

# MPADD: Measurement of Physical Activity in older adults through Data Donation

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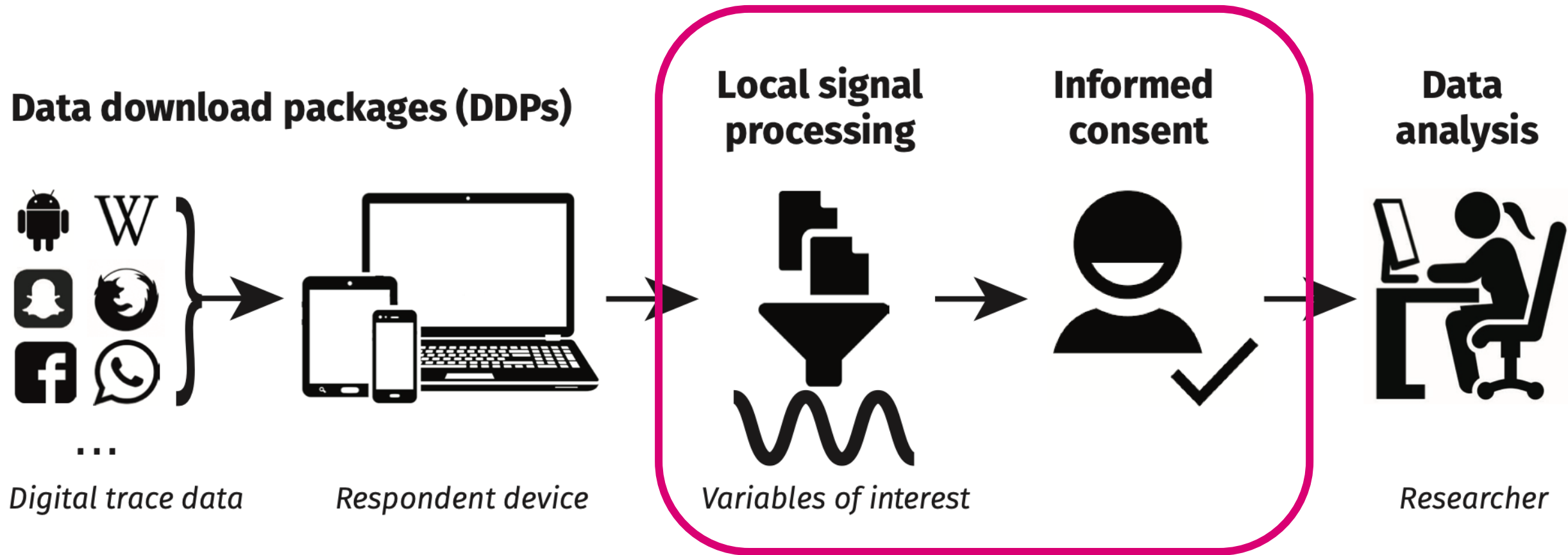
# Studying Physical Activity (PA)

- Key predictor of many health outcomes in older adults
- High quality of measurement needed to develop interventions
- Usually measured through self-report
  - Limited to global measures (average daily hours of moderate/vigorous activity)
  - Suffer from misclassification (e.g., walking a dog not considered PA)
  - Day reconstruction methods burdensome and prone to recall error – only for limited amount of time

# Data Donation

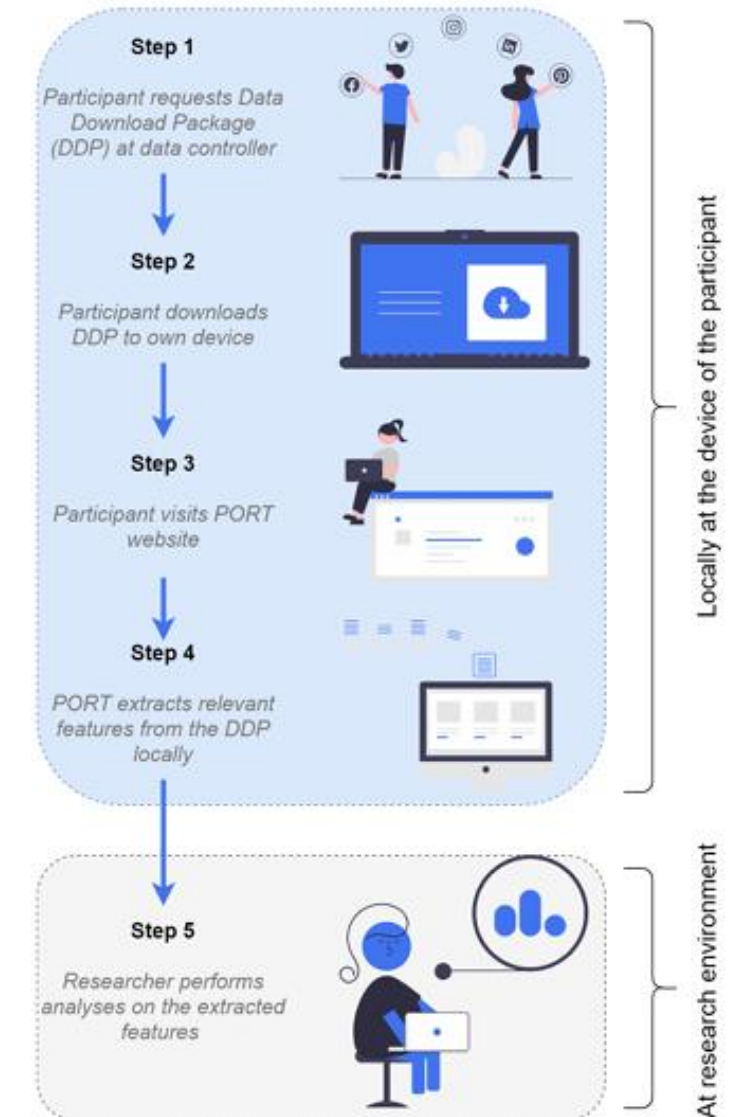
- Takes advantage of GDPR Article 20 – Right of data portability
  - Receive personal data in structured, commonly used and machine-readable format (Data Download Package, DDP)
  - Transmit data to another data controller
- Data donation = Providing data already stored on digital platforms and available as DDPs to researchers

# Privacy-preserving Data Donation Workflow



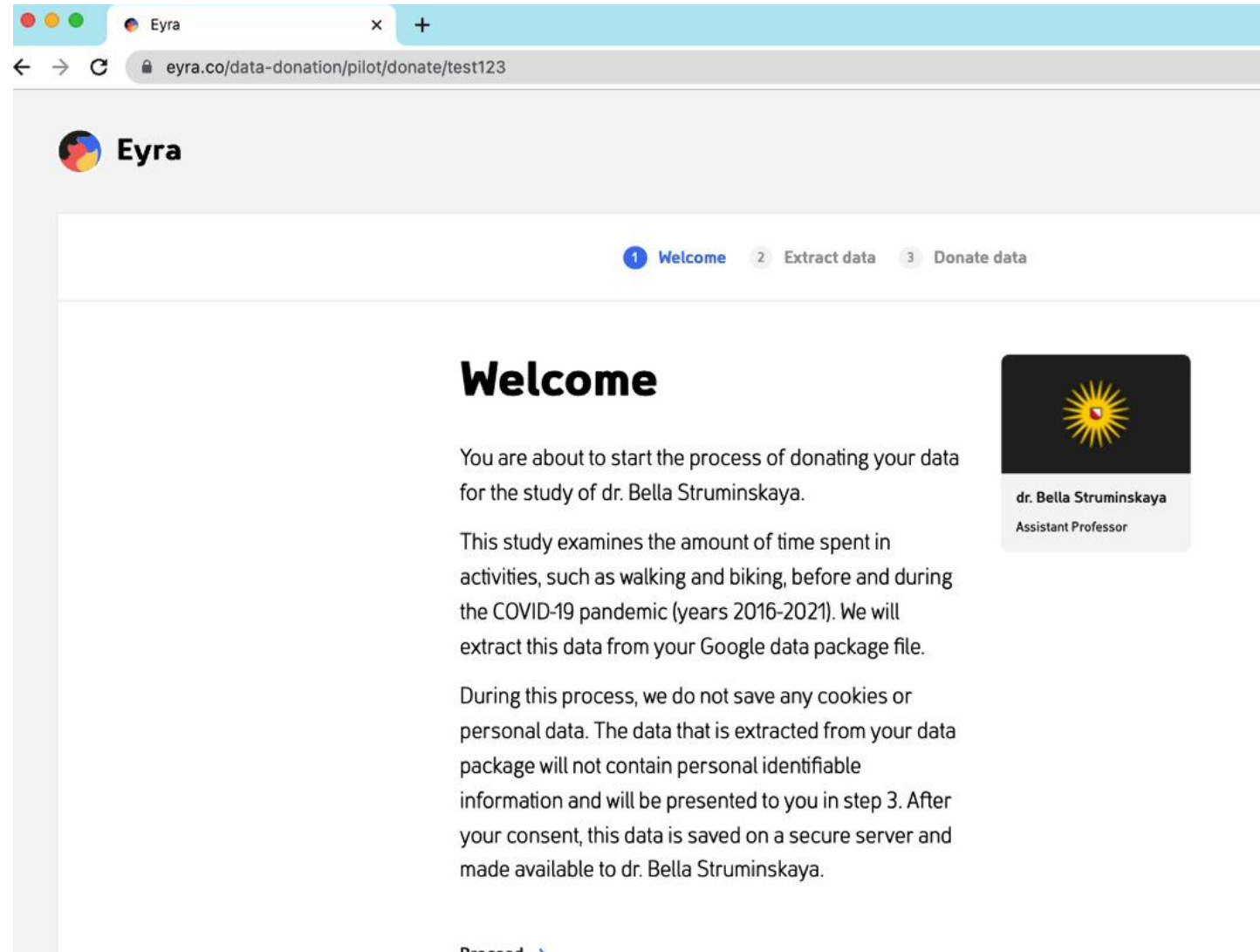
# Digital Data Donation Infrastructure (D3I)

- 6 Dutch universities,
- Data donation with local extraction (PORT)
- Agency (changing data)
- For: Google\*, Meta\*, Twitter, Netflix, Spotify
- Methodological questions:
  - Understanding of consent
  - Representativeness
  - UX
  - Measurement quality
  - Validity & Reliability



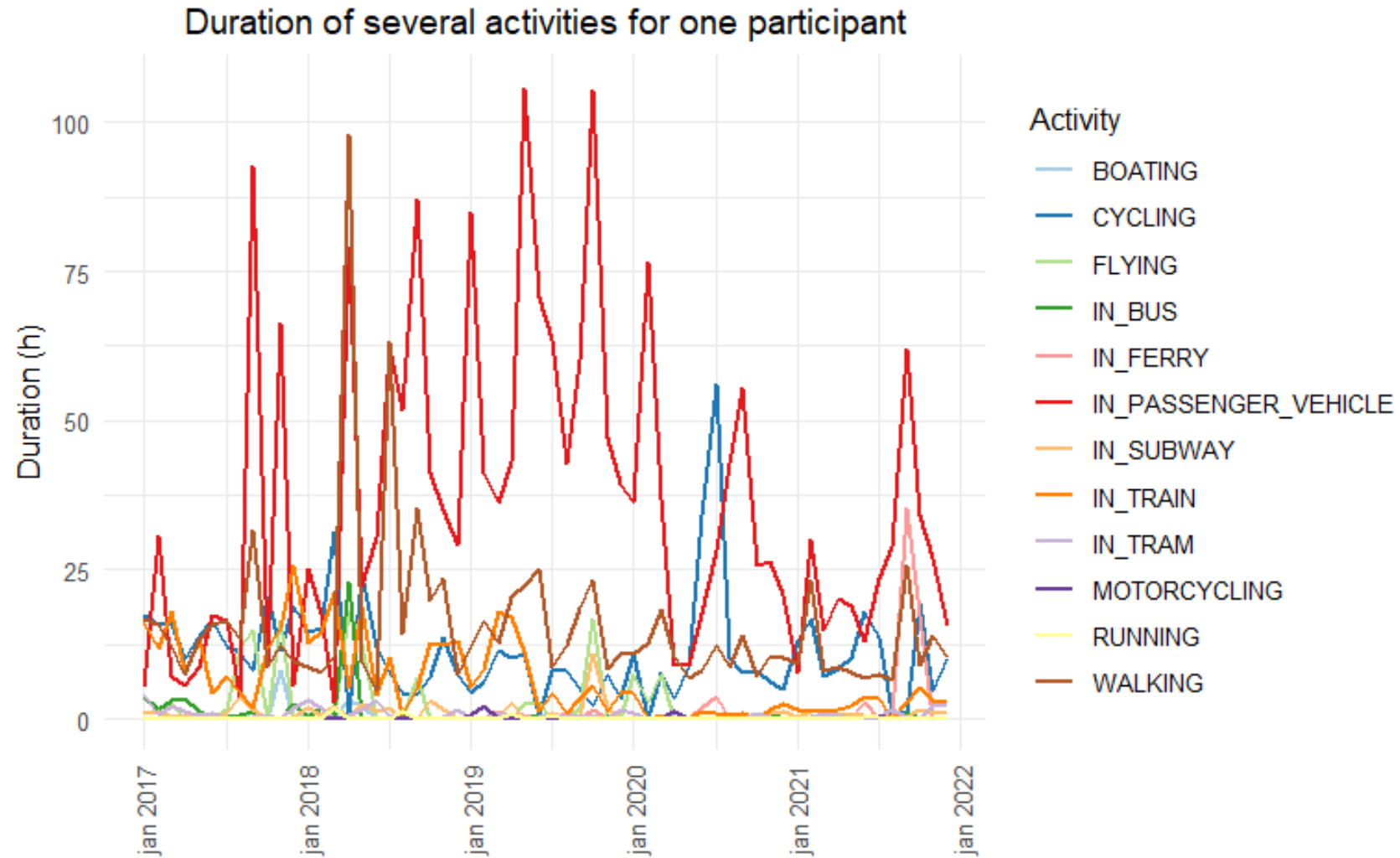
# Example: Using PORT for Google Location History Data Donation

- Seed project Focus Area Applied Data Science
- Together with geographers and computer scientists
- Testing the data donation workflow and ERB procedure
- Changes to Python script for large-scale implementation



The screenshot shows a web browser window with the URL `eyra.co/data-donation/pilot/donate/test123`. The page features the Eyra logo and a progress indicator with three steps: 1. Welcome (active), 2. Extract data, and 3. Donate data. The main content area displays a "Welcome" message to dr. Bella Struminskaya, Assistant Professor, explaining the data donation process for a study on walking and biking during the COVID-19 pandemic (2016-2021). The text states that data will be extracted from Google data package files, that no cookies or personal data are saved, and that the extracted data will be presented to the user in step 3. A "Proceed" button is visible at the bottom of the page.

# Google Location History Data Donation

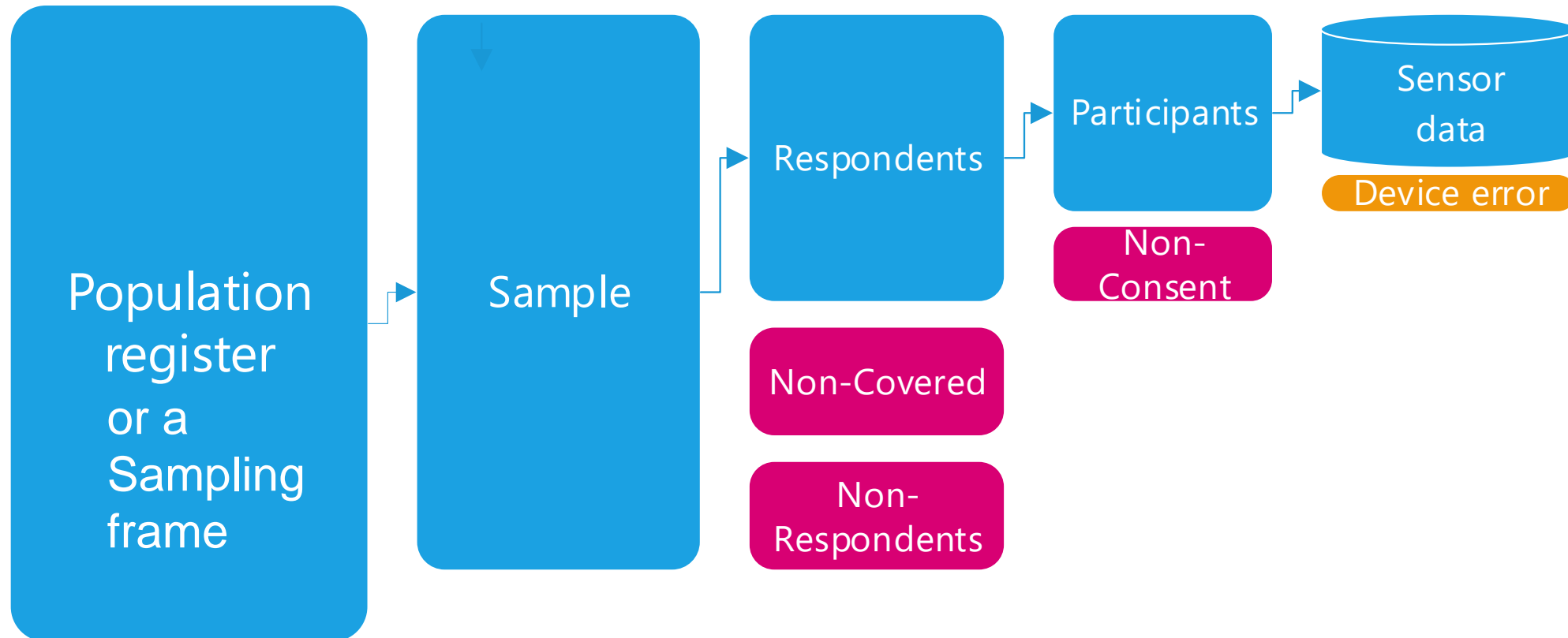


# MPADD Aims

1. Investigate determinants of consent and selection bias in a data donation study on PA among older adults.
2. Assess the quality of donated PA data.
3. Use multi-source PA data to predict health outcomes.



# “Designed Big Data” Approach



# MPADD Study design

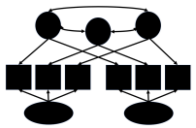
- Recruitment from a probability-based LISS Panel (NL)
- Adults 50+
- Baseline survey N=2,000
- Smartphone owners donate via PORT:
  - Apple Health & Samsung Health (step count, flights climbed, distance)
  - Google semantic location history (aggregated distance walking, biking, running)
- Data are locally processed on participants' devices and visualized
- Expected donation rate abt. 15% (Struminskaya & Boeschoten, prior study)

# Activities for specific aims



## Aim 1: Selection bias

- Compare net sample to those who donated data: survey results on socio-demographics, self-rated health, ~~and~~ health behaviors, PA, smartphone use, data privacy concerns, and digital literacy to identify correlates of consent to data donation (1A).
- Estimate bias in PA measures (1B)



## Aim 2: Quality of donated data

- Compare donated data to self-reported PA data (2A)
- Use an Multitrait-Multimethod (MTMM) approach (2B) to jointly study measurement error in donated and self-reported data-
- Identify threats to validity of passively collected data by examining patterns of smartphone use and how they correlate with PA measures from donated data (2C)



## Aim 3: Predictive power of multi-source PA data

- Regress health outcomes from annual LISS core health module on measures from the different PA sources

# Next steps

- Ethical approval ERB at Utrecht University
- Adaptation of Python script for GSLH
- Development of Python scripts for Apple/Samsung health
- Adaptation of PORT
- Testing of the workflow (small pilot)
- Data collection in the LISS Panel
- Outcomes (presentations at NIMLAS, AAPOR, ESRA, MASS, PAA; methodological and thematic peer-reviewed papers)

# Related research

- Seed funding from the Dutch Institute 4 preventive health
- Investigating willingness and compliance of older adults to use in-home sensors, wearables and apps to prevent readmission to the ER (acute events, e.g., falling)

## **PROACT: PREVENTION OF ACUTE EVENTS OF OLDER PEOPLE**

Preventing unplanned hospitalizations requires in-depth knowledge of patient-related, environmental and care-related factors. Using various digital tools, the research team tests and measures how older people can remain self-reliant for longer and what interventions are needed to prevent admission to the ED. *Researchers: Helianthe Kort (TU/e), Laura Genga (TU/e), Bella Struminskaya (UU), Nienke Bleijenberg (UMC Utrecht)*

# Thank you!

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