horizon
CENTRE FOR DOCTORAL TRAINING

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https://www.nlab.org.uk/project/shopping-data-disease/

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DIGITAL HEALTH

Turing Interest Group Novel Data Linkages for Health and Wellbeing

AI in population health surveillance through digital footprint data

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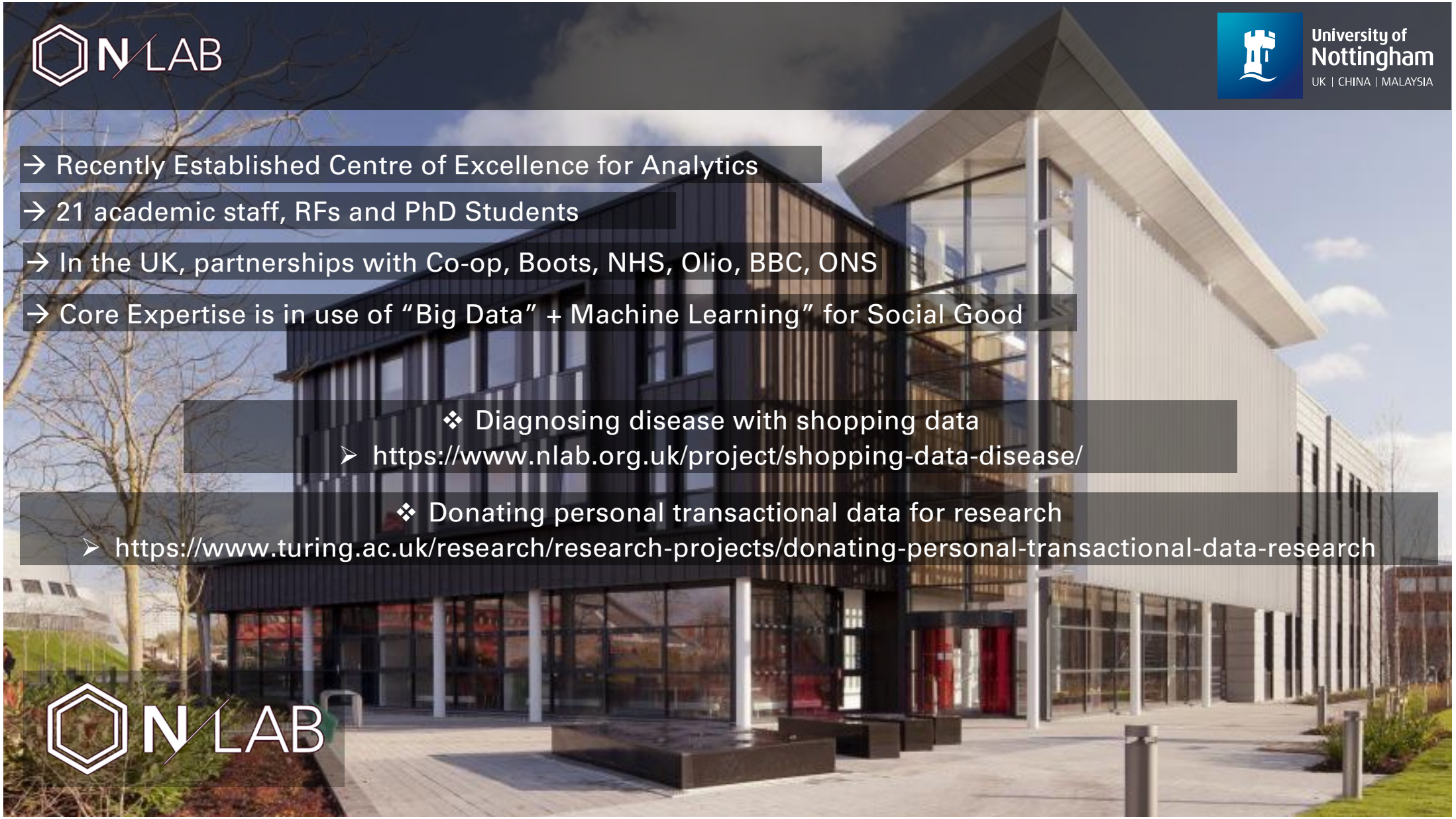
NLAB
University of Nottingham
UK | CHINA | MALAYSIA
→ Recently Established Centre of Excellence for Analytics
→ 21 academic staff, RFs and PhD Students
→ In the UK, partnerships with Co-op, Boots, NHS, Olio, BBC, ONS
→ Core Expertise is in use of "Big Data" + Machine Learning" for Social Good
❖ Diagnosing disease with shopping data
➢ https://www.nlab.org.uk/project/shopping-data-disease/
❖ Donating personal transactional data for research
➢ https://www.turing.ac.uk/research/research-projects/donating-personal-transactional-data-research
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Turing Interest Group Novel Data Linkages for Health and Wellbeing

"This interest group brings multidisciplinary and multi sector communities together to identify, explore and optimise opportunities for linking novel digital footprint data to health and wellbeing outcomes."

https://www.turing.ac.uk/research/interest-groups/novel-data-linkages-health-and-wellbeing

A few emerging themes:

- The value to policy makers & healthcare organisations
- Public acceptability
- Industry as data providers

Dr Anya Skatova
Turing Fellow

Michelle Morris
Turing Fellow

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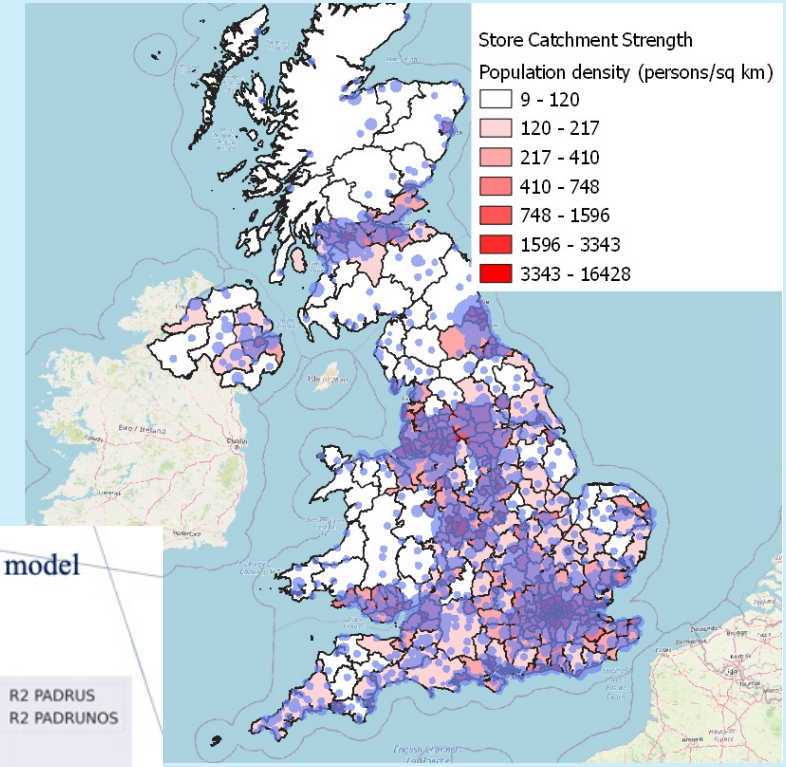
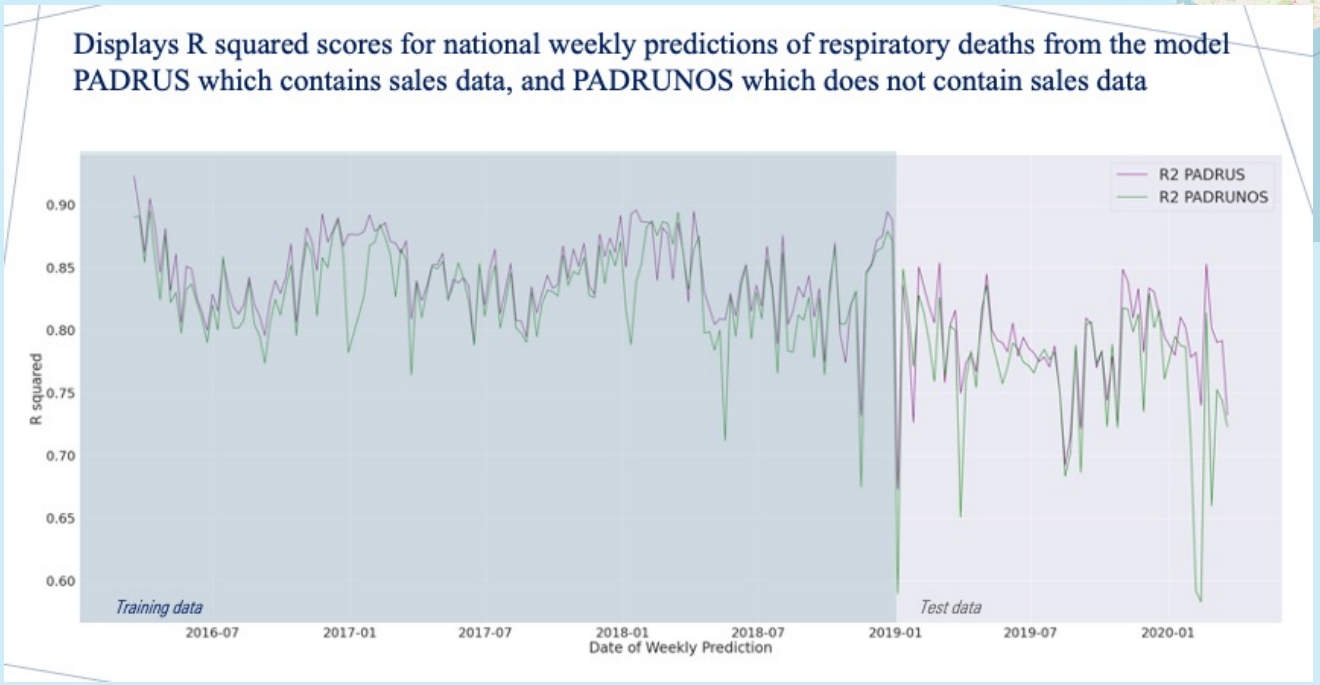
The value to policy makers & healthcare organisations

Assessing the value of integrating national longitudinal shopping data into respiratory disease forecasting models

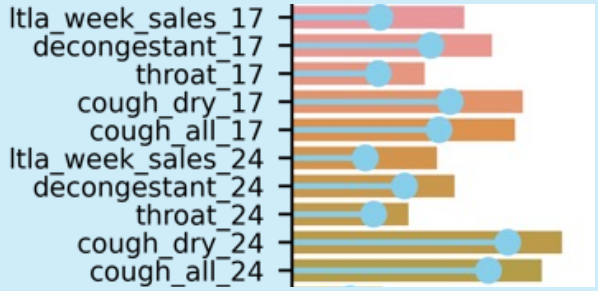
https://www.researchsquare.com/article/rs-2226531/v1

https://github.com/nhsx/commercial-data-healthcare-predictions





Applying novel AI explainability tool MCR (model class reliance) for Random Forest to show value of sales data in model predicting weekly deaths from respiratory disease



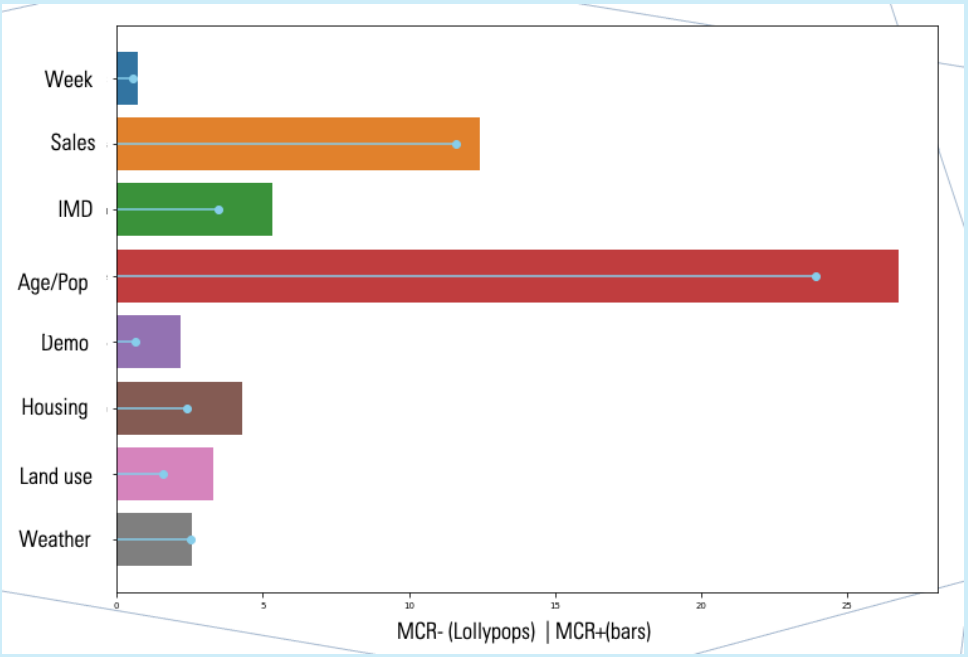


Figure 1: Group MCR PADRUS model

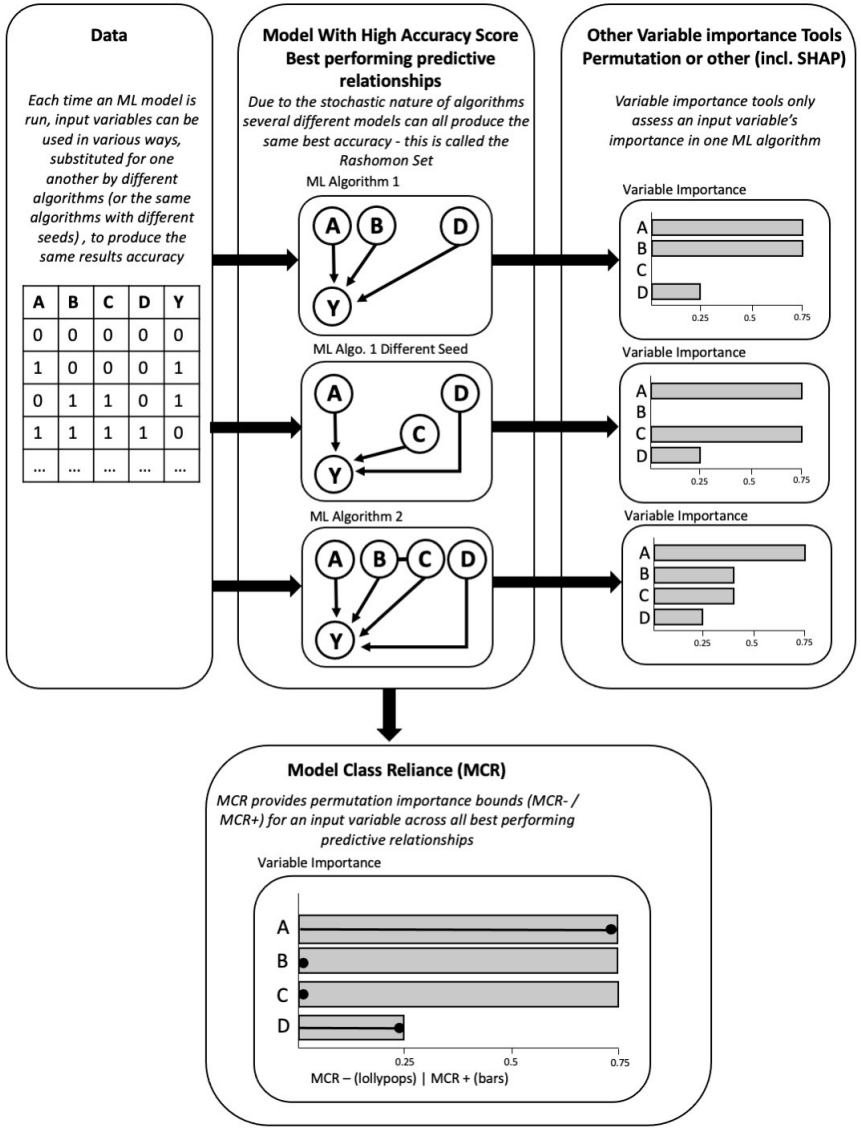


Figure 2: Diagrammatic representation of the difference between other variable importance tools and Model Class Reliance

Public acceptability

Public attitudes towards sharing loyalty card data for academic health research: a qualitative study

https://bmcmedethics.biomedcentral.com/articles/10.1186/s12910-022-00795-8

Conclusion: Whilst participants were largely in favour of donating loyalty card data for academic health research, information, choice and appropriate safeguards are all exposed as prerequisites upon which decisions are made.

Location data [even store or geographical region] was often negatively associated with **SURVEILLANCE**, with concerns being more identifiable in those participants answering questions about COVID-19.

"[…]except location, because, that's just getting too much […] you can determine exactly my pattern of movement around London […] a little bit much for just health research." (P117).

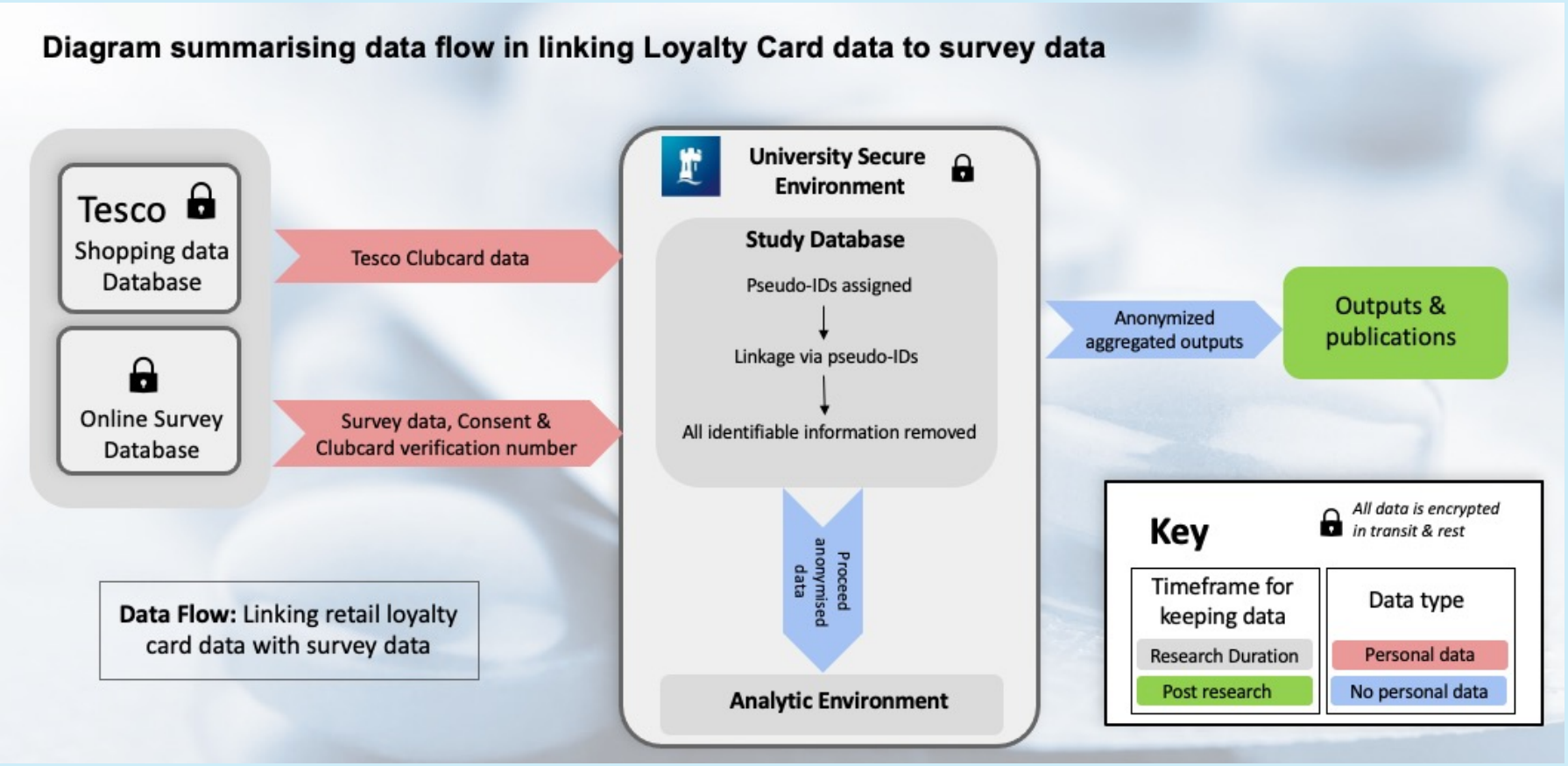
However, the fact that a participant voiced concern that location data could be used to track movements did not translate to a decreased willingness to share such data.

Importantly with **INCREASED UNDERSTANDING** of research purpose, participants expressed **HIGHER WILLINGNESS TO DONATE DATA**.

Industry as data providers

Using shopping data to predict respiratory disease and COVID-19: CIDS (Covid Individual Data Study)

- How do we collect this data?
- Bias in AI
- Digital barriers in data collection methods



Summary

Potential to use digital footprints effectively for population health surveillance using AI, however, there are challenges we must be aware of and be willing to overcome.

Value ❖ Acceptability ❖ Data collection

Thank you to all my supervisors and co-investigators on these studies:

James Goulding, Laila Tata, Alexandra Lang, Gavin Smith, Harry Marshall, and Gavin Long at the University of Nottingham.

Anya Skatova, and Kate Sheills at the University of Bristol.

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How to join **Turing Interest Group Novel Data Linkages for Health and Wellbeing**…

https://www.turing.ac.uk/research/interest-groups/novel-data-linkages-health-and-wellbeing

- Join mailing list
- Attend Digital Footprint 2023 Conference on 11th May 2023, Bristol
  https://digifootprints.co.uk/digital-footprints-2023/

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