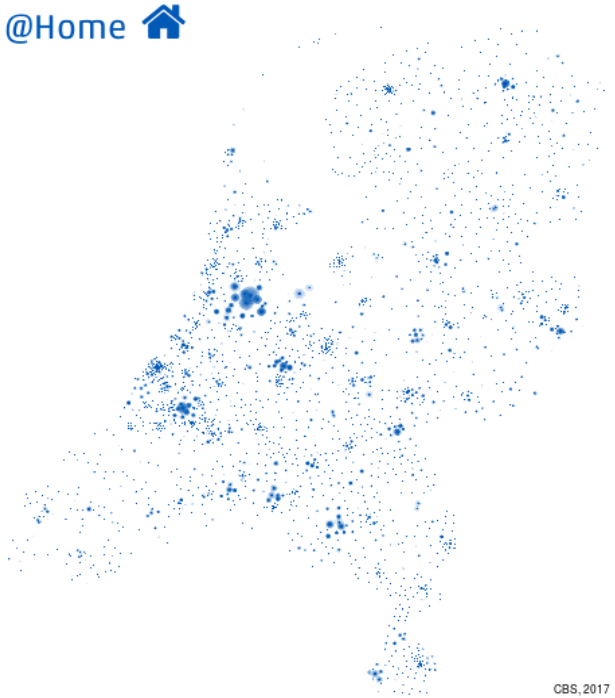
Social Aspects of AI

A Social Data Science Perspective
Frauke Kreuter LMU Munich & UMD

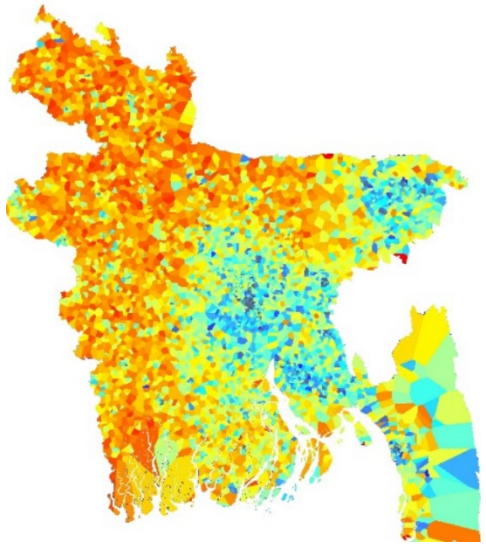
UN Sustainable Development Goals

Sustainable Communities



Source: https://www.cbs.nl/en-gb/our-services/innovation/project/towards-motives-behind-mobility

No Poverty

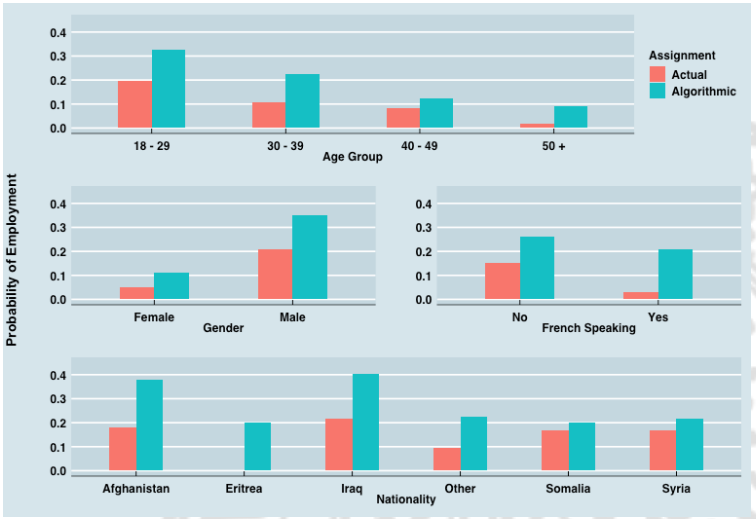


https://doi.org/10.6084/m9.figshare.c.3662800.v1

See also Steele, J. et al. (2017): „Mapping poverty using mobile phone and satellite data.“, *Journal of the Royal Society Interface*, 14.

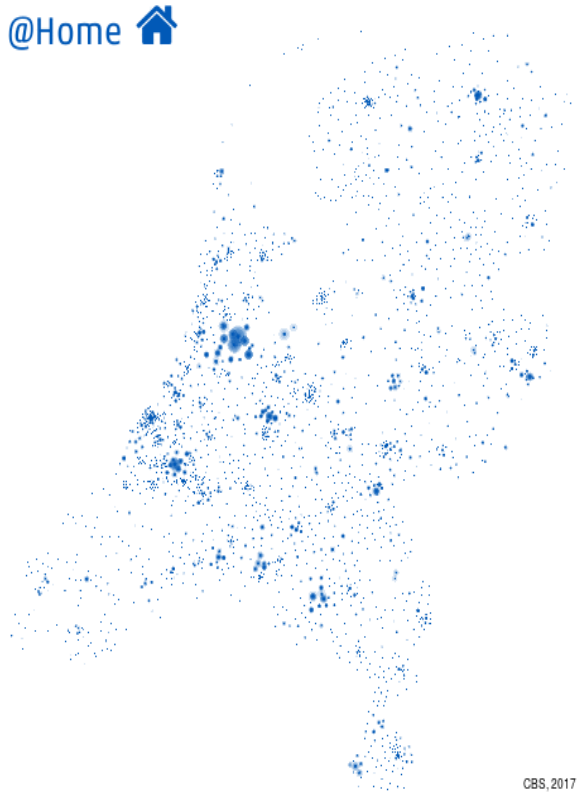
See also Jean, N. et al. (2016): „Use of satellite imagery and machine learning to predict poverty.“, *Science*, 353(6301), 790-794.

Decent Work - Economic Growth



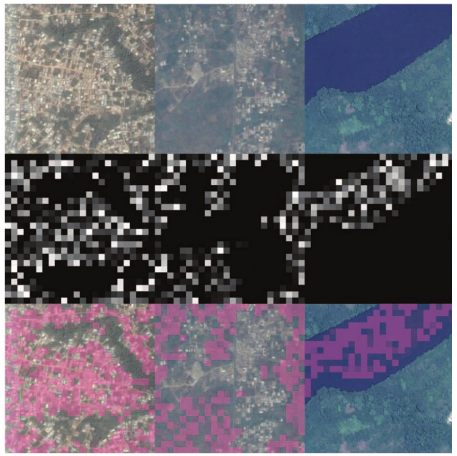
See also Bansak, K. et al. (2018) Improving refugee integration through data-driven algorithmic assignment. Science, 359, 6373, 325-329.

Mobility and Poverty (UN Sustainable Development Goals)



Source: https://www.cbs.nl/en-gb/our-services/innovation/project/towards-motives-behind-mobility

- Cell tower usage predicts household income in Bangladesh (red areas < $2.50/day)
  Source: Steele JEet al. 2017Mapping poverty using mobile phone andsatellite data.J. R. Soc. Interface14



- Nature paper showcases use of satellite imagery and machine learning to predict poverty
  Source: Jean et al. (2016): Nature, 353(6301), 790-794.

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Profiling of the Unemployed

Loxha and Morgandi, 2014; Desiere et al. 2019; Hangartner et al. 2021, Nature

Human Decider: Who will get what support, when

Problem: inefficient, subjective, …

Rule Based: Enrollment into support program follows fixed rules

Problem: ineffective, …

Algorithm Based: AI models predicts who is most likely to succeed where

Hope: efficient, effective, objective

Figure: Stylized timeline of **algorithmic profiling** across OECD

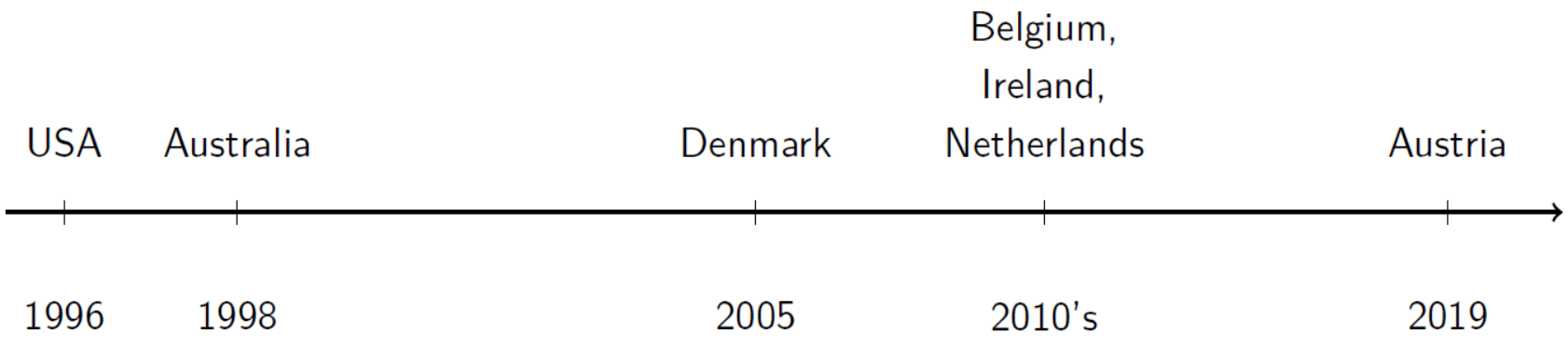

Photo by Souvik Banerjee on Unsplash

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1. Decisions about fairness are independent of AI
2. Data access and data linkage are indispensable
3. Contextual integrity as guiding principle
4. Two new initiatives @ LMU

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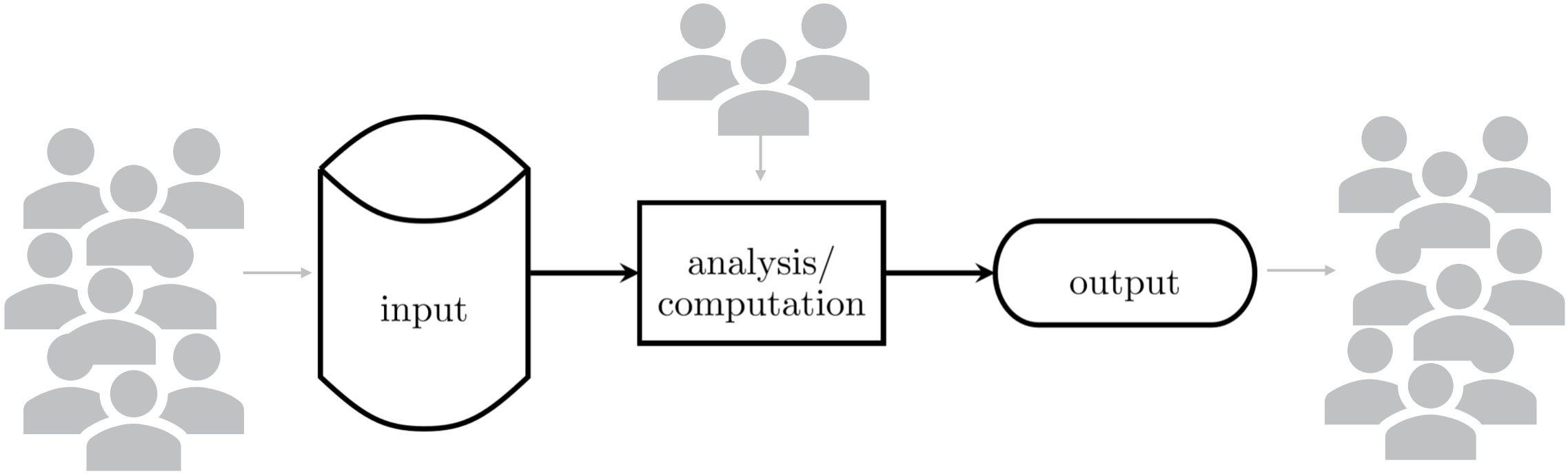
Decisions ... are made throughout the AI pipeline



Good AI rests on good data

Google Image Search:

“University Professor”

June 12, 2018;
July 15, 2019

Good AI rests on good data

Google Image Search: “University Professor”

July 19, 2019

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AI is not unfair by itself

- **We must decide on the justice principles**
- **This is true for AI and human decisions**

Theory (section)	**Distribution Principle**	**Illustration** (Box 1)
Egalitarianism (3.1)	Allocate resource amount *R* to individual *X* iff the current resource stock *Y* of *X* is such that giving *R* to *X* minimizes overall inequality across all individuals' resource stocks.	Allocate support programs such that all jobseekers are eventually served equally.
Desert (3.2)	Allocate amount *R* of the resource to individual *X* iff *X* deserves *R*. *X* deserves *R* by virtue of having attribute (desert-base) *Y*.	Allocate support programs according to jobseekers' previous contribution to public welfare or, alternatively, to historically marginalized groups.
Sufficientarianism (3.3)	Allocate amount *R* of the resource to individual *X* iff *X* needs R. *X* needs *R* iff the stock *Y* of resources that *X* has in the absence of *R* is below the threshold of resources that individuals should minimally have.	Focus allocation of support programs on jobseekers whose socio-economic resources fall below a pre-determined threshold.
Prioritarianism (3.4)	Allocate amount *R* of the resource to individual *X* iff the allocation of *R* to *X* has the highest moral value *Y* among all possible allocations. Allocations have decreasing marginal moral value: The more resources individual *X* already has, the lower the moral value of allocating additional resources to *X*.	Prioritize allocation of support programs to jobseekers according to their level of economic hardship or social exclusion.
Equality of opportunity (3.5)	Allocate equal opportunity to receive amount *R* of the resource to all individuals *X* with the same attribute *Y*.	Ensure that all jobseekers who are equally eligible for support have the same real opportunity of being assigned to support programs.

https://doi.org/10.48550/arXiv.2105.01441

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Fairness Challenge

Imperfect training data → many subpopulations

- *Misrepresentation of subpopulations affects accuracy and can have considerable real-world consequences (Buolamwini 2019)*

Gender Classifier	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest Gap
Microsoft	94.0%	79.2%	100%	98.3%	20.8%
FACE++	99.3%	65.5%	99.2%	94.0%	33.8%
IBM	88.0%	65.3%	99.7%	92.9%	34.4%

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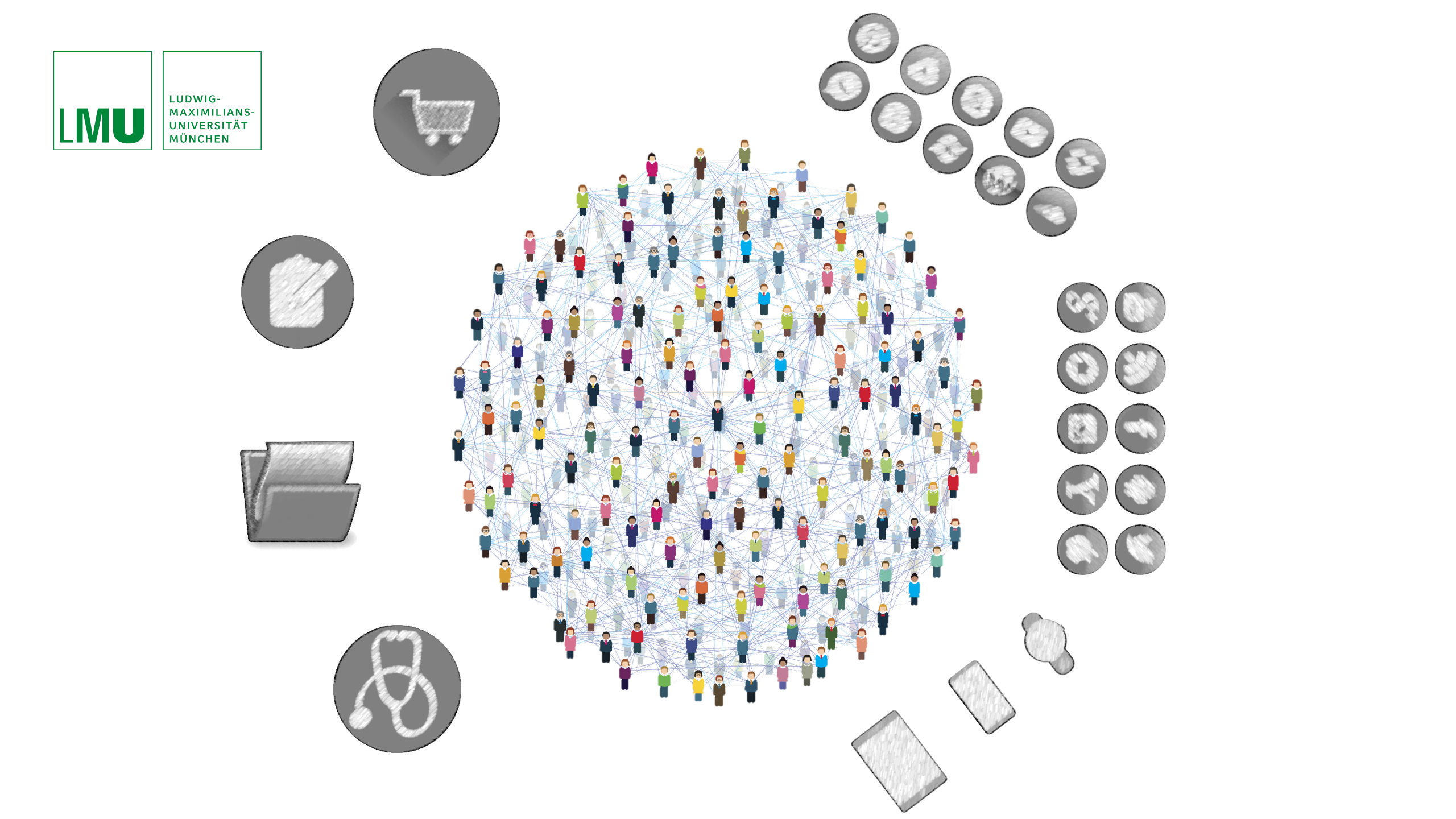

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Zensus 2022

@zensus2022

zensus 2022

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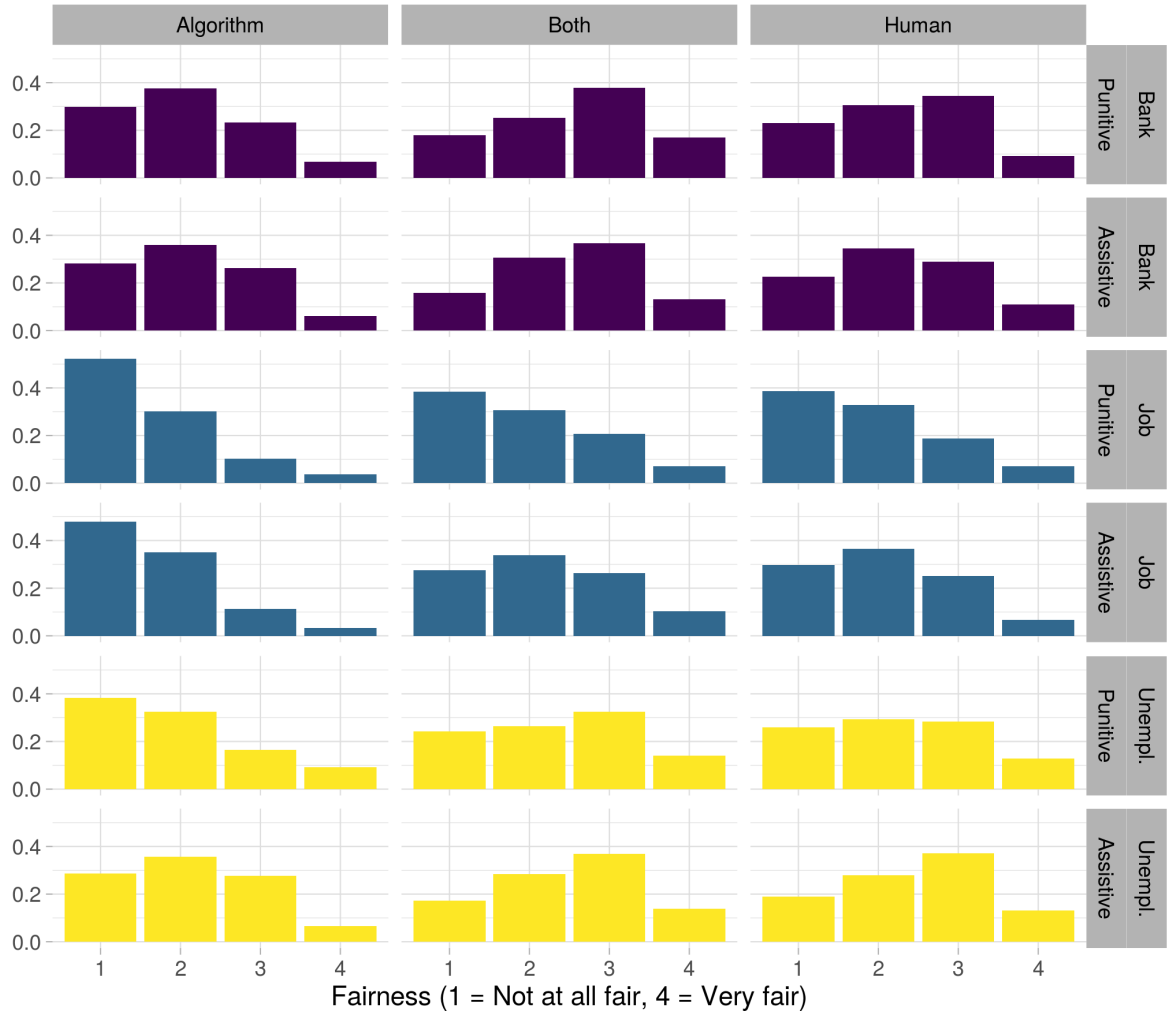
Context matters

- Probability-based longitudinal online survey
- July 2021 n = 4,108 respondents

Vignette Dimensions

1. The **context** in which an ADM system is applied
2. Type of **action** the decision effects
3. Type of **data** used to inform decision
4. The degree of **human involvement** in decision-making



www.uni-mannheim.de/newsroom/presse/pressemitteilungen/2022/januar/algorithmen/

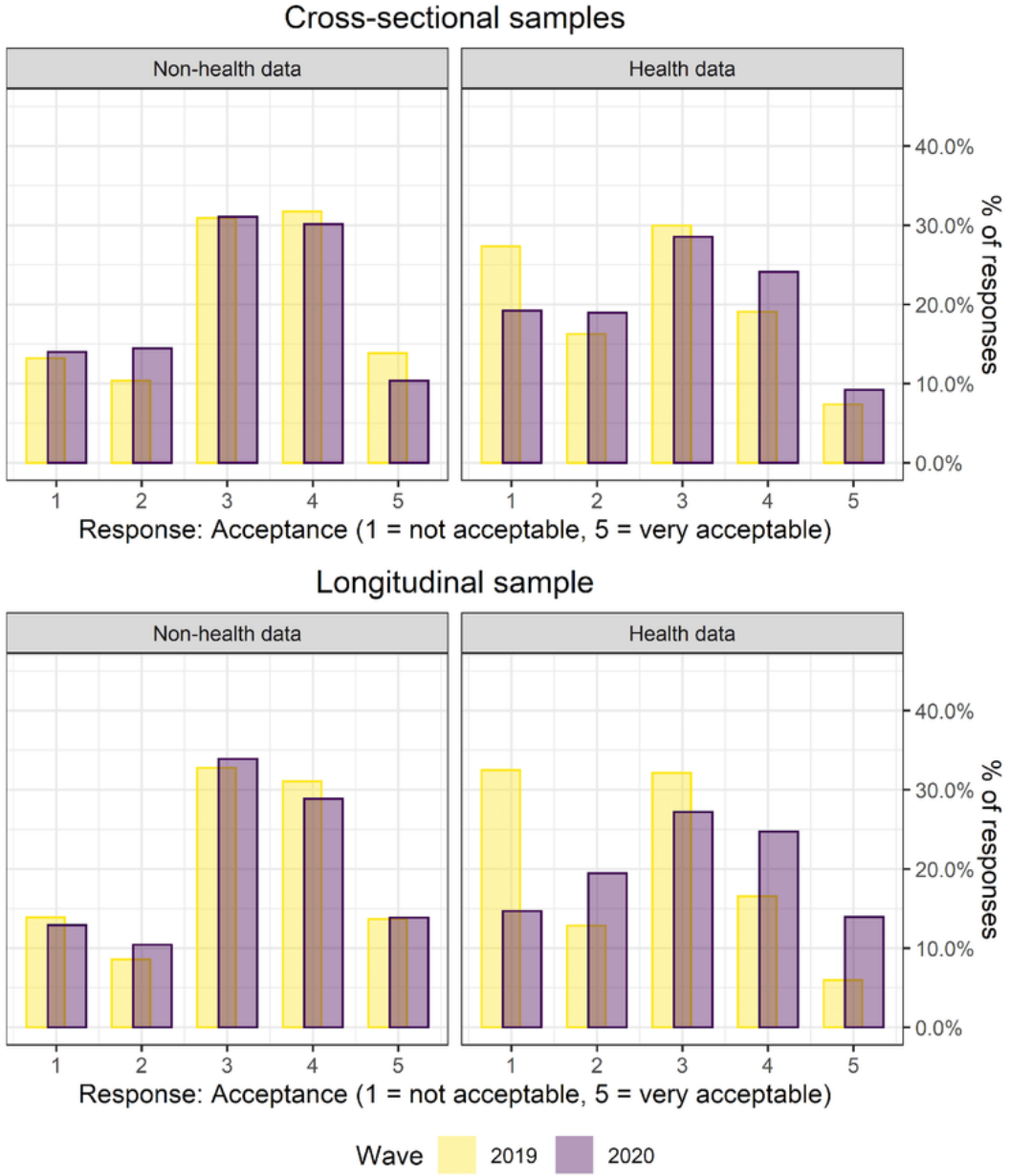
Context matters

Recipient:
- Public authority
- Company

Data type:
- Health: Sensors on a smartphone collect data on the health condition
- Location: Smartphones collect location data during car rides
- Energy: Intelligent power meters collect data on the energy consumption

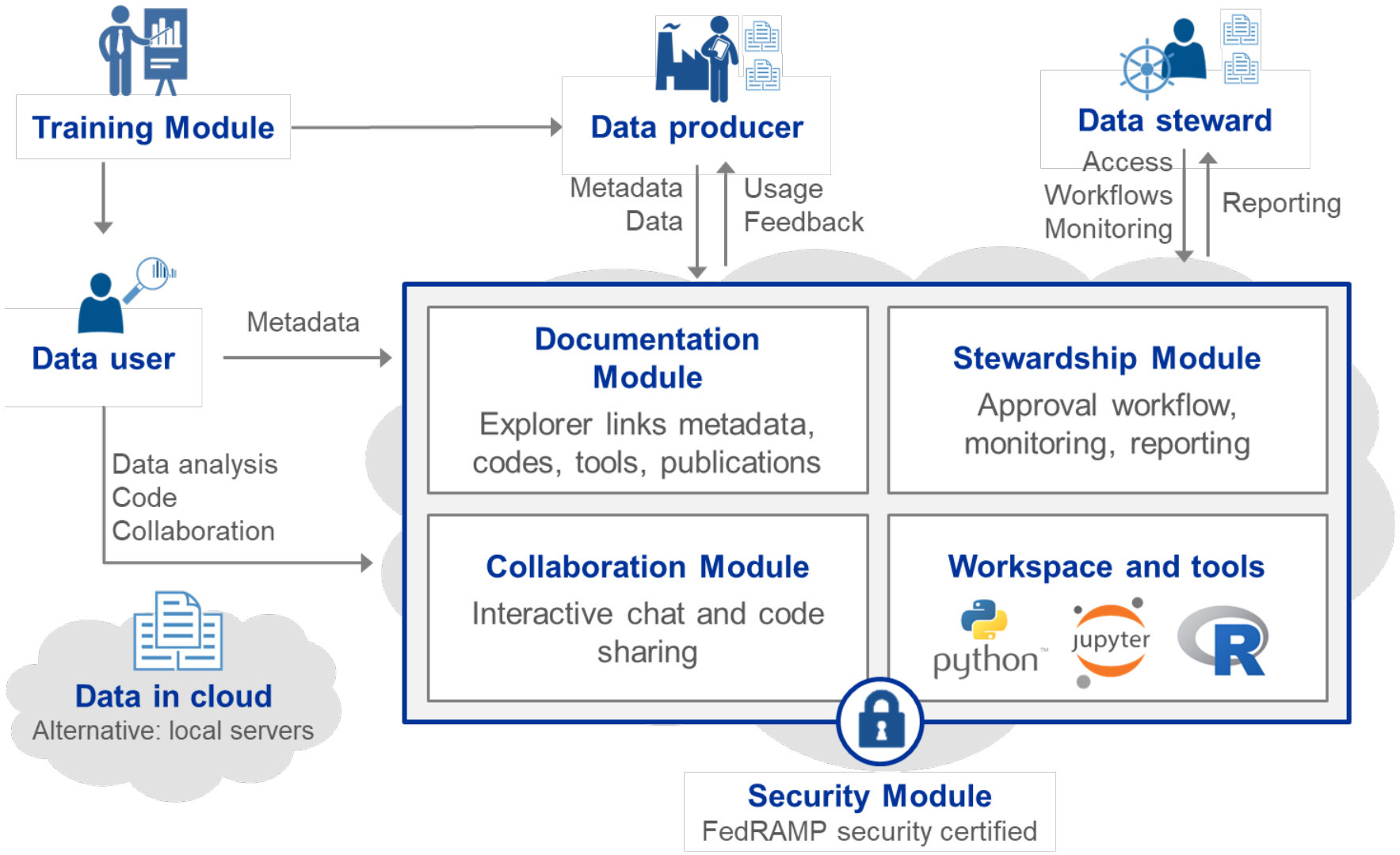
Sensors installed on a smartphone collect data on the health condition of the holders (e.g., heart rate). With consent of the holder, these data are transmitted to a public authority. The public authority uses these data to detect the spread of infectious diseases in the population early and to develop solutions to their containment. The data are safe, anonymous, and protected from misuse.

Depending on data type:	Private purpose	Public purpose
Health	… personal recommendations on health behavior	…to detect outbreaks of infectious diseases early and to develop solutions to their containment.
Location	… personal recommendations on driving behavior and routes	…to develop improvements of the local infrastructure
Energy	… personal recommendations on the optimization and reduction of the own energy consumption	… to develop a more efficient energy distribution system



Gerdon, Nissenbaum, Bach, Kreuter & Zins. 2021.
Harvard Data Science Review https://doi.org/10.1162/99608f92.edf2fc97cc-by-4.0

Context matters for AI model training and sharing



Kreuter, F., Ghani, R., & Lane, J. (2019). Change Through Data: A Data Analytics Training Program for Government Employees. *Harvard Data Science Review*, *1*(2). https://doi.org/10.1162/99608f92.ed353ae3

https://coleridgeinitiative.org/

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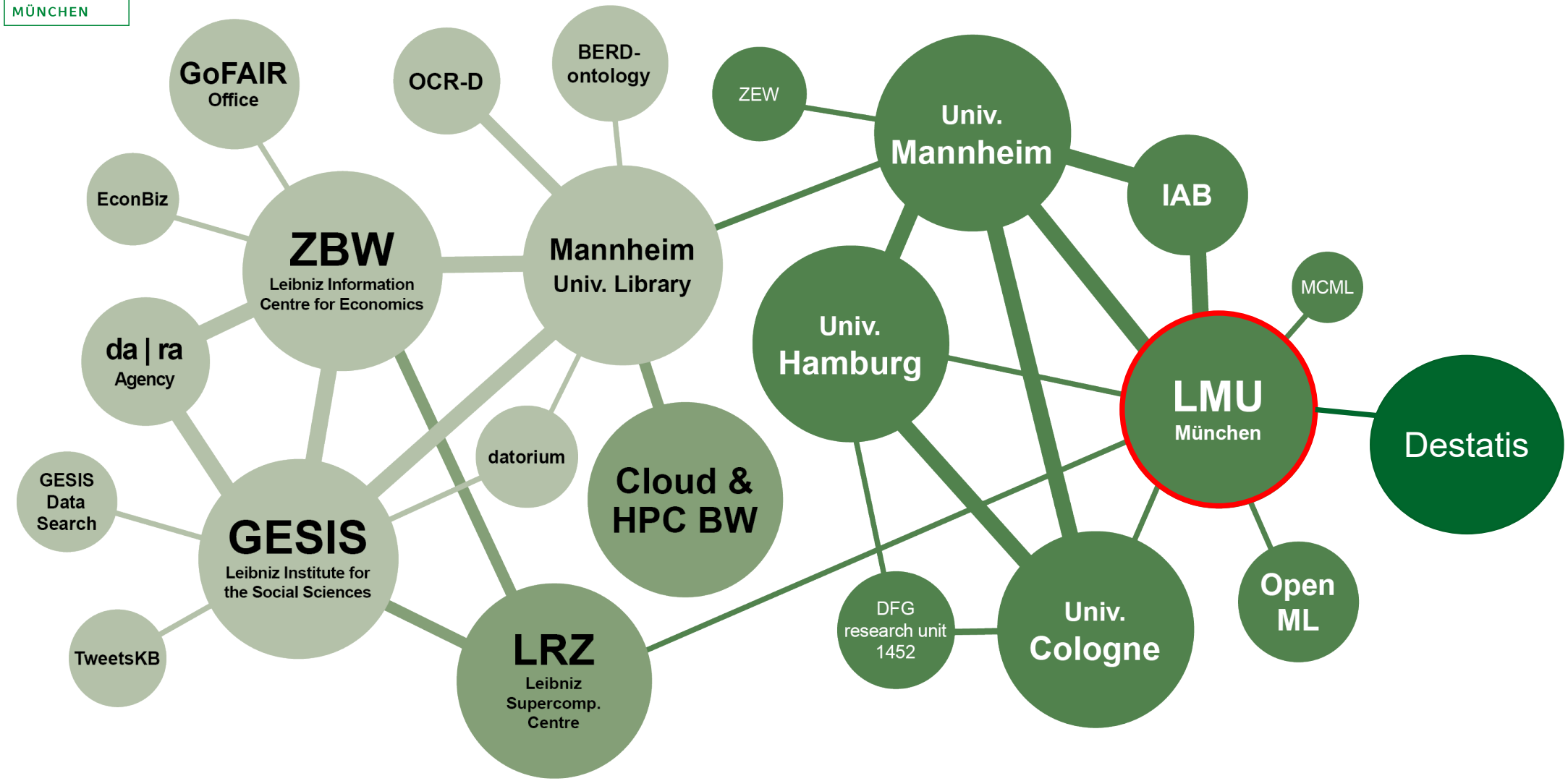
BERD@NFDI – Stat@LMU + Destatis



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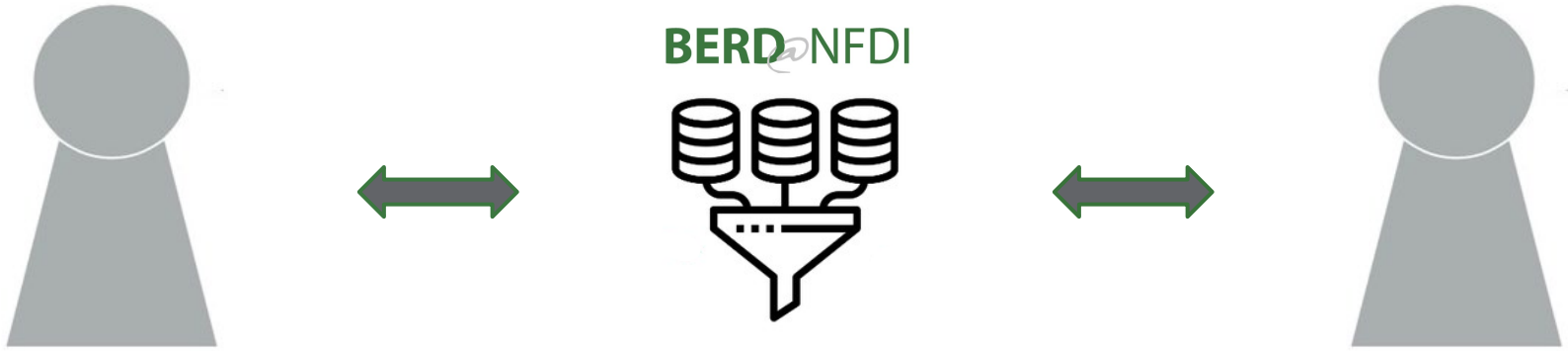
BERD as an Open Platform for Analysis



Domain Specialist

- Define task in accordance with theory
- Refine theory based on results

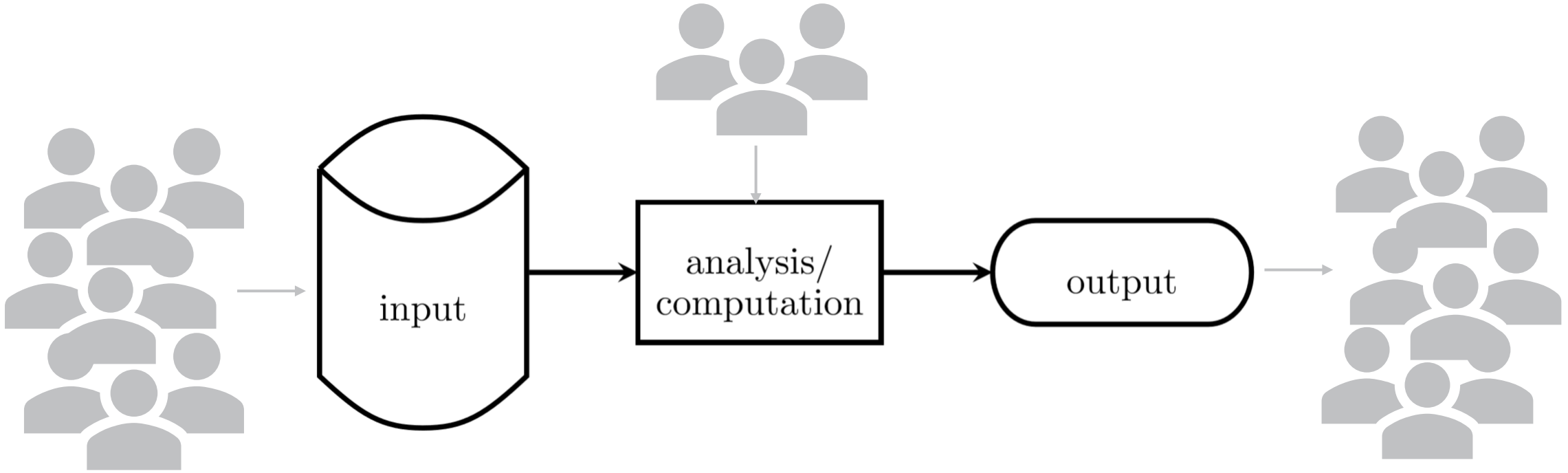
BERD

- Interactive notebooks
- Similarity search on studies
- AutoML removes drudge work
- ...

Data Scientist

- Map task to analysis
- Refine and optimize analysis pipelines

BERD facilitates optimal collaboration between domain specialists and data scientists


input
analysis/
computation
output

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In sum: Good AI rests on good data

- Decisions about fairness are independent of AI
- Data access and data linkage are indispensable
- Contextual integrity as guiding principle

Safe projects

Safe people

Safe settings

Safe data

Safe exports

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Frauke Kreuter
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