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AnthroPOLIS | SystemX
HUMAN CENTERED MOBILITY

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Anthropolis Seminar 20 April 2022 | 10-11h

INTEGRATING TODAY'S AND TOMORROW'S USERS IN MOBILITY SYSTEM DESIGN: POTENTIALS OF MATCHING PERSONAS AND SYNTHETIC POPULATIONS

DESIGN 2022

17th INTERNATIONAL DESIGN CONFERENCE ONLINE

MAY, 23-26, 2022, CROATIA

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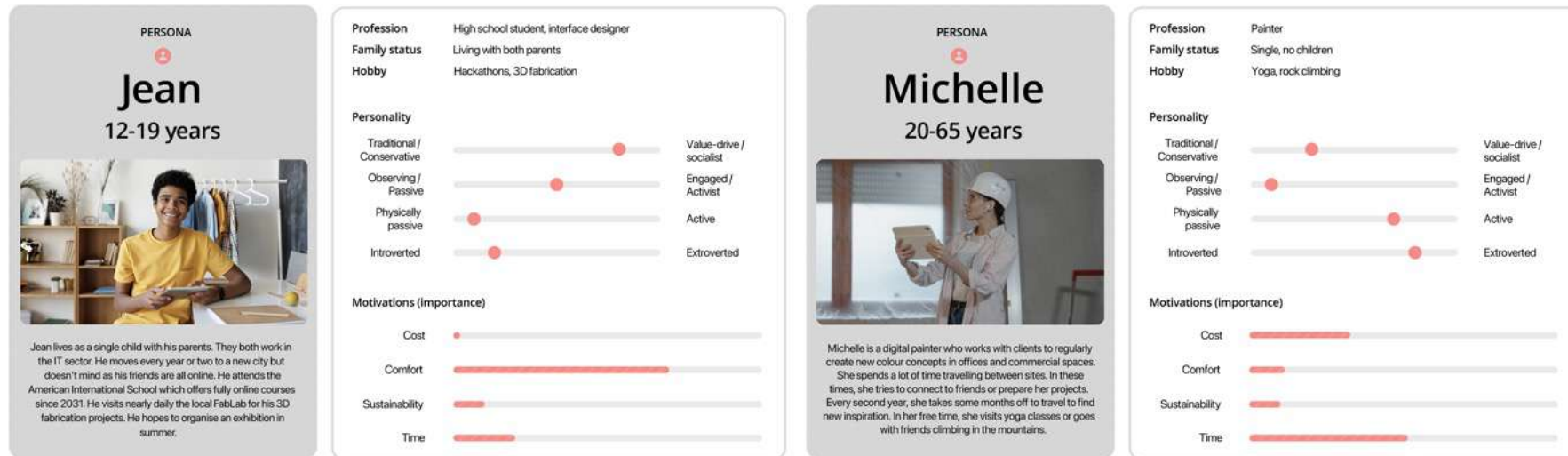
INITIAL QUESTION

'What are synergies between synthetic populations and persona-based approaches, and how can they strengthen and complement each other?'

Sample personas for Rouen. Online workshop 19 May 2021, Human-robomobile relations across territories.
Gall, T., Lecomte, R., and Vallet, F.

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OVERVIEW OF PERSONAS AND SYNTHETIC POPULATIONS

Personas: Definition and usage in user-experience design

- Fictional user model used in design teams (Cooper, 1999)

- Shared basis for communication (Grudin & Pruitt, 2002)

- Also used in policy making to design services to the population (Gonzalez de Heredia et al., 2018)

- A potential lack of solid empirical grounding (Miaskiewicz & Kozar, 2011)

Example of Xtensio persona template (Source: https://xtensio.com/user-persona/)

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OVERVIEW OF PERSONAS AND SYNTHETIC POPULATIONS

Personas: Definition and usage in user-experience design

- Three ways to generate accurate personas: collect survey data; **cluster existing data from different sources**; iterate between interviews and survey data (Gonzalez de Heredia et al., 2018)

Example of computational
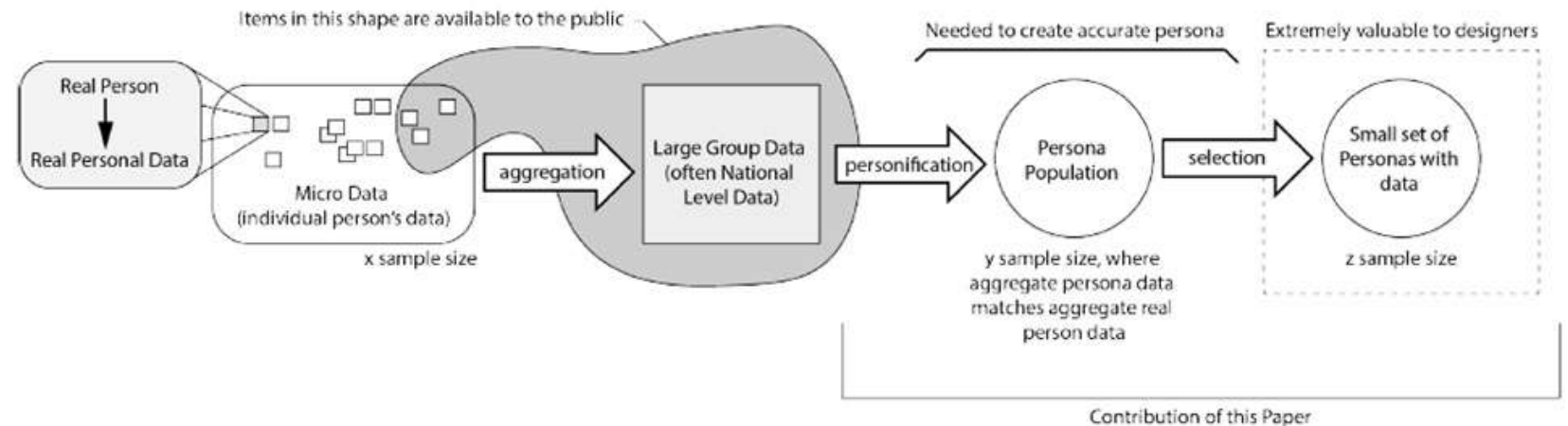**Persona generator**
(Stevenson and Mattson, 2019)

Figure 1. Process for creating a population of personas.

Persona generator (Stevenson and Mattson, 2019)

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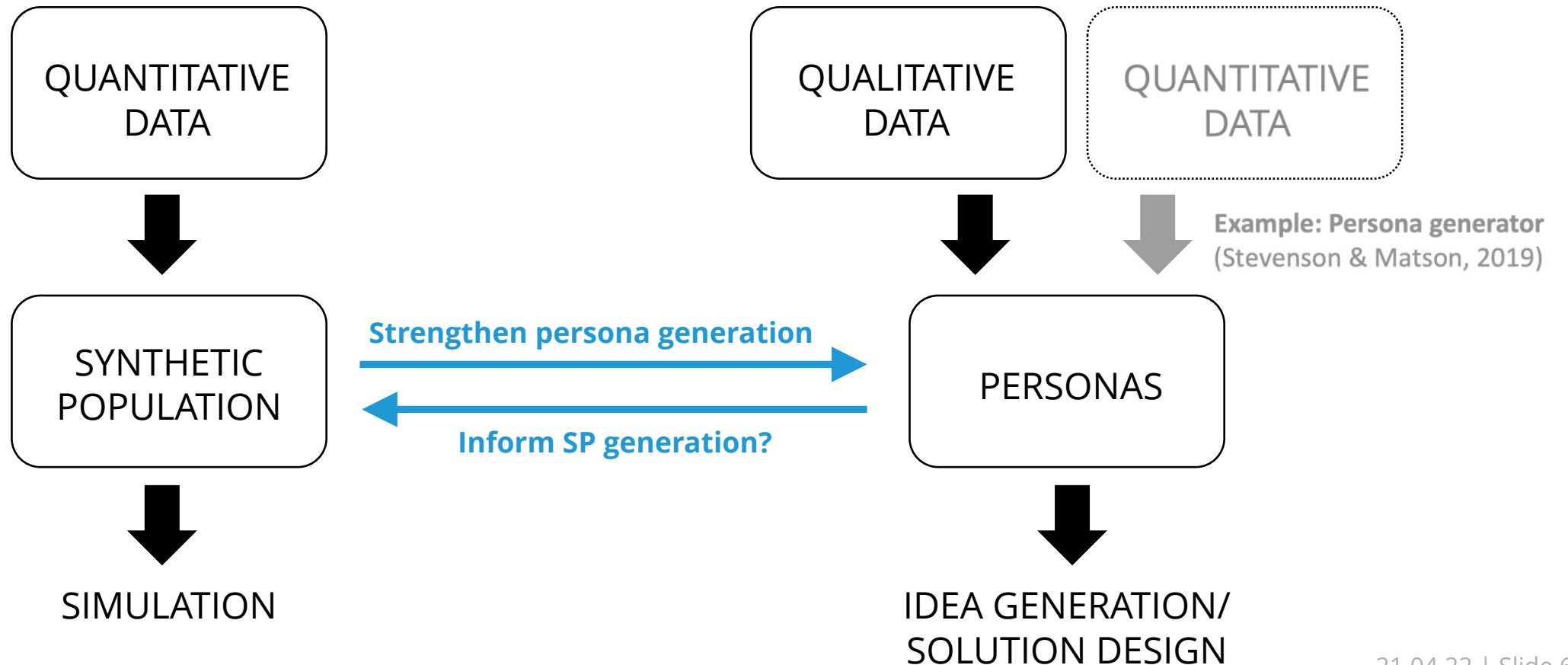Tjark Gall | tjark.gall@irt-systemx.fr

OVERVIEW OF PERSONAS AND SYNTHETIC POPULATIONS

Synthetic populations : Definition and usage in multi agent simulation

- Digital representations of the real population (Ramadan and Sisiopiku, 2020; Hermes and Poulsen, 2012).

- Frequently used in modelling the mobility patterns of the population > Simulation of novel mobility services (Hörl et al., 2021)

- Various approaches: Statistical fitting algorithms (Durán-Heras et al., 2018; Yameogo et al., 2021); Bayesian networks on sparse disaggregated data (Saadi et al., 2016)

- Despite the common attributes of personas and synthetic populations, their practical connection remains a challenge!

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FRAMING THE PROPOSITION

Process description

From **synthetic population** to **clusters**   ...to **personas**

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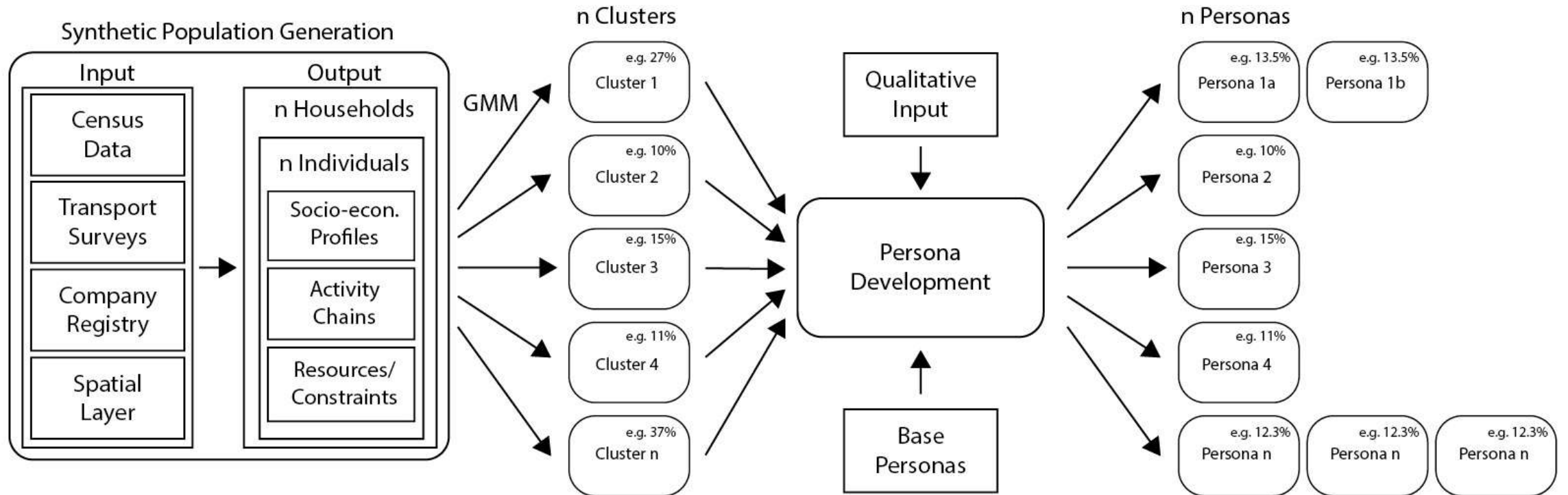
APPLICATION CASE: MOBILITY IN PARIS

Clustering the synthetic population of Paris in 8 classes with a Gaussian Mixture Model (GMM)

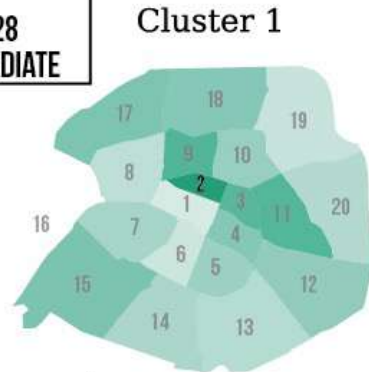**Example: Cluster 5**

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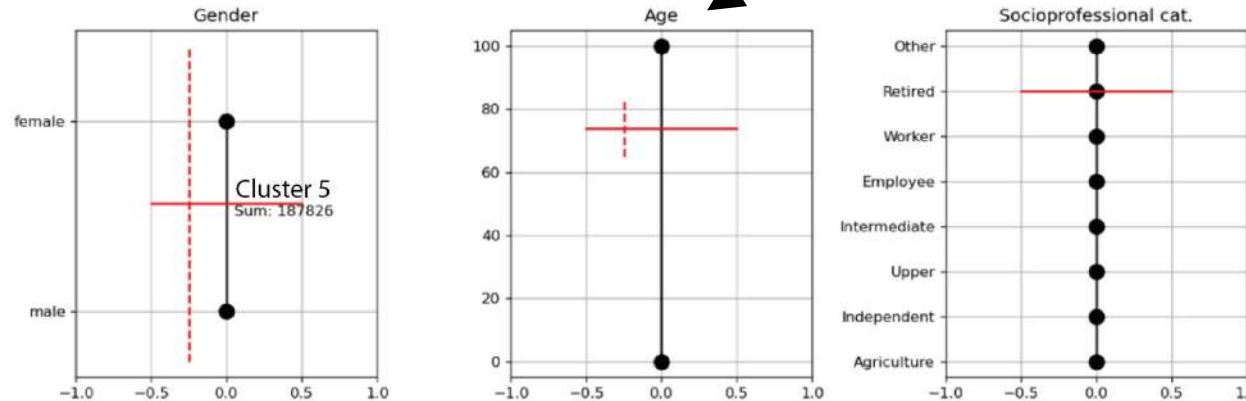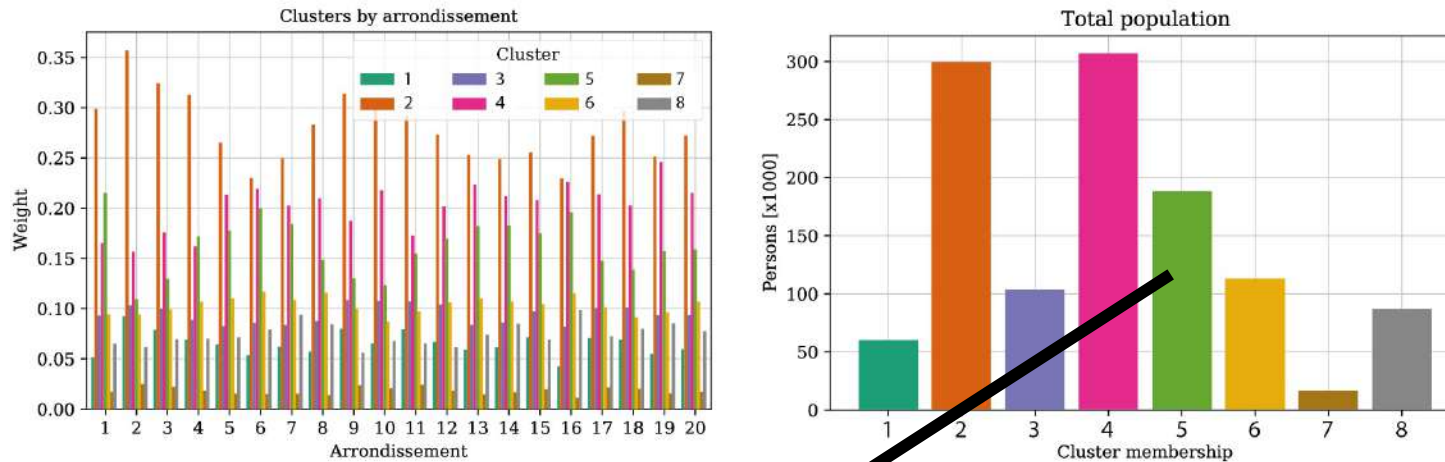
APPLICATION CASE: MOBILITY IN PARIS

Cluster distribution per arrondissement

FEMALE AGE 21-28 INTERMEDIATE — Cluster 1

MALE AGE 30-55 INTERMEDIATE — Cluster 2
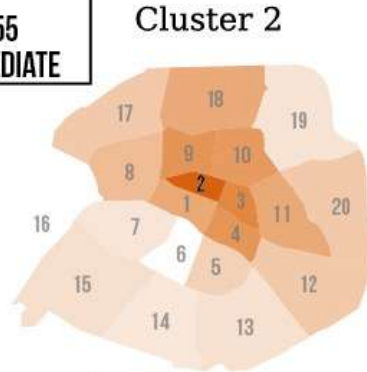
FEMALE AGE 35-55 EMPL. TO UPPER — Cluster 3
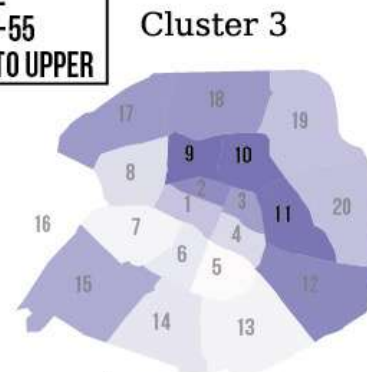
FEMALE-MALE AGE 8-19 OTHER — Cluster 4
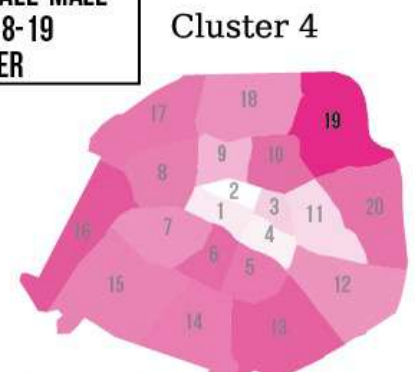
FEMALE-MALE AGE 65-82 RETIRED — Cluster 5
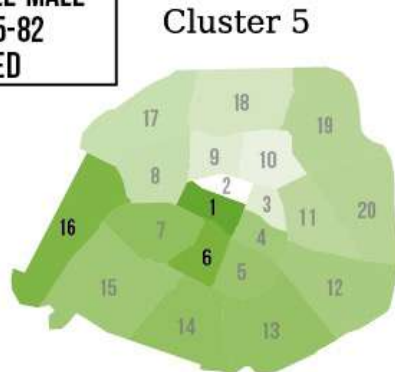
FEMALE AGE 45-60 EMPL. TO UPPER — Cluster 6
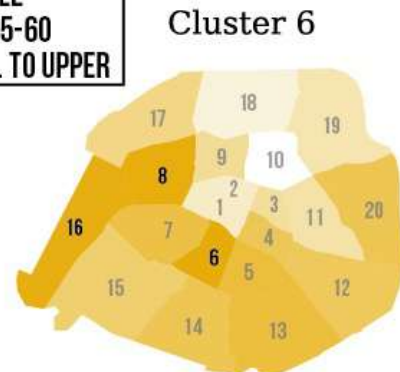
FEMALE AGE 30-35 EMPL. TO UPPER — Cluster 7
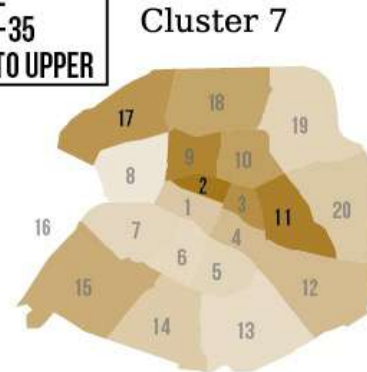
FEMALE-MALE AGE 20-60 OTHER — Cluster 8
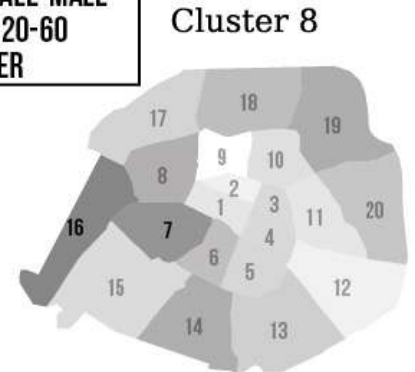
(darker = higher occurrence)

APPLICATION CASE: MOBILITY IN PARIS

Matching existing personas with clusters

Base of test:
Qualitative
personas for
'Paris, an Air of
change' towards
2050 lifestyles
(Elioth, 2017)

PERSONAS	STÉPHANIE	MONIQUE	JACQUES	LEILA	JULIEN	ERIC	NADIA	OLGA	CAMILLE	EMILIE	MANUEL	THIERRY	ADNAN
AGE	41	65	68	28	32	53	53	77	22	34	39	50	22
POSITION	Care assistant	Retired		IT project manager	Journalist	Asset manager	Retired	Student	Teacher	Civil servant	Job seeker	Syrian refugee
CHILDREN	1	0		0		2		0	0	1		0	0
STATUS	Modest	High		Average		Very high		Average	Modest	Average		Modest	Very modest
APP. SIZE	44 sqm	90 sqm		45 sqm		256 sqm		60 sqm	16 sqm	56 sqm		36 sqm	15 sqm
ARRONDIS.	13th	4th		9th		7th		16th	19th	2th		14th	18th
HOUSING	S	-		R		-		-	SH	-		S	H-T
SHORT TRIPS	Car	Car		Petrol scooter	Car	Taxi	Bike	Public transport	Public transport (PT)		Walk/PT	Walk
LONG TRIPS	Train	Car	Plane	Train	Plane	Car	Plane	Plane	Carsharing /train	Car	Plane	Car pooling	HiH Carsharing
NUTRITION	Carnivore	Omnivore		Carnivore		Carnivore		Carnivore	Flexiterian	Flexiterian		Carnivore	Omnivore
CLUSTER	C6	C5		C1	C2	C8	C6	C5	C1/C8	C7	C2	C8	C8

SH: Social housing; R: Rent; S: Shared; H: Hostel; T: Tent; PT: Public transport; HiH: Hitchhiking

1. Test age / position

2. Test/adjust living area

3. Match persona & cluster

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APPLICATION CASE: MOBILITY IN PARIS

Outcome: A set of personas attached to a probable living area

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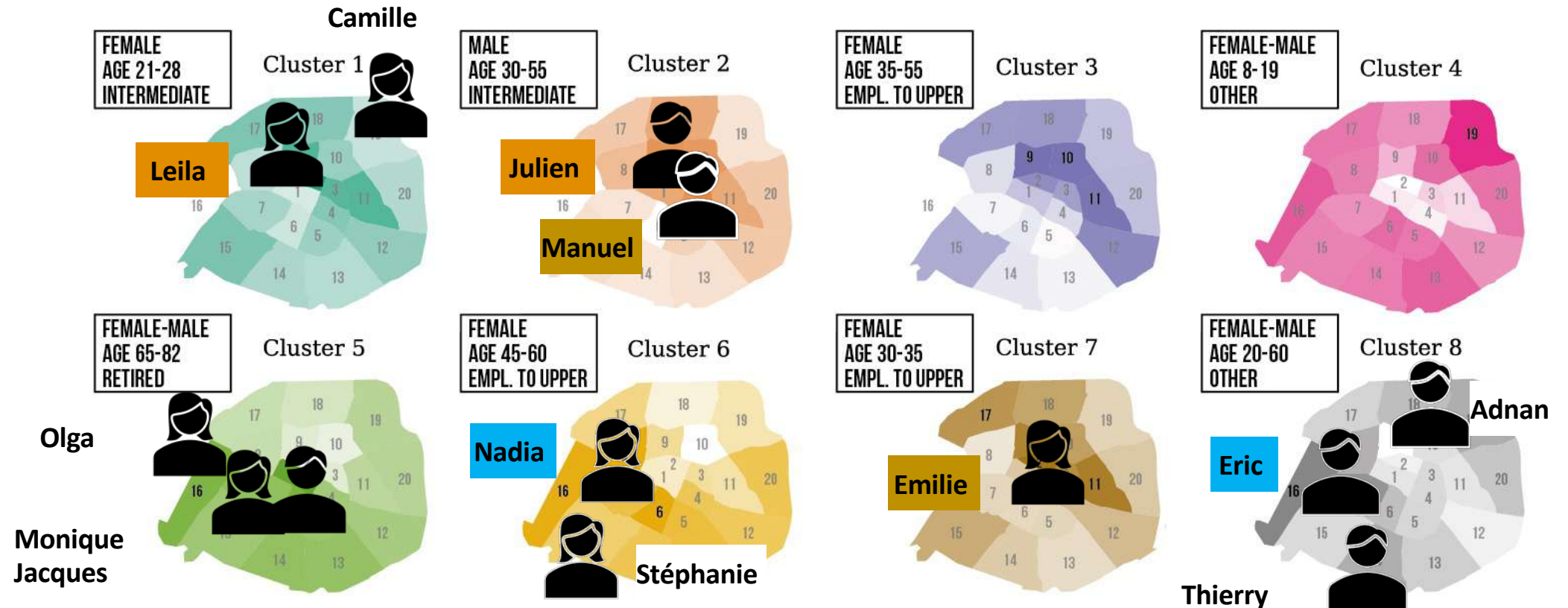
CONCLUSION & DISCUSSION

- **We proposed a framework (1) to move from a synthetic population to personas following a data-driven approach; (2) to enable a collaboration between UX designers and data scientists**

- **Two directions of work:**
    - **Design of product and service development for a set of personas,**
    - **Simulation of individual behaviours of the same personas.**

- **We explored the possibility to match existing personas with a synthetic population (SP) for Paris area: enrich personas with living areas and make SP more tangible**

- **The approach allows to envisage the creation of future personas … but special care to avoid a mismatch between current aggregated data and future projections**

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NEXT STEPS

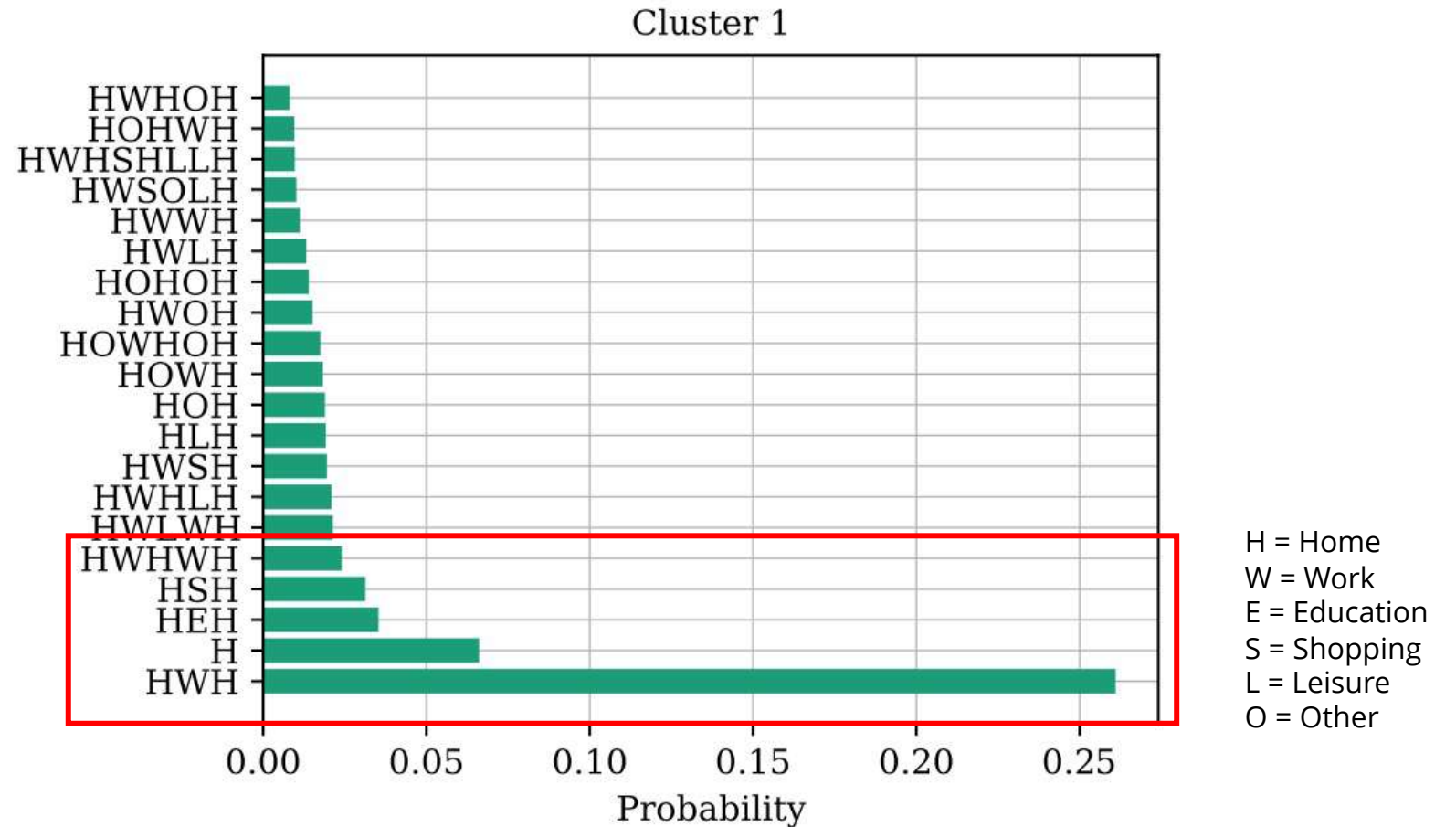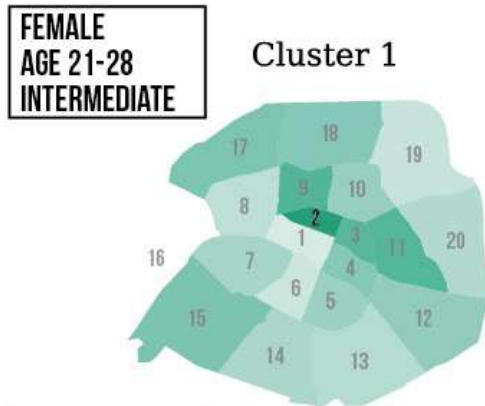# 1. Integration of activity chains

2. Reverse process

3. Application to future scenario planning

INTEGRATION OF ACTIVITY CHAINS

FEMALE
AGE 21-28
INTERMEDIATE

Cluster 1

Cluster 1

H = Home
W = Work
E = Education
S = Shopping
L = Leisure
O = Other

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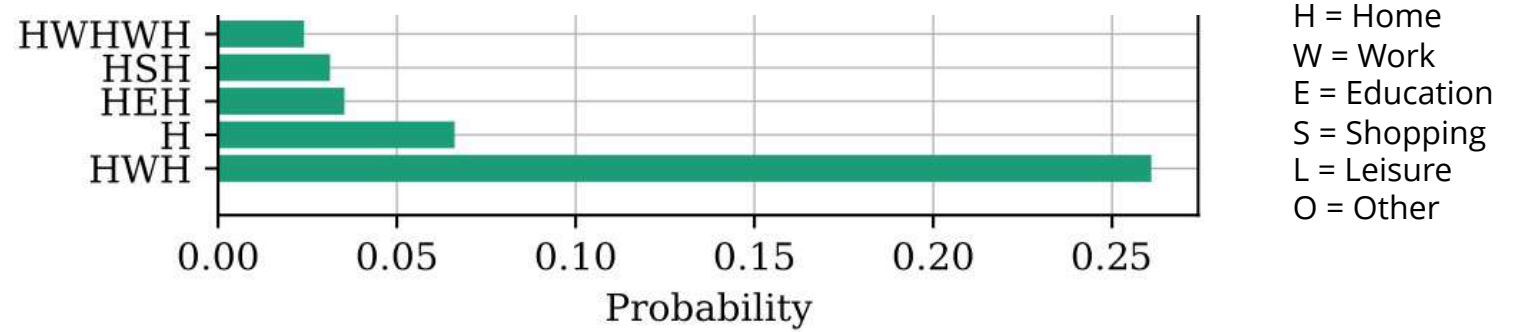
REVERSE PROCESS

REVERSE PROCESS

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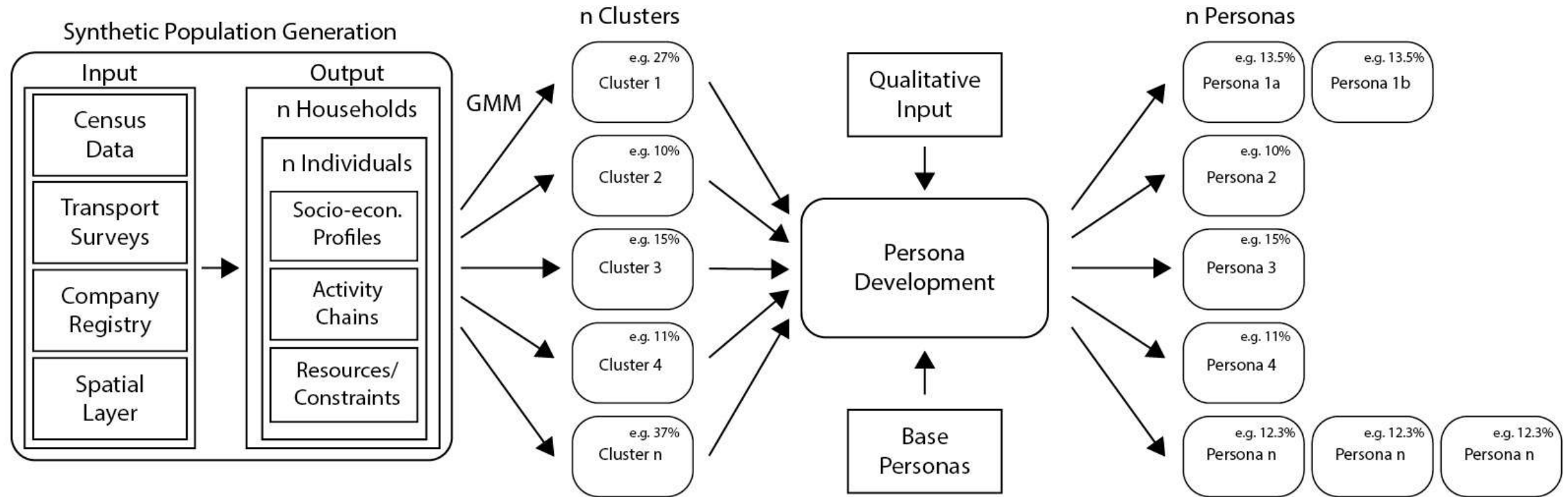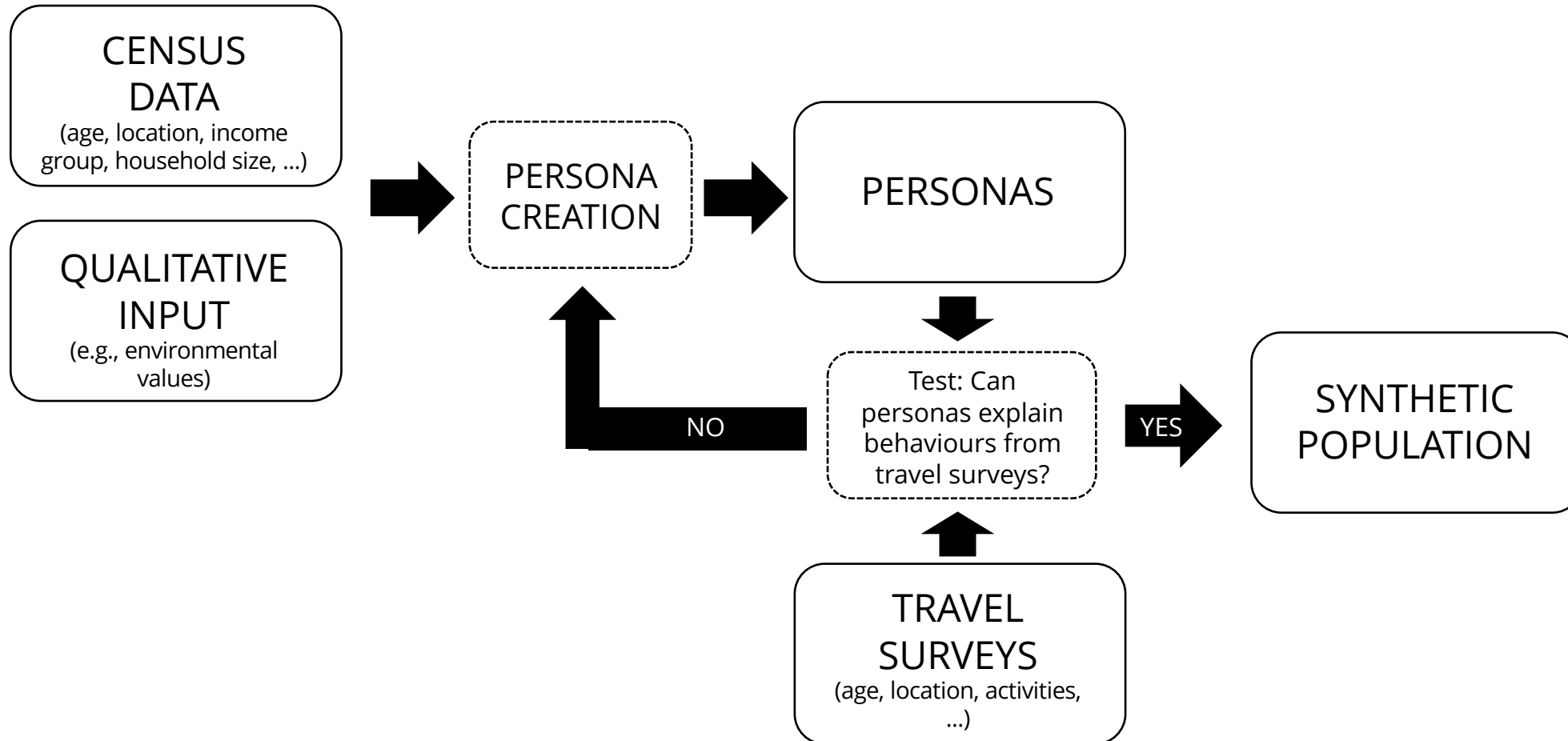
APPLY TO FUTURE SCENARIO PLANNING
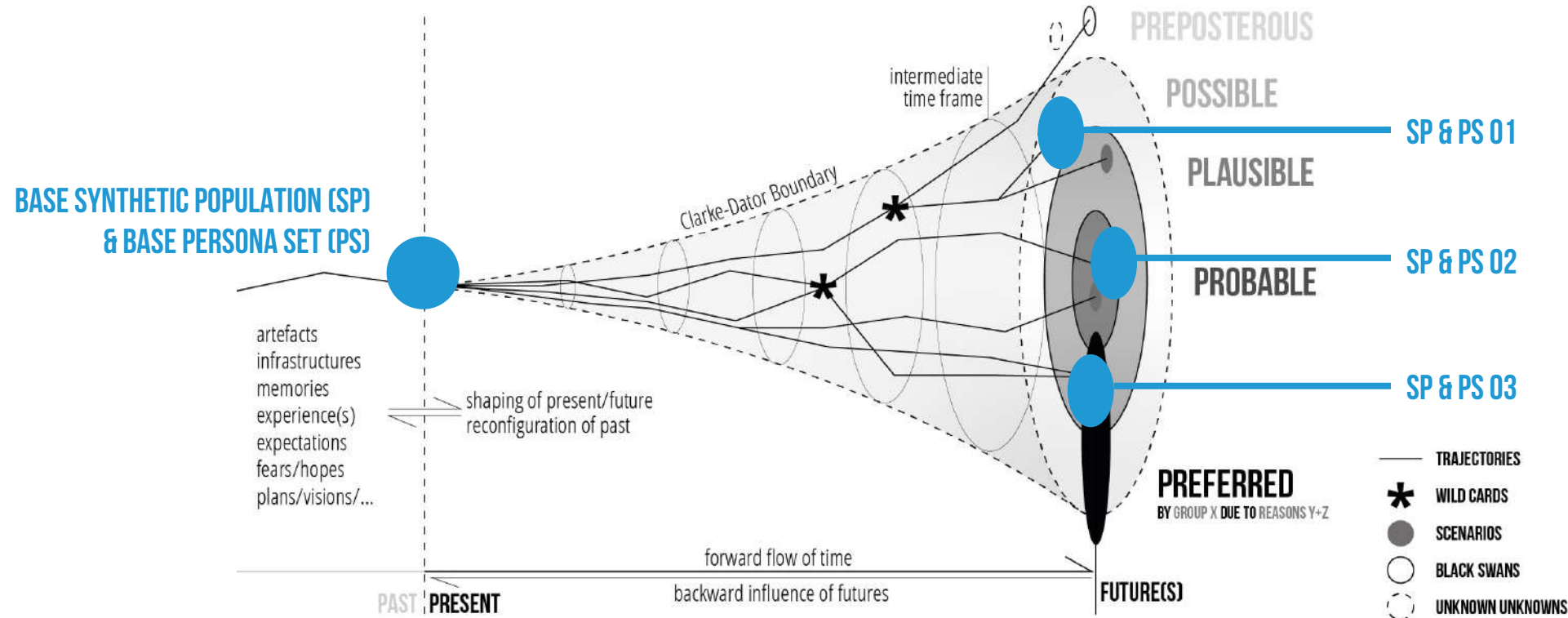
Scenario planning is a tool to strategically integrate different alternatives in the process of preparing plans, policies, and solutions, that can make them more futureproof, flexible, and considerate of uncertainty.

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REVERSE PROCESS

CENSUS
DATA 2030
(age, location, income
group, household size, ...)

1. Simulation of 2-4 possible
future demographic scenarios
(e.g., population growth, aging,
household size decrease)

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REVERSE PROCESS

CENSUS
DATA 2030
(age, location, income
group, household size, …)

QUALITATIVE
INPUT
(e.g., changing values,
lifestyles for 2030)

2. Integrate trends of lifestyles,
car ownership, … for 2030
(+ one with unchanged values)

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REVERSE PROCESS

CENSUS
DATA 2030
(age, location, income
group, household size, ...)

QUALITATIVE
INPUT
(e.g., changing values,
lifestyles for 2030)

PERSONA
CREATION

2030
PERSONAS

3. Generate personas with same methodology as for present

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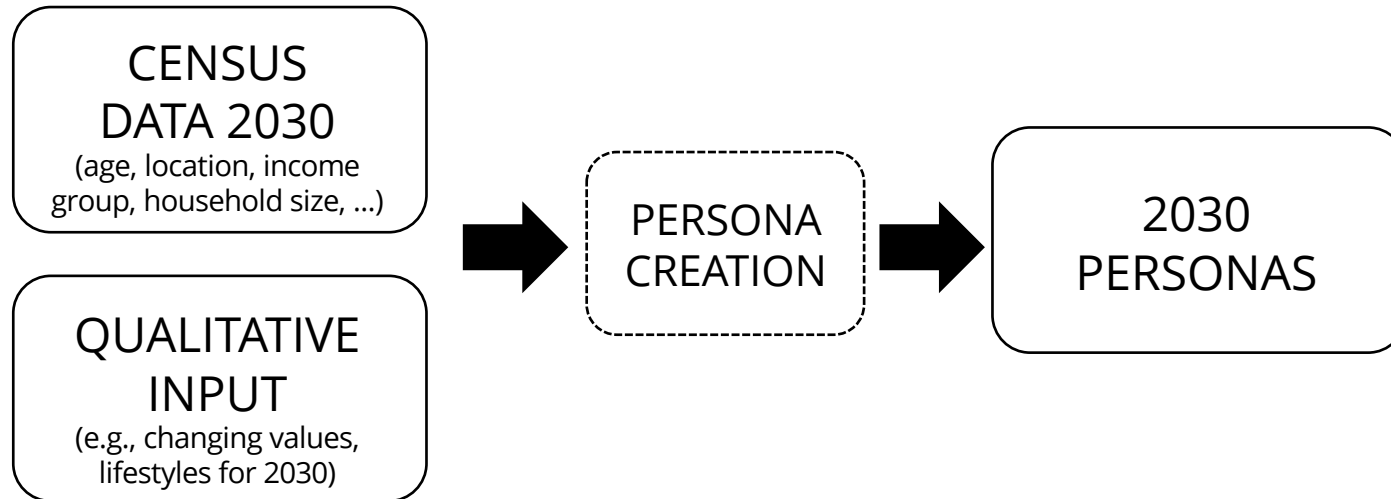Tjark Gall | tjark.gall@irt-systemx.fr

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REVERSE PROCESS

CENSUS
DATA 2030
(age, location, income
group, household size, ...)

QUALITATIVE
INPUT
(e.g., changing values,
lifestyles for 2030)

PERSONA
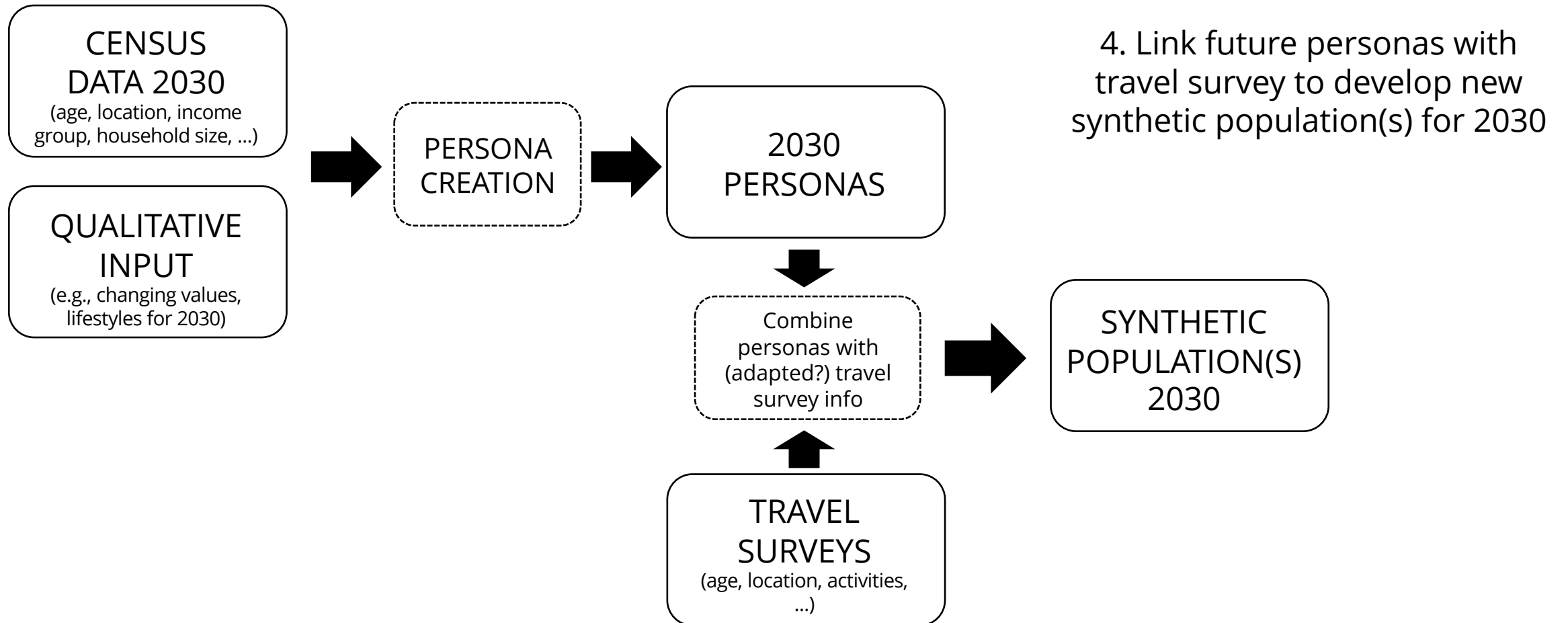CREATION

2030
PERSONAS

Combine
personas with
(adapted?) travel
survey info

TRAVEL
SURVEYS
(age, location, activities,
...)

SYNTHETIC
POPULATION(S)
2030

4. Link future personas with
travel survey to develop new
synthetic population(s) for 2030

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DISCUSSION

- Data-based, supplemented persona creation process

- Cross-disciplinary link between design & simulation

- Validation of personas via matching with travel survey data

- Novel workflow for generation of present synthetic population

- Combined workflow proposition for multiple future scenarios

=> The completed and ongoing work shall result in a validated approach to better integrate design and simulation in urban mobility management, both in the representation of today, as well as in possible future scenarios.

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