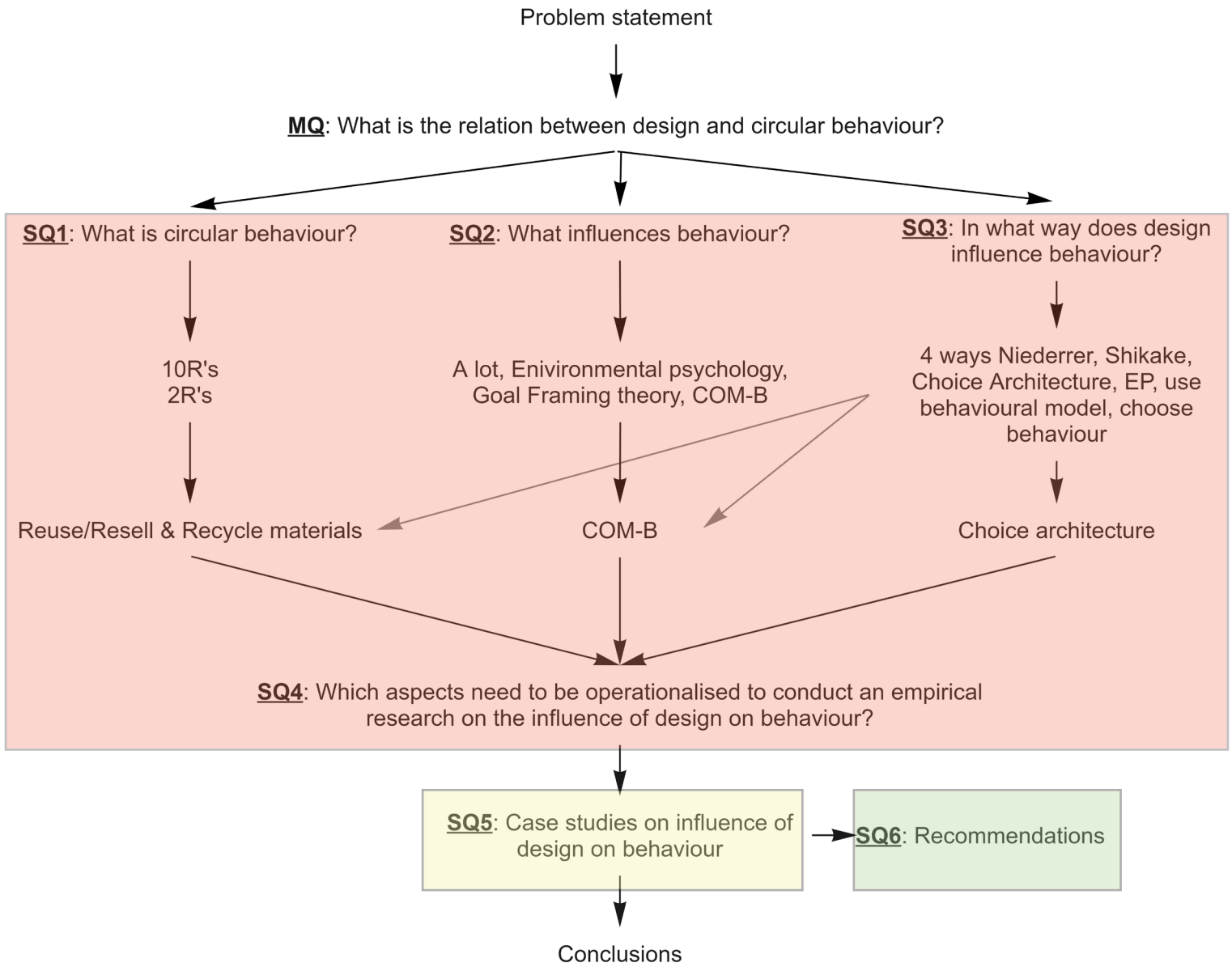
- Ready to use framework and method for researching for any context and behaviour

- Recommendations for the studied cases and in general

Research design



Research questions

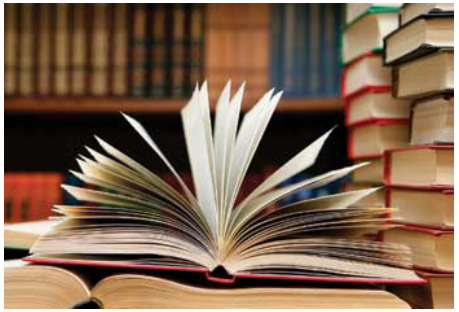


Methodology

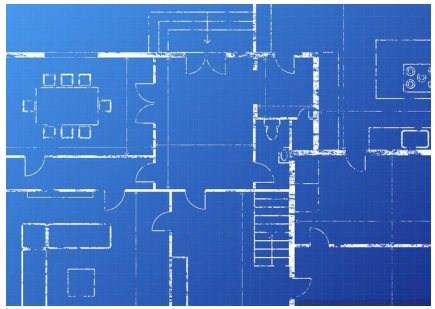
- Qualitative study

- Grounded theory & sensitizing concepts
- Themes as variables

- Document analysis & semi-structured interviews
- Cross case analysis



COM-B aspect	Design aspect	Choice technique	Influence
Capability physical	Distance	B1,B2	
	Weight	B2,B3	
	Accessibility	B2,B3	
	Height	B1,B2	
	Thresholds	B2,B3	
Capability psychological	Difficulty	A1,B2,B3,C1	
	Access to information	A2	
	Reminders	C1	
	Understanding	A1,A2	
Opportunity physical	Availabilty of inanimate objects	B1,B3	
	Duration	B2,B3	
	Costs financial	B2,B4	
	Costs social	B2,B4	
	Distance	B1,B2	
Opportunity social	Rules from organisation	A3,B4,C2	
	Norms	A3	
	Culture	A3	
	Participation	A2,C2	
Motivation reflective	Informing	A1,A2,A3	
	Important factors	depends	
	Reminders	C1	
	Rewards	B4	
	Punishment	B4	
Motivation automatic	Cue's	B1	
	Triggers	B1	
	Direct feedback	B4	
	Stable environment	B1	



COM-B aspect	Design aspect for Recycle Materials	Choice technique	Mijnbouwplein
Capability physical	Accesibility	B2	Present
	Elevator	B2	Present
Capability psychological	Inform about what goes where	A1,A2,B2	Other people
	Reminders to do it	C1	There are bins to separate at the collection point
	Visible	C1,A2	Present
Opportunity physical	Distance to bins	B2	50-90m
	Different bins at home	B1,B2,B3	Not standard, small studio lacks space
	Different bins at the collection point	B1,B2,B3	Present
	Take away the costs such as buy your own bins	B2	Missing
	Capacity bins for building	B2	Paper
	Size of studio	B2	Too small
Opportunity social	People participate collectively	A3,B4,C2	present, not properly, collection point neglected
	Visible culture	A2, C2	Present, collection point out in the open
Motivation reflective	Provide information on impact of recycling materials	A2, B4	Missing
	Reward or punish behaviour	B4	Missing
	Convenience	B2	Depends on location
	Stinking bins	B4	For some interviewees
	Not wanting to put effort	B2	For some interviewees
	No one is forcing	A3,C2	No control
	Roommates do it	A3	-
	Environmental reasons	A2	For most interviewees
Motivation automatic	New location allows for new habits to form	B1	Present

Scope

Context:

- Students living in student housing complexes

    - Accessible data
    - Many students
    - Potential impact
    - High moving frequency

Circular behaviours:

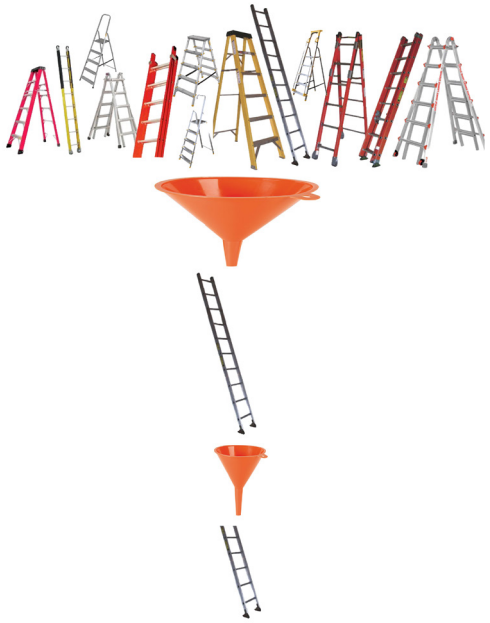
- Reuse and Recycle Materials

    - Potential impact
    - National goals
    - Frequency of behaviour
    - Physical objects needed

Literature research

SQ1: "What is circular behaviour?"

- No consensus, very broad
- Desired behaviour for circular business models
- R ladders (38R's -> 10R)



R0 Refuse
R1 Reduce
R2 Resell/Re-use
R3 Repair
R4 Refurbish
R5 Remanufacture
R6 Repurpose
R7 Recycle Materials
R8 Recover (Energy)
R9 Re-mine

Vermeulen, Reike & Witjes (2018)

PHASE:	USE	END OF USE
User ownership (product orientated)	Establishing relationship	Prolong replacement
	Product care	Return product
	Repair	Sell (via third party)
	Engage with product life extension services	Enable reuse
	Product attachment/ownership	Correct disposal/ recycling
Provider Ownership (use/performance orientated)	Adhere to contractual obligations	
	Product care	Fast circulation of goods
	Engage with product life extension services	Reducing operating costs
	Provide information	
	Avoid Product misuse	
	Avoid Damaging behaviours	

Wastling, Charnley & Moreno (2018)

Literature research

SQ2: “What factors influence behaviour?”

Literature research

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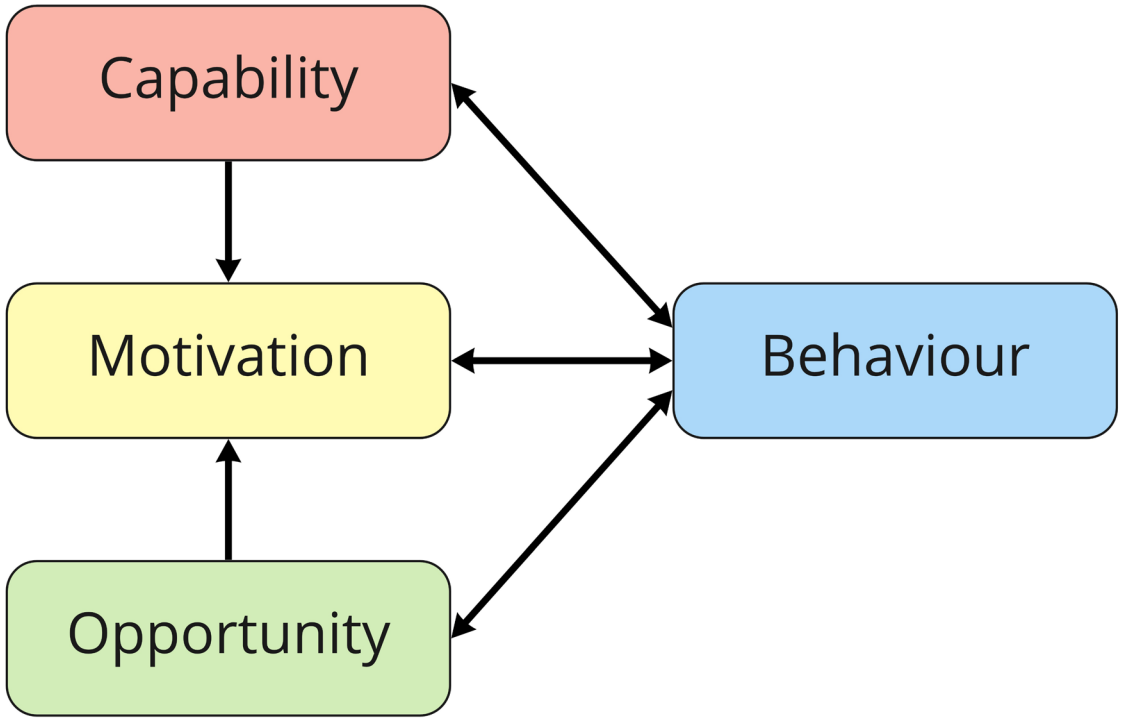
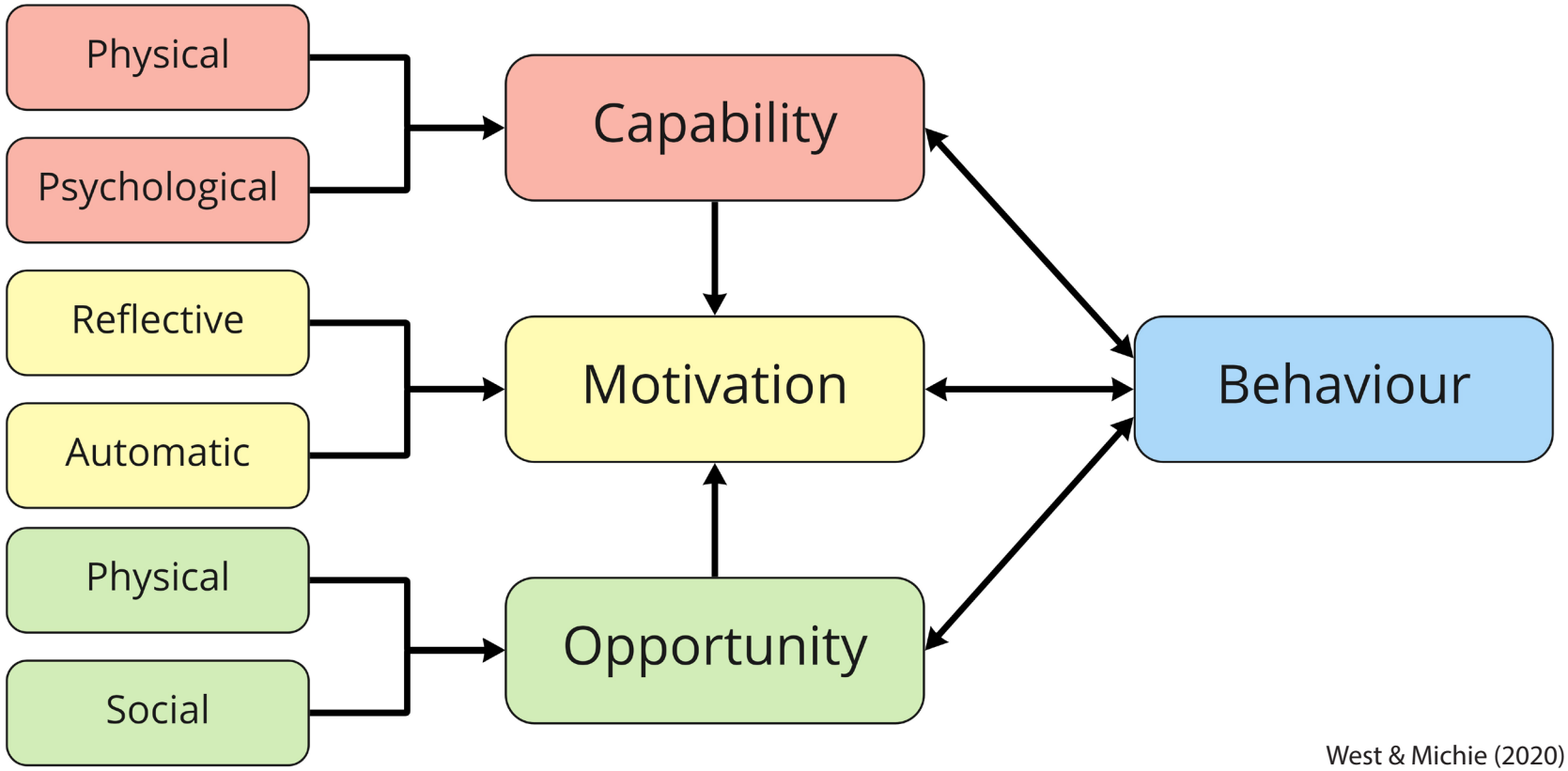


West & Michie (2020)

Literature research

SQ2: “What factors influence behaviour?”



West & Michie (2020)

Literature research

SQ3: “In what way does design influence behaviour?”

4 Main ways:

- Make easier
- Make difficult
- Stimulate
- Refrain

Niedderer et al. (2014)

3 Categories:

- Individual
- Context
- Middleground

Common steps in DfBC:

1. Decide on behaviour
2. Choose behaviour model
3. Research context and user
4. Choose suitable techniques

Matsumura et al., (2014);
Münscher et al., (2015);
Wastling et al. (2018)

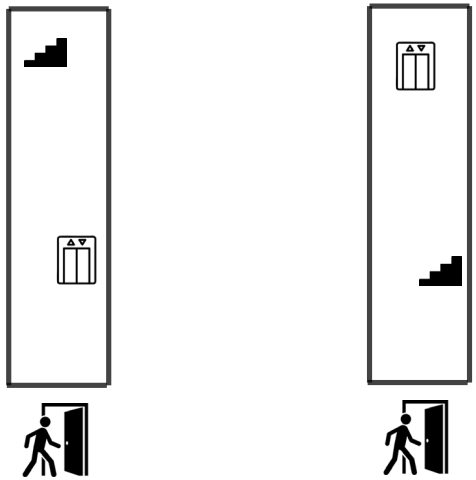
Literature research

SQ3: "In what way does design influence behaviour?"

Category	Technique
A. Decision information	A 1 Translate information *Includes*: *reframe*, *simplify*
	A 2 Make information visible *Includes*: *make own behavior visible (feedback)*, *make external information visible*
	A 3 Provide social reference point *Includes*: *refer to descriptive norm*, *refer to opinion leader*
B. Decision structure	B 1 Change choice defaults *Includes*: *set no-action default*, *use prompted choice*
	B 2 Change option-related effort *Includes*: *increase/decrease physical/ financial effort*
	B 3 Change range or composition of options *Includes*: *change categories*, *change grouping of options*
	B 4 Change option consequences *Includes*: *connect decision to benefit/cost*, *change social consequences of the decision*
C. Decision assistance	C 1 Provide reminders
	C 2 Facilitate commitment *Includes*: *support self-commitment/public commitment*

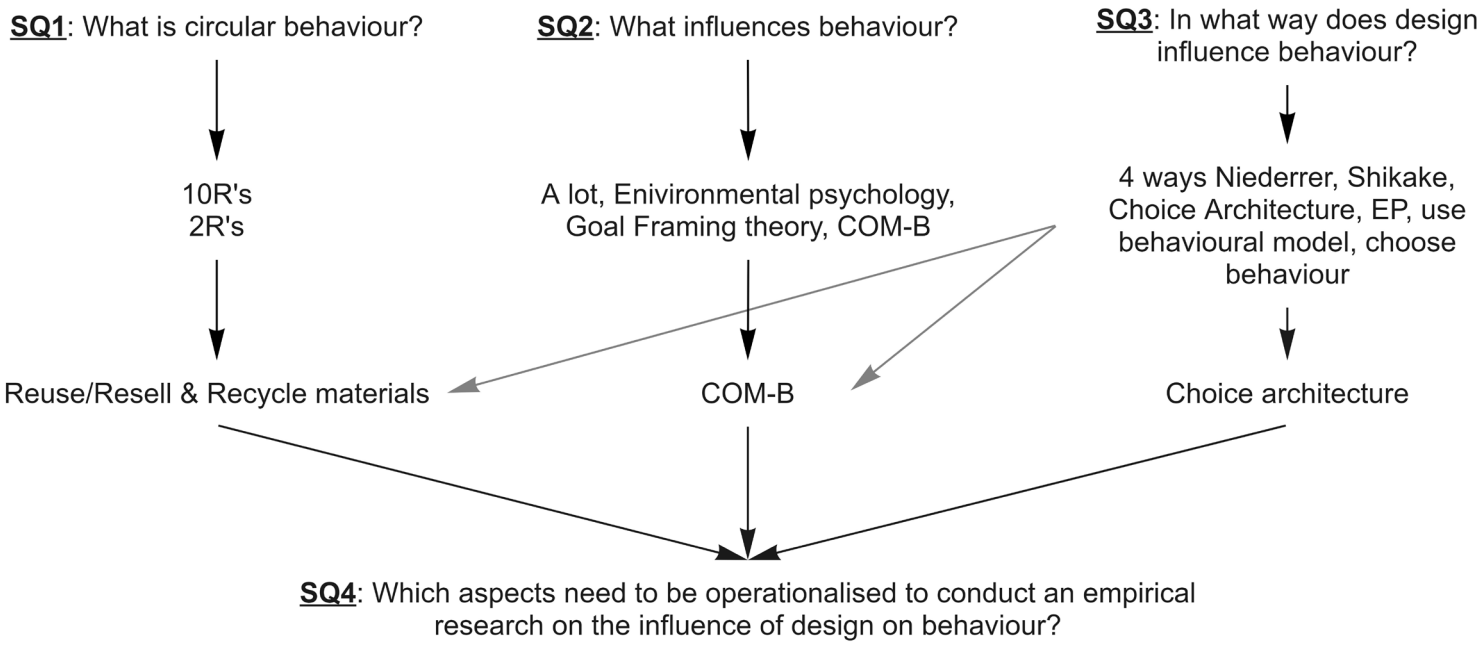
Münscher et al., (2015)

B2: Change option-related effort



Literature research

SQ4: "Which aspects need to be operationalised to conduct an empirical research on the influence of design on behaviour?"



Literature research

SQ4: "Which aspects need to be operationalised to conduct an empirical research on the influence of design on behaviour?"

Choose circular behaviour:

R0 Refuse
R1 Reduce
R2 Resell/Re-use
R3 Repair
R4 Refurbish
R5 Remanufacture
R6 Repurpose
R7 Recycle Materials
R8 Recover (Energy)
R9 Re-mine

Vermeulen et al. (2018)

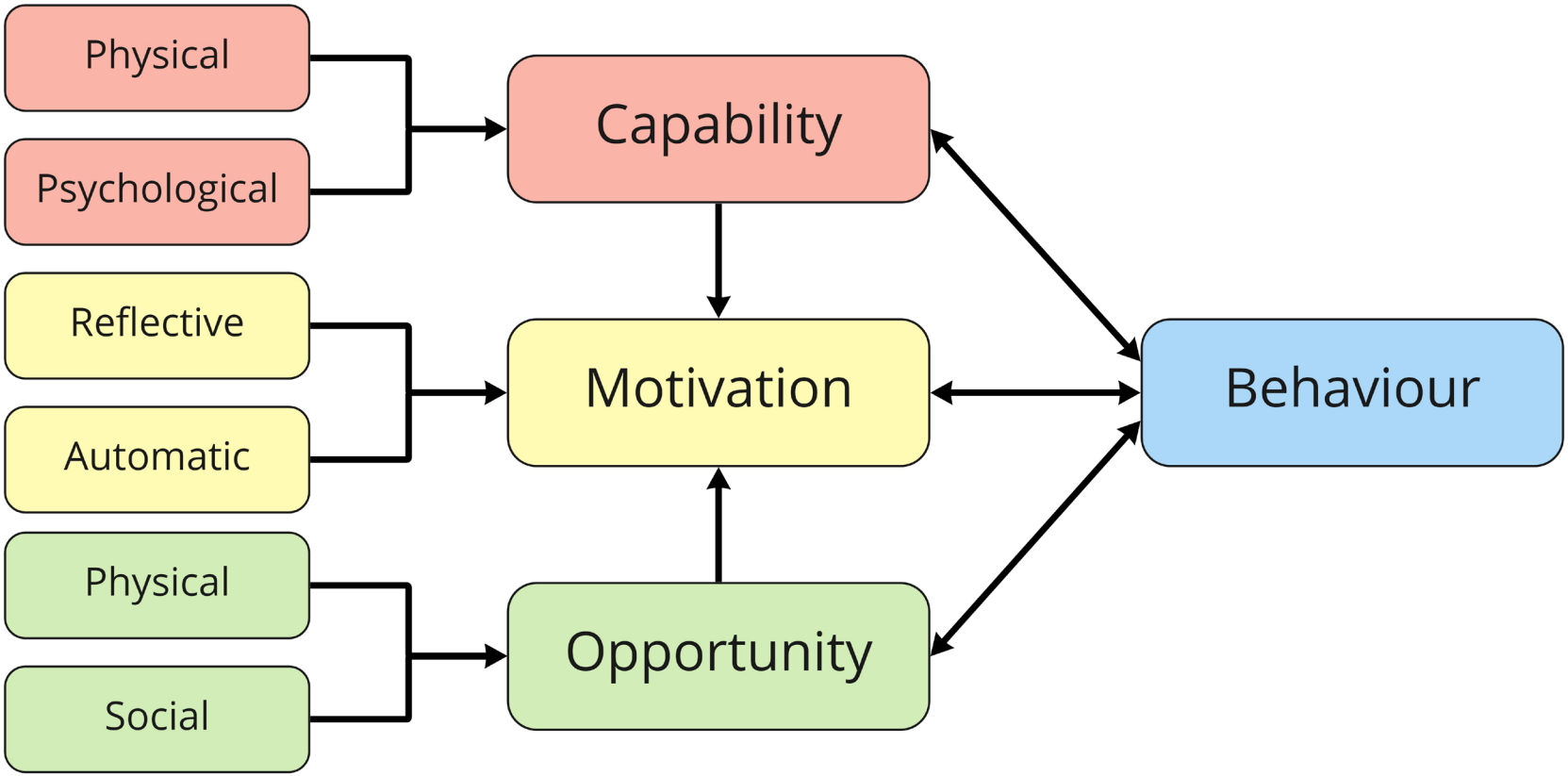
R2 Resell/Re-use

R7 Recycle Materials

Literature research

SQ4: "Which aspects need to be operationalised to conduct an empirical research on the influence of design on behaviour?"

Choose behavioural model:



West & Michie (2020)

Literature research

COM-B aspect	Design aspect
Capability physical	Distance
	Weight
	Accessibility
	Height
	Thresholds

Literature research

COM-B aspect	Design aspect
Capability physical	Distance
	Weight
	Accessibility
	Height
	Thresholds
Capability psychological	Difficulty
	Access to information
	Reminders
	Understanding

Literature research

COM-B aspect	Design aspect
Capability physical	Distance
	Weight
	Accessibility
	Height
	Thresholds
Capability psychological	Difficulty
	Access to information
	Reminders
	Understanding
Opportunity physical	Availability of inanimate objects
	Duration
	Costs financial
	Costs social
	Distance

Literature research

COM-B aspect	Design aspect
Capability physical	Distance
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	Height
	Thresholds
Capability psychological	Difficulty
	Access to information
	Reminders
	Understanding
Opportunity physical	Availability of inanimate objects
	Duration
	Costs financial
	Costs social
	Distance
Opportunity social	Rules from organisation
	Norms
	Culture
	Participation

Literature research

COM-B aspect	Design aspect
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	Costs financial
	Costs social
	Distance
Opportunity social	Rules from organisation
	Norms
	Culture
	Participation
Motivation reflective	Informing
	Important factors
	Reminders
	Rewards
	Punishment

Literature research

COM-B aspect	Design aspect
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	Understanding
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Opportunity social	Rules from organisation
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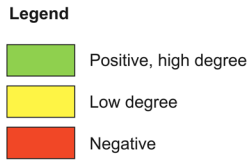
	Participation
Motivation reflective	Informing
	Important factors
	Reminders
	Rewards
	Punishment
Motivation automatic	Cue's
	Triggers
	Direct feedback
	Stable environment

Literature research

COM-B aspect	Design aspect
Capability physical	Distance
	Weight
	Accessibility
	Height
	Thresholds
Capability psychological	Difficulty
	Access to information
	Reminders
	Understanding
Opportunity physical	Availability of inanimate objects
	Duration
	Costs financial
	Costs social
	Distance
Opportunity social	Rules from organisation
	Norms
	Culture
	Participation
Motivation reflective	Informing
	Important factors
	Reminders
	Rewards
	Punishment
Motivation automatic	Cue's
	Triggers
	Direct feedback
	Stable environment

Capability physical	Behaviour Y
Distance	5m
Weight	100kg
Accessibility	Not wheelchair accesible
Height	1m
Thresholds	Staircase



Literature research

Category	Technique
A. Decision information	A 1 Translate information *Includes*: *reframe*, *simplify* A 2 Make information visible *Includes*: *make own behavior visible (feedback)*, *make external information visible* A 3 Provide social reference point *Includes*: *refer to descriptive norm*, *refer to opinion leader*
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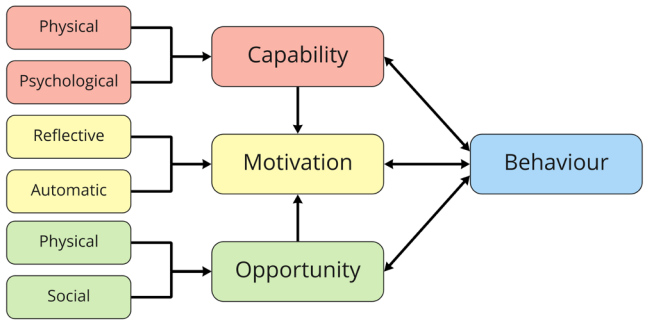
Münscher et al., (2015)



West & Michie (2020)

COM-B subcategory	Choice architecture technique
Capability physical	B1, B2, B3
Capability psychological	A1, A2, B1, B2, C1
Opportunity physical	B1, B2, B3, B4
Opportunity social	A2, A3, B4, C1, C2
Motivation reflective	A1, A2, A3, B2, B3, B4, C1, C2
Motivation automatic	A2, B4, C1

Own creation

Literature research

General

COM-B aspect	Design aspect	Choice technique	Influence
Capability physical	Distance	B1,B2	
	Weight	B2,B3	
	Accessibility	B2,B3	
	Height	B1,B2	
	Thresholds	B2,B3	
Capability psychological	Difficulty	A1,B2,B3,C1	
	Access to information	A2	
	Reminders	C1	
	Understanding	A1,A2	
Opportunity physical	Availability of inanimate objects	B1,B3	
	Duration	B2,B3	
	Costs financial	B2,B4	
	Costs social	B2,B4	
	Distance	B1,B2	
Opportunity social	Rules from organisation	A3,B4,C2	
	Norms	A3	
	Culture	A3	
	Participation	A2,C2	
Motivation reflective	Informing	A1,A2,A3	
	Important factors	depends	
	Reminders	C1	
	Rewards	B4	
	Punishment	B4	
Motivation automatic	Cue's	B1	
	Triggers	B1	
	Direct feedback	B4	
	Stable environment	B1	

Literature research

General

COM-B aspect	Design aspect	Choice technique	Influence
Capability physical	Distance	B1,B2	
	Weight	B2,B3	
	Accessibility	B2,B3	
	Height	B1,B2	
	Thresholds	B2,B3	
Capability psychological	Difficulty	A1,B2,B3,C1	
	Access to information	A2	
	Reminders	C1	
	Understanding	A1,A2	
Opportunity physical	Availability of inanimate objects	B1,B3	
	Duration	B2,B3	
	Costs financial	B2,B4	
	Costs social	B2,B4	
	Distance	B1,B2	
Opportunity social	Rules from organisation	A3,B4,C2	
	Norms	A3	
	Culture	A3	
	Participation	A2,C2	
Motivation reflective	Informing	A1,A2,A3	
	Important factors	depends	
	Reminders	C1	
	Rewards	B4	
	Punishment	B4	
Motivation automatic	Cue's	B1	
	Triggers	B1	
	Direct feedback	B4	
	Stable environment	B1	

Reuse

COM-B subcategory	Design aspect	Choice technique
Capability physical	make it easier or more difficult	B2
	Proximity	B1,B2
	Elevator	B2
Capability psychological	Explain how	A2
	Reminders at waste collection	C1
	Clear rules	A2
	Make it visible	A2
	Awareness of digital platform	A2
Opportunity physical	Place to offer items	B1, B3
	Short process and short distance	B2
	low cost or free	B2
Opportunity social	People participate collectively	A3
	Create zero waste norm	A3,B4,C2
	It is allowed by the organisation	B4,C2
	Make culture visible	A2, C2
	Stimulate culture of reuse	A3,C2
Motivation reflective	Provide information on impact of reuse	A1,A2,B4
	Important factors that influence motivation	Depends
	Make it visible	C1,A2
	Remove thresholds	B1,B2,B4
Motivation automatic	Trigger for reuse on the route to garbage collection point	A1,C1
	Offer direct reward for reuse	B4
	New location allows for new habits to form	B1

Recycle Materials

COM-B subcategory	Aspect for Recycle materials	Choice technique
Capability physical	Accesibility	B2
Capability psychological	Inform about what goes where	A1,A2,B2
	Reminders to do it	C1
Opportunity physical	Distance to bins	B2
	Different bins at home	B1,B2,B3
	Different bins at the collection point	B1,B2,B3
	Take away the costs such as buy your own bins	B2
Opportunity social	People participate collectively	A3,B4,C2
	Visible culture	A2, C2
Motivation reflective	Provide information on impact of recycling materials	A2, B4
	Important factors that influence motivation	Depends
	Reward or punish behaviour	B4
Motivation automatic	New location allows for new habits to form	B1

Literature research

General

COM-B aspect	Design aspect	Choice technique	Influence
Capability physical	Distance	B1,B2	
	Weight	B2,B3	
	Accessibility	B2,B3	
	Height	B1,B2	
	Thresholds	B2,B3	
Capability psychological	Difficulty	A1,B2,B3,C1	
	Access to information	A2	
	Reminders	C1	
	Understanding	A1,A2	
Opportunity physical	Availability of inanimate objects	B1,B3	
	Duration	B2,B3	
	Costs financial	B2,B4	
	Costs social	B2,B4	
	Distance	B1,B2	
Opportunity social	Rules from organisation	A3,B4,C2	
	Norms	A3	
	Culture	A3	
	Participation	A2,C2	
Motivation reflective	Informing	A1,A2,A3	
	Important factors	depends	
	Reminders	C1	
	Rewards	B4	
	Punishment	B4	
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	Triggers	B1	
	Direct feedback	B4	
	Stable environment	B1	

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COM-B subcategory	Design aspect	Choice technique
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	Elevator	B2
Capability psychological	Explain how	A2
	Reminders at waste collection	C1
	Clear rules	A2
	Make it visible	A2
	Awareness of digital platform	A2
Opportunity physical	Place to offer items	B1, B3
	Short process and short distance	B2
	low cost or free	B2
Opportunity social	People participate collectively	A3
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	Take away the costs such as buy your own bins	B2
Opportunity social	People participate collectively	A3,B4,C2
	Visible culture	A2, C2
Motivation reflective	Provide information on impact of recycling materials	A2, B4
	Important factors that influence motivation	Depends
	Reward or punish behaviour	B4
Motivation automatic	New location allows for new habits to form	B1

Empirical research

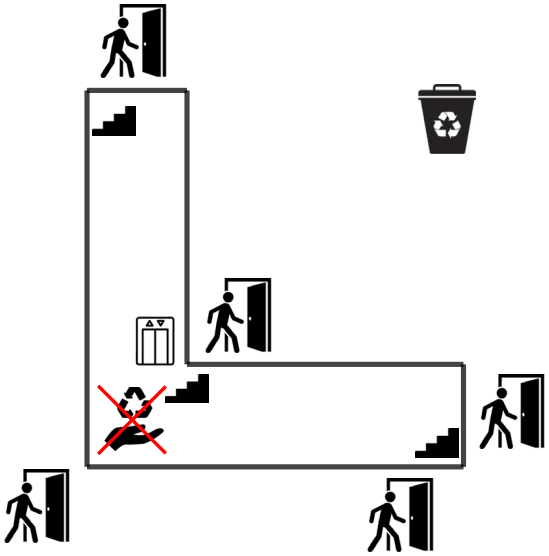
SQ5: "What influence do designs have on the circular behaviours of Reuse and Recycle Materials on inhabitants in current practice in student housing complexes?".

- 2 Cases
- 2 Behaviours
- Document analysis
- User research, semi-structured interviews
- Cross case analysis

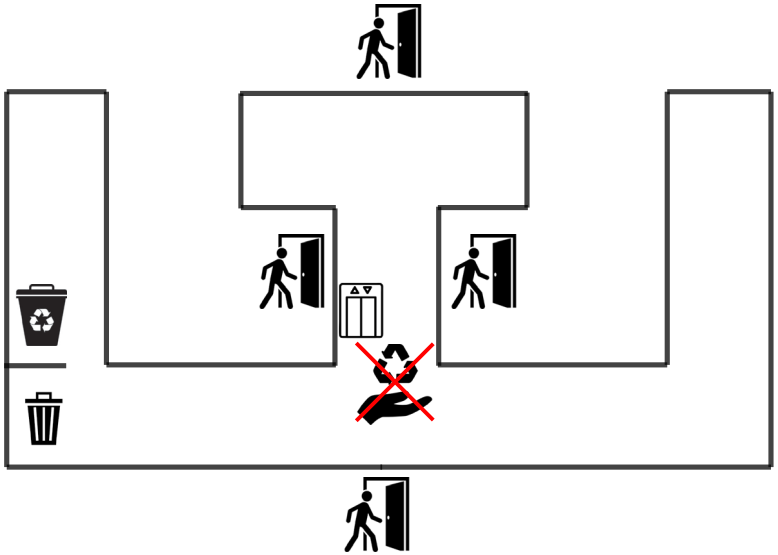
Empirical research

Document analysis

Case A



Case B



Empirical research - Reuse - Cross case analysis

COM-B aspect	Design aspect for Reuse	Choice technique	Case A	Case B
Capability physical	Difficulty	B2	Easy	Easier, trolley
	Proximity	B1,B2	Central location	Central location
	Elevator	B2	Present	Present
Capability psychological	Explain how	A2	Advertisement, vague for entrance	Advertisement, vague for entrance
	Reminders at waste collection	C1	Stimulating to throw away	Option to offer potential reuse next to waste collection
	Clear rules	A2	Prohibited at entrance, but people do it anyways, drop-off, mayhem	Prohibited, but people do it anyways, drop-off
	Visible	A2	prohibited, but visible	prohibited, but visible
	Awareness of digital platform	A2	Not all interviewees know about facebook group	present
	Note that you can take it	A2	-	Sometimes
Opportunity physical	Place to offer items	B1, B3	Advertisement, Entrance but not clear	Advertisement, Entrance but not clear
	Short process and short distance	B2	present, max 75m	present, at the entrance
	low cost or free	B2	joint costs, free placing	joint costs, free placing
	Advertisement for next tenant	A2,C1	Present	Present
Opportunity social	People participate collectively	A3	Present	Present
	It is allowed by the organisation	B4,C2	When moving, but prohibited at entrace, but people do it anyways	When moving, but prohibited at entrace, but people do it anyways
	Make culture visible	A2, C2	Present	Present
	Contact with previous and next tenants	A2	Present	Present
Motivation reflective	Provide information on impact of reuse	A1,A2,B4	Missing	Missing
	Make it visible	C1,A2	Present	Present
	Low costs	B2	Present	Present
	Hygiene	-	Depends on item	Depends on item
	Convenience	B2	Present	Present
	Moving to studio needs more things	B1,B3	Present	Present
	Good quality items	-	Depends on person and object	Depends on person and object
Motivation automatic	Trigger for reuse on the route to garbage collection point	A1,C1	Depends on route	Present
	Offer direct reward for reuse	B4	Missing	Missing
	New location allows for new habits to form	B1	Present	Present

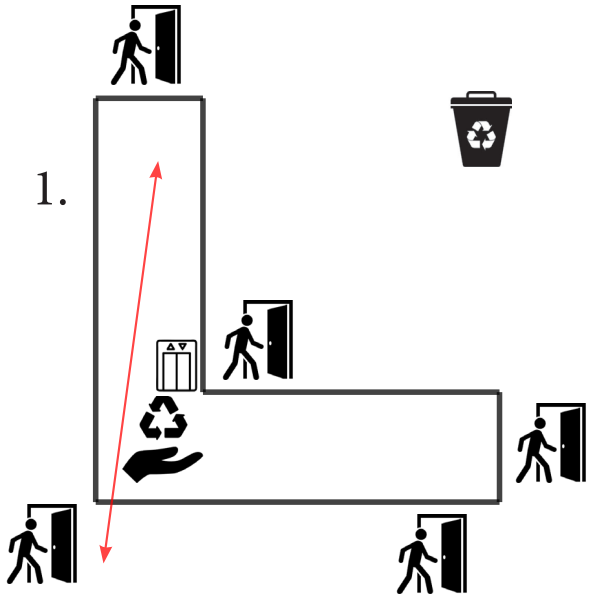
Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Reuse - Case A

Interviewee 1 Reuse

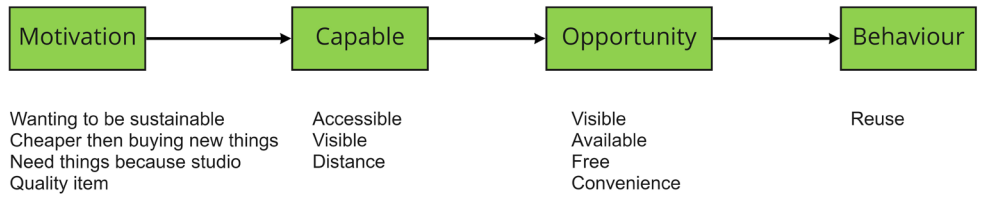
Motivation	Capable	Opportunity	Behaviour
Wanting to be sustainable Cheaper then buying new things Need things because studio Quality item	Accessible Visible Distance	Visible Available Free Convenience	Reuse



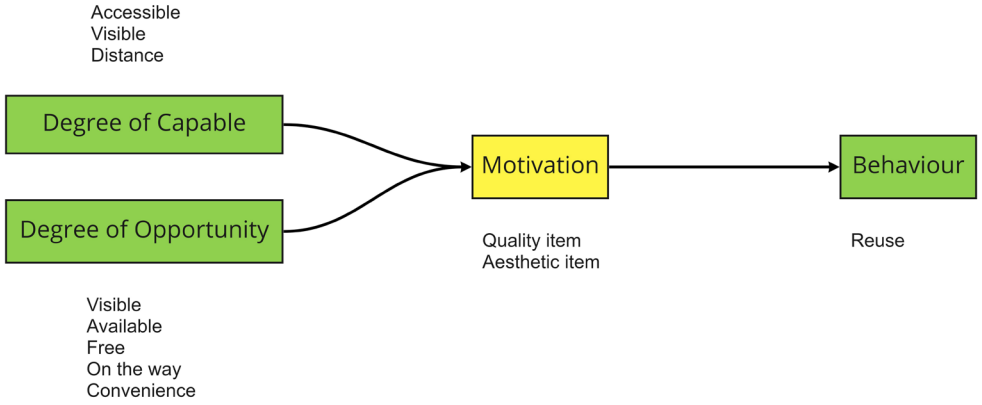
Legend

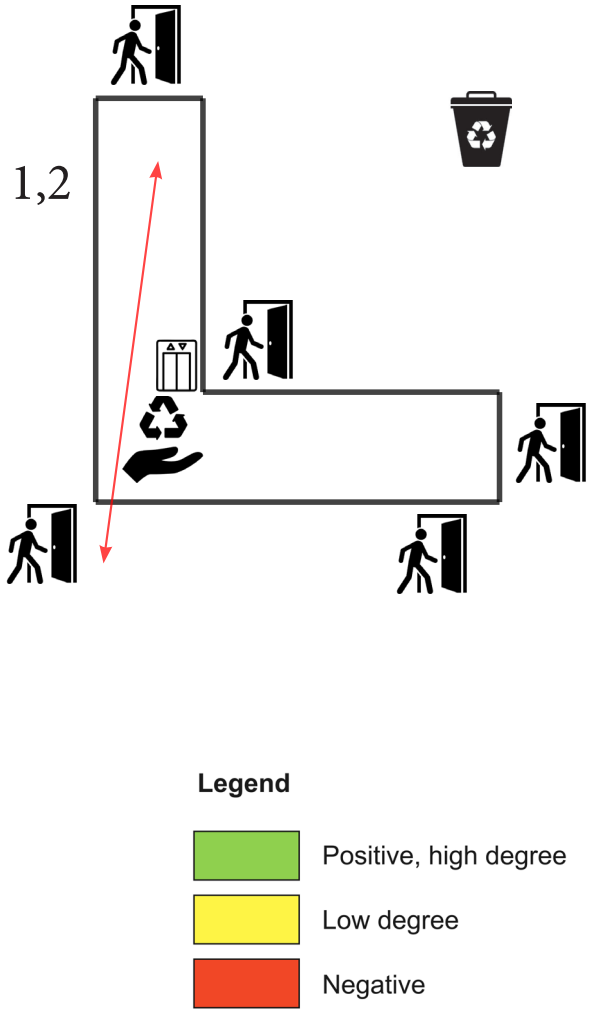
- Positive, high degree
- Low degree
- Negative

Interviewee 1 Reuse

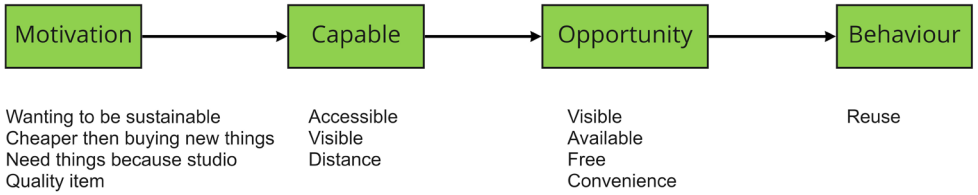


Interviewee 2 Reuse

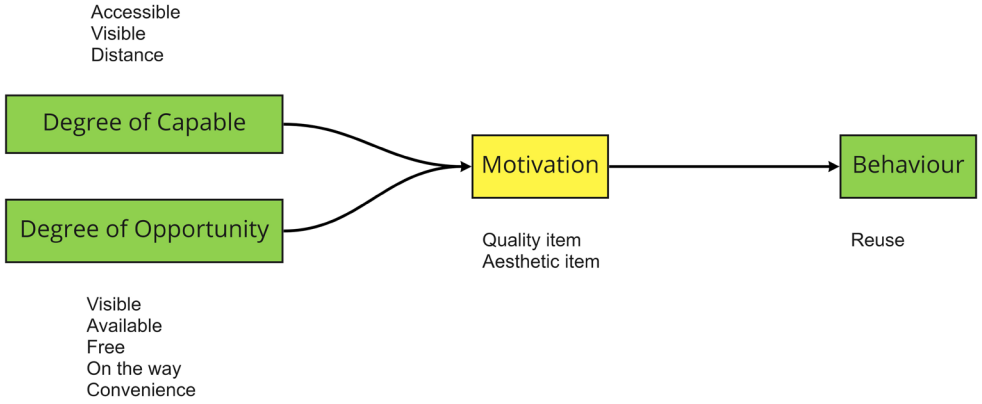




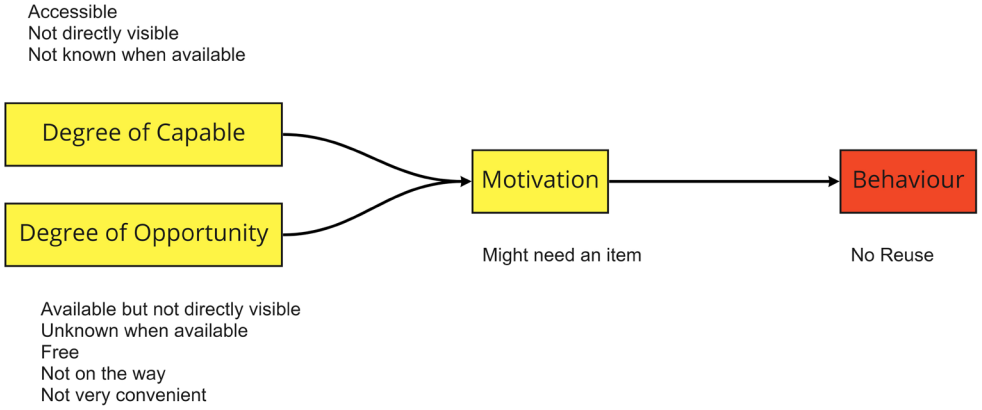
Interviewee 1 Reuse

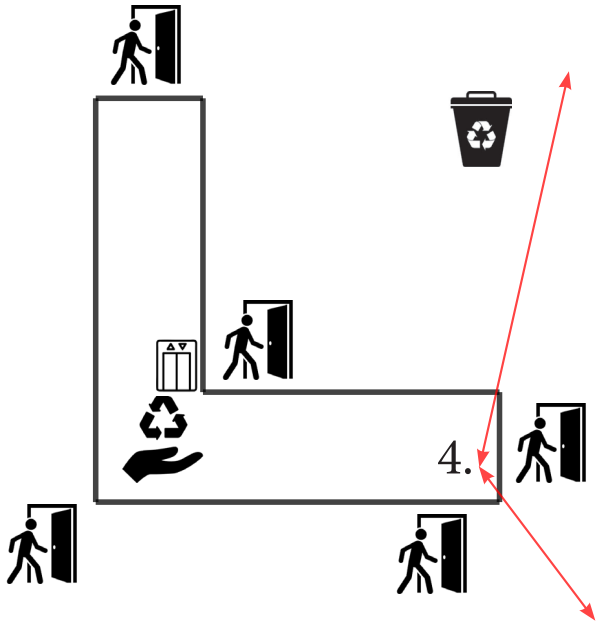


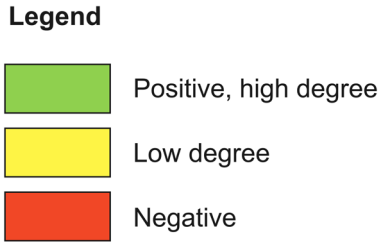
Interviewee 2 Reuse



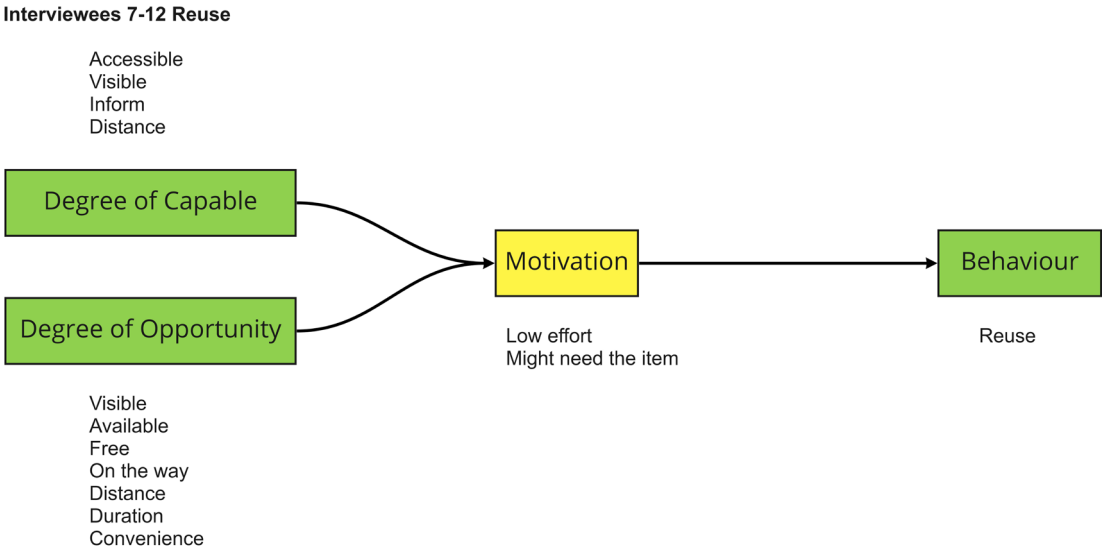
Interviewee 4 Reuse

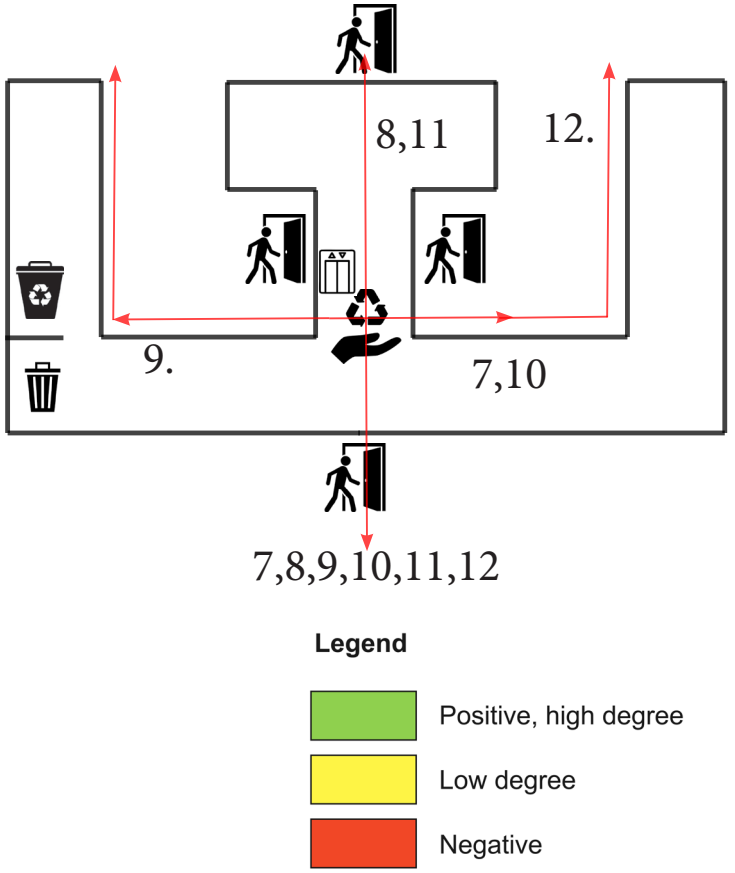






Empirical research - Reuse - Case B





Empirical research - Reuse - Cross case analysis

Case A

Interviewee 2 Reuse

Accessible
Visible
Distance

Degree of Capable
Degree of Opportunity
Motivation
Behaviour

Quality item
Aesthetic item

Reuse

Visible
Available
Free
On the way
Convenience

Interviewee 4 Reuse

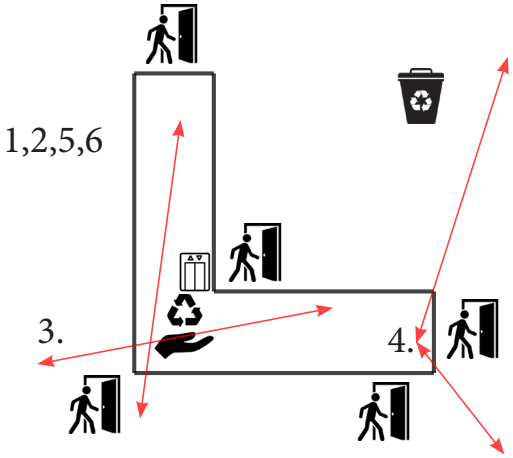
Accessible
Not directly visible
Not known when available

Degree of Capable
Degree of Opportunity
Motivation
Behaviour

Might need an item

No Reuse

Available but not directly visible
Unknown when available
Free
Not on the way
Not very convenient



Case B

Interviewees 7-12 Reuse

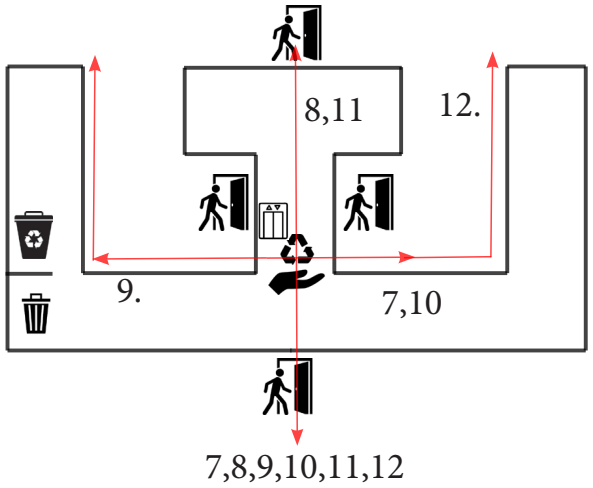
Accessible
Visible
Inform
Distance

Degree of Capable
Degree of Opportunity
Motivation
Behaviour

Low effort
Might need the item

Reuse

Visible
Available
Free
On the way
Distance
Duration
Convenience



Empirical research - Recycle materials - Cross case

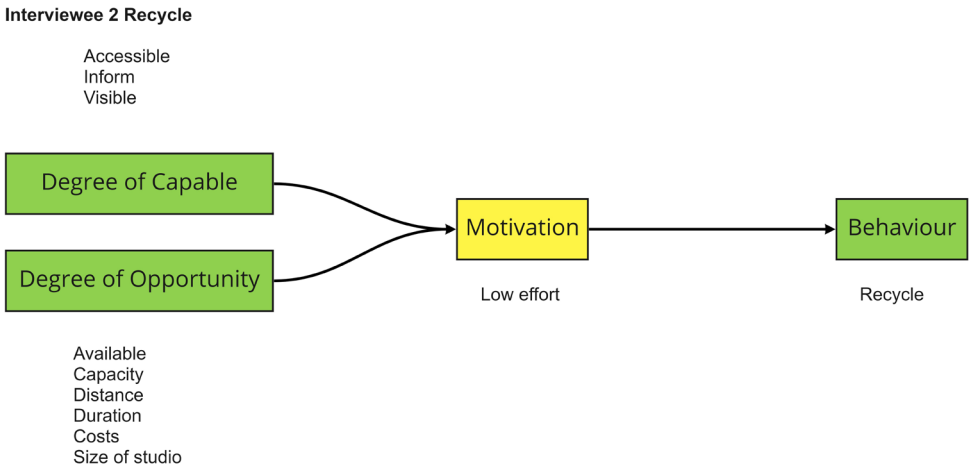
COM-B aspect	Design aspect for Recycle Materials	Choice technique	Case A	Case B
Capability physical	Accesibility	B2	Present	Present
	Elevator	B2	Present	Present
Capability psychological	Inform about what goes where	A1,A2,B2	Other people	Roommates, other people
	Reminders to do it	C1	There are bins to separate at the collection point	There are bins to separate at the collection point
	Visible	C1,A2	Present	In a seperate room that is hidden
Opportunity physical	Distance to bins	B2	50-90m	45m-125m
	Different bins at home	B1,B2,B3	Not standard, small studio lacks space	In group housing yes, studio missing, small studio lacks space
	Different bins at the collection point	B1,B2,B3	Present	Present, but hidden
	Take away the costs such as buy your own bins	B2	Missing	Missing
	Capacity bins for building	B2	Paper	Glass
	Size of studio	B2	Too small	Too small
Opportunity social	People participate collectively	A3,B4,C2	present, not properly, collection point neglected	Present
	Visible culture	A2, C2	Present, collection point out in the open	Collection point hidden
Motivation reflective	Provide information on impact of recycling materials	A2, B4	Missing	Missing
	Reward or punish behaviour	B4	Missing	Missing
	Convenience	B2	Depends on location	Bins always available
	Stinking bins	B4	For some interviewees	Not mentioned
	Not wanting to put effort	B2	For some interviewees	Not separating all waste
	No one is forcing	A3,C2	No control	Unclear
	Roommates do it	A3	-	For group housing
	Environmental reasons	A2	For most interviewees	For most interviewees
Motivation automatic	New location allows for new habits to form	B1	Present	Present

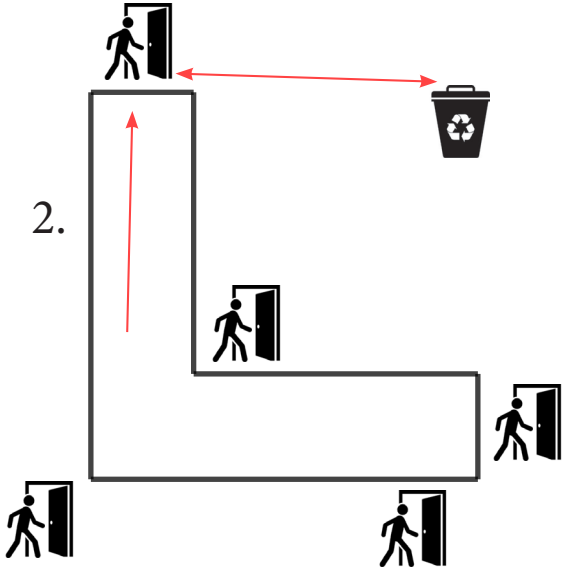


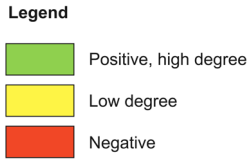
Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Recycle materials - Case A



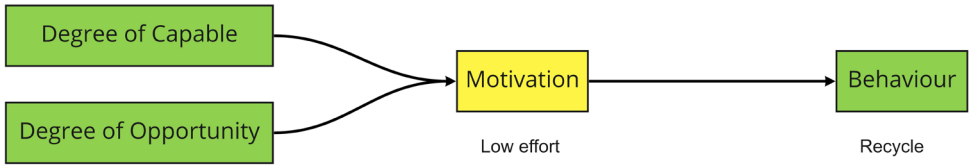




Empirical research - Recycle materials - Case A

Interviewee 2 Recycle

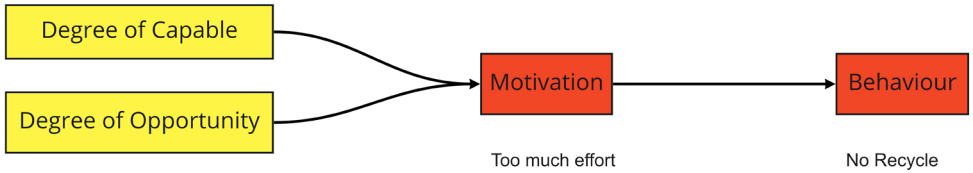
Accessible
Inform
Visible



Available
Capacity
Distance
Duration
Costs
Size of studio

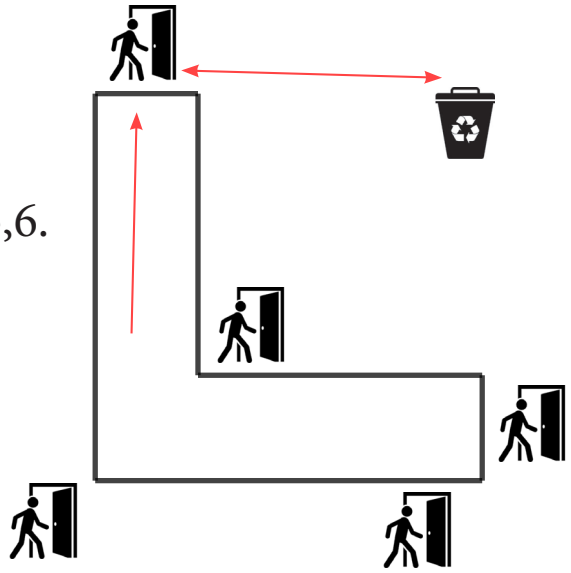
Interviewee 5 & 6 Recycle

Accessible
Not informed
Visible
Distance is too far



Available at collection
Not available at home
Distance is too far
It is not convenient
It is not on the way
Size of studio

5,6.



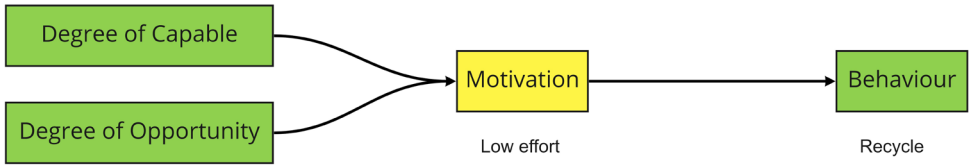
Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Recycle materials - Case A

Interviewee 2 Recycle

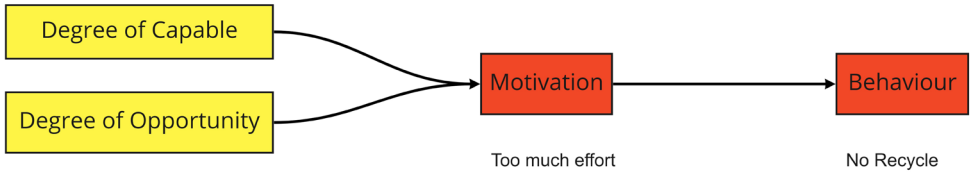
Accessible
Inform
Visible



Available
Capacity
Distance
Duration
Costs
Size of studio

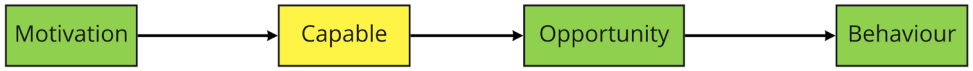
Interviewee 5 & 6 Recycle

Accessible
Not informed
Visible
Distance is too far



Available at collection
Not available at home
Distance is too far
It is not convenient
It is not on the way
Size of studio

Interviewee 3 Recycle

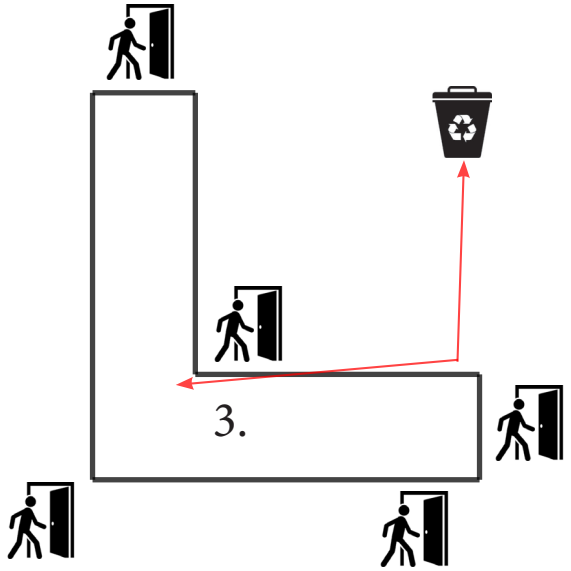


Environment
Impact
Norms
Values

Accessible
Not Informed

Available
"No" organic bin
Distance
Duration

Recycle
but not organic



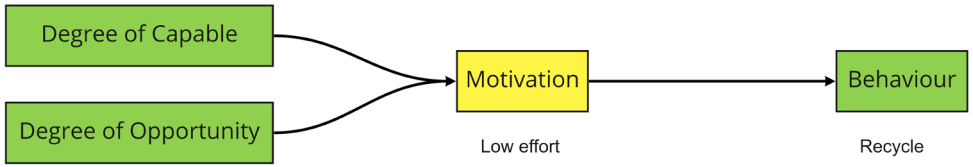
Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Recycle materials - Case A

Interviewee 2 & 4 **Recycle**

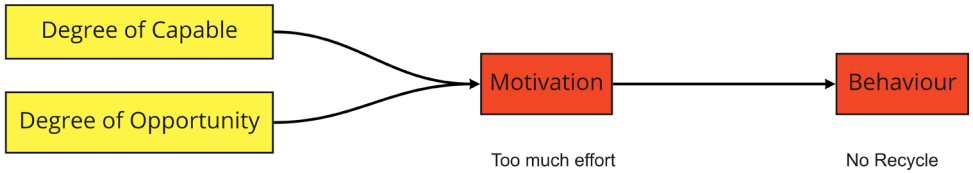
Accessible
Inform
Visible



Available
Capacity
Distance
Duration
Costs
Size of studio

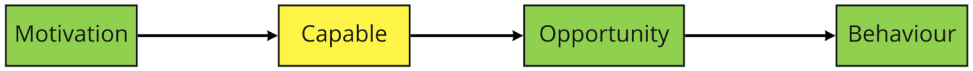
Interviewee 5 & 6 Recycle

Accessible
Not informed
Visible
Distance is too far



Available at collection
Not available at home
Distance is too far
It is not convenient
It is not on the way
Size of studio

Interviewee 3 Recycle

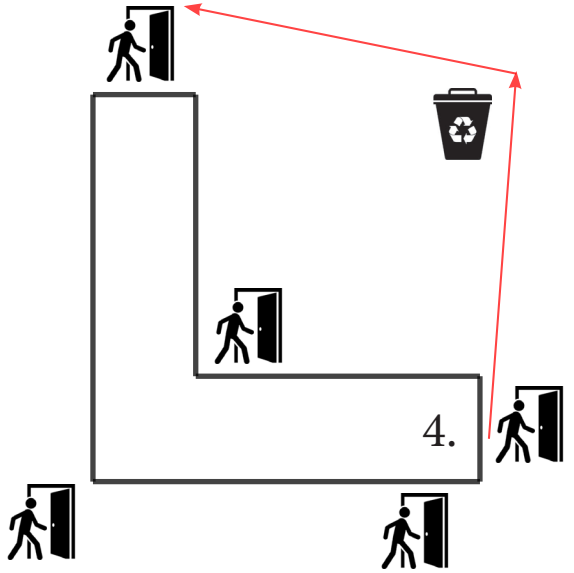


Environment
Impact
Norms
Values

Accessible
Not Informed

Available
"No" organic bin
Distance
Duration

Recycle
but not organic



Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Recycle materials - Case B

Interviewee 8 & 11 Recycle

Accessible
Informed by roommates

Degree of Capable

Degree of Opportunity

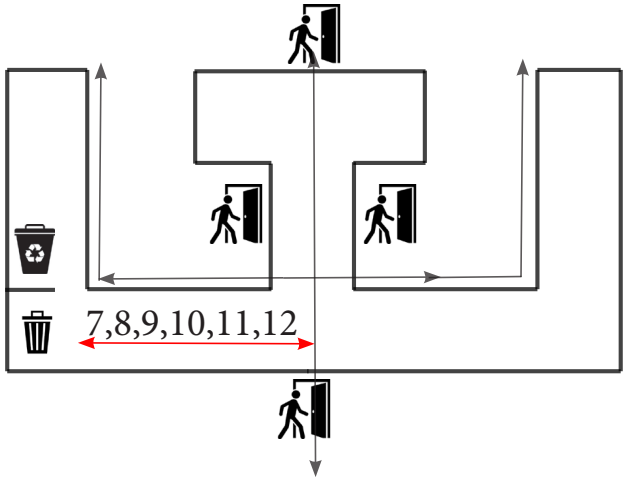
Available at home
Available in building
Distance
Duration

Motivation

Low effort
House does it so do they

Behaviour

Recycle



Legend

- Positive, high degree
- Low degree
- Negative

Empirical research - Recycle materials - Case B

Interviewee 8 & 11 Recycle

Accessible
Informed by roommates

Degree of Capable

Degree of Opportunity

Motivation

Behaviour

Low effort
House does it so do they

Recycle

Available at home
Available in building
Distance
Duration

Interviewee 7 Recycle

Motivation → Capable → Opportunity → Behaviour

Environment
Impact
Norms
Values

Accessible
Not informed

Available every day
Distance
Duration
Not GFT

Recycles, but not PMD and GFT

Interviewee 9 Recycle

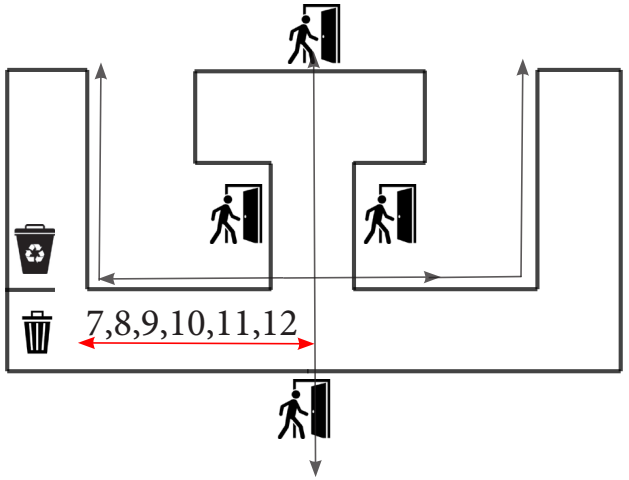
Motivation → Capable → Opportunity → Behaviour

Environment
Impact
Norms
Values

Accessible
Not very visible
Not informed
Learned from others

Available every day
Small room difficult to make own bins
Convenience of building

Recycles

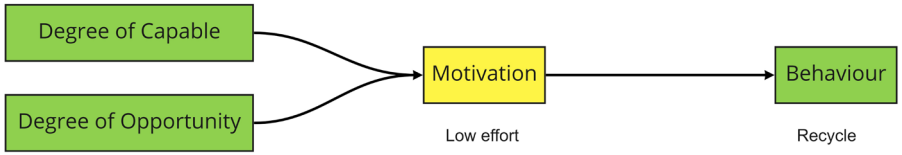


Legend

- Positive, high degree
- Low degree
- Negative

Interviewee 2 Recycle

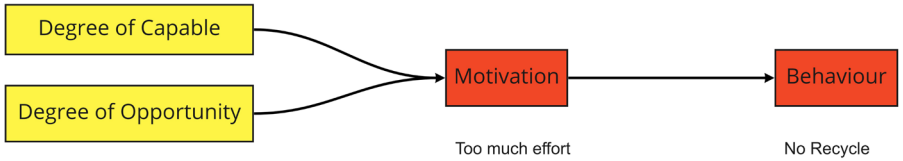
Accessible
Inform
Visible



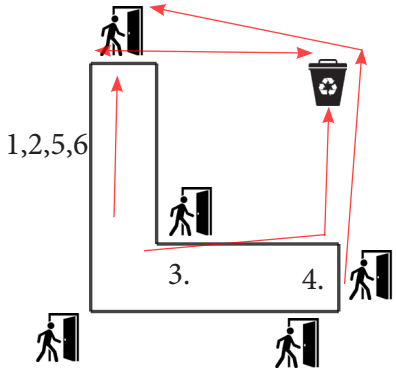
Available
Capacity
Distance
Duration
Costs
Size of studio

Interviewee 5 & 6 Recycle

Accessible
Not informed
Visible
Distance is too far

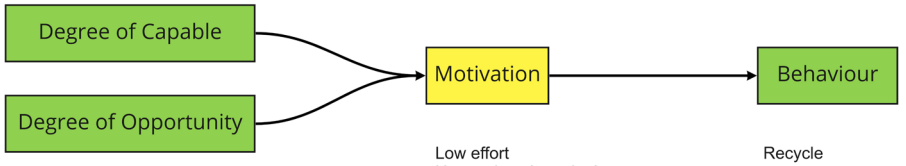


Available at collection
Not available at home
Distance is too far
It is not convenient
It is not on the way
Size of studio



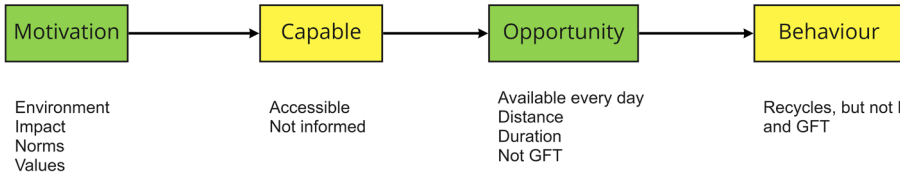
Interviewee 8 & 11 Recycle

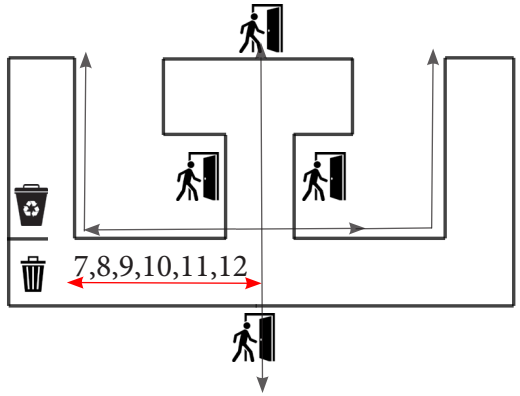
Accessible
Informed by roommates



Available at home
Available in building
Distance
Duration

Interviewee 7 Recycle





Recommendations

General recommendations:
- Facilitate and inform
- High degree of capability and opportunity
- Also impact motivation

Design principles:
- Distance
- Availability
- Duration
- Accessibility
- Visibility
- Convenience
- Costs
- Informing

Behaviour is complex:
- Specify behaviour
- Research context and users

Specific for Reuse:
- Visibility
- Convenience
- On the way
- Near your home
- Clear rules
- Trolley and Elevator

Specific for Recycle Materials:
- Availability at home
- Availability at building
- Informing
- Visibility
- On the way

Conclusion

- Design has influence on behaviour in multiple ways

- Make it possible or impossible, degree

- Not all aspects can be influenced by design

- Many aspects can be mapped with the framework

Discussion and limitations

- Findings are specific for cases, might be transferable

- Interviewees might not provide true data

- Low amount of interviews, not yet saturated findings

- Interview on rational, conscious process, not habits

- Different perceptions of people

Future research

- More cases

- Different contexts

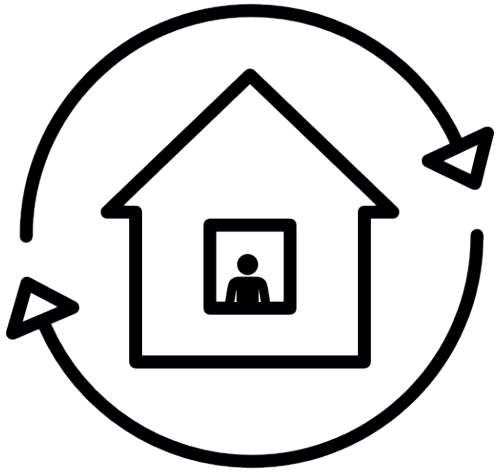
- Different behaviours

- Measure the weight of different aspects

- Feasibility, costs and benefits

THE NEXT STEP IN CIRCULAR HOUSING

An exploratory user-centred research into the relationship between design and circular behaviour of students living in student housing complexes.



Final graduation presentation
Friday, 1st of July, 2022
12:45-14:30

Management in the Built Environment, Delft University of Technology 21/22

Teun Lagestee (4443543) T.Lagestee@student.tudelft.nl

TU Delft