

Which are the most relevant factors affecting households' investment decisions toward the energy transition?

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Introduction

- The energy transition lays on the shoulders of households.
- Families, in general, are not characterized by taking rational decisions.
 - The resource man [1] is how most people think.
 - Hence, household-related behaviours are unsuitable for traditional models [2].
- Investment decisions towards the energy transition is no different.
 - Therefore, a different approach with different lenses is needed.

[1] Strengers, Y. (2014). Smart energy in everyday life: are you designing for resource man?. interactions, 21(4), 24-31.

[2] Scott, J. (2000). Rational choice theory. Understanding contemporary society: Theories of the present, 129, 671-85.

Objectives of this talk

- Explain the methodology followed to model household-related behaviour related to investments decisions toward the energy transition.
- Present the main results achieved so far.
- Explain what we are going to do during the hybrid-workshop

... But first of all, some words about the projects organizer of this event



Learn how households use energy now and will invest in the energy transition to create better energy system models.



Demonstrate a large set of different technologies (microgrids, heat pumps, energy storage, electric charges, etc.) to build positive energy districts in Bilbao and Amsterdam.



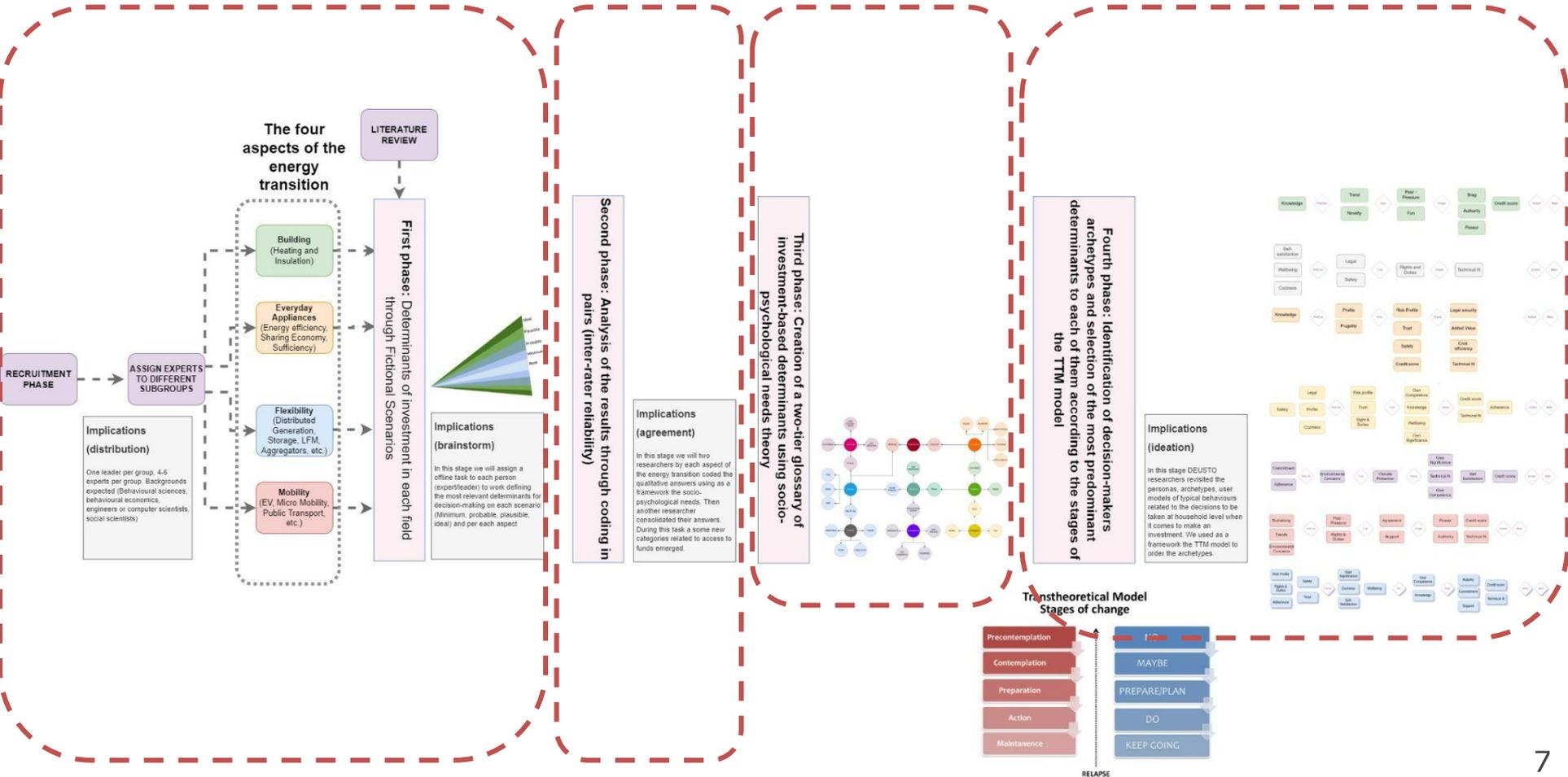
Design and develop a unique local flexibility market platform through the seamless integration of IoT and blockchain technologies.



Create a new generation energy certificate for individual and groups of buildings that will include information about the smartness of the building, improvements on the living conditions and run time costs.

Methodology...

Overall Methodology



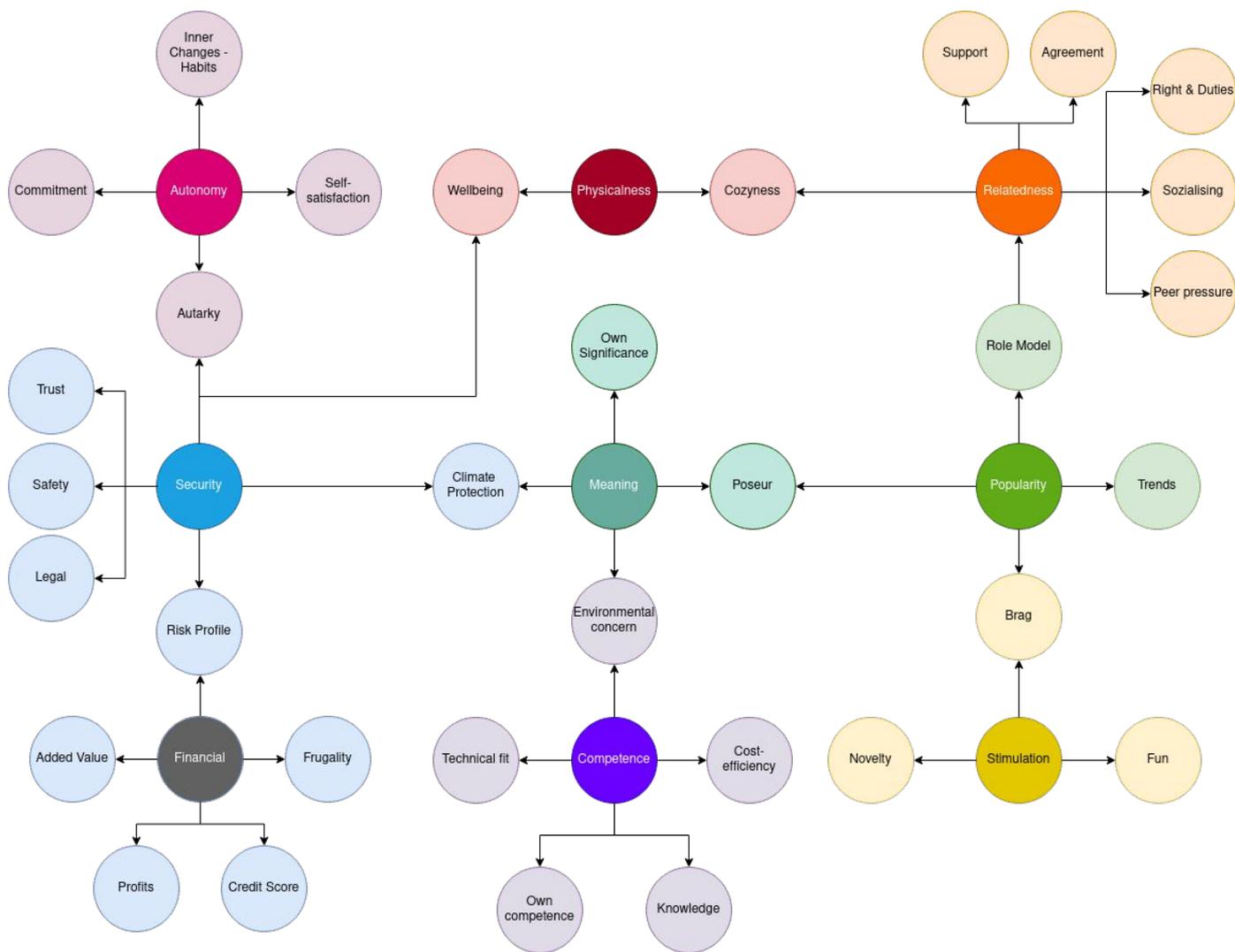
Results (3rd phase)...

Emerging taxonomy

- A two-tier hierarchy was created
 - **Level 1:** 8 Basic psychosocial needs + Financial = 9 categories/themes



- **Level 2:** 32 individual determinants/codes (some of them were shared among the top tier categories)



Results per Aspect

		Flexibility	Appliances	Building	Mobility	TOTAL
	Financial	18%	13%	32%	16%	19%
	Security	10%	11%	10%	20%	13%
	Competence	26%	29%	15%	22%	24%
	Autonomy	7%	6%	4%	5%	5%
	Physicalness	0%	1%	5%	4%	2%
	Relatedness	24%	21%	18%	15%	19%
1st	Stimulation	3%	4%	3%	3%	3%
2nd	Popularity	7%	10%	8%	7%	8%
3rd	Meaning	5%	6%	6%	7%	6%

	1st
	2nd
	3rd

Results - Preliminary observations

- The principal group of determinant is **Competence**
- **Relatedness** and **Financial** determinants are tied in second place
- **Flexibility** and **Appliance** follow a quite similar distribution
- **Security** determinants seems to be very relevant for **Mobility**
 - may be related to the ability to secure access to the workplaces and other daily chores?
- **Financial** determinants seems to be very relevant for **Buildings**
 - may be related to the large investments needs in this case?
- Other determinants are mentioned less frequently by the experts.

Results - Preliminary observations

- The principal group
- Financial
- S
- th
- Other
- that
- W.

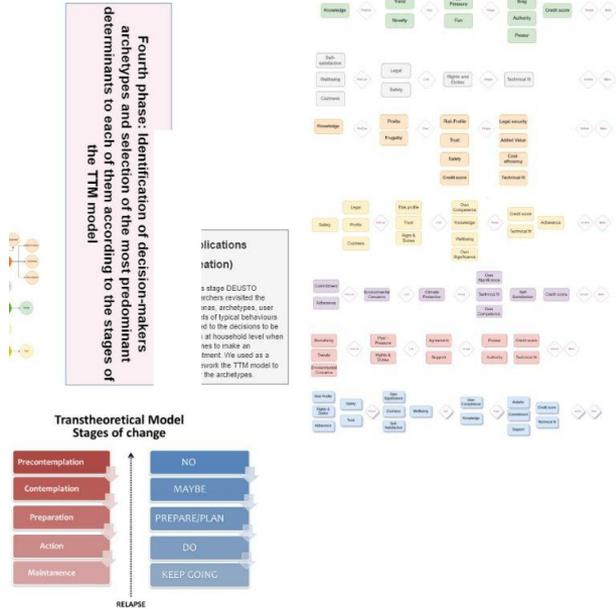
Nevertheless, almost all interventions & existing literature only focus on financial determinants !!!

... experts. We argue ... are quite rational

... rational man archetype

Methodology...

4th Stage: Causal Threads



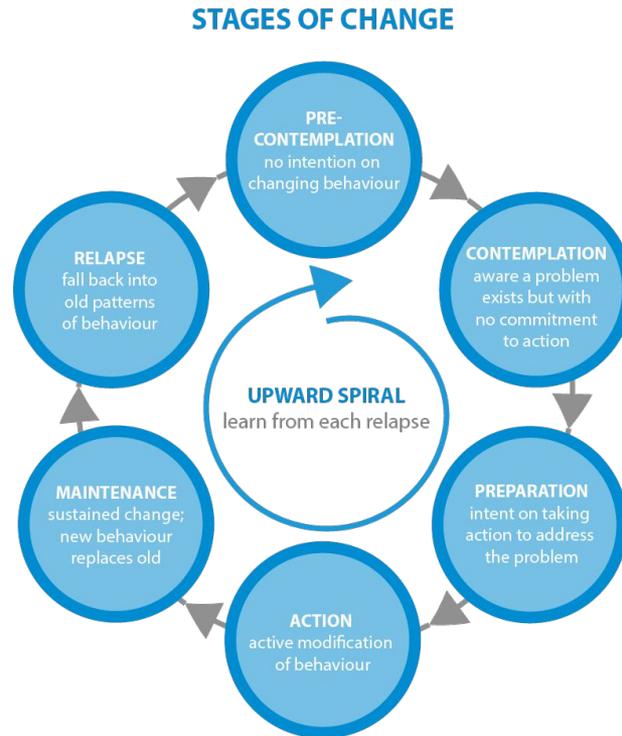
- Understand decision-making on investments as an step by step procedure.
- Use of the stages of change model to order the determinants.
- Create initial archetypes of potential types of investors.

A little bit of theory...

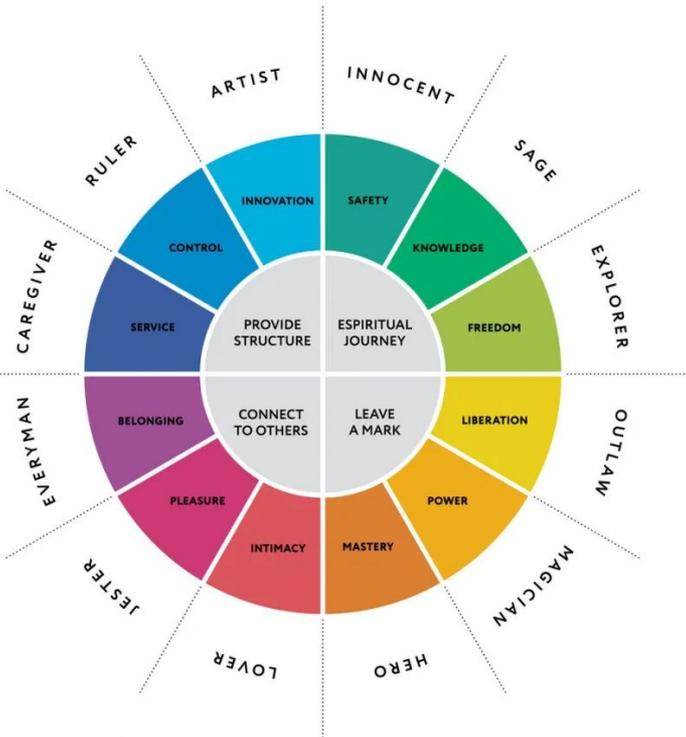
Investments towards energy transition do not usually follow a yes/no decision model...



...but they are usually more oriented to stages



...and we all do not behave the same...



 <p>HERO</p>	<p>CHARACTERISTICS Strength, courage, stamina, faith, competing against great odds</p> <p>CHALLENGES Arrogance, delusions of grandeur</p>	 <p>SOVEREIGN</p>	<p>CHARACTERISTICS Order, stability, control, tradition</p> <p>CHALLENGES Entitlement, greed, irrelevance</p>
 <p>SAGE</p>	<p>CHARACTERISTICS Wisdom, intelligence, clarity of thought, rational decision making</p> <p>CHALLENGES Feeling disconnected, passiveness, arrogance</p>	 <p>MAGICIAN</p>	<p>CHARACTERISTICS Surprise, powers of perception, intuition, cleverness</p> <p>CHALLENGES Trickery, hubris, manipulation</p>
 <p>INNOCENT</p>	<p>CHARACTERISTICS Openness to experience, trust, honesty</p> <p>CHALLENGES Naiveté, denial that problems exist</p>	 <p>CREATOR</p>	<p>CHARACTERISTICS Nonconformity, imagination, sense of aesthetics</p> <p>CHALLENGES Over-dramatization, perfectionism</p>
 <p>LOVER</p>	<p>CHARACTERISTICS Belonging to a group, willingness to sacrifice for others</p> <p>CHALLENGES Lack of own identity, obsession, jealousy</p>	 <p>EXPLORER</p>	<p>CHARACTERISTICS Independence, testing limits, bravery, non-conformity</p> <p>CHALLENGES Aimlessness, alienation, self-indulgence</p>
 <p>CAREGIVER</p>	<p>CHARACTERISTICS Compassion, steadiness, loyalty, empathy</p> <p>CHALLENGES Arrogance, delusions of grandeur</p>	 <p>JESTER</p>	<p>CHARACTERISTICS Humor, originality, irreverence</p> <p>CHALLENGES Cruelty, being misunderstood, inefficiency</p>
 <p>CITIZEN</p>	<p>CHARACTERISTICS Fairness, stewardship, accountability</p> <p>CHALLENGES Righteousness, recklessness</p>	 <p>REBEL</p>	<p>CHARACTERISTICS Leadership, risk taking, individuality, bravery, honesty</p> <p>CHALLENGES Negativity, lawlessness, fanaticism</p>

but ...

1) how many and

2) what

investment behaviours
really are in the population?

How to do that?

1. **Cross-sectorial survey:** Create archetypes of behavior using the determinants
2. **Longitudinal survey:** Assess what determinants are related with each stage of change for each archetype

How to do that?

1. **Cross-sectorial survey:** Create archetypes of behavior using the determinants
2. **Longitudinal survey:** Assess what is related with each stage of change for each archetype

Not enough time in a project to capture these correctly

How to do that?

1. **Cross-sectorial survey:** Create archetypes of behavior using the determinants
2. **Panel of experts:** Assess what determinants are related with each stage of change for each archetype
3. **Telegram Bot:** Role play to simulate different investment decisions

How to do that?

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Cross-sectorial survey

1. Prioritizes scenarios
2. Assess the existence of clusters of determinants (a.k.a archetypes)
3. Assess investment decision (mainly financial and barriers)
4. Measure psychological and socio economic profile (to perform different segmentations)



Results...

Results - Preliminary observations

- **15' Minutes Cities** and **Flexibility Markets** are the most preferred scenarios
- The median amount to **be willing to invest** (if they have money) will be of around 40k€.
- If provided an **interest free credit**, people will be willing to invest 50k€, a 20 % more.
- In case of a sudden need for renovation, around 50% of the population will be **willing to buy the efficient option** at current prices (with large differences for appliances and electric cars).
- The main barriers to buy the efficient option are **economic and lack of trust**.
- These **not willing to buy the efficient option**, would do so if:
 - its price is **no more than 44 %** more a regular appliance,
 - its price is **reduced by a 66%** for batteries, PV and insulation and
 - has **price parity** for the case of heat pumps and electric vehicles.

Results - The 8 behavioural clusters:

	The Early Adopter
Safety	<p>An archetype who is always affected and driven by novelty. Always wants to be on trend and be the first to make changes at home or in their personal life (overall when cutting-edge technology is in the equation). Its motivations are mainly technical, but it does care about the environment nonetheless. Its enjoyment and excitement of what it does are predominant factors for their actions. It has a social status to maintain and its peers expect it to behave in this way. It may be the case that in certain situations it likes to show off or tries to be perceived as an authority.</p>
Cost-Efficiency	
Knowledge	
Environmental Concerns	
Self-Satisfaction	
Commitment	
Adherence	
Peer-Pressure	
Socialising	
Novelty	
Fun	
Brag	
Trends	
Authority	
Own Significance	

Results - The 8 behavioural clusters:

	The Uninterested
Cost-Efficiency	<p>An archetype that does not pay special attention to external information or incentives to make some kind of improvement in the home or in his personal life. The maintenance of comfort is what predominates its daily life when making decisions. It usually applies shortcuts for decision-making such as following peers' trends and applying defaults. Rarely it will accept changes without resistance.</p>
Knowledge	
Technical Fit	
Self-Satisfaction	
Adherence	
Wellbeing	
Coziness	
Peer-Pressure	
Support	
Socialising	
Brag	
Trends	
Authority	
Own Significance	
Cost-Efficiency	

Results - The 8 behavioural clusters:

	The Homo Economicus
Profits	<p>An archetype that has a medium-high degree of knowledge about economics and/or energy transition. Its motivations for undertaking any activity are merely economic, either to make profits or to reduce expenses. It will be more or less interested in making new investments depending on its risk perception, confidence in the current markets' situation, sales trends, and access to funds. Added value drives its choices.</p>
Credit Score	
Risk Profile	
Trust	
Safety	
Cost-Efficiency	
Knowledge	
Technical Fit	
Self-Satisfaction	
Adherence	
Socialising	
Fun	
Brag	
Trends	
Own Significance	

Results - The 8 behavioural clusters:

	The Fearful
Credit Score	<p>An archetype with average environmental awareness who is able to understand the need to make legal, economic, or personal changes. However, it is usually so afraid or laziness that entails inaction because of the amount of risk and time involved. A driver for urgent and long-lasting decision-making will be a lack of confidence in the current situation that may affect their personal safety and well-being.</p>
Risk Profile	
Trust	
Safety	
Climate Protection	
Cost-Efficiency	
Knowledge	
Technical Fit	
Self-Satisfaction	
Commitment	
Adherence	
Wellbeing	
Socialising	
Brag	
Own Significance	

Results - The 8 behavioural clusters:

	The Stubborn
Credit Score	<p>An archetype with average environmental awareness who is able to understand the need to make legal, economic, or personal changes. However, it is usually so afraid or laziness that entails inaction because of the amount of risk and time involved. A driver for urgent and long-lasting decision-making will be a lack of confidence in the current situation that may affect their personal safety and well-being.</p>
Safety	
Climate Protection	
Cost-Efficiency	
Knowledge	
Own Competence	
Technical Fit	
Environmental Concerns	
Self-Satisfaction	
Commitment	
Adherence	
Wellbeing	
Brag	
Own Significance	
Credit Score	

Results - The 8 behavioural clusters:

	The Influencer
Credit Score	<p>An archetype who enjoys influencing peers. It looks always for an added value to its actions, either monetary, authoritative, or either increased social capital. Complying with what the group expects of it turns into an obligation.</p>
Added Value	
Legal	
Cost-Efficiency	
Knowledge	
Peer-Pressure	
Support	
Socialising	
Agreement	
Fun	
Brag	
Trends	
Authority	
Own Significance	
Poseur	

Results - The 8 behavioural clusters:

	The Careful
Credit Score	<p>An archetype that aims at maximizing personal, collective, and ecosystem well-being and security. Every decision it takes is strongly influenced by its perceived safety, self-competence, impact on the environment, and confidence in the outcomes of the action. Personal or group satisfaction is the main driver for action. In particular, when maintaining the physical and mental comfort of those who are close in relation to climate anxiety.</p>
Risk Profile	
Trust	
Safety	
Climate Protection	
Cost-Efficiency	
Knowledge	
Own Competence	
Technical Fit	
Environmental Concerns	
Self-Satisfaction	
Commitment	
Adherence	
Autarky	
Wellbeing	

Results - The 8 behavioural clusters:

	The Activist
Legal	<p>An archetype that has the duty of supporting its community. Its pro-environmental values and beliefs are aligned with its way of leaving. Moral obligation drives it to take action. Nevertheless, it is well aware of regulations, norms, and restrictions so its actions are always aligned with the legal framework. It trusts in technology appropriation, open knowledge, and sharing economy.</p>
Trust	
Safety	
Cost-Efficiency	
Knowledge	
Technical Fit	
Environmental Concerns	
Self-Satisfaction	
Commitment	
Adherence	
Peer-Pressure	
Socialising	
Brag	
Trends	
Own Significance	

Concept	Early Adopter	Uninterested	œconomicus	Fearful	Stubborn	Influencer	Careful	Activist
Profits			X					
Credit Score			X	X	X	X	X	
Risk Profile			X	X	X		X	
Added Value						X		
Frugality								
Legal		X				X		X
Trust			X	X			X	X
Safety	X		X	X	X		X	X
Climate Protection				X	X		X	
Cost-Efficiency	X	X	X	X	X	X	X	X
Knowledge	X	X	X	X	X	X	X	X
Own Competence					X		X	
Technical Fit		X	X	X	X		X	X
Environmental Concerns	X				X		X	X
Self-Satisfaction	X	X	X	X	X		X	X
Commitment	X			X	X		X	X
Adherence	X	X	X	X	X		X	X
Autarky							X	
Wellbeing		X		X	X		X	
Coziness		X						
Rights and Duties								
Peer-Pressure	X	X				X		X
Support		X				X		
Socialising	X	X	X	X		X		X
Agreement						X		
Novelty	X							
Fun	X		X			X		
Brag	X	X	X	X	X	X		X
Trends	X	X	X			X		X
Authority	X	X				X		
Own Significance	X	X	X	X	X	X		X
Poseur						X		

Any question?

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Distribution in the different groups

Group	Moderator	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6
A (Waste4Think)	Macarena Larrea	Christian Klockner	Bram Vanacker	Afrodita Lioudaki	Uliana Torkunova	Chris Merveille	
B (online)	Amanda Schibline	Marta Struminska-Kutra	Maite Ruffo	Johannes Thema	Evgenia Kapassa	Carmen Sanchez	
F (Timon)	Carlos Quesada	Peru Sasia	Peter Conrady	Andrzej Ceglarz	Roberto Alvaro	Leire Astigarraga	Javier Goikoetxea
FF (online)	Diego Casado	Sebastian Seebauer	Guntram Preßmair	Ismi Dimitriadou	Julio Elarre	Igotz Lopez	
M (online)	Cruz Borges	Roberto Barrella	Oscar Pulido	Grzegorz Sierpinski	Marcin Staniek	Mario del Viejo Martínez	

Group	Moderator	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6
FF (online)	Diego Casado	Sebastian Seebauer	Guntram Preßmair	Ismi Dimitriadou	Johannes Thema	Julio Elarre	Igotz Lopez
M (online)	Amanda Schibline	Grzegorz Sierpinski	Marcin Staniek	Evgenia Kapassa	Oscar Pulido	Roberto Barrella	

Order in which the archetypes should be discussed:

Group	Early Adopter	Uninterested	Homo œconomicus	Fearful	Stubborn	Influencer	Careful	Activist
A (Waste4Think)	3 rd	4 th	5 th	6 th	7 th	8 th	1 st	2 nd
B (online)	7 th	8 th	1 st	2 nd	3 rd	4 th	5 th	6 th
F (Timon)	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
FF (online)	8 th	7 th	6 th	5 th	4 th	3 rd	2 nd	1 st
M (online)	5 th	6 th	7 th	8 th	1 st	2 nd	3 rd	4 th

Now, your turn!

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Results - The 9th behavioural cluster?

	The Energy Austere
?	An archetype that try to use as low energy as possible due to its conviction or most typically their financial situation.
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	
?	

The final panel per aspect

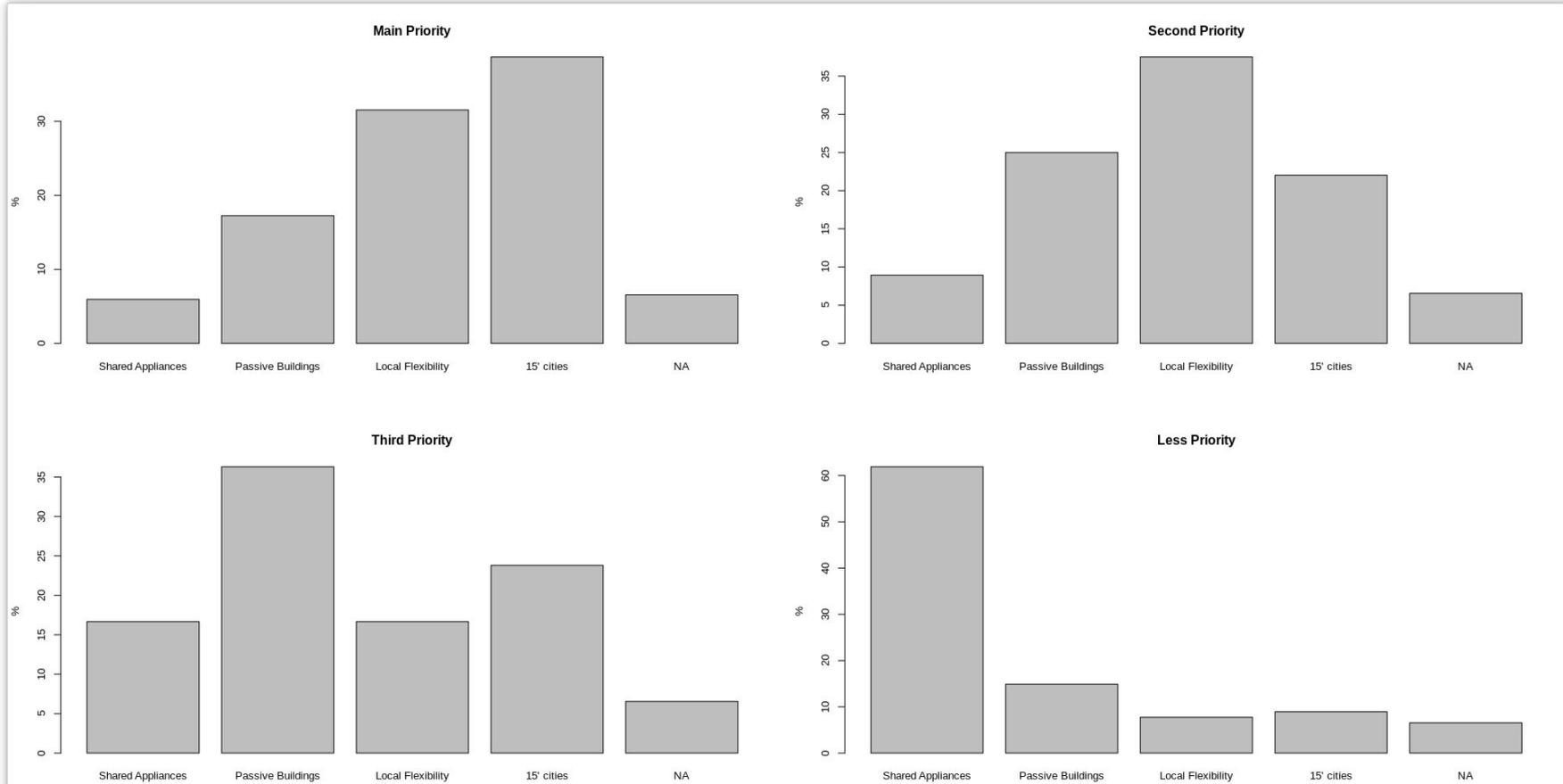
	Number	Interdisciplinary	Intersectorial	Internacional	Gender Balance
Building (Heating and Insulation)	7 / 13	All four fields	Academia, Industry & Public Authorities	Austria, Spain, Romania, Croatia and Poland	1/7
Everyday Appliances (Energy efficiency, Sharing Economy, Sufficiency)	13 / 10	All four fields	Academia & Industry	Austria, Norway and Greece	3/13
Flexibility (Distributed Generation, Storage, LFM, Aggregators, etc.)	7 / 12	All four fields	Academia, Industry & Civil Society	Spain, Austria, Germany, Sweden and Bulgaria	4/7
Mobility (EV, Micro Mobility, Public Transport, etc.)	7 / 10	Except psychology	Academia & Industry	Poland, Spain, Greece and Estonia	2/7

Answers provided

	Minimum	Probable	Plausible	Ideal	
Flexibility	84	70	72	65	291
Appliances	107	101	88	92	388
Buildings	58	97	67	70	292
Mobility	79	74	63	46	262
	328	342	290	273	1233

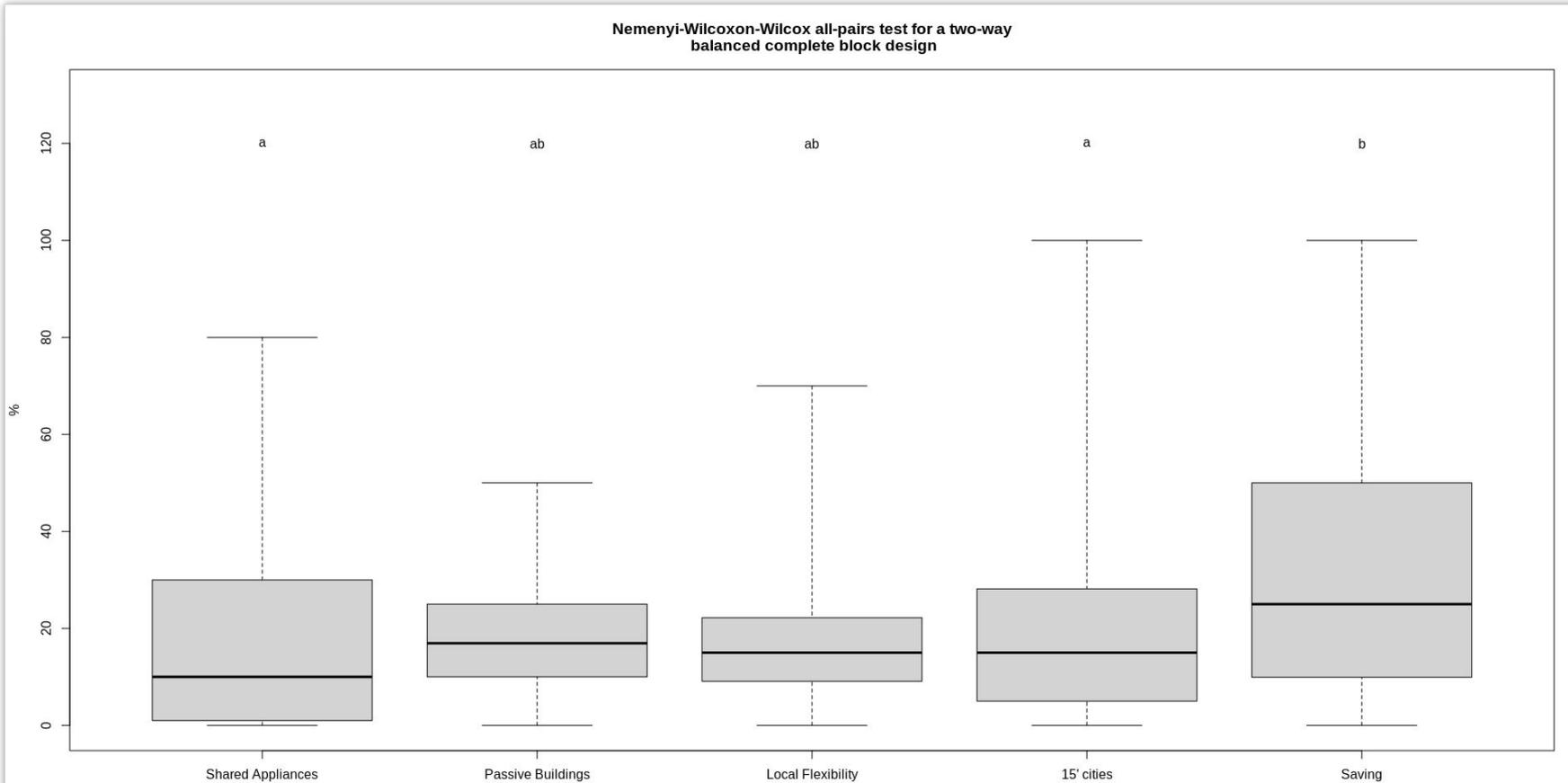
[Preliminary] Survey Results

Prioritization of the scenarios



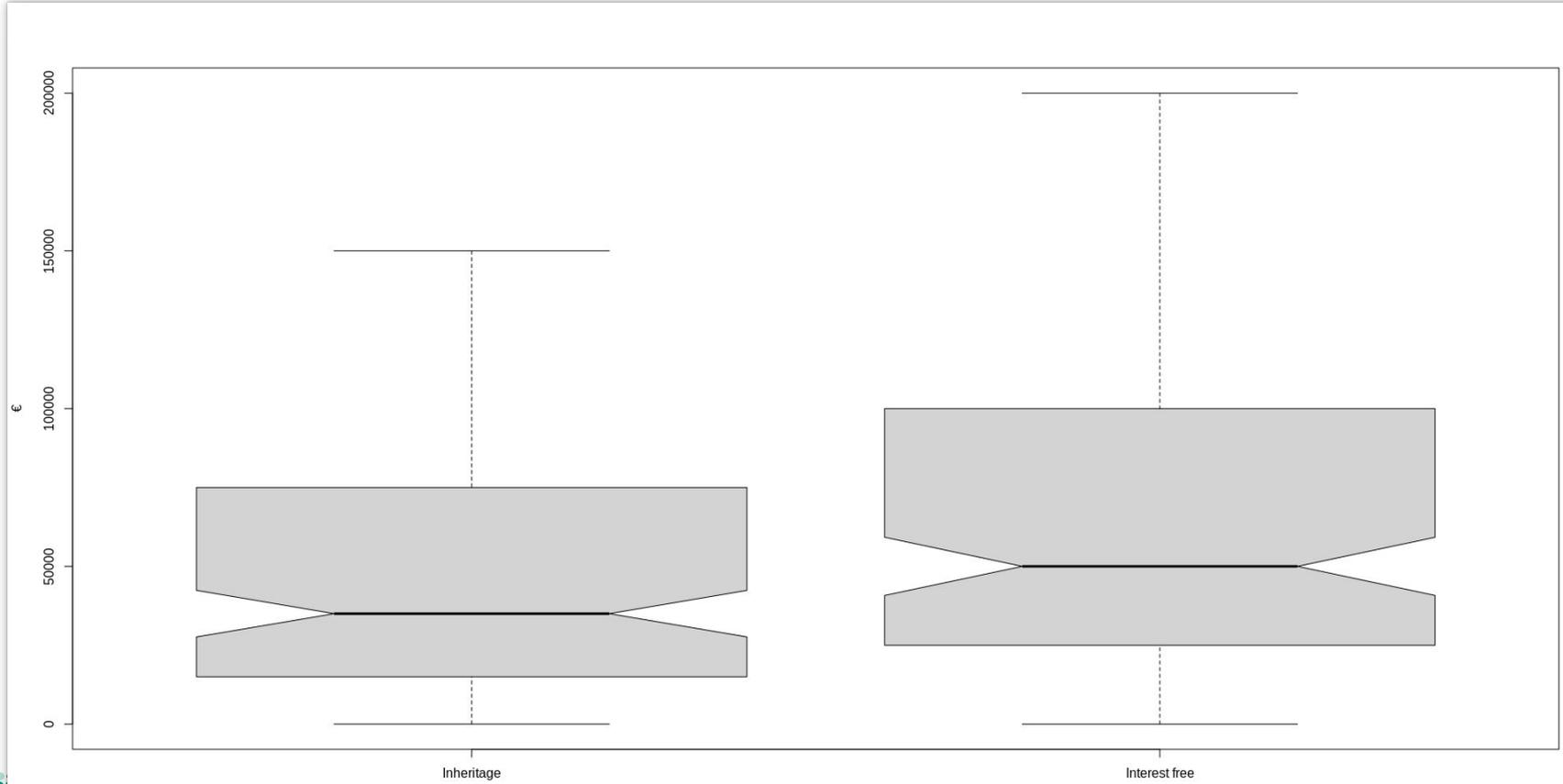
[Preliminary] Survey Results

Percentage of euros willing to invest in each scenario



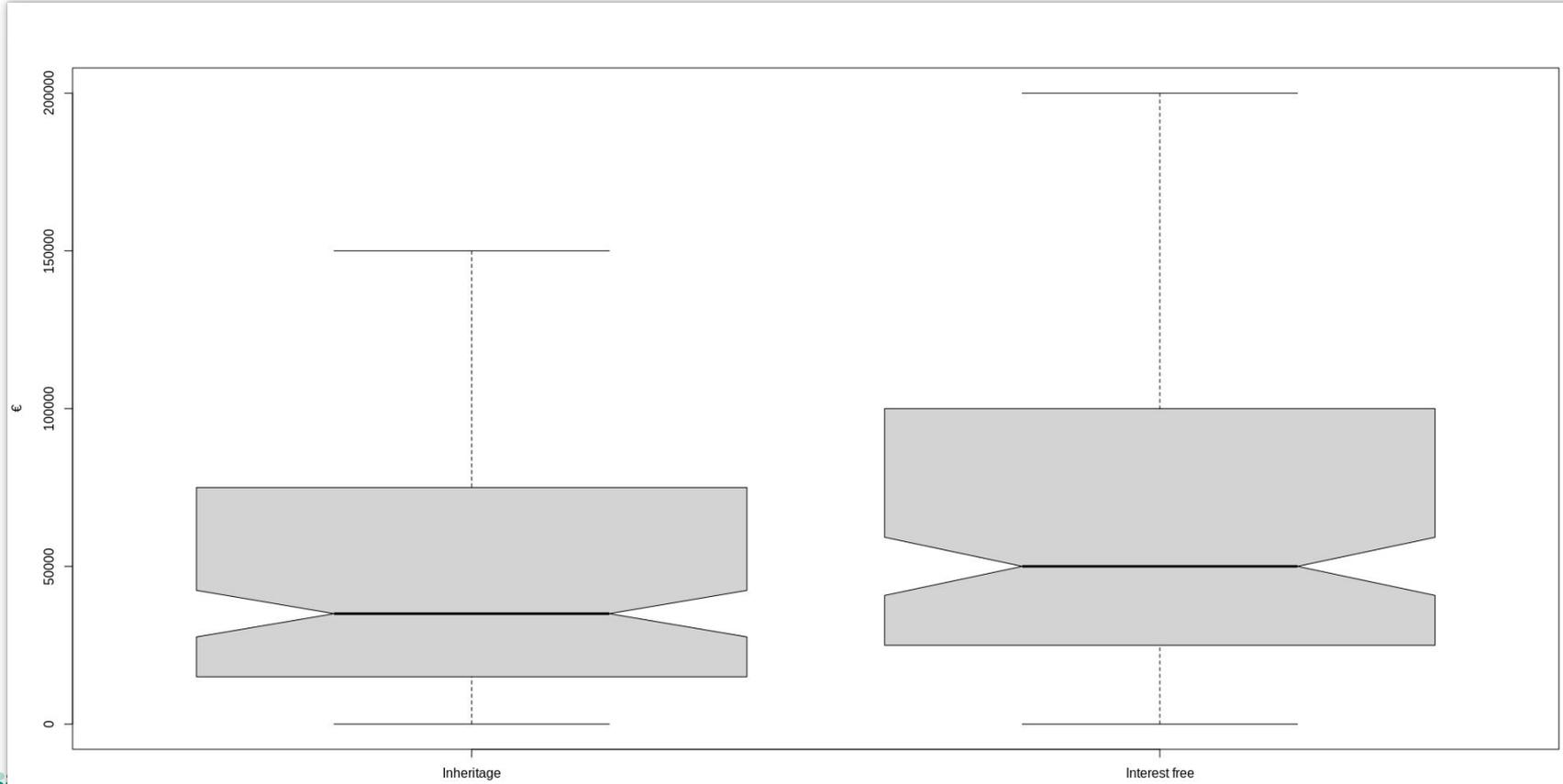
[Preliminary] Survey Results

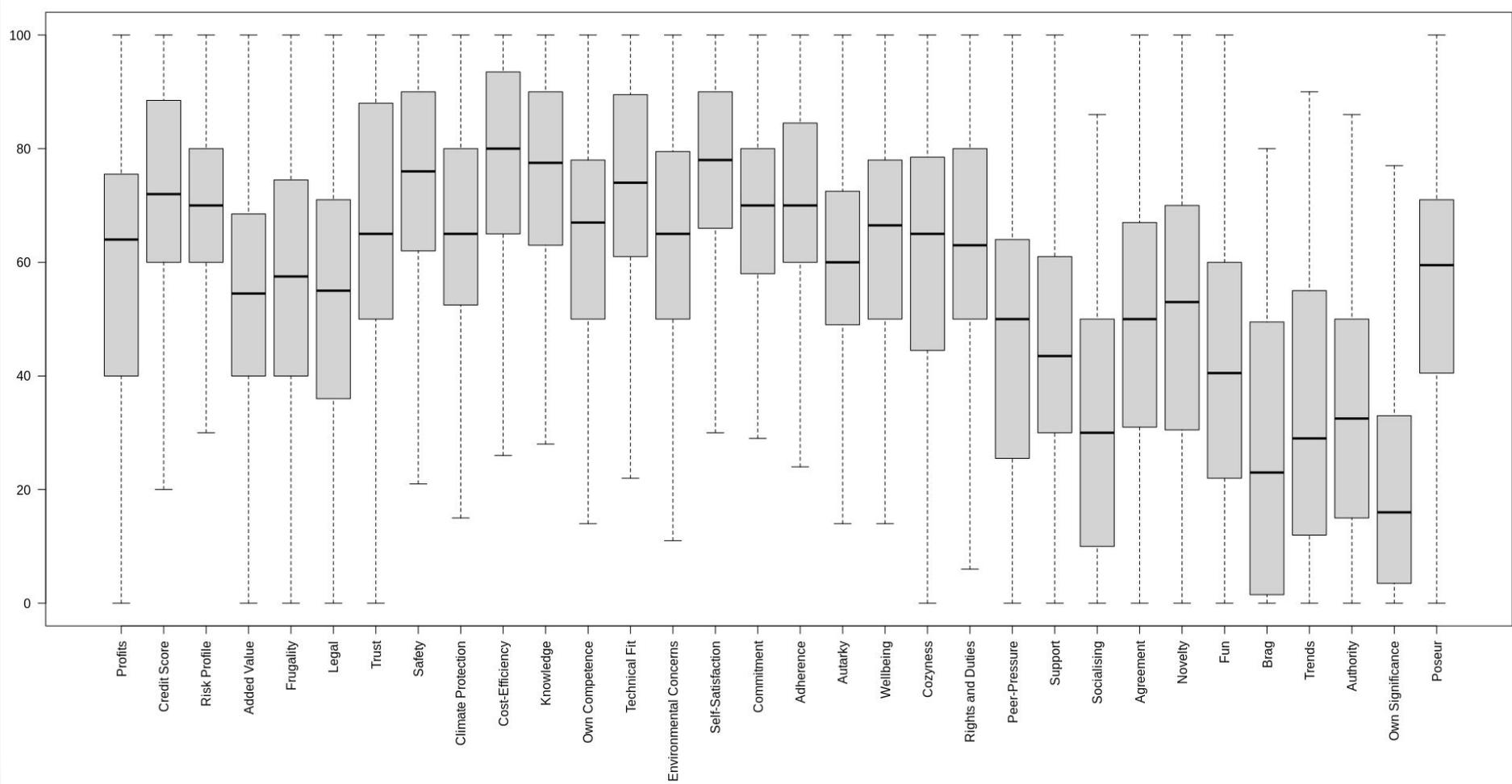
Total amount of euros
willing to invest



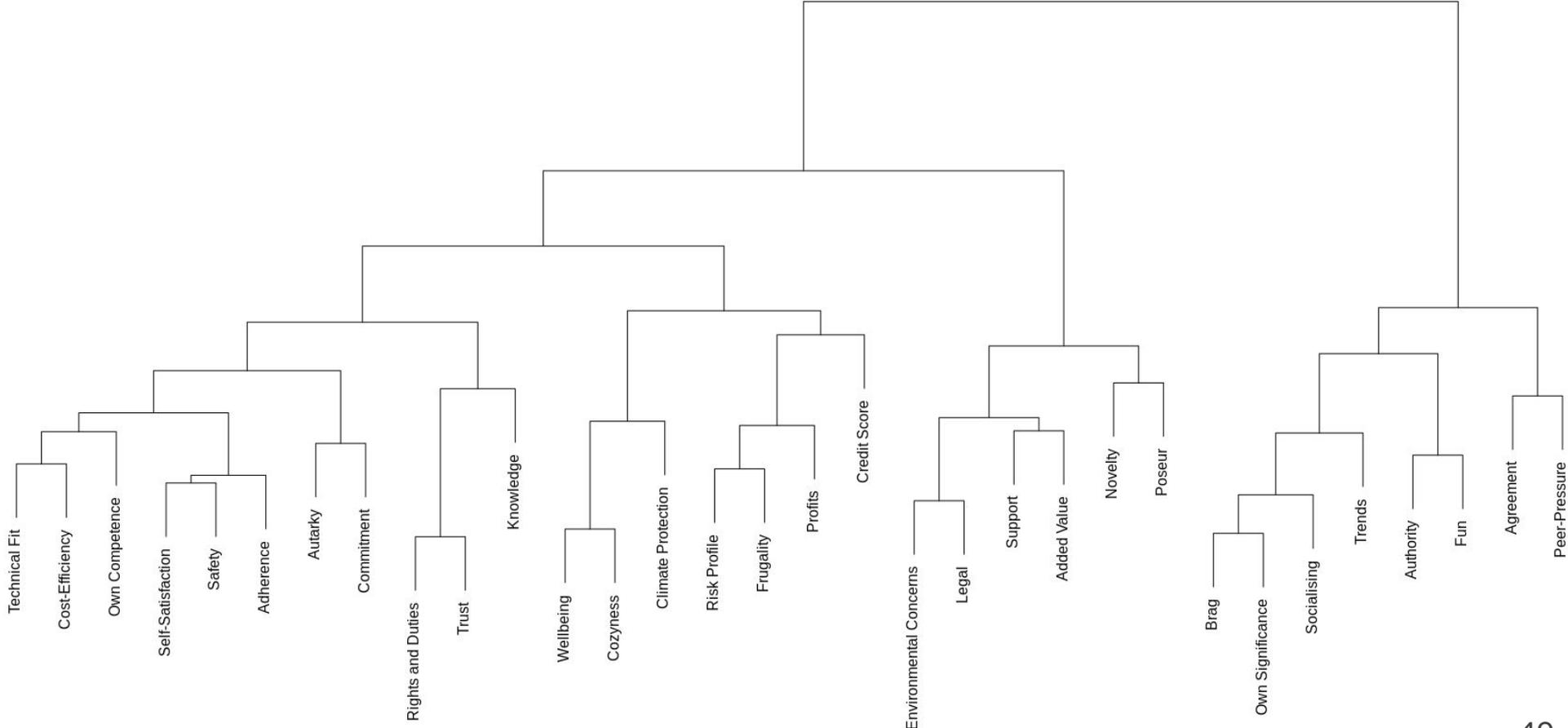
[Preliminary] Survey Results

Total amount of euros
willing to invest

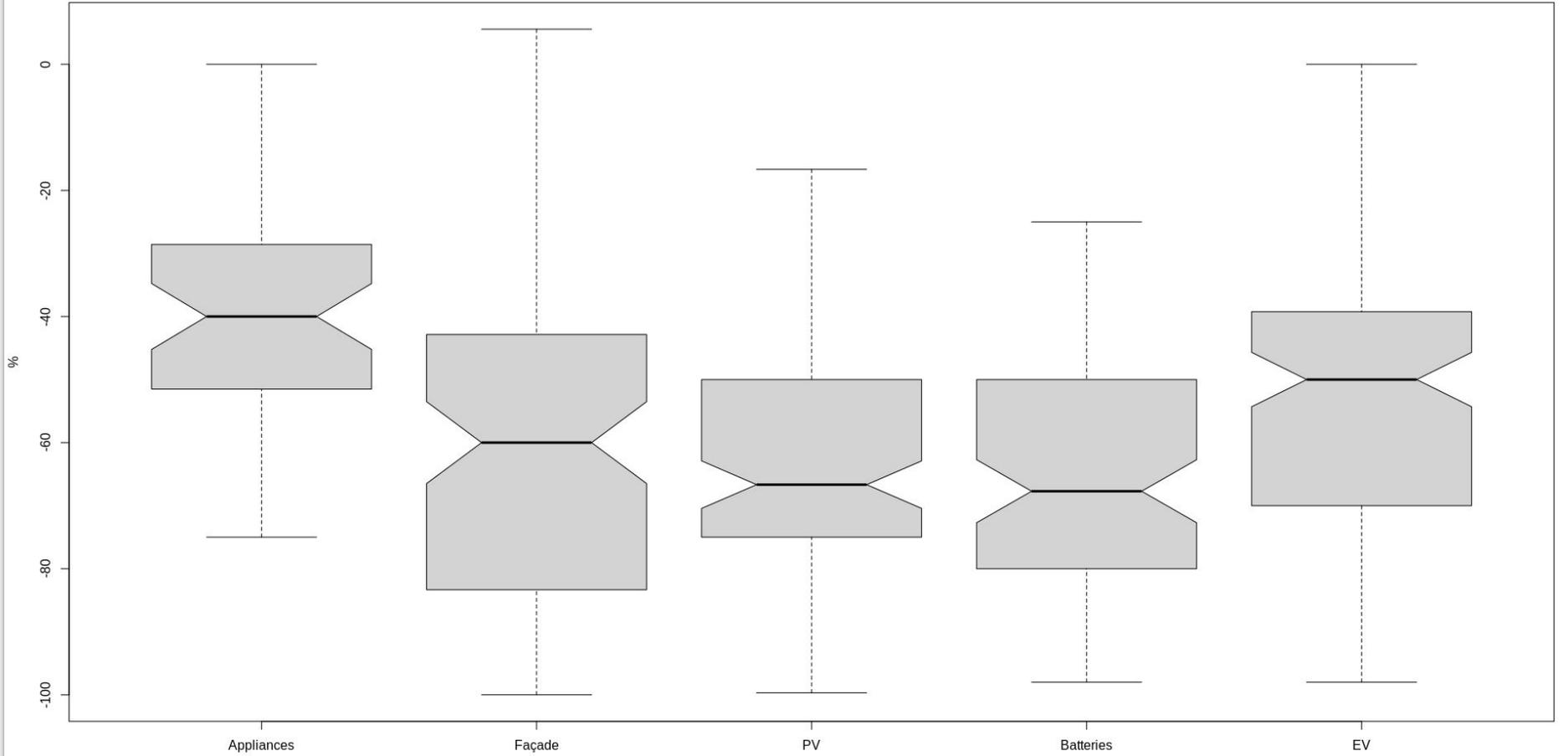




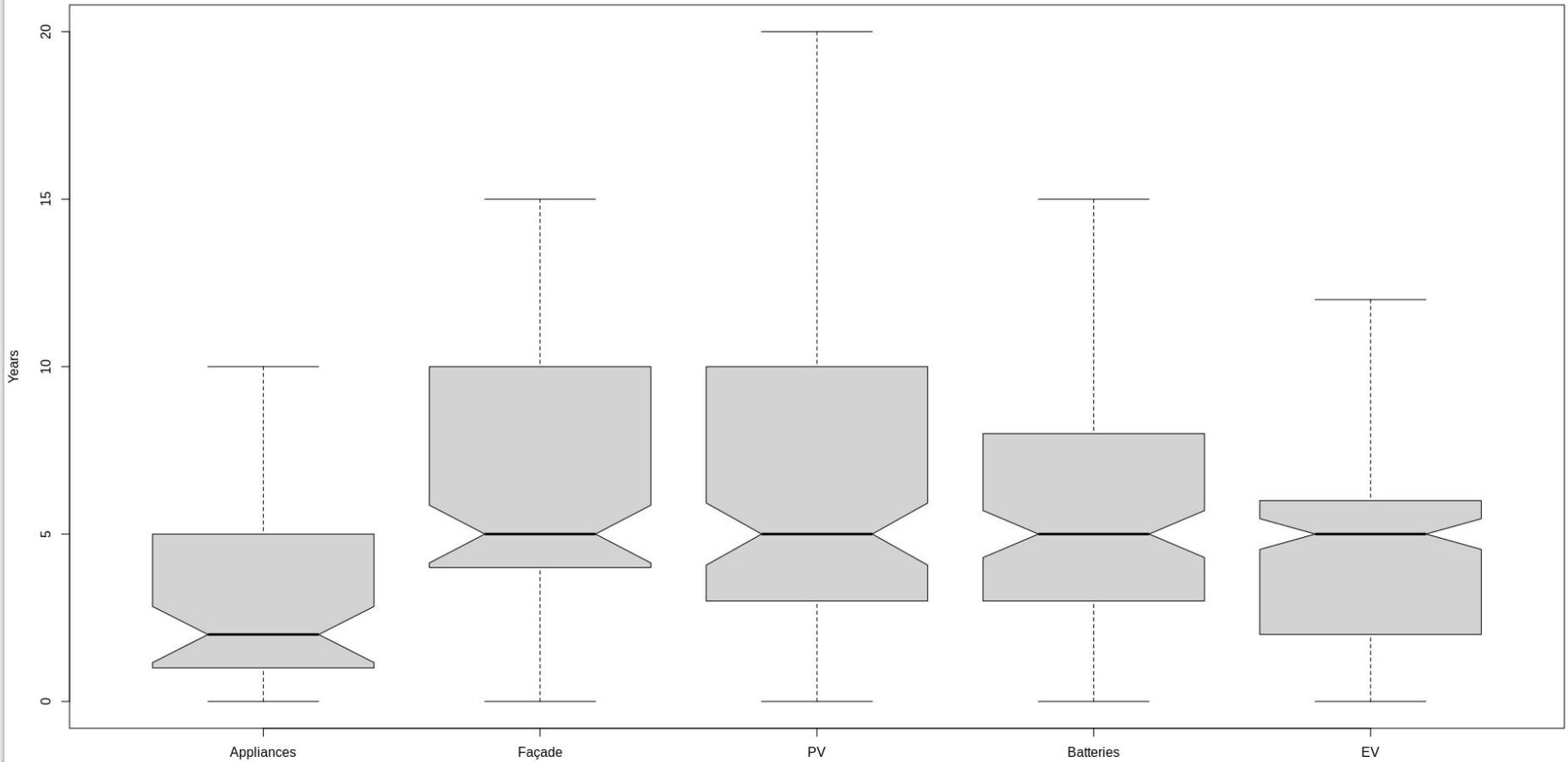
Cluster Dendrogram



Cost difference to be willing to buy

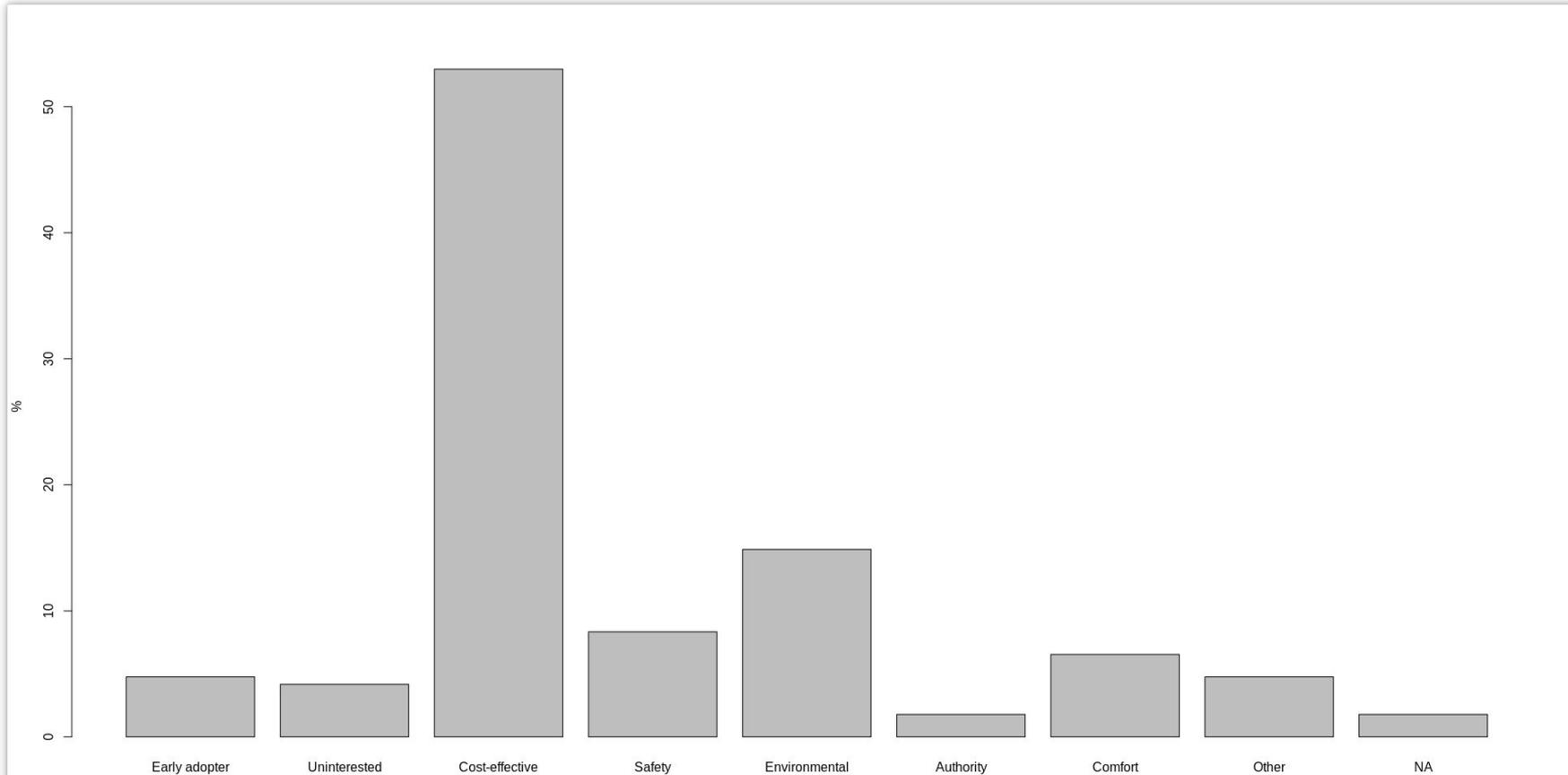


PAYBACK



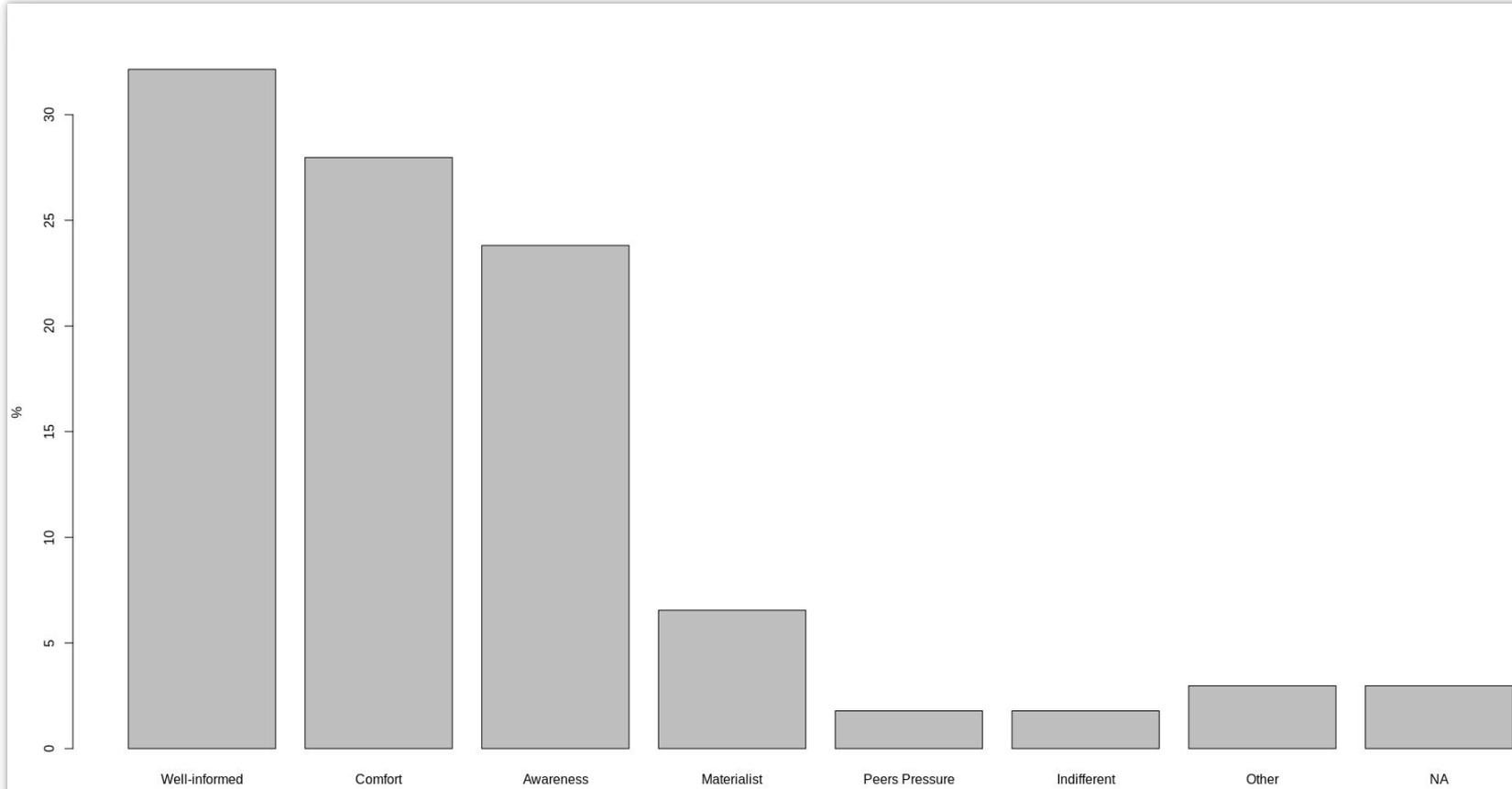
[Preliminary] Survey Results

Psychological profile



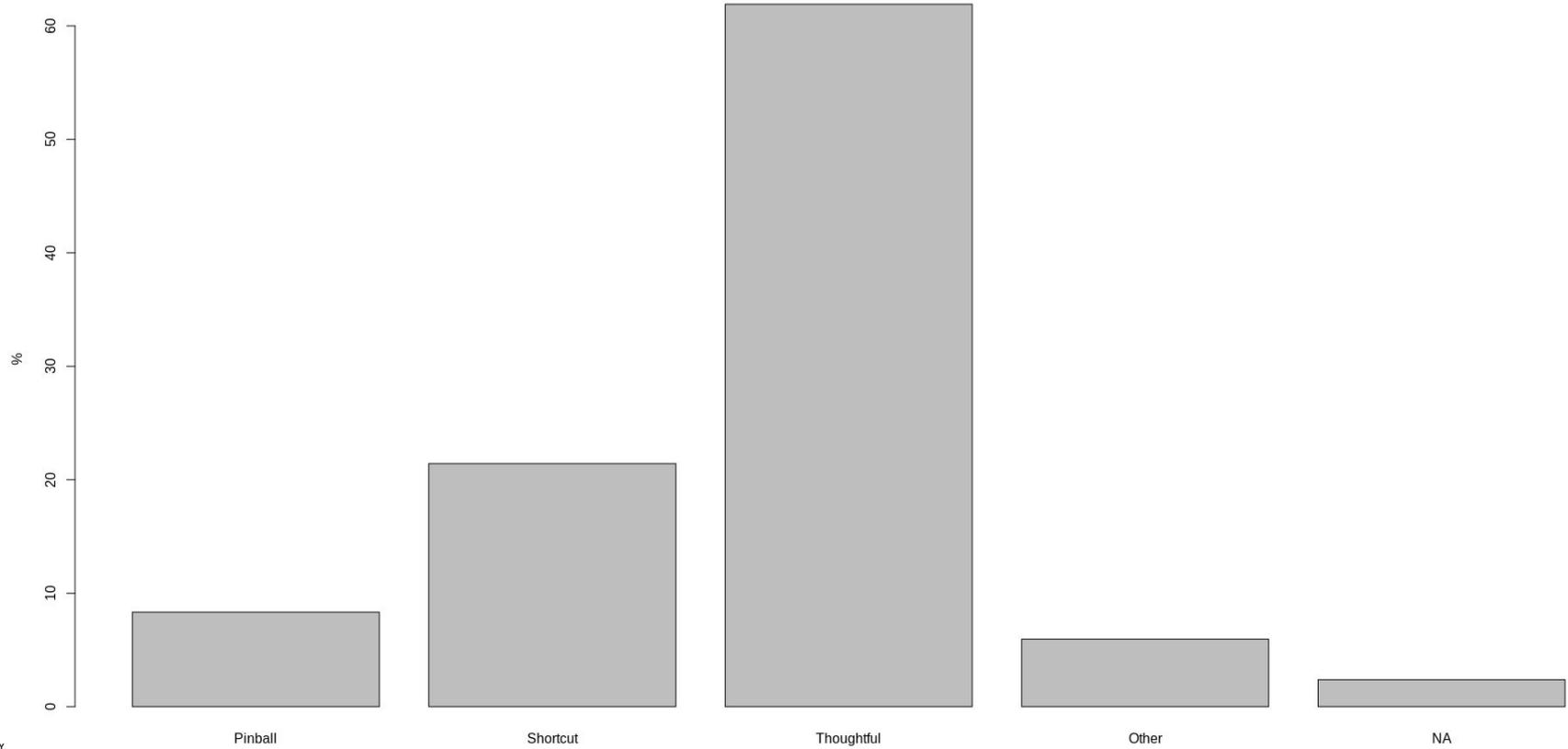
[Preliminary] Survey Results

Psychological profile

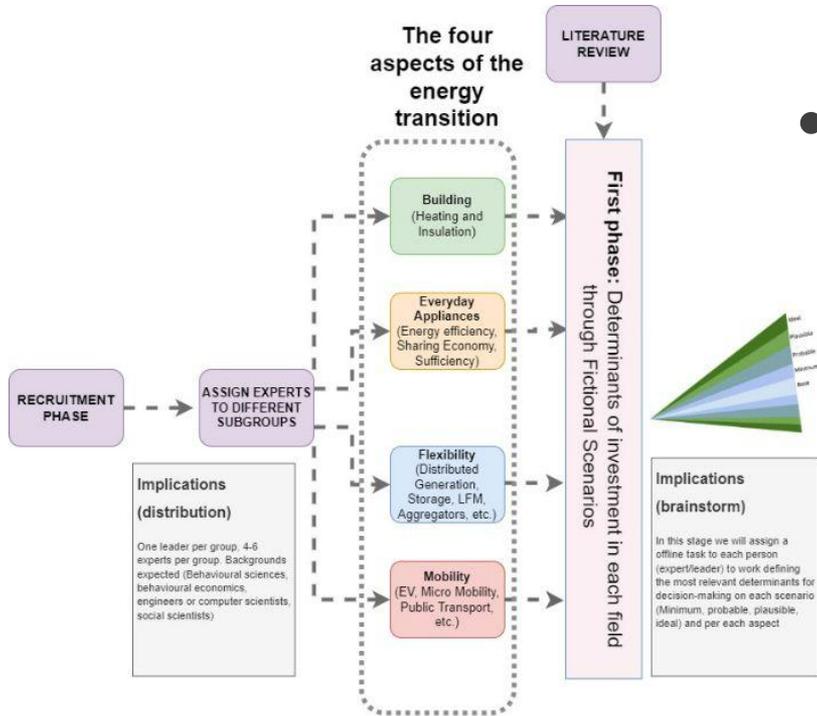


[Preliminary] Survey Results

Psychological profile

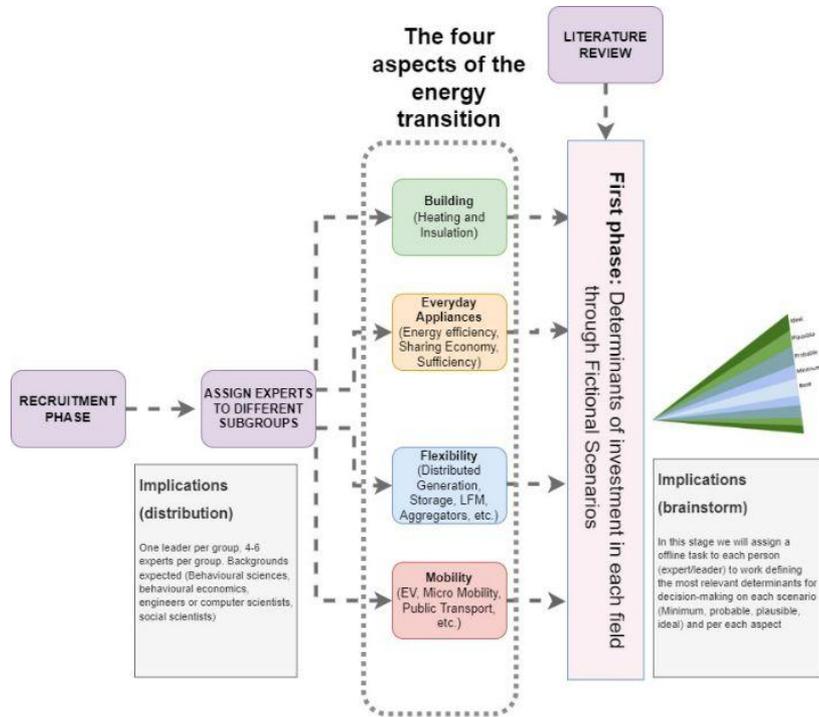


1st Stage: Fuzzy Delphi Method



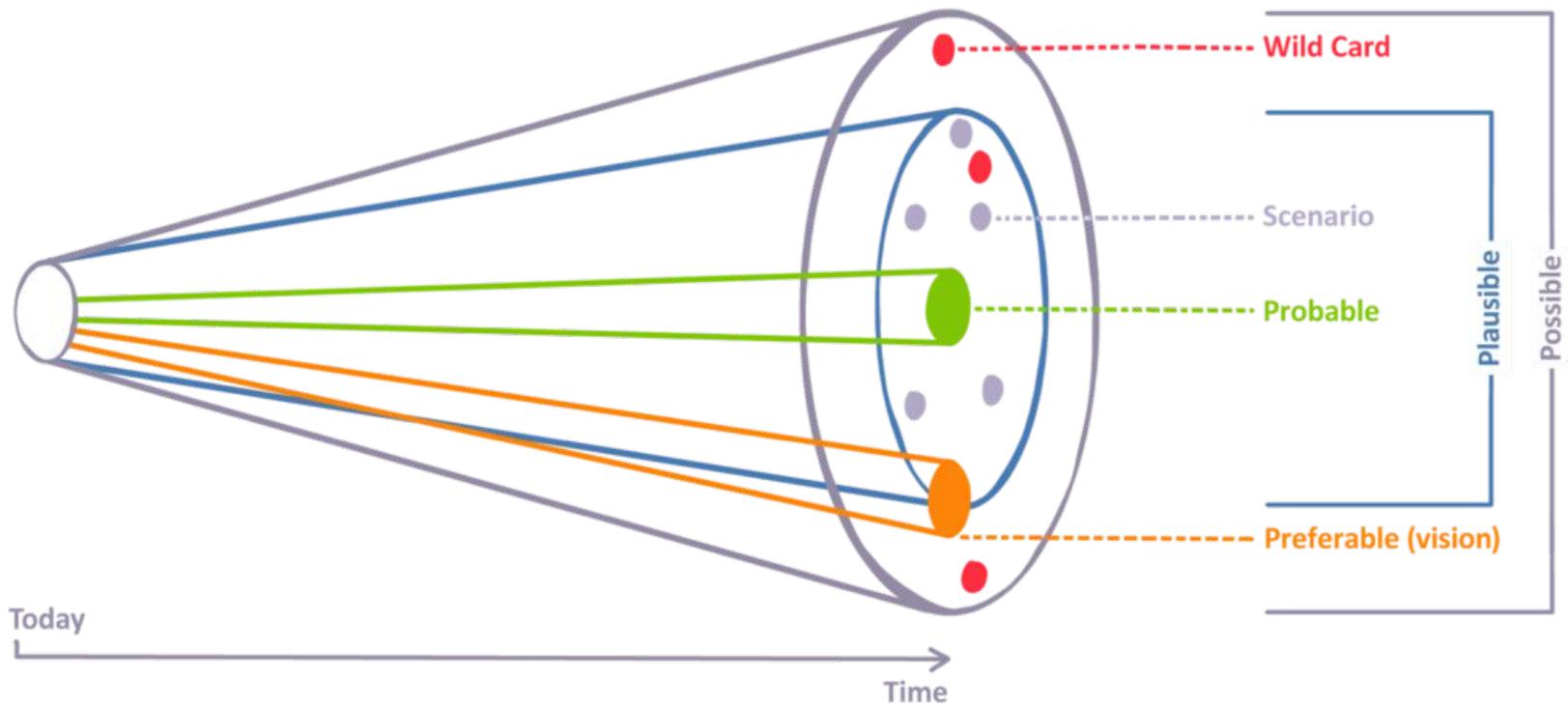
- Find experts on each aspect.
 - **Interdisciplinary:** with experts on the technical, economic, social and psychological facets of the aspect.
 - **Intersectorial:** including experts from the four sectors: academia, enterprises, public authorities and civil society.
 - **International:** including experts from different countries and cultural backgrounds.
 - **Gender balance:** including as much females as possible.

1st Stage: Fuzzy Delphi Method



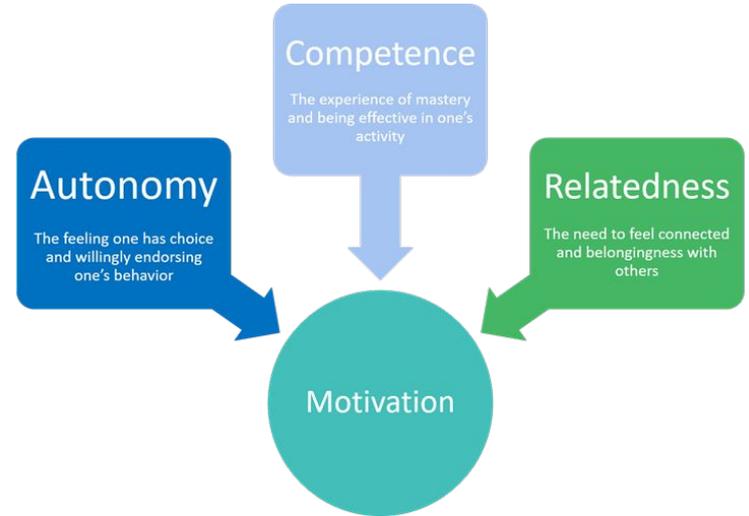
- Prepare an online methodology to extract expert knowledge.
 - Scenarios
 - Template

Four speculative scenarios per aspect



Main Categories

- Self-determination theory (SDT) is an empirically derived theory that differentiates motivation in terms of being autonomous and controlled.
- It address the fundamental universal psychological needs for growth, integrity, and wellness.
- STD suggests that people are motivated to grow and change fulfilling their universal psychological needs.
- We extend the Autonomy, Competence and Relatedness categories to eight main themes.



Main Categories

Ph

Physicalness

Description:

Feeling that your body is healthy and well-taken care of rather than feeling out of shape or unhealthy.

During the event I felt ...

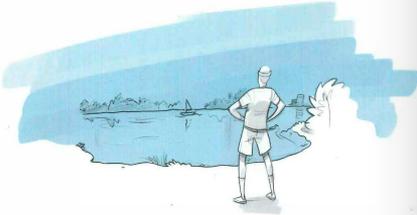
... that I got enough exercise and was in excellent physical condition.
 ... that my body was getting just what it needed.
 ... a strong sense of physical well-being.

The product creates a feeling of

Health
 Fitness
 Physical Performance
 Balance
 Trimness
 Agility

Quotes:

»I feel healthy all around.«
 »I am beautiful.«
 »My body is strong.«
 »I feel alive.«



»A breath of fresh air and some exercise.
 This truly nurtures body and soul.«

Ph

Ph

Me

Meaning

Description:

Feeling that you are developing your best potentials and making life meaningful rather than not getting anywhere and experiencing nothing of importance.

During the event I felt ...

... that I was „becoming“ who I really am.“
 ... a sense of deeper purpose in life.
 ... a deeper understanding of myself and my place in the universe.

The product creates a feeling of:

Meaningfulness
 Understanding
 Self-awareness
 Fulfillment
 Self-realization

Quotes:

»That was exactly my thing.«
 »That is in line with my values.«
 »I found out what I was meant to be.«
 »It allowed me to run free.«



»They grew up so quickly. To me it seems as if their first day at school had been just yesterday.«

Me

Me

Me

Co

Competence

Description:

Feeling that you are very capable and effective in your actions rather than feeling incompetent or ineffective.

During the event I felt ...

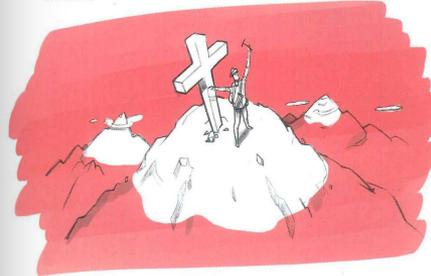
... that I was successfully completing difficult tasks and projects.
 ... that I was taking on and mastering hard challenges.
 ... very capable in what I did.

The product creates a feeling of

Confidence
 Control
 Effectiveness
 Empowerment
 Efficiency

Quotes:

»That's no problem for me.«
 »I am in control of everything.«
 »I approach it and it works.«
 »It is on me.«



»It had been a real challenge, but finally I made it to the summit all alone.«

Co

Co

Co

Re

Relatedness

Description:

Feeling that you have regular intimate contact with people who care about you rather than feeling lonely and unshared for.

During the event I felt ...

... a sense of contact with people who care for me, and whom I care for
 ... close and connected with other people who are important to me.
 ... a strong sense of intimacy with the people I spent time with.

The product creates a feeling of:

Common ground
 Presence
 Romantic
 Family
 Friendship
 Solidarity

Quotes:

»It is always nice to be with you.«
 »We get along swimmingly.«
 »I love to be with you.«
 »I think of you.«
 »To be of one mind.«



»It is great to know that you're not alone and even better to show how much you care about the other.«

Re

Re

Re

Main Categories

Au

Autonomy

Au

Description:

Feeling like you are the cause of your own actions rather than feeling that external forces or pressures are the cause of your actions.

During the event I felt ...

... that my choices were based on my true interests and values.
... free to do things my own way.
... that my choices expressed my „true self“.

The product creates a feeling of

Liberty
Independence
Limitlessness
Self-reliance
Freedom
Detachedness

Quotes:

»Let's get started.«
»No one butts in.«
»I could do whatever I wanted.«
»Finally I could let myself go.«



»Without a recipe, just by guess and gosh, I prize the liberty to do so.«

Au

Au

Se

Security

Se

Description:

Feeling safe and in control of your life rather than feeling uncertain and threatened by your circumstances.

During the event I felt ...

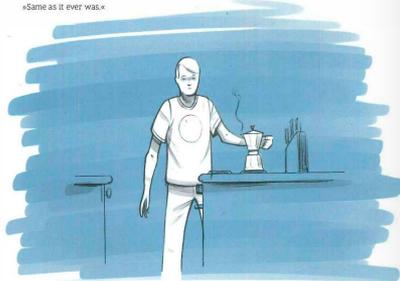
... that my life was structured and predictable.
... glad that I have a comfortable set of routines and habits.
... safe from threats and uncertainties.

The product creates a feeling of

Comfort
Predictability
Silence
Intimacy
Routine
Continuity

Quotes:

»I know what I am doing.«
»I feel secure.«
»I don't worry.«
»Same as it ever was.«



»There is hardly anything more relaxing than indulging in a beloved morning ritual.«

Se

Se

St

Stimulation

St

Description:

Feeling that you get plenty of enjoyment and pleasure rather than feeling bored and under-stimulated by life.

During the event I felt ...

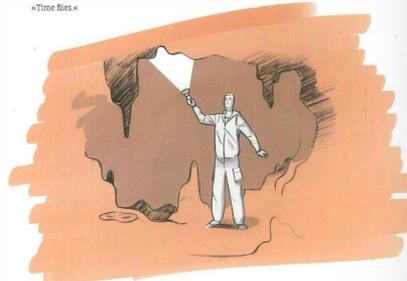
... that I was experiencing new sensations and activities.
... that I had found new sources and types of stimulation for myself.

The product creates a feeling of

Novelty
Surprise
Fascination
Excitement
Discovery
Richness

Quotes:

»Thrilling!«
»That's all new!«
»Look! We have to take a good look at that.«
»Time flies!«



»What adventures await us here? What secrets does this place keep?«

St

St

Po

Popularity

Po

Description:

Feeling that you are liked, respected, and have influence over others rather than feeling like a person whose advice or opinions nobody is interested in.

During the event I felt ...

... that I was a person whose advice others seek out and follow.
... that I strongly influenced others' beliefs and behavior.
... that I had strong impact on what other people did.

The product creates a feeling of

Influence
Perception
Consideration
Prominence
Appreciation
Interest

Quotes:

»They count on me.«
»They like me.«
»That was received well.«
»They hung on to my every word.«



»It just feels good to inspire other people and to give their lives a fresh impetus.«

Po

Po

