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The Netherlands

DATA FOR POLICY 2025 EUROPE

Twin Transition in Data and Policy for a Sustainable and Inclusive Future

BOOK OF ABSTRACTS

12- 13 June, 2025

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Love Opeyemi David, University of Johannesburg, South Africa

Patrick Micheal Brock, World Bank UNHCR Joint Data Center on Forced Displacement, Denmark

Conference Programme Day 1 (12 June)

10:00 - 11:30 | **Arrivals & Registration**

11:30 - 12:30 | **Lunch**

12:30 - 12:45 | **Opening Remarks** (Room A0.06)

Sarah **Giest,** Regional Conference Chair, Leiden University
Bram **Klievink**, Regional Conference Chair, Leiden University
Zeynep Engin, Chair & Founder, Data for Policy CIC

12:45 - 13:25 | **Keynote Session** (Room A0.06): "**Digitally Powered Green Transition**"

Speaker: Andrea **Halmos,** Deputy Head of Unit at European Commission

Chair: Sarah **Giest**, Leiden University, The Netherlands

13:30 - 15:00 | **Parallel Session 1**

Session 1A (Room A0.06 – Auditorium): Panel: "**A socio-technical systems' view on integrating resources and stakeholder networks toward long-standing challenges"**

Chair: Francesco **Mureddu –** The Lisbon Council, Belgium
Speakers: Marcella **Bonanomi –** The Lisbon Council, Belgium / Natalia **Oprea** – The Lisbon Council, Belgium / Francesco **Osimanti** – The Lisbon Council, Belgium / Luca Alessandro **Remotti –** DataPower, Italy

Session 1B (Room A2.02) **– Sp1.1: Private Sector Data for Public Interest in the EU – Government-Business Data Relations**

- *"Unravelling Tensions between Business and Government on Mandatory Business-to-Government Data Sharing for Public Interest in the EU";* Iryna **Susha** – Utrecht University, Netherlands, Louis **Knüpling –** Utrecht University, Netherlands, Philip **Leifeld –** University of Manchester, United Kingdom. (Submission #23)
- *"Medical data – discrepancies, half-truths and challenges";* Jadwiga **Glanc** – UZH, Switzerland, Zbigniew **Handzel** – WSEI, Poland, Łukasz **Faber** – AGH**,** Poland. (Submission #91)
- *"Governance dynamics as innovation determinants in data-enabled social innovation ecosystems";* Federico **Bartolomucci –** Politecnico di Milano, Italy, Luca Testoni – Politecnico di Milano, Italy, Mario **Calderini** – Politecnico di Milano, Italy. (Submission #24)
- *"From data asymmetry to alliance? Business-to-government data sharing in Europe";* Jaime **Bernal –**Utrecht University, Netherlands, Iryna **Susha –** Utrecht University, Netherlands, Koen **Frenken** – Utrecht University, Netherlands. (Submission #25)

Chair(s): Iryna **Susha**, Utrecht University, Oskar J. **Gstrein**, University of Groningen

Session 1C (Room A2.03) **– Sp3.1: Security and Justice Policy in the Age of Algorithms and AI**

- *"Towards a Decolonial AI in/for Africa? Critical Analysis on Data Capitalism, Epistemic Injustice, and Ethics";* Chikezie E. **Uzuegbunam** – Rhodes University, South Africa. (Submission #9)

- *"Code of Justice: A Sector-Specific Quantitative Analysis of Regulatory Gaps in the U.S. Federal Courts for AI Governance";* Shruti **Kakade** – Hertie school of Governance, Germany, Abhivardhan **Abhivardhan** – Indian society of AI and Law, India. (Submission #17)
- *"(Super) Data Diversity Framework: 'Diversity through Data' and 'Diversity with Data' in Automated Decision-Making Systems";* Mergime **Ibrahimi** – Tallinn University of Technology, Estonia. (Submission #34)
- *"Data and Advanced Data Analytics to empower SNGs in energy transition policymaking";* Devin **Diran** – TNO, Netherlands. (Submission #86)

Chair(s): Brecht **Weerheijm,** Leiden University, Ritten **Roothaert**, VU Amsterdam

Session 1D (Room A2.04) **– St1.1: Digital & Data-driven Transformations in Governance**

- *"Bias by design: how political views on benefit recipients are embedded in unemployment technologies";* Margot **Kersing –** VU Amsterdam, Netherlands. (Submission #29)
- *"Unpacking the Relational Side of Data-Informed Governance";* Fernando **Fernandez-Monge** – Harvard University, United States, Quinton **Mayne** – Harvard University, United States, Jorrit de Jong – Harvard University, United States. (Submission #33)
- *"From Proprietary to Public Purpose: Unlocking Mobility Data for Better Urban Futures";* Fernando **Fernandez-Monge** – Harvard University, United States. (Submission #43)
- *"The Data Agency Awakens: A New Era for Official Statistics – a New Data Hope";* Anastasija **Nikiforova** – University of Tartu, Estonia, Luca Di Gennaro **Splendore –** University of Malta, Malta. (Submission #66)

Chair: Alex **Ingrams,** Leiden University

Session 1E (Room A2.05) **– St4.1: Ethics, Equity, and Trustworthiness**

- *"Can trust be legislated? What can we learn from data altruism's challenges and how to implement these lessons in building European data spaces";* Adrianna **Michałowicz** – University of Łódź, Poland. (Submission #28)
- *"'Healthy finances' and 'cost-efficient healthcare': a qualitative case study of values and goal displacement in AI adoption processes";* Jinke **Oostvogel –** The Hague Centre for Digital Governance, Institute of Public Administration, Leiden University, Netherlands. (Submission #31)
- *"Issues of Privilege, Power and Policy in Publicly and Privately Collected Women's Health Data Sets";* Kristin **Caolo –** University of Cambridge, United Kingdom. (Submission #53)
- *"The role of contextualisation for responsible research and innovation in AI";* Sydney **Howe –** Erasmus School of Health Policy and Management, Netherlands. (Submission #58)

Chair: Masaru **Yarime,** Hong Kong University of Science and Technology

15:00 - 15:30 | **Break (Tea & coffee)**

15:30 - 17:00 | **Parallel Session 2**

Session 2A (Room A0.06 – Auditorium) Panel: **AI and Data Science Revolutions: Implications for Public Benefit Research and Policy Making**

Chair: Anastasija **Nikiforova**, University of Tartu, Estonia

Speakers: Oliver **Berry** – Smart Data Foundry (University of Edinburgh), United Kingdom / Magdalena **Getler –** Smart Data Foundry (University of Edinburgh), United Kingdom / Rosario **Piazza** – Joseph Rowntree Foundation, United Kingdom.

Session 2B (Room A2.02) **– Sp4.1: Data Law & Governance for the Digital and Green Transitions**

- *"OA Book Usage Data Trust: An International Data Space for Usage Data and Beyond";* Ursula **Rabar –**OA Book Usage Data Trust, Switzerland, Christina **Drummond –** OA Book Usage Data Trust, United States, Yannick **Legré** – OPERAS, Belgium. (Submission #14)
- *"How Should the EU Regulate Smart Water: Risk, Uncertainty, and the Choice of Legal Form";* Orlin Y**alnazov** – University of Hull, United Kingdom, Alberto **Quintavalla** – Erasmus Universiteit Rotterdam, Netherlands. (Submission #16)
- *"Confronting Risks At the Intersection of Climate Change and Artificial Intelligence: The Promise and Perils of Rights-Based Approaches";* Barrie **Sander** – Leiden University – Faculty of Governance and Global Affairs, Netherlands. (Submission #19)

  Chair(s): Enrique Santamaria **Echeverria**, Erasmus School of Law, Florin Coman **Kund**, Erasmus School of Law, Alberto **Quintavalla**, Erasmus School of Law

Session 2C (Room A2.03) **– Sp3.2: Security and Justice Policy in the Age of Algorithms and AI**

- *"Using and designing a data driven approach to detect undermining in schools. The perilous road from intuition to intervention";* Nienke **de Groes –** Leiden University, Netherlands, Vlad **Niculescu-Dinca** – Leiden University, Netherlands, Pieter Tops – Emeritus Professor for Undermining Studies at Leiden University, Netherlands. (Submission #40)
- *"Human Rights Challenges and Directions for Hash-sharing Governance";* Sarah **Scheffler** – Carnegie Mellon University, United States, Gavin **Sullivan** – University of Edinburgh, United Kingdom. (Submission #46)
- *"The institutionalization of open data in Cambodia: power, synergies and tensions";* Júlia **García-Puig** – Leiden University, Netherlands. (Submission #74) *(Virtual Presentation)*
- *"Balancing Digital Data Governance and Fraud Investigations: Proposing a Privacy-Preserving Digital Forensics Framework";* Wishnu Agung **Baroto** – Institute of Science Tokyo, Indonesia. (Submission #94)

  Chair(s): Brecht **Weerheijm,** Leiden University, Ritten **Roothaert**, VU Amsterdam

Session 2D (Room A2.04) **– St2.1: Technologies & Analytics**

- *"Enhancing the Researcher's Data User Journey: Insights from the UK National Data Services";* Adam **Milward –** MetadataWorks, United Kingdom, David Milward – MetadataWorks, Oxford University, United Kingdom. (Submission #32)
- *"Governing Risks of Generative Artificial Intelligence: A Sectoral Innovation System Analysis of Financial Services and Healthcare";* Masaru **Yarime –** The Hong Kong University of Science and Technology, Hong Kong, Hillary **Giam –** The Hong Kong University of Science and Technology, Hong Kong. (Submission #52)

- *"Causal Discovery for School Attendance – Informing Policy Decisions";* Roman **Marchant** – Human Technology Institute, The University of Technology Sydney, Australia, Sally **Cripps –** Human Technology Institute, The University of Technology Sydney, Australia, Rebekah **Grace** – Transforming Early Education and Child Health Research Centre, Western Sydney University, Australia, Susan **Collings** – Transforming Early Education and Child Health Research Centre, Western Sydney University, Australia, Gilad **Francis –** Human Technology Institute, The University of Technology Sydney, Australia, Daniel **Waller** – Transforming Early Education and Child Health Research Centre, Western Sydney University, Australia, Kristofer **de Las Penas** – Human Technology Institute, The University of Technology Sydney, Australia, Vijetta **Bachraz** – Transforming Early Education and Child Health Research Centre, Western Sydney University, Australia, Anna **Lapatnikova** – Human Technology Institute, The University of Technology Sydney, Australia, Hadi Mohasel **Afshar** – Human Technology Institute, The University of Technology Sydney, Australia. (Submission #95)
- *"YouthView: A platform for interactive visualizations to explore youth disadvantage"* ; Ujjwal **KC** – Melbourne Institute: Applied Economic & Social Research, The University of Melbourne, Victoria, Australia, Steeve **Marchand –** Melbourne Institute: Applied Economic & Social Research, The University of Melbourne, Victoria, Australia**,** A. Abigail **Payne –** Melbourne Institute: Applied Economic & Social Research, The University of Melbourne, Victoria, Australia. (#DAP-2025-0055)

  Chair: Friso **Selten,** Leiden University

Session 2E (Room A2.05) **– St4.2: Ethics, Equity, and Trustworthiness**

- *"The Data-Ethics of Proactive Service Delivery: a multiple-case study on social welfare benefits in the Netherlands";* Marten **Knol –** Utrecht University School of Governance, Netherlands, Erna **Ruijer –** Utrecht University School of Governance, Netherlands, Albert **Meijer –** Utrecht University School of Governance, Netherlands. (Submission #63)
- *"AI for Social Equity: Developing a framework for responsible AI in proactive welfare services";* Bob **Kersten** – PhD student UU / civil servant min SZW, Netherlands, Mirko Tobias **Schaefer –** UU, Netherlands, Erna **Ruijer** – UU, Netherlands. (Submission #77)
- *"A Privacy-focused Data Solution for Understanding and Improving Indoor Environmental Quality in Social Housing From the SHINE Project";* Joseph **Mullally** – Dublin City University, Ireland, Valesca **Lima** – Dublin City University, Ireland, Tracy Mae **Ildefonso** – Dublin City University, Ireland, Stephen **Daniels** – Dublin City University, Ireland. (Submission #79)
- *"Explainability in the EU's legal framework for AI – a stepping stone in the path towards a digital and circular economy";* Marie-Claire **Najjar** – European University Institute, Italy. (Submission #80)

  Chair: Federico **Bartolomucci**, Politecnico di Milano

17:00 - 17:10 | **Break**

17:10 - 18:00 | **Parallel Session 3**

Session 3A (Room A0.06 – Auditorium) – Panel: **Value and limits of long-term projections and practical ways forward**

Chair: Thijs **Noordzij** – Dutch Ministry of Education, Culture and Science, The Netherlands
Speakers: Daniel **Van Vuuren** – Tilburg University; SEO Economic Research; Dutch State Committee Demographic Developments 205, The Netherlands /Thom **Wittebrood** – Dutch Ministry of Education, Culture and Science, The Netherlands / Sybren **Spit** – University of Amsterdam, Netherlands / Jessie **Bakens** – Research Centre for Education and the Labour Market (ROA), Maastricht University, Netherlands / Cheyenne **Ramada** – Dutch Ministry of Education, Culture and Science, The Netherlands / Meindert **Heres Hoogerkamp** – Dutch Ministry of Education, Culture and Science, The Netherlands

Session 3B (Room A2.02) **– Other Focus Areas**

- *"Uses of GenAI in higher education assessment: a scoping review and typology";* Josette **Daemen** – Leiden University, Netherlands. (Submission #26)
- *"Data and Blockchain for Real Estate: The Case of Portugal";* Fabio dos Santos **Cardoso –** Nova School of Business and Economics, Portugal, Leid **Zejnilovic** – Nova School of Business and Economics, Portugal, Bernardo Forbes **Costa** – Nova School of Business and Economics, Portugal, Joao **Santos** – Unlockit, Portugal. (Submission #98)

Chair: Collegial chairing, Leiden University

Session 3C (Room A2.03) **- Other Focus Areas**

- *"Responsible Data, Responsible AI: Setting Standards for Public Data Collection";* Dana **Mazia** – Alliance for Responsible Data Collection. (Submission #38)
- *"A Socio-Technical Perspective on Digital Twins as GovTech solutions. The Case of WiseTown"* ; Ilaria **Mariani –** Department of Design, Politecnico di Milano, Milano, Italy, Marzia **Mortati –** Department of Design, Politecnico di Milano, Milano, Italy**,** Francesca **Rizzo –** Department of Design, Politecnico di Milano, Milano, Italy**.** (DAP-2025-0059) *(Virtual Presentation)*

Chair: Hsini **Huang,** Leiden University

Session 3D (Room A2.04) **– St2.2: Technologies & Analytics**

- *"Multilingual Classification of AI-Oriented Policy Documents based on Bias Types*"; George **Manias** – Department of Digital Systems, University of Piraeus, Piraeus, Greece ; Jheronimus Academy of Data Science, Tilburg University, Tilburg, Netherlands, Chrysa **Agapitou –** Department of Tourism Studies, University of Piraeus, Piraeus, Greece, Nemania **Borovits –** Jheronimus Academy of Data Science, Tilburg University, Tilburg, Netherlands**,** Alenka **Guček –** Department for Artificial intelligence, Jožef Stefan Institute, Ljubljana, Slovenia**,** Andreas **Karabetian –** Department of Digital Systems, University of Piraeus, Piraeus, Greece**,** Matej **Kovacic –** Department for Artificial intelligence, Jožef Stefan Institute, Ljubljana, Slovenia**,** Konstantinos **Mavrogiorgos –** Department of Digital Systems, University of Piraeus, Piraeus, Greece, Tanja Zdolšek **Draksler –** Department for Artificial intelligence, Jožef Stefan Institute, Ljubljana, Slovenia**,** Willem-Jan **van den Heuvel –** Jheronimus Academy of Data Science, Tilburg University, Tilburg, Netherlands**,** Dimosthenis **Kyriazis –** Department of Digital Systems, University of Piraeus, Piraeus, Greece**.** (DAP-2025-0061)

- *"A Rights-Based Approach to AI Governance: Recognizing Individual Rights in AI Interactions";* David Uriel **Socol de la Osa** – Hitotsubashi University, Japan. (Submission #13)

  Chair: Roman **Marchant** (TBC)**,** University of Technology Sydney

Session 3E (Room A2.05) **– St1.2: Digital & Data-driven Transformations in Governance**

- *"Regulating Utilisation of Identity Card Data";* Sree **Shivani –** Research practitioner, India, Debayan **Gupta** – Research Practitioner, India. (Submission #72) *(Virtual Presentation)*
- *"AI-Powered Evidence Synthesis for Policymaking";* Bram **Klievink –** Leiden University, Netherlands, Valérie **Pattyn –** Leiden University, Netherlands, Wolfgang **Kaltenbrunner** – CWTS, Leiden University, Netherlands. (Submission #61)

  Chair: Francesco **Mureddu,** The Lisbon Council

18:00 **| End of Day 1 Programme**

19:00 - 22:00 **| Conference Dinner** at Beachclub Atlantis (Scheveningen)

Sponsored by **The LDE Centre for BOLD Cities**

Conference Programme Day 2 (13 June)

09:00 - 10:30 | **Parallel Session 4**

Session 4A (Room A0.06 – Auditorium) "**Between Promise and Problem: Data-Driven Models in Sustainability Policy"**

Chair: Jiska **Engelbert,** Director of the LDE Centre for BOLD Cities
Speakers: Jurriaan **Parie**, Co-founder of NGO Algorithm Audit / Eefje **Cuppen,** Director at Rathenau Institute / Alex **Ingrams**, Associate Professor at Leiden University

Session 4B (Room A2.02) **– Sp4.2: Data Law & Governance for the Digital and Green Transitions**

- *"Circular by Design: The Role of Data Governance and IPRs in a Circular Economy";* Laura **Zoboli** – University of Brescia, Italy. (Submission #54)
- *"Risk and Inequality in Africa's Data-Driven Green Transitions";* Jamie **Fuller –** Research ICT Africa, South Africa, Anri **Van der Spuy –** London School of Economics, United Kingdom. (Submission #56)
- *"Addressing AI's Hidden Sustainability Costs: Challenges in the EU AI Act and Ireland's Digital Policy";* Elizabeth **Farries –** UCD School of Information and Communication Studies, Centre for Digital Policy, Ireland, Patrick **Brodie** – UCD School of Information and Communication Studies, Centre for Digital Policy, Ireland, Alexandros **Minotakis –** UCD School of Information and Communication Studies, Centre for Digital Policy, Ireland. (Submission #59*)*

Chair(s): Enrique Santamaria **Echeverria**, Erasmus School of Law, Florin Coman **Kund**, Erasmus School of Law, Alberto **Quintavalla**, Erasmus School of Law

Session 4C (Room A2.03) **– St6: Global Challenges and Dynamic Threats**

- *"Sustainable Worlds: A Comparative Analysis of Policy Discourses Regarding Green IoT in Europe, the United States, and China";* Semahat Ece **Elbeyi** – Center for Tracking and Society, Department of Communication, University of Copenhagen, Denmark, Klaus Bruhn **Jensen** – Center for Tracking and Society, Department of Communication, University of Copenhagen, Denmark, Kiran Juliana **Kappeler** – Center for Tracking and Society, Department of Communication, University of Copenhagen, Denmark, Yang **Yang** – Center for Tracking and Society, Department of Communication, University of Copenhagen, Denmark, Dechun **Zhang** – Center for Tracking and Society, Department of Communication, University of Copenhagen, Denmark. (Submission #35)
- *"AI Governance and Social Equity: A Comparative Study of Regional Divides in a Global Context";* Wilson **Wong** – The Chinese University of Hong Kong, Hong Kong. (Submission #68)
- *"Brokering biodiversity knowledge: the role of market-led initiatives";* Roelien **van der Wel** – Leiden University, Netherlands, Natascha **van der Zwan** – Leiden University, Netherlands, Sarah **Giest** – Leiden University, Netherlands (Submission #71)

Chair: Friso **Selten,** Leiden University

Session 4D (Room A2.04) **– St1.3: Digital & Data-driven Transformations in Governance**

- *"Governance considerations in a time of digital and sustainability transition";* Mitzi **Bolton** – Monash Sustainable Development Institute, Australia. (Submission #21) *(Virtual Presentation)*
- *"Proactive-by-Design: The Future of Governance Beyond Bureaucracy?";* Anastasija **Nikiforova** – University of Tartu, Estonia, A. Paula Rodriguez **Müller** – European Commission, Joint Research Centre, Spain, Luca **Tangi** – European Commission, Joint Research Centre, Italy. (Submission #87)
- *"Governance through Geotagging: Interpretations from the Indian state";* Sanjana **Malhotra** – Columbia University; Jodhpur Institute of Engineering and Technology (JIET), India. (Submission #96) *(Virtual presentation)*

  Chair: Leid **Zejnilovic**, Nova School of Business and Economics

Session 4E (Room A2.05) **– Sp1.2: Private Sector Data for Public Interest in the EU – Government-Business Data Relations**

- *"Assessing and Operationalizing the Business Case for Business-to-Government Data Sharing in the EU: Lessons Learned and Comparative Practices";* Adam **Zable** – The GovLab, Germany, Stefaan **Verhulst** – The GovLab; New York University; Data & Policy, United States, Andrew **Zahuranec** – The GovLab, United States. (Submission #27)
- *"Intervenability in Data Spaces: A Layered and Multi-Dimensional Concept";* Sophie **Stalla-Bourdillon** – University of Southampton, United Kingdom, Pablo Rodrigo Trigo **Kramcsak** - Brussels Privacy Hub - Vrije Universiteit Brussel, Belgium, Barbara da Rosa **Lazarotto** - Vrije Universiteit Brussel, Belgium. (Submission #42)
- *"Data for Green. (G2B) Data Sharing and State as a Platform"; Antoine* ***Donne*** *– Université Paris Dauphine – PSL, France. (Submission #45)*
- *"Shaping Organizational AI Governance: Insights From An Explorative Comparative Case Study Among Four Dutch Public Sector Organizations";* Marissa **Hoekstra** – TNO / Leiden University, Netherlands, Martijn **Wessels –** TNO, Netherlands, Pippa **Jones** – TNO, Netherlands, Wouter **van der Bij –** TNO, Netherlands. (Submission #48)

  Chair(s): Iryna **Susha**, Utrecht University, Oskar J. **Gstrein**, University of Groningen

10:30 - 10:50 | **Break (Tea & coffee)**

10:50 - 12:20 | **Parallel Session 5**

Session 5A (Room A0.06 – Auditorium) Panel: "**Comparing notes on the progress and outlook of national data strategies in Europe. Learning from and for the Dutch Data Strategy"**

Chair(s): Devin **Diran** – TNO, Netherlands, Thijmen **van Gend** – TNO, The Netherlands

- **Speakers:** Tim **Faber** - Ministry of Interior and Kingdom Relations, The Netherlands / Anne Fleur **van Veenstra** - TNO Vector; Universiteit Leiden / Anastasija **Nikiforova** - University of Tartu / Iryna **Susha** - Utrecht University / Adrianna **Michałowicz** – University of Lodź

Session 5B (Room A2.02) **– Sp4.3: Data Law & Governance for the Digital and Green Transitions**

- *"Balancing Digitalization, Data Protection, and Sustainability: Reconciling GDPR Principles with EU Green Objectives";* Anna Capellà **Ricart –** Institut de Dret i Tecnología (UAB), Spain, Andres Chomczyk **Penedo** – Institut de Dret i Tecnología (UAB) / Law, Science, Technology and Society LRG (VUB), Spain. (Submission #62)
- *"What does Justice mean in the Twin Transitions? An analysis on the pitfalls of digitisation of the energy sector and the role justice plays in these spaces.";* Shakya **Wickramanayake –** Tilburg Institute of Law Technology & Society (TILT), Belgium, Linnet **Taylor –** Tilburg Institute of Law Technology & Society (TILT), Netherlands. (Submission #73)
- *"Regulating Indonesia's Digital Economy: Balancing Growth, Inclusion, and Governance* ; Wishnu Agung **Baroto** – Institute of Science Tokyo, Tokyo, Japan ; Directorate General of Taxes of the Ministry of Finance of Indonesia, Jakarta, Indonesia ; Firman **Darajat –** Directorate General of Taxes of the Ministry of Finance of Indonesia, Jakarta, Indonesia ; Andalas University, Padang, Indonesia (DAP-2025-0062)
- *"Potentials of Administrative Informatics for the Analysis of Policymaking. Notes on the Integration of Administrative Informatics into the Policy Cycle*"; Sander **Frank** – The Open Government Institute, Zeppelin University, Friedrichshafen, Germany, Jörn **von Lucke –** The Open Government Institute, Zeppelin University, Friedrichshafen, Germany. (DAP-2025-0056)

  Chair(s): Enrique Santamaria **Echeverria**, Erasmus School of Law, Florin Coman **Kund**, Erasmus School of Law, Alberto **Quintavalla**, Erasmus School of Law

Session 5C (Room A2.03) **– St5: Algorithmic Governance**

- *"Visionary Leadership and Support for Digital Transformation: The Mediating Role of Meaningfulness";* Friso **Selten** – Leiden University, Netherlands. (Submission #39)
- *"Implementing Algorithm Transparency";* Hsini **Huang –** Leiden University, Netherlands, Alex Ingrams – Leiden University, Netherlands. (Submission #50)
- *"Algorithmic Collusion in EU Competition Law: Decoding the Puzzle";* Valeria **Caforio** – Bocconi University, Italy. (Submission #78)
- *"Towards Sustainable NLP: Low-Rank Factorization for Efficient and Energy-Aware FlauBERT Inference";* Angela **Ciocan** – IR, ESAIP School of Engineers, Angers, France, Vincent **COURBOULAY –** I3I, La Rochelle University, La Rochelle, France**.** (DAP-2025-0058)

  Chair: Laura **Zoboli,** Università degli Studi di Brescia

Session 5D (Room A2.04) **– St1.4: Digital & Data-driven Transformations in Governance**

- *"Participating in and for Futures: Decentralised 'Personal Data' Architectures";* Georgia **Meyer** – London School of Economics and Political Science, United Kingdom, Edgar **Whitley –** London School of Economics and Political Science, United Kingdom, Jakob **Dirksen –** London School of Economics and Political Science, United Kingdom. (Submission #99)

- *"Taking Stock of Urban Data Governance in German Small Towns"*; Leonard **Higi –** Institute for Applied Research Urban Futures, University of Applied Sciences Potsdam, Potsdam, Germany ; Institute of Urban Planning, Brandenburg University of Technology Cottbus-Senftenberg, Cottbus, Germany , Tobias **Schröder –** Institute for Applied Research Urban Futures, University of Applied Sciences Potsdam, Potsdam, Germany ; Social and Educational Sciences Department, University of Applied Sciences Potsdam, Potsdam, Germany**,** Silke **Weidner –** Institute of Urban Planning, Brandenburg University of Technology Cottbus-Senftenberg, Cottbus, Germany**,** Heike **Neuroth –** Institute for Applied Research Urban Futures, University of Applied Sciences Potsdam, Potsdam, Germany ; Information Sciences Department, University of Applied Sciences Potsdam, Potsdam, Germany. (DAP-2025-0054)
- *"Enhancing Human Rights Monitoring with AI: The Civic Space Pulse Data Transformation Framework";* Mohamed **Elmokadem –** UN-OHCHR, Switzerland, George **Hodge –** UN-OHCHR, Switzerland, Annissa **Zahara** – UN-OHCHR, Switzerland. (Submission #76)

  Chair: Wilson **Wong,** Chinese University of Hong Kong

Session 5E (Room A2.05) **– Sp2: Bridging the Gap: The role of Data Intermediaries in the Creation of Urban Digital Twins**

- *"Enhancing Urban Digital Twins for Heat Transition: AI-Powered Heat Demand Modeling for Municipal Policymaking";* Nazanin **Bagherinejad –** Chair of Methods for Model-based Development in Computational Engineering, RWTH Aachen University, Germany, Jonas **Luft** – syte GmbH, Germany, Philipp **Sommer** – Department of Energy, Building, and Environment, FH Münster, Germany, Ali Razavian – syte GmbH, Germany, Julia **Kowalski –** Chair of Methods for Model-based Development in Computational Engineering, RWTH Aachen University, Germany. (Submission #65)
- *"Spatial Temporal Graph Neural Networks for Urban Digital Twin Modeling";* *Toni* Rubio **Serrano –**Universitat Pompeu Fabra, Spain, Manuel Portela **Charnejovsky** – Universitat Pompeu Fabra, Spain, Vladimir **Estivill-Castro** – Universitat Pompeu Fabra, Spain. (Submission #81)
- *"Designing for the Urban Twin Transition: Data Intermediary Challenges in Prototyping Data Collaboratives – A Case Study from Milan";* Francesco **Leoni –** Politecnico di Milano, Italy, Federico **Bartolomucci** – Politecnico di Milano, Italy (Submission #89)

  Chair: Manuel **Portela**, Universitat Pompeu Fabra in Barcelona

12:20 - 13:10 **| Closing Plenary** (Room: A0.06): **Powering the Data Transition – Rethinking Digital Sustainability**

Chair(s): Frits **Bussemaker** – Dutch National Government, The Netherlands

Speakers: Karen **van der Zanden**, Chair Expert Group Sustainable Digitalization, House of ESG / Stijn **Grove,** Dutch Data Center Association / Claire **Groosman,** Top Sector Energie / Inge **Sonnenschein,** Alliander Digital Strategy

13:10 - 13:20	**Conference Chairs' Reflections & Closing Discussion** (Room A0.06)
	Sarah **Giest,** Regional Conference Chair, Leiden University Bram **Klievink**, Regional Conference Chair, Leiden University Zeynep Engin, Chair & Founder, Data for Policy CIC
13:20 - 14:15	**Lunch**
14:15	**End of Data for Policy 2025 – Europe**

Keynote Session: "**Digitally Powered Green Transition**"

Andrea **Halmos**[1], Deputy Head of Unit, European Commission, DG ENV,

Chair: Sarah **Giest**, Leiden University, The Netherlands

Abstract

The keynote speech will emphasise how a genuine digital and green transition can evolve in synergy, highlighting the role of digitalisation in enhancing competitiveness alongside with advancing environmental and climate goals. It will stress the importance of circularity beyond just GHG emissions, promote sustainable digital technologies, and demonstrate how digital tools can contribute to environmental and climate objectives. The speech will feature concrete EU-level use cases and best practices, discuss the current policy context, and identify key enablers that support a digitally powered, sustainable transition.

[1] Andrea Halmos is a Deputy Head of Unit at the European Commission; supporting environmental policy-design and implementation with the use of digital tools in the Directorate-General for Environment (DG ENV). Previously, she worked as Deputy Head of Unit at DG DIGIT's Interoperability and Digital Government Unit, on the digital transformation of public administrations in the EU through interoperability. Her work included the implementation of the Interoperable Europe Act, with particular focus on the role of interoperability on common European data spaces, AI in the public sector, GovTech and the digital transformation of local and regional administrations.

Panel: Session 1A

A socio-technical systems' view on integrating resources and stakeholder networks toward long-standing challenges

Speakers:

Marcella **Bonanomi** PhD, MSc Arch – Senior Research Associate and Project Manager, The Lisbon Council
Natalia **Oprea** PhD - Researcher, The Lisbon Council
Francesco **Osimanti** - Research Associate and Project Manager, The Lisbon Council
Luca **Remotti -** Managing Partner, Datapower Consulting

Chair: Francesco **Mureddu** PhD – Vice President for Development and Senior Researcher, The Lisbon Council

Abstract

This panel explores the crucial role of data in advancing the EU Green Deal within cities and local communities. Drawing on insights from EU-funded research projects URBREATH, ExPEDite, USAGE, ACES and BeOPen - the discussions will examine how data-driven initiatives can support local administrations and stakeholders in the transition to more resilient and sustainable communities. Panelists will describe their experiences and lessons learned and provide an opportunity for questions and answers.

Context and Challenges

The European Union has, in recent years, placed a paramount emphasis on the effective utilisation, sharing, and overall optimal exploitation of data within its borders. This focus underscores the EU's recognition of data as a critical asset in driving innovation, economic growth, and addressing societal and environmental challenges. To this end, a strong legal framework surrounding data (e.g. European Strategy for Data, Data Governance Act, Open Data Directive) and various initiatives promoting deployment, research and innovation have been funded to unlock data-driven innovation. In this context, cities and local communities play a crucial role in implementing these policies and achieving the ambitions of the EU Green Deal and European Strategy for Data through concrete actions. They are seen as both the sources of and solution to today's economic, social and environmental challenges. While cities have been long active in climate policies, data strategies and initiatives at the cross-road of these two critical areas, they often struggle to create

integrated socio-technical systems that effectively leverage diverse resources (existing and/or new data, algorithms, tools) and stakeholder networks to tackle long-standing challenges.

Purpose

This panel aims to assess current practices in various EU cities and communities for leveraging data to advance the EU Green Deal. More specifically, considering various levels of the local data ecosystem, we will examine how data-driven projects can (i) break down silos within local public administrations for green and digital transformation, (ii) identify effective strategies and governance mechanisms for collaboration among various ecosystem actors (data holders, data users, data intermediaries), and (iii) evaluate the opportunities and challenges of using data-based resources to engage citizens in innovative, green initiatives.

Intended Outcome

Panel participants will discuss current approaches adopted by various EU cities and local communities to spur data sharing and (re)use on environmental issues, covering both technological solutions and governance strategies. Participants will exchange experiences on initiatives that create systemic solutions, addressing trust, legal and decision-making concerns among stakeholders engaged in generating value from data.

Proposed Discussion Questions

- How can we balance public responsibility and civic participation? Should we prioritize public service or the common good?
- How can the current Common European Data Spaces strategy facilitate the uptake of Data Sharing across the EU and its various entities?
- How do we embed the real challenges of digital service design into the advanced concepts developed inside Horizon Europe RIAs?

Considering that in many cases IT services are developed without properly understanding the business and functional requirements, even if interacting with the "owners" of these processes [According to McKinsey, 70% of digital transformation projects fail to meet the stated goals. It means most projects revolving around data are not getting the results they are looking for.] Involving citizens in co-design adds a lot more complexity to this process and a lot more risk of not meeting the goals. First, it is necessary to adopt the appropriate approach ensuring the quality of design and the effective interaction between IT people and process owners: already enough of a challenge. The citizen involvement needs to be carefully designed to be effective, making sure that the final users have their say on the assessment of their UX.

- What do you think are the most significant challenges to data sharing in (local) data spaces or ecosystems? (hint: lack of standardization across systems, lack of inter-organisational agreements, resistance of stakeholders, concerns of data privacy).

- Reflecting from your project and/or policy area perspective, what are the most relevant benefits of creating data spaces/data sharing among entities?

3 Abstracts of The Five Projects Involved

The URBREATH project (Systemic Integration of Transformative Technical and Nature-based Solutions to Improve Climate Neutrality of European Cities and Regions and tackle Climate Change) aims to create and test a complete urban regeneration method, called the URBREATH Framework. This framework will help European cities become more resilient and climate-neutral by addressing climate change. The Framework is based on community and stakeholder involvement, using urban greening Living Labs (LLs), and advanced digital technologies, like urban Digital Twins (DTs).
Reference panelist > Marcella Bonanomi

The USAGE project (Urban Data Space for Green Deal) aims to enable universal access to city-level environmental and climate data for everyone, following the FAIR principles. Its objective is to support the European data strategy implementation and various priority actions of the European Green Deal, with a specific focus on cities and towns where the impact of climate change is most prominent. USAGE offers innovative governance mechanisms, streamlined arrangements, AI-driven and other tools, and data analytics to facilitate accessibility, sharing and utilisation of city-level data.
Reference panelist > Natalia Oprea

The ExPEDite project (Enabling Positive Energy Districts through Digital Twins) aims to develop and integrate modular components that can be used to analyze and predict a district's energy performance under various what-if scenarios. These components form a district Digital Twin, enabling not only a visualization of the built environment, but also real time information on energy flows and spatiotemporal optimization of the district's energy needs. This tool allows for district planning actions to be designed, analyzed and compared, leading to evidence-based decision making. In parallel, citizen engagement actions will be promoted through a mobile application aiming at increasing awareness and improving behavior towards energy efficiency through gamification, while also presenting citizens with options on how to engage in the district's energy transition and providing messaging capabilities for collecting soft data on their views.
Reference panelist > Francesco Osimanti

The BeOPen project (Open framework for boosting EU High Value Datasets from Public Sector) aims to facilitate organisations and public entities to re-use Open Data across the EU for the development of information products and services.
Reference panelist > Luca Remotti

Session 1B: Private Sector Data for Public Interest in the EU – Government-Business Data Relations

Unravelling Tensions between Business and Government on Mandatory Business-to-Government Data Sharing for Public Interest in the EU.

Louis Knüpling[1], Iryna Susha[1], Philip Leifeld[2]

1. Utrecht University
2. University of Manchester

Keywords: business-to-government data sharing, B2G, EU Data Act, public consultation

Abstract

Research problem

To address complex societal challenges, like the climate crisis or pandemics, governments need to make evidence-based decisions based of best available data. However, data needed to make policy decisions is no longer solely in the domain of public sector, but increasingly also in the hands of the private sector resulting in growing business-government data asymmetry (Verhulst, 2022). In an attempt to re-balance the data asymmetry and gain access to potentially valuable data, governments start to put pressure on businesses to share data needed to address societal challenges. For instance, in early 2024 the EU Data Act was adopted which includes provisions to mandate companies to share data with the government "in situations of exceptional need". Previous research showed that the proposal had been met with resistance from the private sector and that the adopted text has favored the position of business (Susha et al., 2022). In this study we aim to explicate the policy preferences of the public and private sector actors and how they framed the issue of regulating B2G data sharing for public interest. Hence, our research

question is: What discourse coalitions and frames shaped policy preferences on B2G data sharing for public interest in the EU?

Research approach

For this study we conducted a Discourse Network Analysis (Leifeld, 2017) of 449 responses to a survey that was part of the EU's public consultation on the Data Act. The survey was carried out between June and September 2021. Out of the 449 respondents, 100 were public sector organizations, 105 companies, 122 business associations, 21 NGOs, 21 research organizations, 56 citizens, and 28 unspecified 'others'. A discourse network analysis takes information on concepts or topics that actors mention and maps either actors based on which concepts they discuss, or concepts based on which actors discuss them as a network. In such networks the actors (concepts) are represented as nodes, and links of different weight indicate the degree of association between the actors (concepts). The stronger the overlap in concepts they discuss, the more related are two actors, and vice versa, the stronger the overlap in actors that discuss them, the more related are two concepts. To answer our research question, we draw from the literature on framing and from the Advocacy Coalition Framework (Sabatier, 1988). Framing can be defined as "selecting some aspects of a perceived reality and making them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman, 1993, p. 52). Coalitions seek to translate their beliefs into public policies. Based on these literatures, we construct an analytical framework distinguishing three elements of a frame: diagnostic (how the problem is defined), prognostic (what solution is preferred), and instrumental (which ways to arrive at this solution are suggested). We segmented the relevant questions from the survey into these three main elements following our analytical framework: different perceived problems with current B2G data sharing (diagnostic), whether legislative action about B2G data sharing is needed and for which public interest purposes (prognostic), and instruments for the implementation, such as safeguards, the price, as well as financial and non-financial incentives (instrumental).

Initial findings

Our initial analysis of the network reveals that there is a clear separation into two coalitions, one dominated by public sector organizations, and one dominated by private sector organizations. However, there are outliers on both sides which tend to be organizations working closely with the respective other side, such as national transportation organizations, or energy providers. Despite these outliers, there is no dominant sectoral coalition within the private sector side. That is, different companies within telecommunications, within finance, or within the automotive sector vary in their degree of polarization from strongly opposite to the dominant public sector position to a

rather moderate, while still opposing, stance. Actors that are neither governmental nor private companies, such as NGO's, research organizations, and citizens take overall rather moderate stances, but tend to be more aligned with the public sector positions. The clear separation into a public sector and a private sector coalition becomes more evident when referring to the solutions only, and less evident when referring to the problems only. That is, public and private sector organizations aligned overall more in their assessment of the existing barriers to B2G data sharing, but less so in their assessment of the actions to tackle them, which includes the scope of data sharing obligations as well as the required safeguards, and the price.

Based on the concept networks, we find that the dominant public sector coalition was aligned on the following problem-solution-instrument framing. B2G data sharing is impeded by legal and technical barriers, as well as by the lack of awareness. EU action is needed through mandatory data sharing for a number of public interest purposes (especially statistics, public services, and environment). Safeguards should be particularly around sensitive information and that governments ensure transparency reporting. In contrast, the dominant private sector coalition was aligned on the following problem-solution-instrument framing. B2G data sharing is impeded by the lack of safeguards and lack of skills and data protection on the public sector side. EU action is not needed, and data sharing should remain voluntary. The need for safeguards takes center stage in this coalition's discourse, as well as pricing the data depending on the purpose and the need to build cocreation capabilities.

Medical data – discrepancies, half-truths and challenges.

Jadwiga Glanc[1], Zbigniew Handzel[2] and Łukasz Faber[3]

1. UZH
2. WSEI
3. AGH

Keywords: medical data, cybersecurity, divulgence of data

Abstract

The research and/or question of policy: The research looks into the issue of the quality of medical data gathered by various medical entities (both public and private). On the one hand, it examines the increasing reluctance of patients to disclose certain data (and a concomitant temptation to fabricate it) – something that results in highly unreliable data sets which are quite unsuitable for further analysis. On the other hand, it examines certain facts, practices and regulations that make the situation even worse. The research examines the process of the gathering of medical data together with its greatest current shortcomings and aims to put forward ways of enhancing the quality of the data (as well as enhancing anonymity and cybersecurity in the actual handling and gathering of data).

Research methodology and data used:

The research is based on surveys of patients, as well as on a review of the factual and regulatory situation in one European country. Among other things, the surveys show the attitude of patients towards the divulgence of sensitive data and also the degree of their confidence in medical digital systems. It also examines certain practices of entities together with State regulations, both of which would seem to be key factors that make the situation worse.

Key findings:

Data produced in the medical field is in large measure unreliable and this situation may deteriorate even further unless the process is rectified (either by factual or regulatory measures). Although the reasons behind this unreliability (and its consequences) vary, one

important reason would be the reluctance of patients to share data. Furthermore, many programs (or applications) used by medical practitioners are constructed in such a way that they highlight issues such as billing and documentation (the aim being to forestall any legal claims in the future) and so are not designed to optimize consistent data extraction and solution building. Moreover, the need to settle accounts and accounting responsibilities which are incumbent on entities (public entities in particular) may make the data produced "shadow" (and in a distorted fashion at that) the above-mentioned financial reasoning behind data gathering, such as the need to show certain effects which have been planned beforehand or have previously been classified in a certain manner.

The data sets which are currently being produced are largely unfit for further use and – as there is no way in which they can be corrected post factum – they can have a negative impact on the decisions and systems which are based on them. Moreover, varying access to data sets may make some entities build solutions on the faulty data that is available to them. Another finding would be that the low digital literacy of the population at large — combined with factors such as the somewhat advanced average age of medical practitioners and recent medical data leaks further — undermine people's trust in the medical digital systems.

Governance dynamics as innovation determinants in data-enabled social innovation ecosystems.

Federico Bartolomucci[1], Luca Testoni[1] and Mario Calderini[1]

1. Politecnico di Milano

Keywords: Governance, Social Innovation Ecosystem, Innovation, Data-Centered Ecosystems

Abstract

1. Research relevance

The complexity of societal grand challenges, such as climate change and social inequalities (Geels, 2010), frequently necessitates the involvement of multiple societal actors in the design and implementation process of innovative solutions. The implementation of an ecosystem perspective (Alcaide-Lozano et al., 2019, Terstriep et al., 2020) is an effective strategy to nurture participatory dialogue and creativity in a variety of institutional, cultural and geographical settings.

Among the others, social innovation ecosystems (SIEs) (Andion et al., 2020) [2] have been shown to be a successful infrastructure to prompt collaboration between public administrations, private actors and citizens to find innovative solutions in different contexts.

Due to their multistakeholder and continuously evolving nature (Carayannis and Campbell, 2009), SIEs present important governance challenges. Governance aspects, both related to the interaction nexus among stakeholders (e.g. trust creation and community engagement) and to the infrastructural aspects (e.g. tech infrastructure or agreements), determine the SIEs effectiveness in developing impactful solutions over time (Mora et al., 2023). While literature on innovative ecosystems has extensively discussed actors-related intra-

ecosystem dynamics (Coletto et al. 2024), few have focused on the exogenous dynamics influencing the ecosystem evolution over time.

2. Research Design

We analyze SIEs under a multi-level perspective (Walrave et al. 2018). This perspective identifies SIEs as innovation niches, operating in a broader context made of socio-technical regimes and landscapes (Loorbach et al. 2017). Under this perspective, and acknowledging the dynamic nature of SIEs (Coletto et al. 2024; Paasi et al. 2023) we use collaborative governance as a research framework to isolate inter-layer dynamics (i.e. among the niche, regime and landscape level).

The research is based on an abductive approach. First, through literature on the governance of similar socio-technical constructs, we have isolated a theory-informed research framework. Then, the framework has been used as guidance to conduct two cycles of semi structured interviews with the researchers from City Science Network.

The City Science Network is a network of SIEs, endorsed and facilitated by the MIT Media Lab. The network is composed of ten SIEs operating on five continents. Each Lab involves actors from the public, private, and academic sector and aims to find innovative tech-enabled solutions to glocal urban challenges, guided by a community- and people-centered approach.

3. Results and Contribution

The research highlights the presence twelve inter-layer dynamics of three different types: temporal, structural and relational. These dynamics are homogeneously originated by and distributed among the different layers of interaction between the niche, the regime and the landscape level.

Results position the SIEs capacity to navigate through these dynamics as a key success factor to sustain the SIEs activity over time and generate systemic and transformative impact.

The study provides two major contributions. First, through the adoption of a multilevel perspective, the study contributes to theory building and provides an innovative contribution to our understanding of the dynamic nature of SIE and the factors affecting their effectiveness.

Secondly, it identifies for the first time inter-layer dynamics affecting SIEs capacity to operate over time and generate systemic impact.

From data asymmetry to alliance? Business-to-government data sharing in Europe.

Jaime Bernal[1], Iryna Susha[1], and Koen Frenken[1]

1. Utrecht University

Keywords: data sharing, data governance, data act, smart city, European Union

Abstract

This paper explores business-to-government (B2G) data sharing in Amsterdam and Barcelona. While businesses hold valuable data for policymakers generated through commercial activities, governments seek access to enhance their data for data-driven decision-making (DDDM) capabilities. However, businesses often perceive more risks than incentives in sharing data, leading to suboptimal engagement and fragmented data ecosystems. This study employs discourse analysis of interviews with government officials and businesses, alongside policy document reviews, to uncover the hidden forces shaping B2G data sharing negotiations. The results show that B2G data sharing negotiations are primarily shaped by a complex interplay of tensions that underpin sites of discourse contestations and underlying structural challenges that form the less negotiable backdrop against which these struggles unfold.

Business-to-government (B2G) data sharing can drive societal progress by combining the private sector's capacity to generate data with the government's central position in delivering public services. Yet, when facing the decision of voluntarily sharing data with governments, businesses tend to perceive more disincentives than incentives, resulting in perceived unsatisfactory levels of engagement despite the societal benefits at stake (Martens & Duch-Brown, 2020). Nonetheless, as administrators of increasingly digitalized and populated urban centres with high economic activity, environmental impact and exposure to major security and health threats, municipalities have perceived it as essential to gather insights from business data to fulfil their duties (Fernandez-Monge et al., 2024). Therefore, an increasing number of European cities, have begun adopting strategies to mandatorily request data from businesses, for example, including data sharing obligations

in contracts or as conditions for obtaining permits to operate in the city (Micheli, 2022; Van den Dool, 2024). Meanwhile, at the EU level, the 2023 Data Act gives public authorities the possibility to request access to business data in cases of exceptional need such as public emergencies (European Commission, 2023). This intensifying push to encourage B2G data sharing through legal instruments leaves a research gap in the field.

This paper studies the resulting tensions to advance B2G data sharing through the adoption of legal instruments in the referent cities of Amsterdam and Barcelona. It analyses discourses from both, government officials and businesses, to shed light into the complexities and conflicting visions at play during negotiations. Textual data from semi-structured interviews and policy documents has been gathered and examined by applying an open inductive coding approach through critical discourse analysis (CDA) to uncover hidden meanings in order to reveal how tensions manifest in stakeholder discourses (Fairclough, 2013). The tensions explored suggest that B2G data sharing faces significant challenges, even when mandatory instruments are leveraged by governments.

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Session 1C: Security and Justice Policy in the Age of Algorithms and AI

Towards a Decolonial AI in/for Africa? Critical Analysis on Data Capitalism, Epistemic Injustice, and Ethics.

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1. Rhodes University

Keywords: Artificial Intelligence, Decolonial AI, Epistemic injustice, Data capitalism, Anthropology of AI

Abstract

Emerging technologies, particularly Artificial Intelligence (AI), have witnessed remarkable growth and disruption in recent years. As a transformative force in the fourth industrial revolution, AI promises to reshape societies and economies worldwide (Arakpogun et al. 2021). Notably, the rise of generative AI tools, such as ChatGPT, has sparked widespread discourse, inciting moral panic, hope, enthusiasm, controversial debates, and conversations that transcend the technology industry to researchers, policymakers, governments and ordinary citizens. This ongoing discourse diverges around two camps: the optimists and the pessimists. The optimists align with the agelong notion of technological solutionism, a school of thought that presumes that technological advancements can solve all problems and improve the world by driving social change. Pessimists, on the other hand, are technological sceptics who believe technology can harm society and call for a more critical examination of their role in society to mitigate the potentially damaging impact of technology - AI, more specifically. This paper underscores the latter camp by highlighting decolonial perspectives on AI in Africa to unearth its interconnected epistemic, ethical, and socio-technical dilemmas.

This paper explores Artificial Intelligence (AI) in Africa through a decolonial lens, critically addressing how its development and deployment intersect with systemic inequalities and epistemic injustice. AI technologies promise to transform sectors like healthcare, education, and agriculture. However, they also perpetuate colonial legacies through data extraction, algorithmic bias, and the homogenisation of Africa's socio-cultural diversity. But beyond AI's perceived socio-economic benefits for African countries lie the socio-technical concerns about AI as a tool for perpetuating colonialism and historical inequalities.

Thus, 'AI colonialism' is a term that stresses how the development and deployment of AI systems amplify, perpetuate, and instigate forms of domination and oppression characteristic of the colonial era. The term conceptually overlaps with 'data capitalism', portraying how data extraction can serve coloniality (Mollema 2024, 580). Moving away from, but also related to data extraction and coloniality issues, are privacy, bias and discrimination, over-reliance, and usability concerns. These concerns have heightened academic discourse on AI decolonisation and prompted calls for related regulation, which we critically discuss. This paper examines the deployment of AI across several African countries through a decolonial lens, highlighting its implications for systemic inequality, epistemic justice, and ethical governance. Drawing on decolonial and anthropological perspectives, we critically engage with the contradictory potential of AI within the African context. The analysis incorporates examples from Mauritius, Egypt, South Africa, Tunisia, Ghana, Kenya, Nigeria, and Morocco, illustrating the opportunities and challenges of AI deployment across diverse socio-political and cultural landscapes. This paper is not an attempt to exhaustively unravel contentious AI decolonisation issues regarding Africa. Rather, we recognise its imperfect but crucial contribution to the ongoing discourse on disassembling AI coloniality for a more equitable and connected world (Udupa and Dattatreyan 2023, 22).

Using examples from African countries, including initiatives like Nuru, Kudi AI, and MomConnect, the paper highlights how locally tailored AI solutions can challenge these inequities. It interrogates contentious issues surrounding AI ethics, governance, and policy, advocating for integrating local knowledge systems and inclusive frameworks to decolonise AI. By re-examining the promises and pitfalls of AI in the African context, this paper contributes to ongoing debates about fostering equitable and contextually relevant technological futures.

Decolonising AI means framing AI with an African lens or context. It requires some specificity based on deep contextual knowledge and local ambition. The development and use of AI technologies have profound implications for what it means to be human, and these implications must be critically examined within the historical context of colonialism and racism. AI is currently plagued by racial and gender biases, the commodification of human experience, and geopolitical power struggles, highlighting the urgent need for decolonisation and ethical reform within the field. Three views inform discourse around the decolonial knowledge landscape: 1) the decentring view, which rejects Western imitation and emphasises asserting unique identities, restoring global histories, and acknowledging marginalised knowledge (Bhambra et al. 2018). Examples are efforts to decolonise curricula and promote marginalised knowledge in various fields (Jansen, 2019); 2) the additive-inclusive view that encourages using existing knowledge while recognising the value of new approaches and supporting pluralism (Mignolo, 2012); and 3) the engagement view that prompts a critical examination of scientific practice from the margins, putting marginalised populations at the centre of the research process and questioning assumptions (McDowell and Chinchilla, 2016).

Epistemic injustice is another profound consequence of AI's coloniality, necessitating decolonisation (Mollema 2024, 582). In this sense, decolonisation challenges the dominance of Western epistemology in shaping global education and knowledge production. Udupa and Dattatreyan (2023, 154) describe this epistemic injustice as the interplay between knowledge, power, and being, highlighting how institutions, disciplines, and individuals position themselves within this nexus. They argue that dismantling the colonial foundations of knowledge production requires these actors to critically interrogate their roles in perpetuating dominant ideologies rather than accommodating them under the guise of liberal values such as freedom of speech. By embedding these biases into AI technologies, the field perpetuates an epistemic injustice where local African epistemologies are excluded and devalued, limiting their potential to contribute to contextually relevant AI applications that address the continent's unique socio-cultural and linguistic needs. Deciding what counts as valid knowledge, what is included within a dataset, and what is ignored or unquestioned is a form of power held by AI researchers that cannot be left unacknowledged. 'Reverse tutelage' is a decolonial approach that addresses this imbalance by encouraging dominant institutions to learn from historically excluded epistemologies. Through ongoing processes of criticism and research, reverse tutelage becomes a powerful mechanism to inform AI design and deployment, reorienting it toward inclusivity and equity (Mohamed, Png, & Isaac, 2020, 17; Mollema, 2024). This approach fosters a reciprocal exchange where global AI frameworks are reshaped to reflect the lived realities of diverse communities, offering a path to counteract epistemic injustices embedded in contemporary AI systems.

The rapid evolution and deployment of Artificial Intelligence (AI) have introduced profound ethical and policy challenges globally, particularly in the African context, where governance structures and institutional capacities often lag behind technological advancements (Duan, Edwards and Dwivedi 2019). African countries have demonstrated a growing commitment to AI development, with initiatives such as national AI strategies in Mauritius, Egypt, South Africa, Tunisia, and Morocco (Dwivedi et al. 2021; Insights 2022) highlighting the continent's ambition to align AI technologies with local socio-economic needs. For example, Mauritius was the first African nation to formalise a national AI strategy. Morocco's establishment of the AI Movement Centre at Mohammed VI Polytechnic University showcases its regional leadership in AI development (Bensalah, 2021; Jaldi, 2023).

However, significant gaps still need to be addressed, as many African nations face institutional and infrastructural limitations that hinder their ability to harness AI's transformative potential fully. This governance gap reflects broader global inequalities in AI development and deployment, exacerbating divides between the Global North and South. While some countries like Algeria, Nigeria, Ghana, and Kenya have established governmental agencies to drive AI adoption, most African nations need more resources

and institutional capacity to develop robust ethical and policy frameworks for AI governance (Arakpogun et al., 2021, 7-8). These challenges risk perpetuating digital colonialism and systemic inequities, particularly without comprehensive legal systems tailored to address AI-specific issues such as accountability, privacy, and algorithmic bias.

In conclusion, the African continent stands at a critical juncture in its engagement with Artificial Intelligence (AI). While the burgeoning AI ecosystem demonstrates immense potential for addressing socio-economic challenges, it also underscores the need for contextually grounded and inclusive strategies. The reliance on Western models of AI computing infrastructure and the absence of robust national and regional frameworks risk perpetuating the inequities of digital colonialism. These structural challenges underline the urgency of fostering regional integration, building capacity, and developing tailored AI policies that reflect Africa's unique socio-cultural, economic, and linguistic realities. Decolonising AI thus necessitates rethinking these embedded inequities. It requires integrating local knowledge systems, fostering inclusive governance, and challenging the epistemic hierarchies embedded in contemporary digital capitalism. Only through this lens can we address the socio-technical concerns that threaten to entrench existing inequalities further while forging a path toward a more equitable and contextually relevant digital future.

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Code of Justice: A Sector-Specific Quantitative Analysis of Regulatory Gaps in the U.S. Federal Courts for AI Governance.

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2. Indian society of AI and Law

Keywords: AI regulation, regulatory gaps, federal courts, regulatory uncertainty, agency enforcement

https://zenodo.org/records/15579528

Abstract

The rapid expansion of artificial intelligence (AI) across major U.S. sectors—including healthcare, finance, and technology—has outpaced the ability of existing legal frameworks to provide clear, consistent regulatory guidance. The U.S. regulatory environment for AI remains highly fragmented, shaped by a patchwork of federal agency guidelines, state laws, and judicial interpretation rather than a unified policy framework. This has led to sector-specific gaps and inconsistencies, especially as courts increasingly address novel legal questions arising from AI deployment. This paper introduces a quantitative, data-driven methodology to systematically identify and measure regulatory gaps in AI governance by analyzing U.S. federal court opinions from 2010 to 2025. Using the Free Law Project's CourtListener API and natural language processing, we assembled a comprehensive dataset of judicial opinions relevant to AI. Legal citations, sectoral, and temporal metadata were extracted from each opinion.

To capture regulatory ambiguity, we introduce the Regulatory Gap Index (RGI), which synthesizes citation density, citation diversity, lexical complexity, and hedging frequency. The Regulatory Gap Percentage (RGP) quantifies the share of cases in a sector that exhibit systemic indicators of regulatory strain or failure. High regulatory failure cases are identified through a composite of structural signals, including low citation grounding, high RGI, and unresolved judicial outcomes. The RGP reflects the proportion of such cases within a sector, enabling comparative measurement of regulatory adequacy and strain across sectors, courts, and years. To further investigate determinants and consequences

of regulatory ambiguity, causal inference models are applied to analyze how citations, court circuit, and judgment outcome relate to regulatory failure, and to estimate the effect of regulatory strain on plaintiff success and case resolution.

By leveraging quantitative analysis to bridge technological innovation, legal interpretation, and policy formulation, this study offers actionable, data-driven insights for policymakers, legal scholars, and AI developers. The findings underscore the need for sector-specific, evidence-based approaches to AI governance and highlight the importance of consistent, transparent metrics in guiding judicial decision-making. Ultimately, this research provides a replicable, empirically grounded foundation for developing more effective regulatory strategies and contributes a robust framework for future research and policy development in AI governance.

Data and Advanced Data Analytics to empower SNGs in energy transition policymaking.

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1. TNO

Keywords: Data-driven Policymaking, Energy transition policy, Local Governments, The Netherlands

Abstract

Aim and contribution:

To enable subnational governments (SNG) to effectively and efficiently tackle grand societal challenges such as climate change, knowledge is a powerful and necessary resource (Wagner, Velander, Biber-Freudenberger & Dietz 2023). In particular local policymakers lack the necessary knowledge (Durrant, Havers, Downe, & Martin, 2024)., while simultaneously, they are often overwhelmed by the pace and amount at which information is made available in the digital era by means of advanced analytics and increased data availability (Liu & Dijk, 2022). In order to design and implement useful and useable digital technologies for the policy process, it is imperative that scholarship and practice are aware of the impact of digital technologies on (the use of evidence in) policymaking. This paper aims to present and discuss the findings of a research project on the impact of data and data analytics on the evidence-based policy practice of local governments in the energy transition. The theoretical perspective we develop builds upon the field of evidence-based policymaking (Parsons, 2002) and Transition Management (Rotmans, Kemp & Van Asselt 2001), equipped to answer the following research question:

What are the knowledge needs of SNGs for policymaking towards sustainable urban areas, and how do data and advanced data analytics contribute to these knowledge needs?

Methodology

A multi-case study among eight Dutch cities will be conducted with Utrecht, Rotterdam, Amsterdam, Groningen, Nijmegen, Haarlem, Hengelo and Den Haag. These cities are selected based on their pioneering role in energy transition policymaking and

implementation and the inclusion of data in that process. Interviews are the main method for data gathering, augmented with document study of e.g. policy documents.

A semi-structured interview protocol will be derived from a literature based analytical framework encompassing the knowledge needs and the various roles data and advanced data analytics can take to establish that knowledge. The interviewees are selected based a direct and active role in energy transition policymaking or their experience with the collection and use of data.

The analysis will combine a structured and semi-structured approach, based on the analytical framework, with categorical aggregation based on the combined analytical and empirical framework.

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Session 1D: Digital & Data-driven Transformations in Governance

Bias by design: how political views on benefit recipients are embedded in unemployment technologies

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Keywords: Municipal government, Data-driven unemployment technologies, Digital welfare state, Bias

Abstract

Data-driven technologies, such as registration systems, dashboards, and predictive analytics, are increasingly employed to manage social services like unemployment. These technologies are used to assess benefit eligibility, detect fraud, and allocate resources (Eubanks, 2017). Strikingly, data-driven technologies are often framed in technocratic terms as neutral, apolitical, administrative tools focusing on efficiency, thereby overlooking their inherent political and social dimensions (Jasanoff, 2005, Winner, 2017).

This study examines how the way local politicians view and frame (groups of) benefit recipients are embedded in data-driven technologies within unemployment services of a Dutch municipality. We used a sequential mixed methods design combination of automated text-analysis software ConText (1.2.0) and text-analysis software Atlas.ti (9) to inductively analyze municipal council documents over a period of 8 years (2016-2023). These documents (a.o. agendas, meeting minutes, motions) contain discussions within the municipal council and committees, between aldermen, council members, and non-council members.

Our analysis identified key data-driven technologies, their aim, attitudes towards recipients, how transparent the municipality is towards recipients, and how much autonomy recipients have regarding their personal data (Table 1). Preliminary findings

reveal that technologies aimed at service provision often reflect neutral or positive attitudes towards (groups of) recipients, whereas fraud detection systems embed negative views.

In-dept text analysis highlights disparities: young people are generally met with a positive and hopeful outlook, except young single mothers with non-Dutch background. Older individuals and non-Dutch residents are often seen as untrustworthy and potential fraudsters.

For example, in discussions about the digital profile for young social assistant recipients (Box. 1), Rotterdam is depicted as a young blooming city with an eye for talented youth. Unemployed youngsters are portrayed as temporarily vulnerable, with an emphasis on improving their self-reliance, participation, and taking control over their own situation. A hopeful image is presented in which temporarily vulnerable youth, with a little support, can quickly return to work.

Another example is the 2018 municipal council discussion on the motion 'Decisive action against undisclosed foreign assets', which claimed that 'an estimated 20% to 30% of Turkish Dutch welfare recipients conceal foreign assets.' Council members criticized these statements, as they were based on unreliable research conducted by a commercial foreign agency and conflicting with trustworthy Dutch studies. This discussion reveals a political struggle over stereotyping Turkish Dutch welfare recipients as fraud risks. The dominant political perspective overshadows scientific and ethical concerns, such as basing policy on trustworthy scientific research. This is reflected in the design of the Risk profile foreign assets (Box. 2), which flags individuals based on characteristics such as 'non-Dutch country of birth,' 'repeated residence abroad,' and 'spending over 28 days abroad annually'.

Furthermore, we analyzed the transparency of the municipality towards recipients and how much autonomy recipients have regarding their personal data used in these technologies because that gives insight into how much knowledge and power recipients have to counter bias in data-driven technologies. Transparency towards recipients is greater in technologies aimed at improving service provision but minimal in fraud detection technologies. Autonomy remains limited across both types, as municipal priorities like efficiency often outweigh recipients' rights to privacy, transparency, and control in their re-integration process.

For example, in case of the digital profile for young social assistant recipients (Box. 1), despite the emphasis on transparency and autonomy, the young person remains dependent on the counselor for adjusting or removing information in the digital profile and the digital profile remains obligatory. This highlights the organization's priority over recipients' interests, as reflected in the gatekeeping design of the digital profile.

By having shown the political choices and reasoning around these technologies, this research aims to reveal mechanisms shaping their design and identify opportunities for intervention to promote fairness and accountability.

Table 1: Data-driven technology Aim Attitude towards recipient groups Transparency towards recipients Autonomy of recipients

Digital profile of young social assistance recipients Improving service provision Positive: promising young people Transparency, involvement, how DDT works, full insight, can change their data Autonomy: Partly. Dependent on work coach to change information.

HalloWerk Improving service provision Positive/neutral: WIP WIP WIP

MijnWerkKompas Improving service provision Positive/neutral: WIP WIP WIP

Risk profile foreign assets Fraud detection Negative attitude towards older people and country of birth non-Dutch No/little transparency towards recipients. Only in a late stage when council members started asking questions about the workings of the risk profile. None.

Analytics benefits fraud project Fraud detection Negative: non-Dutch WIP No transparency towards recipients at the start. Transparency after criticism by investigative journalists. None.

SyRI Fraud detection Negative: non-Dutch No transparency. None.

Childcare benefits scandal Fraud detection Negative: non-Dutch No transparency. None.

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Unpacking the Relational Side of Data-Informed Governance.

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Keywords: city, data capacity, data-informed governance, teams

Abstract

The ability to leverage data has become a critical capability for city governments seeking to address complex public challenges and deliver positive outcomes for their citizens. While there has been a steady expansion of research on data-informed governance, much of it remains limited by its predominant focus on technical tools and skills, its concentration on empirical research in larger metropolitan areas, and an insufficient consideration of relational and personal dimensions of data use. To address these gaps, this article presents a comparative case study of three medium and small sized U.S. cities—and, more specifically, the cross-functional teams within them—that utilised data to tackle the common challenge of housing distress and abandonment: an urban issue with significant environmental, financial, health, and psychological impacts on individuals and communities. Drawing on qualitative evidence, our findings illustrate that developing data capacity cannot be confined to establishing organisational standards and integrating technical tools. Instead, it hinges on the interactions and relationships formed by individuals working together. These relational elements encompass attention to daily working practices and routines, as well as leadership behaviours at multiple levels, which shape how data practices are tested, integrated, and sustained. By exploring three different approaches and trajectories of data capacity building, the study also highlights diverse pathways cities may take in building data capacity. We conclude by outlining future research opportunities and practical implications, emphasising the need for a more holistic understanding of data-informed governance that integrates technical,

organisational, and relational dimensions and focuses on teams as critical units of analysis to study and strengthen data capacity in local governments.

From Proprietary to Public Purpose: Unlocking Mobility Data for Better Urban Futures.

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Keywords: BtoG, data, data sharing, urban data, mobility

Abstract

Since the inception of modern nation-states, governments have played a central role in data collection. The term statistics, as derived from the word State, is a historical testament to this dynamic. In recent decades, however, the landscape of data gathering has shifted dramatically. Businesses—rather than governments—now generate, collect, and control the largest volumes of data. This transformation has profound implications with one key question increasingly occupying scholars, policymakers, and the public alike: who should have access to business-held data, and under what conditions, especially when data could serve a public interest? While prior scholarship and policy discussions have advanced our understanding of business-to-government (BtoG) data sharing, several limitations remain. First, the assumption that "data is data" obscures how differing data types, industries, and regulatory environments call for tailored access strategies. A one-size-fits-all solution to data-sharing is neither realistic nor efficient. Second, much of the existing work on this topic has been conceptual or theoretical in nature, lacking the fine-grained empirical evidence that could inform more nuanced understandings and recommendations. The present study aims to address these gaps through an exploratory, empirically grounded inquiry into the B2G data landscape at the city level. We centre our empirical investigation on the urban mobility sector. City governments worldwide are under increasing pressure to manage transportation systems more effectively, safely, and equitably, while meeting sustainability targets. Innovations in mobility, such as ride-sharing platforms, micro-mobility (e.g., e-scooters), and real-time navigation apps, generate novel and valuable datasets. Some local governments have been proactive in forging data-sharing agreements, yet many hurdles—from privacy concerns to technical interoperability—remain. Studying the mobility sector thus offers insight into a domain

1 2

where data is both abundant and highly relevant to the public interest, providing valuable lessons for other areas of city governance. Building on over 20 in-depth, semi-structured interviews with city officials, industry representatives and policy or academic experts, we explored themes such as the types of data that could yield the greatest public value, lessons learned from existing data sharing arrangements, and suggestions on overcoming key barriers to data access. The findings will contribute to a deeper empirical and conceptual understanding of how urban governments might access and leverage proprietary data—particularly in the domain of mobility—to advance public-interest goals. By shedding light on these dynamics, our research will inform ongoing policy debates and provide a foundation for further scholarly inquiry into more robust and equitable data-sharing frameworks.

The Data Agency Awakens: A New Era for Official Statistics - a New Data Hope.

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Keywords: Data agency, Official statistics, Data governance, Democracy

Abstract

The global statistical system is at a crossroads. Declining survey response rates, the proliferation of new data sources such as Artificial Intelligence, and big data, along with legislative and regulatory gaps, misinformation, and chronic underfunding, are posing severe risks to the credibility and efficiency of official statistics. In this evolving data landscape, National Statistical Offices must transform into National Data Agencies to ensure continued relevance and trust in government data.

Traditionally, National Statistical Offices have focused on collecting, processing, and disseminating official statistics. However, as data ecosystems expand and the demand for real-time, high-quality, and accessible data grows, these institutions must assume a broader role. By transitioning into National Data Agencies, they can move beyond statistical production and take on data stewardship, governance, and advanced analytics, ensuring they remain at the center of the public sector data infrastructure.

The transition to National Data Agencies would enable governments to harness (1) advanced data analytics, leveraging AI and machine learning to extract deeper insights and predictive capabilities, (2) integrating multiple data sources, including traditional surveys, big data, and administrative records, which would provide a more comprehensive view of society, (3) leverage or enhance real-time data processing that would allow policymakers and the public to access timely and actionable insights that could drive economic growth

and improve public service delivery. Additionally, (4) open data initiatives could make public data more accessible to businesses, researchers, and civil society, while (5) ensuring robust data governance and security frameworks would facilitate prevention of misuse, while (6) fostering innovation and collaboration across academia, industry, and other government agencies.

Democracy, however, fundamentally relies on accurate, impartial, and accessible data, where transforming National Statistical Offices into National Data Agencies presents both opportunities and risks. Enhanced data accessibility can improve governance and public trust, yet it also raises concerns over data favoritism and manipulation. In addition, the shift must ensure that National Data Agencies retain institutional autonomy and avoid political influence, as well as strong data governance frameworks are in place to protect privacy and maintain ethical standards.

Despite benefits associated with the transition to National Data Agencies, the transition poses several challenges. Technical capacity will need to be strengthened through investments in infrastructure, digital literacy, and data science expertise. Regulatory and ethical issues must be addressed to ensure that evolving data governance frameworks maintain public confidence. Furthermore, balancing traditional statistical functions with new responsibilities will require careful resource allocation and strategic planning.

The transition from National Statistical Offices to National Data Agencies is not merely an administrative shift but a necessary transformation for ensuring data-driven governance, informed decision-making, and sustained public trust. Policymakers must recognize the urgency of this shift and invest in the institutional, technical, and regulatory frameworks required to support it. The future of official statistics depends on the ability to adapt to an increasingly complex and dynamic data environment.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to improve formatting, styling and translation. After using this tool/service, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Session 1E: Ethics, Equity, and Trustworthiness

Can trust be legislated? What can we learn from data altruism's challenges and how to implement these lessons in building European data spaces.

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Keywords: Data altruism, data sharing, data spaces, building trust

Abstract

The European Union aims to establish a robust data economy, in which high-value European data spaces foster innovation, economic growth, and societal benefits. However, this goal cannot be achieved without ensuring trust in data sharing mechanisms. Trust is a key determinant of whether individuals and companies will make their data available to others, as well as whether they will consider the provided data to be legitimate, accurate, and a valuable source of information. Trust must therefore be built from multiple perspectives—from the data providers to the data recipients and end users.

Recognizing this, the EU legislator has embedded the concept of trust in several legal frameworks, particularly in the Data Governance Act (DGA). The DGA explicitly highlights the need for trust-enhancing mechanisms, particularly in the context of data altruism organizations. Data altruism, in theory, allows individuals and businesses to voluntarily share data for purposes of public interest, such as scientific research, healthcare improvements, and environmental sustainability. However, an important question arises: how can confidence in voluntary data-sharing frameworks be effectively built to ensure they are both legally sound and practically viable? To facilitate greater data exchange, the DGA introduces mechanisms to enhance trust, including:

- processing data based on the consent of data subjects or permissions from data holders,

- requiring non-commercial and independent status for recognized data altruism organizations,

- imposing transparency obligations, including documentation and reporting duties.

However, the early implementation of these provisions has not yielded the expected results.

Despite being applicable since September 2023, only one organization has registered as a data altruism entity under the DGA – the Spanish DATALOG association, operating locally in Barcelona. This figure is significantly lower than anticipated, and I suppose it will rather slowly grow in the future.

Paradoxically, while the "official" data altruism model under the DGA has faced challenges, data altruism initiatives outside of the DGA's regulatory framework have proliferated. Many grassroots projects, often linked to citizen science movements, involve individuals voluntarily collecting and sharing data for research and social causes. These initiatives thrive without relying on the legal framework established by the DGA.

This research investigates the underlying causes of this regulatory paradox and seeks to answer the following questions:

1. Why has the DGA framework for data altruism not gained traction, while informal data altruism initiatives continue to emerge?

2. Does the DGA fail to build trust, or does it over-regulate the data altruism ecosystem, making it unattractive for potential participants?

3. What lessons can be learned from the early experiences of DGA implementation to inform the ongoing legislative work on European data spaces?

4. Which legal mechanisms are truly effective in fostering trust in voluntary data sharing? Is consent-based regulation an effective trust-building tool in the era of information overload?

The study employs a dogmatic legal analysis, combined with elements of empirical research, focusing on the examination and observation of real-world projects based on voluntarily shared data. Preliminary findings suggest that while the DGA aims to increase trust, its rigid regulatory requirements may unintentionally discourage potential entities from registering as recognized data altruism organizations. In contrast, informal initiatives succeed due to their flexibility and lower bureaucratic burdens.

The insights gained from this research are crucial at this stage, as the EU actively develops sectoral European data spaces, particularly in health and mobility. Understanding what fosters and what hinders trust in data sharing can shape future

regulations, ensuring that European data spaces become effective, balanced, and trusted platforms rather than over-regulated ecosystems with limited participation.

By analyzing the shortcomings and successes of the DGA's implementation, my paper aims to offer several policy recommendations to optimize trust-building strategies in future European data spaces. These insights will be essential for legislators, policymakers, and stakeholders seeking to create a sustainable and socially accepted European data-sharing environment.

‘Healthy finances’ and ‘cost-efficient healthcare’: a qualitative case study of goal displacement in AI adoption processes.

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Keywords: Public values, Artificial intelligence, Organizational innovation, Adoption processes, Healthcare

Abstract

Organizations adopt innovations – such as technologies - to increase their performance and effectiveness in response to internal and external pressures (Damanpour, 1991). Recently, Artificial Intelligence (AI) has gained traction in public sector organizations and innovation literature as a performance-enhancing miracle (Mergel et al., 2023).

The public sector repeatedly faces a value trade-off between efficiency and efficacy (De Graaf & Van Der Wal, 2010; Young et al., 2022). The public sector often appears to prioritize efficiency over other public values, thereby reinforcing long-standing problems (Kempeneer & Heylen, 2023). This aligns with a public values framework focusing on market values and rationality (Nabatchi, 2018), but such frameworks have limitations (Bozeman, 2002). In healthcare for instance, a gradual shift from a public service to a business model has undermined the resilience and robustness of the system (Enzmann, 2012; Gupta et al., 2019; McGregor, 2001; Mooney, 2012; Sikka et al., 2015). Drawing from Nabatchi (2018) and Bannister and Connolly (2014) market-based values can be viewed as economic utility functions, but in the public sector, they do not serve as adequate bases for moral judgment.

Public values represent normative qualities inherent to the public realm that signify what is good, desirable or right, and can legitimize actions and organizations in the public sector (Antonsen & Beck-Jørgensen, 1997; Beck-Jørgensen & Bozeman, 2007; Bozeman, 2007; Meijer & De Jong, 2020). Hence, values have real-life consequences for public sector decision-making (Hood, 1991). A negative implication may be the effect of goal displacement (Young et al., 2021). Goal displacement occurs when the end goals are not tangible, and are consequentially displaced in favor of intermediary, tangible goals (Warner & Havens, 1968). The effect is that organizations tend to focus on the means, instead of the goals (Warner & Havens, 1968). Essentially, public sector organizations appear to favor

instrumental values over intrinsic, because they are tangible and measurable (Warner & Havens, 1968). The problem that arises is that the intrinsic goals are difficult to evaluate, and so organizations tend to focus on concrete outputs instead of broader outcomes (Bohte & Meier, 2000).

The consequences in terms of public values become concrete in the healthcare sector, a high-stakes and value-laden context (Bodenheimer & Sinsky, 2014; Reddy et al., 2020). In response to societal challenges such as population ageing, healthcare organizations increasingly turn to innovation, particularly the adoption of new technologies, as an adaptive strategy (Turnhout, 2023; Zahlan et al., 2023). Specifically, AI is theorized to help healthcare organizations limit severe consequences to the quality, affordability, and accessibility of healthcare (Ministerie van Volksgezondheid, 2023; Vermeer, 2024). Technologies such as AI are often procured to improve efficiency or cost-savings due to automation (De Vries et al., 2016; Thimbleby, 2013). However, a focus on such values may cause value tensions and consequentially marginalize other public values (O'Flynn, 2007).

This study answers the call for empirical research on how values resonate in and affect day-to-day public sector activities (Nabatchi, 2018). This research answers the following question: Does AI adoption in public organizations align with, and contribute to realizing organizational and sectoral core goals? To answer this question, a qualitative explanatory case study is conducted at the radiology department of an academic research hospital in the Netherlands ("the Hospital") that is in the process of adopting an AI tool ("Quick-AI"). The AI tool is developed by a large medical-technology corporation in the private sector ("the Company"). This tool involves new software for Magnetic Resonance Imaging (MRI) machines, designed to both reduce scan times and improve image quality. The Hospital was chosen for this study because it provided a unique opportunity to examine the full AI adoption process from the pre-implementation phase onward. Additionally, the Hospital's explicit commitment to public values and its resources (e.g., capacity) make it an ideal setting for this study. Its status as an academic research hospital ensures the AI adoption process aligns with the objectives of this research.

For this study, various forms of data are collected, including 62 days of ethnographic observations conducted over 18 months, 21 interviews, informal conversations with participants in the field, and analysis of internal and external documents. Data analysis follows an abductive logic, iterating between empirical data and theory. This means that data collection, analysis, and theoretical interpretation occurred simultaneously, allowing for an open-minded approach to understanding participants' actions, intentions, and interpretations. The strength of this method lies in its close engagement with participants in the field, which enhances the validity of theoretical insights by grounding them in empirical evidence (Eisenhardt, 1989; Greenhalgh & Swinglehurst, 2011). The variety of data sources enables triangulation and a deeper understanding of the case (Stake, 2005).

This paper contributes to existing literature in the following ways: first, to literature on public sector innovation and AI adoption, by taking an empirically substantiated, normative stance with the lens of public values. This lens can provide scope, content, and opportunity to engage in a pragmatic, societal discussion on public services and expenditure in a healthcare scarcity model. Second, this paper contributes to literature on public values by substantiating conceptual and theoretical work with empirical data that elucidates the corresponding real-world implications. Specifically, This papers brings more clarity on ethical components of public sector AI adoption processes in situ and argues for normatively imbued evaluations of adoption processes as a necessary complement to market-based evaluations.

Issues of Privilege, Power and Policy in Publicly and Privately Collected Women's Health Data Sets.

Kristin Caolo[1]

1. University of Cambridge

Keywords: Femtech, Data Bias, Health Policy, Data Privacy, Ethics, Inequality

Abstract

The presence of bias in technology has been well documented in the face of rising levels of artificial intelligence and data-driven technologies. Social scientists have argued that gender and racial data bias becomes embedded in technologies, as Wajcman (2010) argued that there is a mutual relationship where technology is both impacted by and influences ideas of gender and gender inequality. Criado-Perez (2019) argues that the presence of gendered data gaps in building technologies stems from the invisibility of women in data sets. Benjamin (2019) argues that the presence of both gender and racial bias in data sets both facilitates and entrenches inequality and discrimination.

Femtech (or women's health technologies) face an additional data barrier compared to other traditional medical technologies. Since women were historically excluded from participation in clinical research and only began to enroll in clinical trials in 1993, there is only a 30 year history of women's health data, leaving a large data gap to fill. Data collection initiatives are now growing in the women's health and Femtech sectors, however, through my research using case studies and interviews with industry professionals I argue that both public and privately sourced data sets potentially started with good intentions but instead have the following three issues: lack of diversity and inclusion, data privacy and the use of data to construct problematized and normative female bodies. I will also demonstrate policy recommendations that can be used to mitigate issues within public datasets and clinical research programmes.

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The role of contextualisation for responsible research and innovation in AI.

Sydney Howe[1], Esra Demir[2], Kostina Prifti[2], Klaus Heine[2], Evert Stamhuis[2] and Rik Wehrens[1]

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Keywords: Healthcare, AI, ethics, transparency

Abstract

The development, deployment, and use of AI-driven technologies hold great promise for better healthcare, including quality improvement, population management and better decision-making. To fully reap the benefits and minimize the risks of these technologies, responsible research and innovation is essential. This perspective paper argues that current legal and ethical frameworks are insufficient to address the full spectrum of ethical and legal issues surrounding the use of AI in healthcare practices. We make the case for centering contextual factors when developing legal and ethical rules for the use of AI in healthcare by exploring the role of transparency.

Panel: Session 2A

AI and Data Science Revolutions: Implications for Public Benefit Research and Policy Making

Speakers:

Oliver **Berry** – Smart Data Foundry (University of Edinburgh), United Kingdom
Magdalena **Getler –** Smart Data Foundry (University of Edinburgh), United Kingdom
Rosario **Piazza** – Joseph Rowntree Foundation, United Kingdom

Chair: Anastasija **Nikiforova,** University of Tartu, Estonia

Abstract

This session will bring representatives from the banking, charity, and research sectors to discuss the AI and data science revolutions, and their impact on society. Speakers will discuss the use of novel data assets in policy-focused research, exploring their potential and limitations. Specific focus will be directed to the issue of replicating existing problems in human decision-making (malicious use, reinforcing societal divisions, power imbalances, and systemic inequalities), the opacity and complexity of data- driven insights, and public attitudes towards data privacy and trust.

The session will be chaired by Smart Data Foundry (SDF), a UK-based organisation with a purpose to open private sector financial data for societal good. SDF stewards and curates granular consumer and business financial data within a Trusted Research Environment (TRE), making this data available both for academics and policymakers. Through recent government funding, they have been selected to function as part of the Smart Data Research UK infrastructure network.

Panel speakers will be drawn from SDF's network of charitable foundations, private sector banking partners, and internal expertise.

During the session, we will outline safe and trusted mechanisms for accredited researchers to access private sector data in the UK. This is primarily based on established procedures already in place for accessing governmental (administrative) data in the UK, including identifying gaps caused by specific characteristics of private sector data, such as commercial sensitivities or building public trust.

1. **Cross-sector partnerships for socially beneficial research leading to improved policy and decision-making. (Oliver Berry)**

Individual-level consumer transaction data—as a form of 'Smart Data'—can provide a rich and novel source for socioeconomic analyses. However, due to its provenance and sensitivity, there are several concerns regarding its access and use across policymaking and research.

The Joseph Rowntree Foundation (JRF) is a research charity with a mission to end poverty in the UK. Recently, they began working with SDF as part of their 'Insights Infrastructure' programme, aiming to use data to more proactively deal with issues of poverty. SDF created an 'Income Volatility' infrastructure based on consumer transaction data for 1.2m individuals shared by a major UK bank. The infrastructure consists of a Great Britain-wide dashboard and TRE.

The owners of private sector data approach sharing with understandable caution, expressing concerns about customer privacy, security implications, legal compliance, and the potential undermining of commercial interests due to information disclosure. Data partners require reassurance that this will not adversely affect them, but also that sharing data for research will support their corporate objectives.

SDF's role here centres on providing incentives, such as demonstrating how data can provide socially beneficial insights into human behaviour, leading to improved policy analysis and decision-making while simultaneously mitigating risks.

Whilst researchers with computational skills may be comfortable working within a TRE, we are conscious of ensuring equitable access to data for those without such skills or a strong funding position. Therefore, we believe it is best practice to additionally provide aggregated statistical data, specifically curated to provide insights on a certain area. This extends to providing data to the public sector, where for various reasons key ready-made insights may be preferable for policymaking over granular data offerings.

An immediate ethical issue arises from data curation in its trustworthiness; data cannot be used as a tool in a vacuum. For example, we often find that in financial data, the more economically 'well-off' appear to show signs of financial distress such as heavy overdraft usage than poorer individuals. At first glance, this suggests that such a group are more vulnerable, but realistically this points to lower overdraft availability in poorer groups.

Understanding trustworthiness is key to dealing with the limitations of this data, thus reassuring researchers of its validity, and data partners of its direction towards positive research outcomes. Representativeness, bias, and reliability must be clearly investigated and mitigated through interaction with administrative and traditional data sources.

2. **On Trusted Research Environments, Ethics, and Public Attitudes to Using Banking Data; What is Possible, Permissible, and Acceptable? (Patricia Ruddy)**

Existing legal frameworks permit the use and sharing of the banking data that SDF curates and provisions through its service, and SDF has worked collaboratively with the UK's data protection regulatory body to map out their approach1. However, a service that is technically feasible and legally permissible is not automatically one which will be acceptable to, or trusted by, the individuals to whom SDF's data holdings relate. There are many potential challenges to establishing and maintaining trust, including the impact of global events such as the 2008 financial crisis and COVID-19 pandemic, as well as known public concerns when it comes to the acceptability of data sharing between the public, private, and third sectors for research purposes2.

We therefore discuss SDF's resultant approaches:

- Continuing to generate evidence from which trust can be built and maintained, through effective compliance monitoring; developing public good/ethics assessment work done on data holdings and the research applications to use them and continuing to operate researcher data access platforms in compliance with the '5 Safes Framework' for secure TREs3.
- Supporting and facilitating public trust, developing collaboratively, public involvement and engagement (PIE) strategies, helping to understand salient public attitudes and respond appropriately in the configuration, operation, and development of their data service.

We then consider the particular concerns of AI-focused research, with reference to opacity, intellectual property, and bias reproduction. The real challenge to be faced is in how AI development can be steered towards public value. We explore how a 'by-design' model could be integrated into projects to consider explicit and unintended implications of AI use at all stages, and whether there is a need for institutional rather than local research ethics and excellence committees, to ensure expertise and mitigation of risk. Specific focus is given to examples of projects working on 'Explainable AI', that could allow researchers to better comprehend and trust the outputs of AI algorithms and models.

1 https://cy.ico.org.uk/media2/migrated/4026433/regulatory-sandbox-final-report-smart-data-foundry-v1_0.pdf
2https://www.researchgate.net/publication/257963356_Public_Acceptability_of_Data_Sharing_Between_the_Public_Private_and_Third_Sectors_for_Research_Purposes
3 https://ukdataservice.ac.uk/help/secure-lab/what-is-the-five-safes-framework/

3. Federated data models and future directions of data-focused policy research in the UK. (Magdalena Getler)

A significant challenge lies in providing safe access to data for impactful research while ensuring individuals' privacy and trust. A federated model to minimise data at the source represents a step in the right direction, particularly considering the potential for linking data across sectors. For instance, SDF, medical research centre the Usher Institute, and the Scottish Centre for Administrative Data Research are currently exploring the individual-level linkage of health and finance data using a privacy- preserving records linkage methodology.

The UK has several approaches to data sharing and federated models with varying scopes. For example, will the National Data Library—a government proposal to link existing research programmes towards data-driven public services—extend its remit to private sector data? Naturally, this is easier said than done, but there would be a clear value loss if there was not a facilitation of the safe and effective reuse and movement of data across administrative and research contexts, as well as among the private, governmental, and academic sectors. Integrating data infrastructures from traditional and administrative to smart would fundamentally enhance the discoverability of data available for research and insight while ensuring equitable access to this data for the public good. The primary challenge will be building a cross-cutting infrastructure that research users want to engage with *and* that is trusted within public opinion, enabling smooth collaboration across data types, disciplines, and domains.

Enhancing countries' competitiveness will rely on successful deployment of AI, for which safe data sharing is crucial. Governments are taking action. For example, the EU's Digital Services Act mandates that large online platforms provide accredited researchers with access to platform data to study systemic risks such as misinformation and electoral manipulation. This establishes an important precedent: companies can be required to share data responsibly in the public interest. In the UK, Ofcom is currently consulting on the existing limitations on data sharing for research to evaluate how greater access could be attained. The UK government's AI Opportunities Plan, released on 13 January 2025, highlighted ambitious goals to position the UK as a global leader in AI. In addition to investing in data centres and supercomputers, one recommendation was to "incentivise and reward researchers and industry to curate and unlock private datasets."[1] Among the most impactful use cases here could be the development of specialised 'narrow' AI systems trained on high-quality, specific data curated by subject- matter experts who possess a deep understanding of the datasets. These systems would focus on highly specialised tasks, unlike general-purpose AI models.[2]

Fundamentally, future models of data federation and governance, especially when integrating AI, must be carefully considered and coordinated to benefit all partners. The

creation of new standards and overarching infrastructures require this to ensure they do not end up instead as competing entities in an ever-increasing web of data-focused organisations.

[1] https://www.sdruk.ukri.org/2025/02/04/private-sector-data-and-ai/

[2] https://www.sdruk.ukri.org/2025/02/04/private-sector-data-and-ai/

Session 2B: Data Law & Governance for the Digital and Green Transitions

OA Book Usage Data Trust: An International Data Space for Usage Data and Beyond.

Ursula Rabar[1] and Christina Drummond[1]

1. OA Book Usage Data Trust

Keywords: Data space, data exchange, OA book usage

Abstract

While APIs have made it easier for policymakers, libraries, publishers, and information services to access, use and innovate with usage and metadata at scale, time and human resources are still required to manage, compile, and link OA book usage data metrics coming from multiple platforms in multiple formats. OA book usage data is even more important at this very moment when EU-funded projects such as PALOMERA worked to support policy alignment for OA monographs in Europe, and the UK has seen the implementation of their new UKRI policy including long-format outputs. It begs the question, how can OA book impact be monitored more effectively to help inform policymaking?

In 2022, the Mellon Foundation awarded a project team led by the University of North Texas, OpenAIRE, and OPERAS to develop "governance building blocks" for the OA Book Usage Data Trust (OAEBUDT) in line with both the Principles of Open Infrastructure and protocols emerging from the Design Principles for International Data Spaces (IDS). Stakeholders leveraged in-depth community consultations to understand the principles needed to exchange OA book usage data across private and public stakeholders and moved ahead with a data space proof of concept. In 2024, the Data Trust's Technical Advisory Committee and Board of Trustees selected an experienced IDS technical team to build out the technical OA Book Usage Data Trust infrastructure to develop a limited proof of concept IDS focused on the exchange of COUNTER item-level views and downloads data while collaborating with technical pilot partners (e.g. JSTOR, LibLynx, Michigan University Publishing, Punctum Books, Knowledge Unlatched). This provides an

opportunity to explore if the IDS model and functionality can be extended to support additional data exchange use cases.

This presentation will showcase the project update with the findings to date and provide visitors with draft plans for the future.

How Should the EU Regulate Smart Water: Risk, Uncertainty, and the Choice of Legal Form.

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1. University of Hull
2. Erasmus Universiteit Rotterdam

Keywords: Privacy, data, smart water, uncertainty, risk, EU law, Directives, Regulations

Abstract

It has been known since at least the golden age of Athens that the form of legal commands should depend in some degree on the quality and volume of the information which lawmakers hold at their disposal. In modern-day EU policy, this proposition is usually taken to mean that, holding all else constant, the Union should pass Directives when uncertainty is high and Regulations when uncertainty is low. Here, we trace the theoretical foundations of that model, and we then refine it by discriminating between two distinct vectors of uncertainty, the axiological and the epistemic. Thereafter, we apply our refined version of the model to several issues of "smart" technology and its regulation. We use these examples to show that, relative to its progenitor, our version of the model captures more of the practical problems that the EU faces, more of the tools of governance that are available to it, and more of the decisions that its officials may plausibly and soon be charged with making.

Confronting Risks At the Intersection of Climate Change and Artificial Intelligence: The Promise and Perils of Rights-Based Approaches.

Barrie Sander [1]

1. Leiden University - Faculty of Governance and Global Affairs

Keywords: Climate change, artificial intelligence, rights-based approaches

Abstract

In 2023, Volker Türk, the UN High Commissioner for Human Rights, delivered a speech emphasising the urgency of addressing 'the catastrophic impacts of climate change, pollution and biodiversity loss' as well as 'the real-life impacts of AI'. The speech is illustrative of the attention increasingly directed towards the twin challenges posed by climate change and AI. At the same time, the speech is also reflective of the siloed approach that tends to be adopted when discussing these challenges – neglecting the ways in which climate change and AI are, in significant respects, interconnected. Where intersections of climate change and AI have been acknowledged, emphasis has typically been placed on AI's promise to enhance societal responsiveness to the climate crisis – with particular weight placed on AI's potential to help decision-makers more effectively predict, mitigate, and adapt to climate change.

Against this background, this paper directs attention towards the risks and burdens associated with relying on AI technologies to address the climate crisis: AI technologies are climate consumers that extract significant resources and energy in their production and catalyse a consumptionist culture of consumerism in their application. As climate mitigators and adaptors, AI technologies risk promoting technocentric solutions that fail to account for social inequalities and hierarchies within their contexts of implementation. AI technologies may also become climate securitizers, enhancing the surveillance of climate activists and climate-induced migrants in ways that reduce them to security threats. AI technologies are also climate discourse shapers, contributing to the distribution of climate mis/disinformation and enabling lobbying campaigns that undermine or at the very least neglect societal responsiveness to the climate crisis.

At a time when these risks are beginning to garner greater public attention, this paper assesses the promise and perils of rights-based approaches for addressing them. The article's central claim is that if rights-based approaches are to contribute to addressing

risks at the intersection of climate change and AI, they must evolve to address at least three challenges: first, the challenge of translating the open-textured vocabulary of rights into more concrete operational standards that are attuned to the particularities of AI technologies (the challenge of concretisation); second, the challenge of applying the predominantly individualised discourse of rights to the collective and societal dimensions of climate AI risks (the challenge of individualism); and finally, the challenge of guarding against corporate capture given the dominance of Big Tech companies in global AI supply chains (the challenge of marketized managerialism).

Methodologically, the paper relies on a doctrinal approach to identify and analyse the scope and content of rights-based approaches within relevant legal instruments. The paper uses the term 'rights-based approaches' to encompass the diversity of frameworks that have been established in international and regional human rights law, the United Nations Guiding Principles on Business and Human Rights (UNGPs), and supra-national legal instruments of the EU including its Charter of Fundamental Rights together with regulations and directives founded on a commitment to fundamental rights within its legal order. This doctrinal method is complemented by drawing on critical legal scholarship on the promise and perils of rights as a vocabulary of governance to identify the priorities, limits, and blind spots of rights-based approaches for addressing risks at the intersection of climate change and AI. The paper is also informed by literature from disciplines beyond the legal field, including digital geography, political ecology, and media studies, for identifying and navigating the risks of relying on AI technologies to address the climate crisis.

Reflecting on the challenges of concretisation, individualism and marketized managerialism, the paper concludes that while rights-based approaches are capable of adapting to a certain extent, harnessing the promise of rights-based approaches requires being candid about their limitations, uncertainties, and perils – acknowledging rather than smoothing over the complexities and weaknesses of rights as a vocabulary for addressing challenges at the intersection of climate change and AI.

Session 2C: Security and Justice Policy in the Age of Algorithms and AI

Using and designing a data driven approach to detect undermining in schools. The perilous road from intuition to intervention.

Nienke de Groes[1], Vlad Niculescu-Dinca[2] and Pieter Tops[3]

1. PhD student Leiden University
2. Assistant Professor Leiden University
3. Emeritus Professor for Undermining Studies at Leiden University

Keywords: Undermining, Plurarisation of policing, Digitalisation of policing, Schools

Abstract:

Introduction

In recent years, crime has increasingly invaded schools, with criminal networks recruiting vulnerable young people into illegal activities such as drug trafficking, theft and prostitution (Noteboom et al., 2020). Research by Van den Broek (2023) shows that many education staff face this and are aware of their responsibility. Yet training, information and protocols to recognise and follow up on relevant signals are often lacking (Van den Broek, 2023, p.14).

This contribution focuses on two themes: the growing concern about organised crime and undermining in the Netherlands on the one hand, and the growing digitalisation and pluralisation of policing on the other. Whereas 'organised crime' deals with the hard and violent forms of crime, the term 'undermining' refers to the interconnectedness between the 'underworld' and 'upper world'. Undermining concerns how the legal infrastructure of the upper world is used for criminal ends by the underworld (for example drugs trafficking via seaports), and how the effects of those criminal activities are manifesting in the upper

world. As undermining effects come into expression at several levels in society, the fight against undermining transcends the responsibility of police (Nelen et al., 2023) and involves a diversity of practitioners (Tops & Tromp, 2021), as municipalities and schools. Those practitioners are each engaging with a variety of new digital technologies (Ernst, 2019). For example, the use of dashboards for data visualisation on undermining in municipalities, or the use of AI technologies in policing.

While the use of technologies in policing is a much-discussed area of research, the role of data-driven practices within the other organisations involved in the fight against undermining remains largely understudied. This contribution addresses this gap by analysing Indicator, a technology designed to support school staff in detecting undermining. Indicator aims to translate intuition and subjective observations – such as the feeling 'something is wrong' – into a systematic and data-driven signalling process. However, this development raises critical questions. When schools increasingly act as gatekeepers within security strategies, the boundary between education and surveillance might become diffuse. How do school professionals balance between this? Also, how does the process work to go from intuition to an intervention in the classroom, by using Indicator? This contribution addresses the following research question: how does the design and use of data driven solutions shape the school professionals' capabilities to signal undermining in schools and what challenges emerge in this process?

Theoretical framework and methodology

To understand how technology shapes the perceptions and actions of practitioners, we need a conceptualization of technology that allows for its active role. Moreover, given the sensitivity of data and the potential implications of technologically mediated choices, we need a theoretical framework that enables us to understand value-driven design choices.

To analyse the implementation and design process of Indicator for signalling undermining in schools, we use a combined approach of the Technology Acceptance Model (TAM) (Davis, 1989) the Actor-Network Theory (ANT) (Latour, 2005) and Technological Mediation Theory (Ihde, 1990; Verbeek 2016). While TAM provides insights into how individual users evaluate technology based on perceived usability and ease of use, ANT and TMT allow us to consider technology not as a neutral tool, but as an actor within a dynamic network. Combining these perspectives, we explore user perceptions (TMT), how they influence technology adoption (TAM) and the iterative process of implementation and redesign (ANT). To understand design practices we draw from the concept of inscription (Akrich & Latour, 1992): the processes in which developers inscribe values and their views into the design of technologies. In the context of Indicator, inscription can become visible in several design choices as which forms of behaviour are highlighted as concerning and how notifications are structured. However, as ANT highlights, this is not a one-way process: users can

interpret or modify these inscriptions in different ways. This process of re-inscription occurs, for example, when users begin to use the system differently than intended.

This study consisted of a triangularity of qualitative research methods, consisting of 40 interviews with users and designers of Indicator, analysing internal reports, receiving regular updates on the design process (in the years 2021 – 2025) and conducting eight hours of observations on the use of Indicator in school context.

Findings

The findings of this study show how the implementation of Indicator within schools presents both opportunities and challenges, bringing together professional intuition, value-laden design choices and ethical issues.

First, the strong urgency around undermining in schools stems from both concrete signals and intuitive suspicions of professionals. The interaction between intuition, expertise and technology leads to differences in interpretation. While some professionals use Indicator to confirm intuitive suspicions, others experience it as a threat to their professional judgement. This can cause inconsistent decisions, compounded by potential biases and a lack of cultural sensitivity. Based on insight on how the layout of Indicator actively mediates the interpretation of users, we provide several recommendations for design.

Second, we identified friction between the willingness to interact with Indicator and the time pressure and 'overload' that teachers experience. In line with Klievink et al. (2017), we conclude that Indicator needs to be aligned with organisational capabilities in order to realise potential benefits. This calls for an implementation strategy that takes workload into account and integrates the technology into existing systems, supported by clear instructions and efficient workflow adjustments.

Finally, our findings underline the need for role clarification. Teachers feel responsibility for undermining signals, but do not want to 'take the place' of care or police professionals. This might create a situation where no one feels fully responsible for follow-up steps, so no action is taken or problems linger. Policymakers should develop clear protocols that structure cooperation between education and external partners to reduce uncertainty and ensure effective interventions. This paper will make a set of concrete suggestions for this.

Human Rights Challenges and Directions for Hash-sharing Governance.

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1. Carnegie Mellon University
2. University of Edinburgh

Keywords: Human rights, Counterterrorism, Governance, Hash sharing, Perceptual hashing

Abstract

Since 2016, the Global Internet Forum to Counterterrorism (GIFCT) has administered a hash-sharing database (HSDB) which is used to detect and moderate terrorist and violent extremist (TVEC) content across multiple platforms. The GIFCT relies on platforms to contribute "hashes" of TVEC images and videos to the HSDB, which then can be used by the platform to detect future content that matches or closely resembles items in the HSDB. Similar hash-based content detection systems are also used in other contexts, including YouTube's Content ID for copyright enforcement, and Mircosoft's PhotoDNA for detecting child sexual abuse material (CSAM).

Hash sharing systems like the GIFCT have faced governance and technical challenges since their inception. Human rights organisations, digital rights advocates, and academics have criticized the GIFCT and other perceptual hashing systems for entrenching opaque surveillance systems, enabling potential abuse, and reinforcing discrimination against minority groups. The GIFCT has sought to improve its legitimacy and demonstrate its commitment to protecting human rights through regular transparency reports on the HSDB, a human rights policy, and an independent human rights assessment. However, the fundamental difficulty remains: the role of the HSDB as a "delete-it-all" blacklist that must operate at "speed [which] inevitably sacrifices thoughtful deliberation" (Citron, 2017) poses an obvious challenge as to whether and how to meaningfully incorporate human rights into these frameworks.

This paper engages with human rights in the GIFCT HSDB system as a problem of sociotechnical and infra-legal design, proposing procedural and design interventions to better align the affordances of the system with human rights principles. Our research is based on a series of interdisciplinary experiments we are undertaking as a computer engineer and cryptographer with technical expertise in perceptual hashing and a sociolegal scholar with expertise in human rights and online counterterrorism governance. In these experiments, we analyze the PDQ and TMK + PDQF hashing algorithms used in the HSDB to detect photo and video TVEC, building on prior work (Dalins et al., 2019), to assess the algorithms' accuracy, privacy, and effectiveness. We then create a "regulatory sandbox" test version of the HSDB, to explore mechanisms for user appeal, redress, and correction/deletion of erroneously hashed content – better aligning the HSDB with these human rights principles. Additionally, we consider how these mechanisms interact with AI-driven content detection or generation. We use all of these to inform our discussion of future governance of the GIFCT HSDB.

These changes are urgent and open in the GIFCT HSDB as it exists today, where the avenues for redress are practically nonexistent. It is also critical to develop these methods now, in light of recent improvements in the power and availability of artificial intelligence (AI) that is likely to make the human rights issues even more challenging. AI is not replacing all forms of data-driven automated governance by governments and private actors in practice – instead, different forms of algorithmic tooling are used in combination to govern complex real-world problems. The cost-effectiveness, accuracy, efficiency, and friendliness to human rights are all taken into consideration when choosing what tool, or combination of tools, to use for some purpose. This work directly informs parts of that consideration.

Our paper draws on recent scholarship in law and platform governance that highlights how legal norms are enmeshed with and reconfigured by the material affordances and dynamics of the digital technologies and platform infrastructures that they purport to regulate and govern. Building on this 'infra-legalities' framing, we argue that if human rights are to offer any meaningful constraints and procedural safeguards with respect to algorithmic content moderation in settings like the GIFCT, then they need to be translated and recomposed into new procedural and technical safeguards. As Karen Yeung has recently observed in her Council of Europe report on AI and Human Rights: 'We … need to expand our frame of rights discourse to encompass our socio-technical architecture'. This means that human rights need to be reconceived in terms of material affordances to 'speak with effective force to new kinds of material and operational considerations' that algorithmic governance poses, ensuring that human rights exert tangible influence on design, implementation, and oversight.

The institutionalization of open data in Cambodia: power, synergies and tensions.

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1. Leiden University

Keywords: Open Data, Power, Policy-making, Values, Policy impact

(Virtual Presentation)

Abstract

Open data initiatives emerged as democratic innovations in Western democracies, praised for their potential to improve government transparency, accountability and democratic control, empower citizens and increase social participation (OECD, 2018; Ruijer et al., 2024; Ubaldi, 2013). Yet in recent years, open data policies and initiatives have been adopted by governments across Asia that do not abide by those same values or are reluctant to enhancing transparency and accountability, and hence, have prioritized other goals such as attracting foreign investment or improving international legitimacy (O'connor et al., 2019). Besides, the open data paradigm also poses security concerns for individuals and advocacy groups, as well as trade-offs between transparency and control. However, the prevailing tendency to assume similar intended goals, interests and underpinning values limits our ability to recognize differences in the understandings and expectations in other contexts.

Amidst such a backdrop, I argue that the predominant Western-centric approach to open data overlooks key factors and rationalities specific to the political and institutional realities of East and Southeast Asia. In response, this paper critically examines the mainstream understanding of open data by delving into the dynamics, motivations and values of the different stakeholders involved in the development of Cambodia's first open data policy, which is currently underway as part of the Digital Economy and Society Policy Framework (2021–2035).

I use a power lens to address the question of how the synergies and tensions between state and non-state policy actors shape the development of the open data policy in Cambodia. Building on Barnett & Duvall (2005), I define power as the capacity of an actor to influence the design and implementation of such policy. More specifically, the paper seeks to identify i) the preferences and values of national government, local civil society organizations, and national/international development organizations and; ii) the engagement strategies and mechanisms employed by them to influence the design of the policy. In addition, the findings make a theoretical contribution by advancing the operationalization of the notion of power to study stakeholders' struggles around data policies. Power is of prominent analytical utility considering that data in the digital era has become a deeply political issue for the new kinds of value it brings to many actors (Mejias & Couldry, 2019).

The paper consists of a case study based on evidence gathered by conducting field research in Cambodia (semi-structured interviews, observation and document analysis). The case of Cambodia is of academic and policy relevance as grassroots and civil society organizations have been particularly active at cultivating open data initiatives for over a decade, both locally and regionally. This explains the high expectations on the upcoming law that will institutionalize open data. Yet concerns exist related to the opportunities and capacities of non-state actors to effectively engage in policy-making, especially due to the poor transparency and accountability of the government, the recent deterioration in freedoms and the security risks faced by advocacy and grassroots organizations.

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Balancing Digital Data Governance and Fraud Investigations: Proposing a Privacy-Preserving Digital Forensics Framework.

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Keywords: Digital Forensics, Data Protection, Privacy-Preserving Framework

Abstract:

Introduction

Digital forensics has become indispensable in contemporary fraud investigations, largely due to the expansive digital footprints created by individuals and organizations. From social media platforms and cloud services to digital transactions and system logs, electronic evidence is both voluminous and multifaceted. Despite its importance in uncovering fraudulent behavior, however, this data also contains sensitive personal information that may be unnecessarily swept into forensic examinations. Such broad data collection raises significant legal and ethical concerns, especially in an era of increasingly aware of privacy rights. Seminal legal cases—most notably Riley v. California (2014), which determined that warrantless searches of mobile devices infringe on constitutional guarantees—underscore the tensions at play. Investigators must meet the demands of criminal or civil fraud investigations while upholding privacy protections mandated by evolving legislative frameworks.

Simultaneously, countries across the globe have enacted stringent data protection regulations in response to public demands for stronger privacy safeguards. Europe's General Data Protection Regulation (GDPR), Japan's Act on the Protection of Personal Information, South Korea's Personal Information Protection Act, and Indonesia's Personal Data Protection Law all prescribe specific obligations and rights—ranging from lawful data processing and robust consent mechanisms to cross-border data transfer restrictions. Although these frameworks share underlying principles (e.g., data minimization), their varying scope, enforcement provisions, and unique definitions of personal data create an intricate compliance environment for cross-jurisdictional investigations.

Objectives and Methodology

This research aims to reconcile the imperatives of robust fraud detection with the need for stringent privacy protection in digital forensic processes. Specifically, it pursues three core objectives:

1. Comparative Regulatory Analysis: Conduct a systematic review of data protection laws in Europe, Japan, South Korea, and Indonesia to identify shared pillars of privacy governance and pinpoint nuanced regional differences critical to forensic investigations.

2. Assessment of Existing Forensic Standards: Examine ISO 27037 and ISO 27042—key international standards for identifying, collecting, preserving, analyzing, and interpreting digital evidence—to ascertain how effectively they address privacy challenges.

3. Proposal of a Privacy-Preserving Digital Forensics Framework: Synthesize best practices from legal precedents, regional regulations, and technical guidelines to develop a process model that embeds privacy controls at each stage of digital forensics.

Methodologically, the paper employs (1) cross-national regulatory review, comparing statutory texts, legal commentaries, and enforcement guidelines; (2) document analysis of ISO standards, to evaluate the nature and extent of privacy provisions; and (3) case-based synthesis, leveraging real-world legal rulings (e.g., Ganias v. the US, Riley v. California) and everyday investigative scenarios that illustrate common pitfalls and opportunities for reform.

Findings and Proposed Framework

The comparative review reveals that global privacy regulations share foundational themes—lawful processing, data minimization, data subject rights—yet diverge in their enforcement scope and cross-border data transfer stipulations. Additionally, while ISO 27037 and ISO 27042 provide solid foundations for maintaining evidence integrity, they fall short in offering explicit measures for safeguarding privacy throughout the forensic lifecycle.

Building on these observations, the paper introduces a Privacy-Preserving Digital Forensics framework. It integrates privacy-enhancing techniques—such as targeted data acquisition, encryption, redaction, and granular access controls—into six stages of digital forensics: preparation, identification, collection, preservation, analysis, and reporting. Emphasizing privacy-by-design principles ensures that evidence collection remains focused on relevance and proportionality, mitigating legal risks and reinforcing public trust.

Conclusion

In an era defined by heightened privacy expectations and sophisticated digital fraud schemes, investigators and policymakers face escalating demands to reconcile investigative rigor with legal and ethical standards. By weaving together multinational data protection requirements, ISO-based guidelines, and insights from landmark court cases, this paper demonstrates that robust investigations need not undermine individual rights. The proposed Privacy-Preserving Digital Forensics framework offers a systematic pathway for practitioners seeking to maintain evidentiary integrity while honoring fundamental data protection principles. This approach not only enhances compliance and legitimacy but also fosters a culture of responsible data governance in the evolving field of digital forensics.

Enhancing the Researcher's Data User Journey: Insights from the UK National Data Services.

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Keywords: Public Sector Data, Researcher User Journey, Data Governance, Metadata, Data Discovery, Policy

Abstract

1. Introduction

The availability and responsible use of public sector data are fundamental to advancing evidence-based policymaking and impactful research. However, researchers and policymakers often face challenges in discovering, accessing, and effectively utilizing these datasets. To address these issues, this study examines the research data user journey, leveraging insights from Health Data Research UK, Administrative Data Research UK, and Smart Data Research UK. By understanding how researchers interact with public sector data services, we can design more user-centric, interoperable, and ethically responsible data ecosystems.

This research maps the Researcher's Discovery User Journey, which consists of six key stages:

1. Awareness – Initial discovery of available datasets and services.

2. Consideration – Evaluation of the relevance and accessibility of data.

3. Conversion – Taking action to request, access, or download data.

4. Adoption – Active engagement with the data for research purposes.

5. Impact – Research outputs and their influence on policy and academia.

6. Advocacy – Long-term engagement and recommendation of data services.

By systematically analyzing this journey, we identify barriers that hinder researchers' ability to fully utilize public sector data and propose solutions that improve data governance, accessibility, and impact.

2. Methodology

Our research has been based on real world projects, as well as integrating:

• Qualitative interviews and stakeholder workshops with researchers, policymakers, and data service providers.

• Analysis of existing research data discovery platforms to assess usability, accessibility, and governance models.

• Findings from previous UKRI-funded research and policy reports to contextualize the challenges and opportunities within the UK's public sector data landscape.

These methods enable a comprehensive understanding of user needs and inform recommendations for improving public sector data infrastructure and governance.

3. The Data Value Chain Framework

To bridge the challenges identified in the researcher's journey, we explore the implementation of a Data Value Chain framework. This approach aligns researcher needs with key data management capabilities, including:

• Metadata cataloguing – Improving discoverability and interoperability.

• Standardized data access protocols – Ensuring transparency and efficiency.

• Shared infrastructure – Enhancing scalability and security.

• Governance and compliance – Upholding ethical and legal standards in data use.

By integrating these components, we propose a researcher-centric model that improves the usability and impact of public sector data.

4. Key Findings & Policy Implications

Our findings highlight several key insights relevant to data governance and policy development:

• Need for standardized discovery mechanisms – Public sector datasets often lack uniform metadata, making discovery and usability inconsistent across platforms.

• Importance of ethical and legal compliance – Researchers require clearer guidance on privacy, security, and consent when working with sensitive public sector data.

• Interoperability and infrastructure gaps – Lack of coordination between data services limits researchers' ability to work across multiple datasets efficiently.

• Barriers to long-term researcher engagement – Building sustained relationships between researchers and data providers requires incentive structures, training programs, and community engagement strategies.

By addressing these challenges, we propose targeted interventions that enhance data accessibility, adoption, and long-term impact.

5. Conclusion

This research contributes to the broader data-for-policy discourse by identifying strategic interventions that improve researcher engagement with public sector data. Our recommendations support the development of secure, scalable, and ethically responsible data ecosystems that foster long-term collaboration between researchers, policymakers, and data providers.

This study aligns with the Data for Policy Conference themes by addressing the intersection of data, AI, and governance, providing actionable insights that strengthen public sector data infrastructure and enhance the role of data-driven research in policymaking.

Governing Risks of Generative Artificial Intelligence: A Sectoral Innovation System Analysis of Financial Services and Healthcare.

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Keywords: Generative Artificial Intelligence, Sectoral Innovation System, Risk Governance, Lifecycle Analysis, Financial Services, Healthcare

Abstract

Generative artificial intelligence (GenAI) has demonstrated remarkable capabilities in generating text, images, and other forms of content by leveraging large language models. Its potential applications span diverse domains, including automated decision-making, content creation, and personalized services. The release of OpenAI's ChatGPT-3 in 2022 marked a pivotal moment, accelerating the adoption of generative models in commercial settings and highlighting their potential to revolutionize industries.

Despite its immense potential, GenAI also introduces risks that stem from its technical architecture and deployment environment. GenAI models operate as "black-box" systems, where their high-dimensional and complex neural networks make it challenging to interpret, explain, or correct outputs. This opacity is particularly problematic when GenAI is integrated into decision-making processes in critical sectors like finance and healthcare, where errors or biases could have serious consequences. In addition, the growing interdependence between developers and deployers, often through third-party collaborations, compounds the risks of data breaches, regulatory non-compliance, and cybersecurity vulnerabilities. It is crucial to understand what risks are involved in developing and deploying GenAI in different sectors and what approaches can be taken to properly govern the risks in facilitating innovation.

This study examines the implementation of GenAI in the financial services and healthcare sectors, focusing on adoption patterns, emerging risks, and risk management approaches. Using a sectorial innovation system framework, we analyze how different industries integrate GenAI into their decision-making processes and manage associated risks. A comprehensive approach is taken to data collection by conducting 37 interviews between February and May 2024 with stakeholders across financial services, healthcare, technology

firms, and regulatory bodies. A combination of stratified, purposive, and snowball sampling is adopted to ensure representative data collection across sectors.

The financial services and healthcare sectors provide a compelling basis for comparative analysis due to their distinct regulatory environments, priorities, and systemic risks. Financial institutions prioritize maintaining market stability, consumer trust, and regulatory compliance, while healthcare institutions focus on patient safety, clinical accuracy, and data privacy. These differences influence how each sector adopts and manages GenAI technologies.

Our findings reveal distinct patterns in GenAI ecosystem development across sectors. In financial services, GenAI adoption has been driven by the need to enhance operational efficiency and decision-making. Use cases such as automated credit underwriting, personalized investment recommendations, and trading algorithms illustrate the sector's reliance on generative models. However, explainability and performance remain central concerns. Financial institutions must ensure that decisions made by GenAI systems can be substantiated to regulators, clients, and other stakeholders, particularly to avoid legal liabilities under consumer protection laws. Moreover, the performance of GenAI models in trading and investment decisions has been scrutinized, as these systems are trained on historical data and may struggle to adapt to dynamic market conditions.

In healthcare, GenAI holds promise for applications such as medical diagnosis, research, and clinical support. However, the sector's emphasis on patient-centricity introduces unique challenges. Healthcare professionals prioritize accuracy and robustness in GenAI outputs, as even minor inaccuracies can have profound consequences for patient outcomes. In addition, IT infrastructure limitations, including data privacy concerns and compatibility issues with electronic health record systems, hinder the scalability of GenAI solutions. The sector's reliance on sensitive patient data also necessitates rigorous cybersecurity measures, further complicating the deployment of generative models.

This study identified two broad categories of risks associated with GenAI adoption. Technical risks include concerns about model accuracy, explainability, and robustness. For example, in financial services, explainability is critical for ensuring that generative models' outputs align with legal and ethical standards. In healthcare, accuracy and robustness are paramount, as clinicians rely on GenAI systems to support decisions that directly impact patient care.

Implementation risks, on the other hand, stem from regulatory uncertainty, data protection requirements, and infrastructure constraints. In financial services, regulatory uncertainty is a significant barrier to scaling GenAI solutions. Institutions face difficulties in navigating evolving regulatory landscapes, which could render their investments in GenAI non-compliant. Outsourcing and third-party collaborations, while offering cost-effective solutions, exacerbate these challenges by introducing additional layers of risk related to

data security and model transparency. In healthcare, infrastructure limitations and data-sharing restrictions hinder the broader deployment of GenAI. Hospitals often lack the necessary IT infrastructure and machine learning expertise to develop and deploy generative models in-house, leading to a reliance on partnerships with academic institutions.

This study explored two primary approaches to managing the risks associated with GenAI. Rule-based governance relies on formal regulations and standards to enforce compliance and accountability. For instance, financial institutions are subject to consumer protection laws and regulations that govern data privacy and cybersecurity. However, rule-based approaches can be rigid and may not adequately address emerging risks introduced by new technologies. In healthcare, strict data protection regulations govern how patient data is managed, adding layers of complexity to the adoption of GenAI solutions.

In contrast, principle-based governance emphasizes ethical guidelines and frameworks to promote responsible AI development. Approaches such as the OECD AI Principles advocate for transparency, trustworthiness, and human-centered design. While principle-based governance allows for flexibility and adaptability, it often lacks accountability mechanisms, making it challenging to enforce compliance. A mixed approach, combining rule-based and principle-based mechanisms, is essential for managing the risks of GenAI while fostering innovation.

The findings of our study reveal both similarities and differences in how the financial services and healthcare sectors approach GenAI adoption and risk management. Both sectors face challenges related to technical uncertainties and regulatory compliance, but their priorities and strategies differ. Financial institutions emphasize explainability and market stability, while healthcare organizations prioritize accuracy, robustness, and patient safety. These differences underscore the importance of sector-specific policy interventions.

Policymakers can draw valuable insights from this study to enhance GenAI governance. For financial services, regulatory frameworks should be adapted to address the unique risks posed by generative models, such as biases in credit underwriting and algorithmic decision-making. For healthcare, investments in IT infrastructure and data-sharing mechanisms can support the scalability and robustness of GenAI solutions. In both sectors, fostering collaboration between regulators, industry stakeholders, and academic institutions can facilitate the development of targeted governance mechanisms that balance innovation with risk management.

Causal Discovery for School Attendance – Informing Policy Decisions.

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Keywords: Education Policy, School Attendance, Causal Discovery

Abstract

Introduction

School attendance is believed to be strongly associated with positive student outcomes, including academic achievement, wellbeing, and social functioning. Recognising this, many educational jurisdictions worldwide utilise attendance as a measure of compliance and a key performance indicator for schools. Despite numerous large-scale prevention and intervention efforts, such as the New South Wales Department of Education's "Every Day Matters" initiative, attendance rates in Australia have been declining. This paper moves beyond merely reporting correlations, aiming instead at identifying likely causal relationships between factors influencing frequent school absence among students, using data from the Longitudinal Study of Australian Children (LSAC). The objective is to uncover and quantify the complex causal relationships influencing school attendance, and present them in a way that effectively informs policy decision makers and supports bespoke initiatives.

Policy/Research Questions

What are the likely causal factors, (peer, school, family, and community) of student non-attendance?

Do these causal factors vary across geographic regions or socio-economic status?

Methodology

This paper uses Bayesian networks, also known as Directed Acyclic Graphs (DAGs), to provide a probabilistic representation of the potential causal pathways that affect school attendance. These causal pathways allow policy makers to identify possible interventions which lead to better educational outcomes and to predict the likely impact of those interventions. We make inference about the most likely Bayesian networks via the posterior distribution of these networks, combining information from experts via the prior distribution and information from data contained in the Longitudinal Study of Australian Children (LSAC) via the likelihood. We use Partition Markov chain Monte Carlo to obtain a sampling-based estimate of this distribution.

Data

School attendance is measured using two metrics. The first is the attendance rate, estimated by the percentage of school days attended in the four weeks prior to the survey. The second is a teacher-reported frequent school absence flag which classifies students as frequently absent or not.

We focus on children who were 12-13 years old in 2012, (n=2,897), referred to as Wave 5 of the kindergarten (K) cohort in the LSAC. The selection of factors which impact attendance, to use in the Bayesian networks, was guided by existing literature and expert knowledge. In addition to the two metrics described above these factors include:

Student Factors: Physical health, sleep problems, screen time, depression, self-efficacy, academic performance, friendships, extra-curricular activities, conduct problems, and sense of belonging.

Peer Factors: Bullying and peer conflicts.

School Factors: Teacher communication.

Family Factors: Socio-economic status, parental education and employment, family cohesion, and parental involvement.

Community Factors: Neighbourhood social capital.

Key Findings

The results consist of likely causal pathways, represented as Bayesian networks, and the corresponding posterior probabilities of these networks. At the population level these networks suggest direct causal relationships between child sleep problems, general health, parental employment, sense of belonging, academic performance and frequent school absence. The resulting graphs also show relevant relationships between sense of belonging, self-efficacy, depression, bullying, and friendship. Stratification of networks by region and socio-economic status indicates interesting differences and suggests why a one-size-fits-all approach to school attendance may not work.

Policy Implications

A core aspect of this paper is its relevance for identifying likely causal relationships and allowing for the simulation of integrated policies that simultaneously address upstream causes of school attendance. The policies, according to the graphs, could be implemented at various hierarchical levels by looking at the ancestors of the frequent school absence node. According to the resulting graphs, at the highest level, are the systematic issues related to addressing family disadvantage and parental employment. While at lower levels, addressing teacher communication, student conduct problems, sense of belonging and sleep problems are the more immediate interventions that can have an impact over frequent school absence.

The proposed method also has the flexibility of modelling and differentiating causal relationships by inspecting a variety of demographic characteristics, such as disadvantage and remoteness. Therefore suggesting what are upstream causes that are likely influencing student belonging and attendance for specific cohorts.

The findings guide policy and practice to support disadvantaged students' school attendance. By evaluating interventions over the graph structures learnt from data it becomes possible to iteratively evaluate the impact of various interventions, leading to robust, dynamic, and data-driven recommendations for national and local education policies.

YouthView: A platform for interactive visualizations to explore youth disadvantage

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Keywords: Youth disadvantage; youth transitions; labor market; integrated data; evidence-based; data-driven; policy

Full paper is accepted for publication in the Data & Policy journal.

Video Presentation: https://youtu.be/ESzYtarueMM

Abstract

In many economies, youth unemployment rates over the past two decades have exceeded 10 percentage points, highlighting that not all youth successfully transition successfully from schooling to employment. Equally disturbing are the high rates of young adults not observed in employment, education, or training, a rate commonly referred to as "NEET." There is not a single pathway for successful transitions. Understanding these pathways and the influences of geographic location, employment opportunities, and family and community characteristics that contribute to positive transitions is crucial.

While abundant data exists to support this understanding, it is often siloed and not easily combined to inform schools, communities, and policymakers about effective strategies and necessary changes. Researchers prefer working with datasets, while many stakeholders favor results presented through storytelling and visualizations. This paper introduces YouthView, an innovative online platform designed to provide comprehensive insights into youth transition challenges and opportunities. YouthView integrates information from datasets on youth disadvantage indicators, employment, skills demand, and job vacancy at regional levels. The platform features two modes: a guided storytelling mode with selected visualizations, and an open-ended suite of exploratory dashboards for in-depth data analysis.

This dual approach enables policymakers, community organizations, and education providers to gain a nuanced understanding of the challenges faced by different communities. By illuminating spatial patterns, socioeconomic disparities, and relationships between disadvantage factors and labor market dynamics, YouthView facilitates informed decision-making and the development of targeted interventions, ultimately contributing to improved youth economic outcomes and expanded opportunities in areas of greatest need.

The Data-Ethics of Proactive Service Delivery: a multiple-case study on social welfare benefits in the Netherlands.

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Keywords: Proactive service delivery, Social welfare benefits, Administrative burden, Non-take-up, Public values, Data-ethics

Abstract

Social welfare benefits are a vital pillar of modern social welfare states as they are focused on limiting poverty and ensuring the social security of citizens (Laín & Julià, 2022). Recent studies (Bolland, Janssens & Goedemé, 2024; Castell et al., 2024; Herd & Moynihan, 2025; Matsaganis, Levy & Flevotomou, 2010) have demonstrated that not all citizens receive the benefits to which they are entitled. This so-called non- take-up ranges from "20-30 percent for many programs but over 80 percent for others" (Ko & Moffitt, 2022, p.31). The digitalization of the welfare state offers new opportunities to proactively find and approach non-users and hereby increase the take-up of social welfare benefits (Broomfield, 2022; Scholta & Lindgren, 2023) and the inclusivity of the service delivery process (Bharosa et al., 2021). This data-driven Proactive Service Delivery (PSD) varies from utilizing or connecting databases (Daigneault et al., 2025; Herd & Moynihan, 2025; Khasmammadli & Erlenheim, 2022) to new technologies such as machine-learning- and data-sharing-techniques (Kassen, 2024; Mergel et al., 2023).

However, due to its drastic and intervening character, PSD also raises ethical concerns (Adekugbe & Ibeh, 2024; Herd & Moynihan, 2025; Van Noordt & Misuraca, 2022). For instance, it could lead to stigmatization (Bharosa et al., 2021) and invade the privacy of citizens (Khasmammadli & Erlenheim, 2022). Although some attention has been paid to the

ethics of PSD in general, the increasing possibilities of using data and data-driven technologies for PSD introduces a new layer of significance to this debate.

It raises the data-ethical question of whether and to what extent the use of data and data-driven technologies for PSD on social welfare benefits is considered desirable, and if so, at what cost (Broomfield, 2024).

The current academic literature on the ethics of PSD fails to answer this question since it does not explicitly make a link between ethics and the use of data or data-driven technologies for PSD. The few studies that do make a link are primarily normative, meaning that empirical insight into the data-ethics of PSD is missing. Furthermore, there is a lack of knowledge on what governance mechanisms could be put in place to prevent possible negative effects of data-driven PSD (Bharosa et al., 2021). The aim of this study is to enhance our understanding of data-ethics of PSD. Through a multiple-case study on seven cases of data-driven PSD on social welfare benefits in the Netherlands, this study explores what data-driven PSD entails, what public values are at stake and how these values can be safeguarded. The multiple-case study consisted of twenty-one scoping interviews, a systematic document analysis, and seventeen semi-structured interviews.

Our contribution to literature is threefold. First, we provide empirical insight into how data and data-driven technologies are used to apply PSD of social welfare benefits. Based on the research conducted by Broomfield (2024), we make a distinction between two so-called data archetypes: 1) data-driven PSD based on structured personal data available from national or local registers, and 2) PSD based on cross- agency data, data-analytics and advanced technologies such as machine-learning and data-sharing techniques. Our multiple case study led to two key findings: PSD based on the first data archetype can be seen as low-hanging fruit as this form of PSD can result in relatively easy outcomes, while few risks are identified. When organizations want to achieve high outcomes with the latter data archetype, more risks arise. In these high gain/high risk applications, we found that more attention must be paid to the safeguarding process value.

Second, this paper builds upon the work of Scholta & Lindgren (2023), who illustrated the possibilities for and constraints to PSD. In our study, we linked these desired outcomes and risks of PSD to respectively outcome values and process values. The use of this public value creation perspective revealed the dual nature of PSD: data-driven PSD can be aimed at reducing the administrative burden for citizens and hereby increase take-up, but can also be used for realizing efficiency by reducing the administrative burdens for governments (Peeters & Widlak, 2023). At the same time, the acknowledged process values of PSD can be divided into values for the society and individual citizens (theta-typed values concerning fairness and righteousness) and risks for the organization (lambda-typed values concerning robustness and resilience) (Hood, 1991; Jørgensen & Bozeman, 2007).

Last, this paper exploratively mapped five governance mechanisms that are used to safeguard values impacted by PSD. These mechanisms, which include consent, (technical) principles, transparency documents, work instructions and internal or external collaboration, enhance our understanding of embedding data-ethics of PSD. These governance mechanisms can be used by public policy makers and public managers in embedding data-ethics of PSD in their organizations.

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AI for Social Equity: Developing a framework for responsible AI in proactive welfare services.

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Keywords: AI, Proactive services, Social equity, Ethical AI, Responsible AI, Framework, Literature review

Abstract

As our welfare systems are increasingly using algorithms and AI systems to support their tasks, scholars from various disciplines inquire and criticize the automation of welfare services, especially concerning the surveillance for fraud (Oldenhof 2024; Eubanks, 2018; Grimmelikhuijsen, 2020). While this strand of literature has led to valuable insights, it also raises the question if responsible AI can be used to foster social equity in social welfare services.

Among the many scandals in the social domain, the Netherlands stand out for their notorious child benefits affair (Peeters and Widlak, 2023), and the use of many problematic algorithms in different contexts especially with risk-based supervision for instance at the Dutch Student benefits scandal (OCW, 2024) and the SyRY case (Rachovitsa, 2022) in Rotterdam. In response to the child benefits affair, many changes have been introduced to working with algorithms in public management in the Netherlands. It has also led to introducing a law of proactive service (proactieve dienstverlening) which stimulates the development of AI systems or the use of algorithms for social equity. Proactive service is defined as the government initiating contact with citizens (Scholta & Lindgren, 2019).

As Oldenhof (2019) argues, a shift needs to be made away from the fraud prevention logic towards more ethical service-oriented values. This requires a new language and way of thinking, away from cost effectiveness and budgets towards a higher standard of living for the vulnerable and disadvantaged. This also touches on the subject of basic services and

and the public values they should achieve. A way to do this, is to apply a framework of public values. Cordella & Bonia (2012) follow Moore's public value approach (1995) and perceive public value as composite outcomes. They argue that public agencies need to look not only at the impact of digital technologies in terms of values such efficiency, effectiveness but also values such as equity, fairness and trust (Cordella & Bonia, 2012). This leads to the question: how can we use AI technology to foster social equity?

Social equity is a fundamental principle in public administration that emphasizes fairness and justice in the provision of governmental policies and services (Ruijer, 2024). This concept encompasses the equitable management of public institutions, fair distribution of public services, and a commitment to promoting justice in policy formation. In the data era, social equity has gained renewed importance as governments increasingly rely on data-driven approaches to deliver public services. This shift has prompted researchers to examine how data applications relate to social equity in terms of access, treatment, service quality, and outcomes. This societal problem of social equity remains a pressing issue, with insufficient consideration given to how AI can be effectively deployed to address it. While administrative burden reduction, decision-making support, and complex assessments are potential areas for AI application, the current policy framework struggles to solve these challenges.

Currently, there is an absence of a robust conceptual framework for researching the responsible proactive use of AI within the context of the social welfare state. While there's a proposed law on proactive service delivery that considers AI implementation, empirical knowledge in this area remains limited, as noted by Khasmammadli & Erlenheim (2022) and Pawlowski & Scholta (2023).This study aims to develop a conceptual framework for assessing both AI's risks and potentials, and on how to evaluate the impact of such solutions on policy, street level bureaucrats, civil servants, and citizens. Ultimately, the goal is to enhance our understanding of whether AI implementation can enhance preferred societal outcomes, particularly in terms of inclusion and social equity,

We develop our theoretical framework, based on a literature review and illustrative cases across Europe including:

1. The Trelleborg Model in Sweden

2. AI assisted patient record keeping in Finland

3. Stella cases at Tax Revenue service

4. The CODY-LLM for civil servants in the Netherlands

5. Development of bias detection tools by the Dutch AI Validation Team

6. Project virtual income desk by the VNG in the Netherlands

The cases demonstrate a different approach to working with AI. Already in their ideation phase they consist of care for citizens, support and prevention of unnecessary harms, rather than enforcing punitive actions.

Our study contributes to the academic debate on applying AI in social welfare which so far focused critically inquiring bias, discrimination and surveillance imposed through algorithmic practices, and as such reaffirming the power asymmetries of the past (Oldenhof, 2024) towards a new paradigm of social equity (Ruijer, 2024). Our research results in an agenda for future research. Our preliminary findings of the literature and examples suggest that scientifically guided experiments are needed to generate empirical data that can help answer the question how AI can be applied to the field of social welfare in an ethical way that will improve social equity for those who are worst off. Finally our study provides guidelines for policy makers and public managers to use AI applications in proactive government services.

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A Privacy-focused Data Solution for Understanding and Improving Indoor Environmental Quality in Social Housing From the SHINE Project.

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Keywords: Social housing, Sustainability, Mould, Sensors, Privacy

Abstract

The Irish social housing sector faces major challenges in improving home environments and sustainability. Ageing infrastructure, harsh weather, and inadequate management responses contribute to poor living conditions, leading to mould growth and worsening health. In a County Dublin social housing block, children and vulnerable individuals suffer from bronchiolitis, breathing issues, chest infections, and mental health decline due to mould exposure (Conneely, 2025). Despite calls for relocation, their health has already deteriorated, highlighting a widespread issue that harms residents and incurs high costs.

The Sustainable Homes Integrating Non-Intrusive Environmental Sensors Research Project (SHINE) aims to improve living conditions by identifying root causes and solutions. Through interviews with 28 stakeholders, including housing officials and residents, SHINE explores the use of non-intrusive environmental sensors in social homes. These sensors provide real-time insights, warning residents of mould risks by monitoring condensation over time. This proactive approach helps prevent issues, reducing management costs, hospital visits, and energy use. Long-term, SHINE seeks to integrate these technologies into social housing policy, promoting sustainability and better health outcomes.

Research Problem

Low-cost environmental sensors, when combined with expert-system mathematical algorithms, can be used by users to get a clear understanding of important living conditions

and the energy efficiency of their home, along with actionable recommendations to improve them. The same type of sensor systems can also be used by building management to receive notifications of different aspects of the premises that need to be repaired. However, when this proposal was presented to our stakeholders, we discovered that data privacy is amongst the top concerns of residents when it comes to indoor environmental monitoring.

As adversarial data harvesting and analytics become increasingly sophisticated, it is crucial for citizens to understand and control the information that exits their homes. Sensor readings collected within households contain sensitive privileged information. However, user data privacy in networked sensor systems is frequently overlooked in favour of over-collection and ease of implementation (Fei et al., 2023). Raw sensor readings are often transmitted to cloud servers, which analyse and disseminate information to other systems. The affordability of sensors, internet connectivity, and storage has led to a rise in the remote harvesting of sensor telemetry from household consumer electronics, contributing to large corporate datasets. While robust legal protections such as the GDPR exist, the average user is still confronted with complex and ever-changing data privacy agreements (van der Schyff et al., 2023). Additionally, user data may be vulnerable to interception in transit by uninvolved third parties. From an information security perspective, once a user's data leaves their household, it should be regarded as beyond their control.

To AI and other machine learning techniques, every bit of information collected from a user's sensors can hold statistical significance, enabling the inference of additional information about the individuals in their vicinity, their behaviours, and their environment - far beyond the original intended purpose of the sensor system. For instance, spikes in room CO_2 levels can indicate presence detection (Cali et al., 205), while pseudo-anonymization can be compromised through sensor fingerprinting (Ahmed & Mathur, 2017). When this data is fused with other datasets from grey-market data brokers (Kröger, 2019), the potential for further de-anonymization increases, providing richer insights into the user and their surroundings. In the wrong hands, this information can be used adversarially against the user —for example, through remote surveillance, manipulation via targeted advertising, or threats of eviction. Similarly, management organisations may face scrutiny due to demonstrated privacy violations against their tenants and allegations of data misuse. Hence, data privacy concerns among our stakeholders, based on this information alone, are warranted. In light of these concerns, a pertinent research question arises: How can we effectively address the challenges of data privacy and ethical usage of sensor data while simultaneously advancing our research goals?

Key Discussion

The SHINE team leveraged our stakeholders' insights in the design of a sensor, aiming to address their concerns while ensuring the effectiveness of the sensor for potential integration into an enhanced social housing management policy. This research outlines a design methodology focused on maximising user privacy in residential IoT sensor systems. By deploying analytical algorithms at the edge, the approach minimises unnecessary information transmission and storage. Furthermore, it ensures users have full transparency and local control over the capture and analysis of their sensitive sensor data, as well as control and visibility over what information is shared with external stakeholders.

The team utilises a non-intrusive sensor suite along with goal-oriented, privacy-focused analytics to continuously monitor various environmental factors such as temperature, humidity, particle counts, energy usage, VOCs, CO_2 levels, light levels, sound levels, and more within social housing. This system generates user-visible reports and recommendations, offering residents the option to share selected, minimal-information-content report data with researchers and housing authorities. By enhancing the understanding of critical parameters that affect residents' well-being and the sustainability of housing units, our research results aim to strengthen the social housing sector. The outcomes of this project are designed to inform policy interventions and facilitate the integration of smart and sustainable technologies, empowering government bodies, local authorities, and social housing tenants to tackle the intricate challenges posed by health, well-being, economic factors, and environmental concerns.

This approach acknowledges that for goal-oriented monitoring, raw sensor measurements hold limited direct value and can pose security risks that need careful management. What truly matters to residents and policy stakeholders are the outputs derived from goal-specific, long-term analytical models that they can choose to engage with (e.g., Mould Risk, Excessive Heat Loss, Over-stimulating Environment). Our design ensures that raw sensor measurements are neither stored or transmitted; instead, they are processed directly by local on-board analytical models, which generate infrequent, low-information-content high-level reports (e.g., a score ranging from 0-4 every seven days). The algorithms employed are sourced from peer-reviewed academic literature, with their implementation and behaviour within the system fully documented, transparent, and accessible to users and stakeholders alike. By ensuring that this openly auditable path is the only way that environmental data can move through the system, we aim to reassure residents that their sensitive sensor information remains within the household and that the algorithms generating environmental reports do not inadvertently exfiltrate additional hidden data signals. This system is strictly designed to produce opt-in high-level assessments and actionable recommendations aligned with policy objectives. We also apply machine learning and other statistical methods to evaluate how effectively these models avert any inferences beyond the specified measurement goals.

Conclusion

The SHINE project prioritizes health improvements while ensuring strong privacy protections to build trust and support sustainable, healthy social housing. Its data analysis policy focuses on evidence-based strategies that drive sustainable development through technology and resident collaboration. Emphasizing an interdisciplinary and cooperative approach, SHINE aims to address environmental and social challenges effectively. This strategy ensures practical implementation with measurable outcomes, ultimately improving citizens' well-being.

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Explainability in the EU's legal framework for AI - a stepping stone in the path towards a digital and circular economy.

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Keywords: Artificial Intelligence (AI), Explainability, Opacity, Twin transition, Fundamental rights, Innovation

Abstract

Artificial Intelligence (AI) explainability consists in ensuring that an AI model, or certain aspects of it, are understandable for humans rather than opaque 'black-boxes'. Such opacity encompasses threats to transparency (when information on the model is not shared), traceability (when information on the model is not properly recorded), and interpretability (when information on the model's functioning is difficult to extract because the model is too complicated). AI explainability becomes increasingly central to the twin transition towards a digital and circular economy.

Explainability serves the effort to achieve a circular economy by mandating the sharing of information that can be crucial to product repurposing or modification after having been put into circulation. Explainability requirements also become relevant for AI systems enabling the circular economy itself – used in designing circular products/components, operating circular business models, and optimising infrastructure for circular product flows.

Explainability serves the effort to achieve an adequate digital economy by aiming to balance the protection of fundamental rights with the promotion of innovation, to avoid two extreme scenarios. On one extreme of the spectrum, insufficient explainability requirements undermine fundamental rights, since AI opacity – to deployers and even providers – can compromise decision-making in high-stakes contexts such as justice, employment, and credit-assessment. On the other extreme of the spectrum, strict explainability obligations can impact innovation through tensions with secrecy, accuracy, or security (despite positive effects on trustworthiness and adoption of emerging technologies). First, explainability obligations create tensions with intellectual property and trade secret protection which can incentivize R&D investments. Second, the use of opaque models has often been justified by an alleged 'accuracy/explainability tradeoff', raising questions on technical feasibility. Third, under the 'AI transparency paradox', post-hoc explanation methods such as counterfactual explanations (techniques that reveal how

a model's inputs would need to differ to observe a diverse outcome) may compromise cybersecurity by unveiling insights on model outcome manipulation.

Legal frameworks for AI have accordingly been tasked with new objectives of 'explainability'. When referring to the European Union (EU) framework for AI and automated decision-making, consideration should be given to the AI Act, revised Product Liability Directive (R-PLD), and General Data Protection Regulation (GDPR), while accounting for the withdrawal of the proposed AI Liability Directive (AILD). This research aims to uncover what model of AI explainability emerges from the EU's legal framework for AI? After studying the different concepts of AI opacity, the research assesses the explainability regime articulated by the EU's AI framework through doctrinal research combining descriptive analysis (assessing legal obligations and enforcement methods), explanatory analysis (assessing underlying rationales), and evaluative analysis (assessing the model's impact on different interests to be balanced).

The research assesses whether the explainability model underlying the EU's AI framework can be defined as based on rights, compliance, and incentives. A first assessment suggests that the AI Act (Article 86 AI Act) and GDPR (Articles 15(1)(h)-22 GDPR) provide a right-based approach to explainability regarding automated decision-making. The AI Act might additionally be defined as including a 'compliance-based' approach to explainability, through certain requirements for high-risk AI systems (HRAIS) referencing the concepts of transparency, traceability, and interpretability: technical documentation (Article 11 AI Act), record-keeping (Article 12 AI Act), transparency and provision of information to deployers (Article 13 AI Act), and human oversight (Article 14 AI Act). The R-PLD might be interpreted to prescribe a complementary 'incentive-based' framework for explainability, through evidence disclosure mechanisms and burden of proof reversals aimed at countering opacity (Articles 9-10 revised PLD). The analysis also accounts for the recent withdrawal of similar mechanisms that had been set out in Articles 3-4 of the proposed AILD.

After unveiling the explainability model, the research will assess its limitations. For instance, the analysis considers the risk that AI Act substantive requirements may be limited to mere transparency (disclosure of AI's inner workings), while explainability should go a step further to unveil the cognitive processes underlying decision-making. The research assesses the efficiency of articulating AI explainability not as a direct requirement but as a tool indirectly facilitating defence from liability claims and compliance with AI Act obligations (like that to provide HRAIS such that deployers can detect anomalies). Doubts also arise on whether the explainability model remains insufficient for AI systems that do not qualify as HRAIS subject to core AI Act obligations. In evaluating the risk-classification's adequacy for explainability, the research considers that the value of explainability varies across AI applications and domains with different overriding interests. When assessing the framework's effectiveness, it is also crucial to evaluate whether the GDPR imposes concrete explainability requirements for automated decision-making

involving personal data processing, namely whether it truly enforces a right to explanations that 'specify what factors have determined unfavorable assessments or decisions' and 'enable users to contest detrimental outcomes'.

Overall, the research explores such gaps in the explainability regime, analyzing the relevance of explainability in the twin transition towards a digital and circular economy. The R-PLD regime adapts product liability to the digital economy by accounting for AI's opacity risks, and to the circular economy by accounting for defects resulting from substantial modifications to the product after it has been put into circulation. But how to understand and measure the impact of substantial modifications on a product's functioning, if that functioning is not understandable in the first place? The research also accounts for parallel EU regulations tackling transparency at the intersection of the twin transitions: for instance, the Digital Product Passport aims to enhance product transparency and information-sharing across product value chains in support of sustainability practices and open data initiatives.

Panel Session 3A

Value and limits of long-term projections and practical ways forward

Speakers:

J. **Bakens** - Research Centre for Education and the Labour Market (ROA)
M. Heres **Hoogerkamp** - Dutch Ministry of Education, Culture and Science
C.A.A.D.T. **Ramada** - Dutch Ministry of Education, Culture and Science,
S.B. **Spit** - Dutch Ministry of Education, Culture and Science; University of Amsterdam
D.J. **Van Vuuren** - Tilburg University; SEO Economic Research; Dutch State Committee Demographic Developments 2050
T. **Wittebrood** - Dutch Ministry of Education, Culture and Science

Chair: T. **Noordzij** - Dutch Ministry of Education, Culture and Science

Keywords: long term projections, uncertainty, scenarios, demography, education, labour market, international

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Abstract

Policymakers increasingly rely on data-driven projections (well-founded assumptions about the future, based on certain premises and trends) to shape long-term strategies. Data-driven projections promote a long-term perspective in decision-making in critical sectors such as social security, pension funds, infrastructure, housing, and education. Yet, recent research casts doubt on the reliability and practical value of data-driven projections for the 'distant future' (say, 15 years ahead an beyond). This raises a fundamental question: To what extent can data-driven projections and scenarios reliably shape policy in an unpredictable future, and what strategies can ensure more resilient governance in the face of these uncertainties? This will be explored in a panel discussion.

The Dutch Ministry of Education, Culture and Science promotes the use of data-driven projections to inform policy. The Ministry (2024) produces annual national, regional, and institution-level projections of student enrolment in publicly funded education. These are used for among others student housing planning, projections of the teacher labour market,

the connection between education and the general labour market, and students' public transport use.

Given the inherent unpredictability of long-term developments, policymakers must consider not just singular projections but also explore possible futures. Two recent publications (Van Leeuwen et al., 2024; De Moor et al. 2024) used long-term scenarios to explore questions that are relevant to policy. Van Leeuwen et al. (2024) investigated what stagnating enrolments of international students means for tertiary education in the Netherlands, when the number of domestic students is dwindling due to demographic developments. A key shift in enrolment patterns is currently unfolding. International students at universities previously offset the decline in Dutch student numbers. The latest data indicate that international students no longer compensate this decline, as inflow of international students has been stagnating and even started to decline as well. This conclusion requires rethinking policy, as the system of tertiary education will have to switch away from decades of growth and universities will be effected differently because of the composition of their student population. De Moor et al. (2024) investigated to what extend the education system can help resolve bottlenecks in the labour market of 2040 by guiding students successfully toward specific fields of study and ensuring they finish those studies successfully. This study shows that even with optimistic effects of ambitious policies, the increase in graduates in sectors with shortages won't be enough to meet expected demand. In fact, a declining student population threatens to further exacerbate skill gaps in critical sectors, potentially weakening economic resilience. The study concludes that effective education policies could help lessen problems of a tight labour market, but additional measures and adjustment mechanisms are necessary.

However, making projections and scenarios for the long-term is not without challenges:

• Mathematical models are by nature oversimplifications. Especially in education and the labour market, human behaviour, societal norms, and economic factors play an important role, but are hard to grasp (SDO, pp. 61-62).

• These models rely on assumptions about factors such as future birth rates, international migration, economic growth, and employment rates that are themselves difficult to predict and sensitive to (policy) change (SDO, pp. 61-62). Some factors, such as wars, pandemics, and the rate of technological development are even more speculative (SDO, pp. 76-77).

• In the long term, in social and economic systems such as the labour market adjustment mechanisms increase uncertainty even further (Bakens et al., 2023). Wage increases can attract job seekers and switchers, potentially reducing shortages.

• Even with reliable data and appropriate methods, small deviations in the short term have cumulative effects in the long term (SDO, pp. 102-103, 366).

For example, a relevant predictor of the future labour market is the chance of international students staying in the country. Recent research shows that the retention rates are higher than previously assumed (Abbink et al., 2024).

Speaking the language of the host country plays a pivotal role in adjustment for people from abroad (Selmer & Lauring, 2015). A recent study by Spit et al. (accepted) sheds more light on how this ability relates to study success in international students. This relation differs quite drastically across educational levels like vocational education and university, which questions how we should ensure that international students from different background are able to participate in the future labour market in the Netherlands. Moreover, research indicates that even indicators that describe the present may be unreliable predictors of future employment market opportunities (Canoy and Wittebrood, 2025). For example, vacancy rates and labour market projections weakly correlate and the relationship between vacancies and job seekers is weakly correlated with wages (Bakens and Fouarge, 2022; Canoy and Wittebrood, 2025).

Although long-term projections come with inherent uncertainty, they still provide essential insights for policy, because many policies can only be effective in the long run. It is important to understand their limitations and act accordingly. The panellists propose, among others, the following:

• ROA suggests that instead of directly predicting the quantity of interest, such as labour market shortages in FTE, it might be better to predict another indicator. ROA maps the expected 'tension' between supply and demand instead of FTE. This type of indicator is much less granular.

• One should avoid overreliance on single deterministic models for making predictions. Instead of making point predictions, scenarios outlining potential futures (even extreme ones) help to challenge existing assumptions and push thinking beyond the status quo.

• Furthermore, it is important to differentiate between policy-neutral (or low-policy) scenarios and policy-driven scenarios. The former assumes no significant policy shifts, while the latter explicitly incorporates potential policy interventions and their effects.

• Data-driven projections can be enriched using other knowledge. For example, when thinking about the future labour market, we should also mind factors such as language proficiency that are hard to capture in a variable denoting an economic quantity.

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Thinking ahead and thinking broadly: scenario planning for fostering resilience[1]

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Abstract

Demographic projections are essential for various planning and policy-making activities. However, the uncertainty of projections is fundamental. Chapters 2 and 8 of Moderate Growth – Report by the State Committee Demographic Developments 2050 (2024) present a detailed analysis of the value and the limits of demographic projections and scenarios in the Netherlands. Faced with inherent uncertainty, the chapters emphasize the need for a forward-looking and adaptive policy making to foster resilience.

Challenges to long-term projections

At its core, building population projections is as much a technical exercise as a social science. The construction of scenarios and projections is data driven, using available statistics and trends to model potential future outcomes. But formal statistical models always leave elements out of consideration. Forecasters must also consider human behaviour, societal norms, and various social, economic, and political factors. This also makes developing projections and scenarios an art, especially in times of high uncertainty. It combines practical observation, interpretation, and learning with imagination (pp. 61-62).

Statistical forecasting models use the past to provide insight into the present and future, but this approach is limited when variables change significantly. Nationwide population projections are heavily dependent on assumptions about birth rates, mortality rates, and international migration (pp. 61-62).

- Predicting birth rates is challenging due to changing norms, economic factors, (medical) technology like birth control pills in the 1960s, and individual choices.

- Although mortality rates have become more predictable, unexpected events like pandemics, radical innovations and wars can still significantly impact them (pp. 76-77).
- International migration is the most volatile and difficult factor to predict due to its sensitivity to economic conditions, political instability, and global events.

Relatively small differences in the annual migration balance and birth rates have cumulatively large consequences in 2050 (pp. 102-103, 366). For example, Statistics Netherlands[2] predicted in 1965 that the Netherlands would reach 21 million inhabitants by the year 2000, while in reality it was 15.9 million by that year (p. 63). This 1965 projection did not account for the rapid decline in the number of children per woman. However, population projections such as these have significant real-world impacts on policy making in critical sectors such as social security, pension funds, infrastructure, housing, education, and so on (pp. 13, 62).

Despite the challenges and uncertainties, long-term projections are essential for various planning and policy- making activities.

[1] Original title (Dutch): Gematigde Groei – Rapport van de Staatscommissie Demografische Ontwikkelingen 2050 (2024)

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Actions available to forecasters

By understanding past forecasting errors, demographers can refine their models and approaches to improve future projections (p. 68). It can reveal 'blind spots' or areas where past projections were inaccurate (p. 70). This is why making projections is not a one-time exercise, but requires iterative refinement to improve understanding (p. 68).

Statistics Netherlands and other institutions use methods like scenario analysis (coherent narrative storylines), variant analysis (systematically exploring different assumptions), and stochastic analysis (generating random paths) to understand how varying inputs affect projections (pp. 77-78). In addition, practitioners do laudable work collecting more accurate and timely data, refining statistical techniques, and incorporating new knowledge into their models.

However, uncertainty is not just a technical problem, but a fundamental aspect of demographic projections (p. 76). Although some uncertainty can be quantified, other uncertainties are intractable. These fundamentally uncertain events are often not included in population projections because they are highly speculative and cannot be easily captured in a statistical model (pp. 76-77).

Forecasters must recognize and articulate the inherent uncertainty in their predictions to decision makers and the public, making sure that projections are not understood as definitive predictions but as outlines for potential outcomes (pp. 61, 77, 79, 350). Moreover, their usefulness and relevancy are increased by engaging with their stakeholders (p. 79).

If scenarios are treated as mere academic exercises or are not effectively communicated to policymakers and the public, they may have little impact on decision making.

Actions available to policy makers

There is a tension between the desire of policy makers for certainty and the inherent uncertainty of projections. We recommend a balanced approach that recognizes both the value and limitations of demographic projections. They provide vital understanding to address challenges such as aging populations, migration, and regional disparities. Demographic projections allow for the identification of potential bottlenecks before they arise, promoting a long-term perspective when making decisions about demographic trends (p. 79).

But the oversimplification of complex systems and the potential for bias can also misguide policy makers or induce a feeling of certainty when there is none. Therefore, it is important to avoid overreliance on single deterministic models for making predictions (pp. 62, 79).

Scenarios should not only reinforce existing assumptions, but actively challenge them (p. 79). They should help push thinking beyond the status quo. By considering a range of possibilities, including those that may seem unlikely, policymakers can avoid being trapped by conventional wisdom and develop more robust strategies (pp. 18, 366). Exploring different scenarios helps identify potential challenges and risks that may not be apparent when focusing solely on the most probable future (p. 77). Once potential challenges have been identified, policymakers can develop strategies to mitigate their negative impacts.

The effectiveness of scenarios depends on how they are used. Scenarios must be integrated into the policy process, and there must be a willingness to adapt plans and policies as new information becomes available (pp. 388). Effective policy making also needs stakeholders from government, civil society, and the private sector to foster dialogue, collaboration, and consensus on shared goals (p. 356).

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Short-term and long-term in labour market forecasting: ROA vision Demand for Talent 2040

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1. Research Centre for Education and the Labour Market (ROA)

Abstract

The Ministry of Education, Culture and Science has worked on an exploration of the labour market in 2040 (Demand for Talent 2040; Dutch: *Talentvraag 2040*). The Research Centre for Education and Labour Market (ROA) has published an analysis in which the usefulness of forecasts for the distant future is tested. Short- and medium-term forecasts are based on econometric models and give an indication of the direction of developments on labour demand and supply in the short- or medium-term. Underlying these models are realised and known cyclical and structural trends in the labour market. These models can be used because assumptions can be made about adjustments and changes in the labour market in the short- and medium- term. Therefore, extending forecasts based on these models to a longer time horizon is not without danger. In the long run, many more processes are uncertain because changes and adjustment mechanisms are at play in the labour market. In addition, economic and policy changes occur on a longer time horizon, and changes in the speed at which technological changes are implemented can play a role. So the longer the time horizon the more uncertain the projections. Since long-term trends do exist with which to look at the long term, other kinds of forecasts are more appropriate. These are forecasts with much less detail in terms of the quantitative size, for example, and scenarios are suitable for outlining long-term trends.

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The future is not now: Challenges in tracking labour market developments for future-oriented education policy

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Abstract

One of the objectives of education policy in many countries is to ensure that students enjoy strong opportunities for work and that their skills are aligned with the demands of employers. The post-pandemic period of labour markets running hot in the Netherlands and other countries has increased the attention for the link between initial education and labour market demand. Aligning the education students enjoy with the labour market that they will enter requires a thorough understanding of the trends shaping the demand for skills and knowledge in the future: Depending on national context and individual differences, a complete trajectory in initial education takes roughly 14 years . Tertiary education, which many students receive as the last step before entering the labour market, takes several years as well. In this time frame the demand for skills might shift, potentially leaving some with skills that do not provide strong opportunities for employment. These mismatches are costly: Those employed in a position that under-utilizes their skills are at increased risk of job loss or earn lower wages, contributing to economic precarity. Policymakers often use indicators for current labour market demand (such as vacancy rates) interchangeably with projections of future labour market bottlenecks, such as those produced by the Research Centre for Education and the Labour Market in Maastricht. A cursory analysis shows, however, that these indicators do not correlate strongly with one another. This discrepancy matches a study by Autor et al. (2024) that finds 60% of workers in 2018 were employed in occupations that did not exist in 1940 . These weak connections could suggest that indicators for current labour demand might be a poor predictor for future skill needs or labour market opportunities in a given field. Given these challenges, policymakers might run the risk of overemphasizing training people towards occupations currently experiencing hiring challenges, while underestimating the importance of skills that are less sensitive to macro-economic changes. During the panel, we discuss the challenges that common labour market indicators pose for alignment of education with labour demand. We also explore how policymakers in education can better use the labour market data available to them to inform their work, and what other sources of insights should be combined with data on economic trends to inform foresight on future skills needs – such as findings in the science of education and development.

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Investigating the Relation Between Second Language Proficiency and Study Success Using a Causal Inference Approach

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Abstract

Prior research suggests that second language proficiency is key in students' study progress,but has mainly been carried out at universities. It is thus unclear how this relation varies across different educational levels. Moreover, previous studies are often not informative about the causality of this relation, making it difficult to base intervention policies on these studies. To address these shortcomings, we analyse a large historical registry dataset of examinees of the Dutch as a second language state exam between 2011 and 2023

(n=12,664). First, we map out the statistical dependency between language proficiency and examinees' study success. Next, using graphical approaches to causal inference, we estimate the effect of a hypothetical intervention: would an increase in language proficiency affect study success rates? We replicate the relation between language proficiency and study success in university students, but it does not generalize to students in applied universities or vocational programs.

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Language Learning.

Uses of GenAI in higher education assessment: a scoping review and typology.

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Keywords: Generative Artificial Intelligence (GenAI), Educational assessment, Higher education, AI in education (AIED)

Abstract

In recent years, developments in Artificial Intelligence have taken a flight, in particular when it comes to Generative AI, GenAI for short. As both students and teachers can and do make use of various new technologies in this category, these developments also impact assessment practices in higher education. In this paper, we seek to answer two empirical questions about this impact. Firstly, in what ways do students and teachers in higher education make use of GenAI in the context of educational assessment? And, secondarily, what are the effects of these uses of GenAI in higher education assessment?

When we speak of 'ways of using GenAI in the context of educational assessment' or 'uses of GenAI in higher education assessment', what we have in mind are GenAI uses that either impact the product on the basis of which a student is assessed (e.g., a student uses ChatGPT in order to improve her writing in an essay assignment), or that impact the method by which the student is assessed (e.g., a teacher uses automated grading software to mark assignments). In order to map such uses of GenAI in higher education and explore their effects, we start by performing a scoping review of the literature that has emerged on this topic. Based on this review, we then develop a typology of the uses of GenAI in higher education assessment.

In our scoping review, we let ourselves be guided by two research questions. (1) In what ways do students and teachers in higher education make use of GenAI in the context of

educational assessment? (2) What are the effects of these use of GenAI in higher education assessment?

In order to find the relevant academic literature, we rely on two databases: Web of Science, which is a large multidisciplinary platform for scholarly articles, and ERIC (acronym for Education Resources Information Center), which is an online library of education research and information. To reflect the relative impact of ChatGPT, we look at the literature published from 2021 onwards.

In our selection, we worked with three blocks of search terms separated by Boolean operators: a block of terms relating to higher education (including 'university', 'teacher', and 'student'), a block of terms relating to GenAI (including 'LLM', 'chatbot', and 'machine learning'), and a block of terms relating to assessment (including 'exam', 'essay', and 'feedback'). The initial search, carried out on 28 January 2025, yielded 597 documents on Web of Science and 34 documents on ERIC. From these 631 documents, we removed 26 duplicates. We screened the remaining 605 documents for their eligibility by reading their titles and abstracts, whereby we included and excluded articles based on the following selection criterion: We are including empirical studies addressing the actual use of GenAI in higher education assessment practices (both formative and summative).

Based on our findings from the scoping review, we aim to develop an empirically informed typology of the uses of GenAI in higher education assessment. We expect this typology to be helpful as a guide for educational scientists who study assessment and / or Artificial Intelligence in education (AIED), as well as educational practitioners who aim to develop policies for the regulation of AI in education.

Data and Blockchain for Real Estate: The Case of Portugal.

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Keywords: Real Estate, Data, Emerging Technologies, Big Data, Blockchain, Evidence-Based Policy

Abstract

The real estate sector plays a significant role in many economies worldwide. Despite its importance, the sector faces persistent challenges such as limited housing supply, market asymmetries, poor transparency, and lack of reliable data. These issues hinder the development of the sector but also decrease the capacity for targeted, evidence-based policies. Emerging technologies like big data, artificial intelligence, and blockchain offer scalability, efficiency, and transparency opportunities in the sector. We employed a case study approach and qualitative methods to study the adoption of these emerging technologies to address the sector-specific challenges. The selected case is Portugal, where the gross value added from the real estate sector is 12.1%, above the European average of 10.3%. Using archival data and literature review, we map the data sources and the practices related to data and emerging technologies. Interviewing 41 participants, we capture perceptions of data quality and the potential for leveraging data technologies to enhance sectoral performance and inform policy development.

Responsible Data, Responsible AI: Setting Standards for Public Data Collection.

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1. Alliance for Responsible Data Collection

Keywords: Responsible Data Collection, Public Web Data, Data Democratization, Ethical Data Practices, AI Training Data, Data Access and Regulation, Scraping Ethics, Data Monopolization

Abstract

As AI systems like LLMs continue to transform industries, the need for responsible data collection standards has never been more critical. AI is only as powerful as the data that fuels it, and one thing is clear: the future of AI relies on continuous access to high-quality, real-time web data. As the new gold, public web data serves as the foundation of AI innovation, enabling organizations to develop smarter, more accurate models. Without open access to this data, AI models risk becoming outdated, inaccurate, and uncompetitive.

With the acceleration of these innovations, data democratization is more crucial than ever for society. And yet, restrictions on access to public web data have increased dramatically. A recent study documented the decline of the AI data commons by as much as 25% in the most critical domains as website providers employ robots.txt to limit access to publicly available data hosted on their platforms (Longpre et al., 2024). The companies leading the AI race, also control much of the data needed to train these models, giving them the power to determine its availability for public use. If websites continue to close their doors on this data, as some have already done and others are attempting, the progress of LLMs will stall, and the issues facing AI models today will remain unresolved. Without long-term, reliable access to relevant public web datasets, the development of these models will inevitably come to a standstill.

Moreover, the risk of embedding bias into AI models increases when the data available on the world wide web is excessively or selectively restricted. To compensate for the lack of actual data, AI developers are turning to synthetic data, which increases the likelihood of exacerbating historical prejudices and bias.

Additionally, asymmetries in information increase the data divide and incentivize large platform providers to exploit their roles as data hosts by taking legal action against smaller companies who often lack resources to fight back.

Beyond the courtroom battles over data access, a broader issue remains: how can AI developers rest assured that the data they are using has been collected in an ethical manner? While many initiatives focus on regulating the development and use of AI (see, e.g., the EU AI Act), the manner in which the data is collected is not well understood or defined. A number of initiatives have proposed restrictions on the use of automated tools to collect publicly available internet data. These efforts allow website providers to cast a wide net over all crawlers and scrapers without regard to the actual manner in which the collection is accomplished. This approach is overly broad and is likely to harm the public interest by preventing responsible entities from accessing publicly available data and blocking legitimate uses of that data.

Ethical data collection is often equated with legal compliance, such as adherence to GDPR. Yet, this approach is far too narrow, failing to address many critical aspects of responsible data collection.

Data collection companies have been left to define their own ethical compliance frameworks. Companies like Bright Data are pioneering best practices in responsible data collection, implementing measures such as Usage Monitoring, strict prohibitions on collecting personally identifiable information (PII), and enforcing Know Your Customer (KYC) protocols. These measures help protect customers, partners, and the integrity of the World Wide Web.

There is a deep need to create market standards, which led to the founding of the Alliance for Responsible Data Collection (ARDC). It is an inter-industry alliance of thought leaders from businesses, non-profits, and academia aligned on a mission to establish responsible data collection standards and guidelines that: provide data collectors with guidance on best practices for conducting data collection, offer third parties a reliable means to assess responsible data sourcing, and preserve open access to public internet data while preventing data monopolization.

Participants in ARDC represent diverse data usage models and share the common goal of ensuring open access to public data within a trusted framework. Our discussions have included contributions from Authors Alliance, Bright Data, Common Crawl, OpenAI, Sequentum, Stanford CodeX, and others. The ARDC Guidelines are voluntary standards designed to protect websites from harm, drive transparency and accountability, and allow variation and choice based on the individual use at issue. An added advantage is the ability to democratize access to data and level the playing field for organizations of all sizes to have access to public internet data.

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AI Disclosure: Chat-GPT was utilized to check spelling, grammar and clarity suggestions.

A Socio-Technical Perspective on Digital Twins as GovTech solutions. The Case of WiseTown

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Keywords: Digital Twin; GovTech; Data-informed Policy-making; Digitalization; Digital Transformation.

Full paper is accepted for publication in the Data & Policy journal.

Video Presentation: https://youtu.be/1bggDmgsB2o

(Virtual Presentation)

Abstract

This article examines the implications of adopting a socio-technical perspective on the design and implementation of GovTech solutions. To observe the phenomenon, it adopts a case study approach focusing on the WiseTown solution and its City Digital Twin (CDT), developed by the Italian company TeamDev. The article investigates how integrating social factors, such as urban governance, with technical elements, like data analysis and modeling, can enhance the conceptualization, design, and implementation of user-centric, data-driven digital solutions as part of a broader digital transformation strategy. The article explores an Italian best practice that is developing four dimensions of the GovTech socio-technical framework: Governance Structures, Institutional Arrangements, User and Context Understanding, and Technological Development. It critically examines and

discusses the challenges and opportunities associated with the adoption of CDTs and their impact on public policy implementation. The analysis is centered on two main aspects that emerged from the case study: data integration and sharing within CDTs, and the social implications associated with data usage for decision-making. Ultimately, the article explores the role of stakeholder collaboration (public-private partnerships) and the creation of innovation ecosystems—GovTech ecosystem in this specific case—to inform and steer policymaking through and beyond the adoption of CDTs.

Multilingual Classification of AI-Oriented Policy Documents based on Bias Types

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Keywords: multilingual classification; bias identification; transformers; transfer learning; pre-trained language models

Full paper is accepted for publication in the Data & Policy journal.

Video Presentation: https://youtu.be/1lF9RdiEHN0

Abstract

The integration of emerging technologies, such as transformers and pre-trained language models (PLMs), is reshaping policymaking and eGovernance domains.

Key aspects that the utilization of these technologies offers are improved transparency, more efficient and timely provided decisions, and administrative efficacy. A key challenge in this domain is addressing multilingualism in policy documents, ensuring inclusivity and accessibility for diverse stakeholders. Moreover, the systematic identification and classification of governmental documents enhance evidence-based decision-making and policy alignment across global landscapes.

This research work leverages the OECD collection of AI policies from multiple countries to identify and categorize different types of bias present in these policy documents. In this direction, this manuscript introduces a comparative mechanism and end-to-end pipeline that are developed to support the multilingual detection and classification of biases within OECD papers, offering stakeholders a deeper understanding of the biases that governments and public authorities consider in their AI policies. The introduction of this streamlined approach for the bias detection and classification across multiple languages fosters transparency, supports fair and inclusive policy development, and helps on the identification of the different types of biases considered by governments worldwide in the context of AI governance. The insights derived from this comparative analysis enhance the transfer and standardization of policies in a multilingual setting, promote cross-border collaboration, and ensure that AI regulations align with ethical and equitable principles.

A Rights-Based Approach to AI Governance: Recognizing Individual Rights in AI Interactions.

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Keywords: Artificial Intelligence (AI), AI governance, Rights-based approach, Human rights, Individual autonomy

Abstract

As artificial intelligence (AI) increasingly permeates our lives and regulatory systems, its integration into various societal sectors raises significant concerns about its potential impact on human rights and individual autonomy. While current AI governance frameworks predominantly focus on system-level regulation and developer obligations, this paper proposes a complementary rights-based approach that empowers individuals to actively assert and protect their interests in AI-mediated environments. This paper argues that existing risk-based regulatory approaches at the development and deployment levels, though necessary, are insufficient in addressing the fundamental need for individual agency in AI interactions. To address this gap, the paper introduces a framework for affirmative rights that enables individuals to exercise control over how AI systems impact their lives, whether these systems are operated by governmental bodies or private entities. The proposed framework encompasses essential rights including: (1) comprehensive information rights about AI system deployment and scope; (2) the right to challenge AI delegation in critical decision-making processes; (3) verification and classification rights regarding personal data processing; (4) the right to opt out of AI-driven processes; (5) scope limitation rights; (6) appeal rights when harm occurs; (7) the right to human oversight; and (8) transparency rights throughout AI interactions. This paper demonstrates how a rights-based approach can function synergistically alongside existing regulatory frameworks to create a more balanced and accountable AI governance structure. This dual approach—combining systemic regulation with actionable individual rights—provides a more robust foundation for ensuring AI systems remain accountable to human agency, and fundamental rights.

Session 3E: Digital & Data-driven Transformations in Governance

Regulating Utilisation of Identity Card Data

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Keywords: Identity Card Data Utilization, Citizen Awareness, Data Safety

(Virtual Presentation)

Abstract

How is citizen ID data being consumed and safeguarded with the rate of expansion of its usage across services ? Are citizens aware of the causes their ID data is being utilised for ?

ID Evolution & Mission Creep

Identity systems have evolved from distinguishers of membership in a group like in the case of the Maori people1, to tools which enable citizens to access services provided by their governments. From the case of the mission creep observed in the UK's plan for national register during world war two2, to the case of the prevalence of identity-documents to access services offered by governments today; an identifying-document has become integral to access almost all the services offered by the state. Another example is the case of Swedish banks issuing identity documents to help their customers prove their identity while utilizing the bank's checks' 3. This ID which aimed to solve a single use case had later evolved to become an officially accepted ID too3.

ID : Usage and Concerns

While the social media platform Facebook requires its users to provide their Identity Card to prove their identity4, there is no clarity as to whether Facebook could utilize said ID data

for other purposes or how it would be stored further. Questions like who would have access to such data and for how long are something an average facebook user would be unclear about while submitting their ID here. While this instance notes ambiguous terms of possible usage and further the acceptance of utilising ID in such a manner by citizens; the following instance analyses the resistance to ID utilisation in the private sector by citizens. It could be observed that enforcing ID usage in private organizations, as observed with the case of a school in Sweden, which needed teachers and parents to log into the school's services through the state provided electronic ID, (used to access services provided by state and also perform private activities like shopping) was met with resistance as there was reticence from teachers' about utilizing their private eID's in a professional setting6. A similar phenomenon could be seen with the staff of the hospital who were asked to do the same, and were further incentivized by linking access to auxiliary services like parking, coffee and more with staff's respective eID and further observed noticeable resistance from staff6. While the above cases reflect the varied stances of citizens towards the utilisation of their ID data, notifying citizens about the scope of utilisation of their data could enable them to further make informed decisions about the same in both cases.

Data Used

- The case of India's Aadhaar informing citizens about the virtual verification process5 without providing awareness about the ID data safeguarding mechanisms

- The sharing and usage of citizen ID data between Brazil's inter-governmental agencies for purposes other than which it was collected for7; showing such activities are not adhering to the country's data protection legislation

- Argentina's use of citizen ID data by inter-governmental agencies8 from the law enforcement to provincial authorities, which raises concerns about the extent and purposes to which such citizen ID data will be utilized

- The case of Chilean ID, being used as a tool of citizen profiling by private entities like supermarkets, pharmacies and more who convey the need for the citizen ID number to access discounts and loyalty programs9. Along with campaigns10 to make citizens aware of such practices and the recent Data Protection Law11 attempt to curb the same.

- While Philippines taking preemptive measures to protect personal information of citizens online; has passed a data protection law first before passing the ID law to safeguard citizen data 12 but could still be vulnerable to cases of government employees utilizing citizen contact information they are not authorized to access13;

- The case of Bangladesh's ID program which has laws to dissuade citizens from providing falsified data while enrolling for their ID; but lacks laws which protect citizen privacy with respect to the ID information in the database14

- The case of Kenya whose digital ID initiative has also been blocked by the High Court of Kenya in the past due to concerns with respect to data protection15

- And the case of the Australian ID system where data would be stored in a centralized mode further making it more susceptible to attacks; it also wouldn't be allowing citizens to selectively disclose their information and leaves them vulnerable to being tracked while they access various services16

- And the case of the European Digital Wallet where citizens' concerns like their mistrust towards private actors providing ID services and their uncertainty about the scope and usage of wallet led to a negative perception towards the wallet17.

Key Findings

The gaps in laws and data safeguarding mechanisms around ID cards have resulted in concerns ranging from data safety, profiling, privacy breaches and abuse of data. This requires a policy which recognises the need for mechanisms to enable citizens to effectively understand what is happening with their data, who is using it and how many times, which actors could have access to it, along with providing a real time awareness of such factors as and when their data is accessed is needed to help them further decide to consent to the same or not. Apart from data safeguarding measures, decentralised storage with zero knowledge proof and tiered access, limiting scope of utilization of ID data this way could lead to an increase in the usage of IDs and citizen trust. While this literature review utilised secondary research methods to analyze how identity systems are developed and utilized across countries; it further aims to theorize how an ideal ID system without the gaps noticed in existing IDs could look like. The paper intends to also provide the results of a citizen survey, asking ID using citizens what their version of an ID would look like to further shed light on the ID requirements of citizens versus the thinking of the state while designing IDs.

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AI-Powered Evidence Synthesis for Policymaking.

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Keywords: Evidence synthesis, Public policy, Policymaking, Big data, AI

Abstract

Addressing complex policy challenges demands integrating knowledge and evidence from diverse contexts, disciplines, and perspectives. However, the sheer volume and fragmented nature of this evidence base often hinders its effective use by policymakers. While digital technologies offer the potential to improve evidence accessibility, the expanding and diversifying knowledge landscape, exacerbated by these very technologies, continues to pose challenges in obtaining clear, relevant, systematic, comprehensive, and unbiased insights.

This paper explores the development and deployment of an AI-supported platform designed to empower policymakers to effectively question, identify, analyze, integrate, and evaluate evidence derived from disparate sources. Leveraging AI methods, the platform facilitates evidence discovery, navigation, and visualization, particularly within large repositories of publications and other relevant materials.

The central focus of this research is how such a platform can enhance evidence synthesis capabilities within civil service professionals engaged in policymaking. Adopting an evidence synthesis chain perspective, we map the role of the AI platform alongside the knowledge needs and evidence utilization patterns of civil servants, encompassing both scientific evidence and policy evaluations. As the platform is currently under development, its direct effects cannot yet be measured. However, this pre-deployment phase allows us to explore potential impacts and generate valuable insights. These

include: (1) anticipated user acceptance of such platforms, including how stakeholders balance data-driven insights with professional expertise; (2) the expected influence of AI integration on policy products (e.g., advice, policy documents) and outcomes; and (3) the critical consideration of public values in the design and deployment of AI systems. Recognizing that AI systems are not neutral, we examine how training data characteristics, output selection and visualization, and the level of explainability can influence the trade-offs inherent in policymaking, particularly in light of potential biases.

Based on the analysis, we discuss how responsible AI might support the development of evidence-informed capacity within policy departments and science-for-policy units. And draw attention to how these units assess and address the inherent complexity, volume, and unstructured nature of the available evidence. Furthermore, the research provides insights on how these units navigate the interplay between existing human workflows, expert knowledge, evaluation, and analysis processes with the capabilities offered by the platform. Crucially, we acknowledge that sources and methods often exhibit significant uncertainties and biases. While experts are typically aware of these limitations, they often lack the tools and methodologies to effectively manage them in their daily work. Based on these insights, this research aims to inform the development and implementation of the platform, maximizing its potential to support evidence-informed policymaking.

Panel: Session 4A

Between Promise and Problem: Data-Driven Models in Sustainability Policy

Speakers:

Jurriaan **Parie** - Co-founder of NGO Algorithm Audit
Eefje **Cuppen** - Director at Rathenau Institute
Alex **Ingrams** - Associate Professor at Leiden University

Chair: Jiska **Engelbert** - Director of the LDE Centre for BOLD Cities

Abstract

The use of complex, data-driven models in government policy and implementation is growing rapidly. Thanks to increasingly powerful computational techniques and the growing availability of data, these models are able to represent complex societal and ecological systems with increasing accuracy. They make it possible to explore policy interventions, predict effects, and support decision-making with scientific insights.

Between the promise of improved policy information and the reality of societal decision-making lies a tension. The use of models not only changes how policy is made, but also who gets to influence it and which types of knowledge are considered legitimate. This raises fundamental questions about transparency, explainability, and political legitimacy. These models are not neutral reflections of reality; they contain assumptions, normative choices, and abstractions that are rarely fully accessible to policymakers, citizens, or stakeholders. In a democratic context, where decision-making involves more than just data, models themselves can become contested.

In this plenary panel, we explore three crucial perspectives:

- The potential of these models for forward-looking sustainability policy, especially in light of recent technological and scientific developments.
- The requirements for transparency, explainability, and contestability of models that support public decision-making.

- The practical use of models in the political arena: how they are deployed, questioned, or even rejected — and what that means for their role in the policy process.

Central question of the panel:

How do the opportunities of complex, data-driven models relate to their limitations and political sensitivities, and what realistic demands can we make regarding the standardization and transparency of their scientific and democratic legitimacy?

Session 4B: Data Law & Governance for the Digital and Green Transitions

Circular by Design: The Role of Data Governance and IPRs in a Circular Economy

Laura Zoboli[1]

1. University of Brescia

Keywords: Trade secrets, intellectual property rights, R-activities, data governance, twin transition

Abstract

This paper explores the critical role of intellectual property rights (IPRs) and data governance in enabling the transition to a circular economy—an economic model that prioritizes resource efficiency by promoting repair, reuse, and recycling (the R-activities). It argues that IPRs, rooted in the traditional linear economy ("take-make-use-dispose"), often obstruct circular practices by restricting access to essential knowledge and tools. Moreover, the effectiveness of R-activities hinges on access to technical data needed to repair products, extend their lifespan, or recover value—data that is frequently protected by trade secrets and thus inaccessible. The paper highlights the resulting tensions between proprietary control and public interest and offers policy proposals to recalibrate IPR and data governance frameworks. Special attention is given to the need for rethinking trade secret protections to better align with circular economy goals.

Risk and Inequality in Africa's Data-Driven Green Transitions.

Jamie Fuller[1] and Anri Van der Spuy[2]

1. Research ICT Africa
2. London School of Economics

Keywords: Risk, risk management, socio-digital inequalities, development, SDGs, data-driven green initiatives, African contexts, human rights, organised irresponsibility

Abstract

Few would dispute the breakneck pace of technological innovation – its only rival is perhaps the alarming advance of global warming. Against this backdrop, it is unsurprising that there should be increased interest globally – from governments, technologists, civil society, and other stakeholders, in how to leverage technology and data-driven solutions to address global warming and to support the green transition. This is especially true since the United Nations' *2030 Agenda for Sustainable Development* (UNGA, 2015) positioned digital solutions as enablers for achieving the UN Sustainable Development Goals (SDGs), including urgent climate change action (e.g., SDGs 9 and 13) (Souter, 2021).[1] On the African continent, the potential of digital solutions to build climate-resilient development pathways has captured the attention of foreign and multilateral stakeholders across public and private sectors, reflected in growing financial commitments (African Development Bank, 2023, 2024). In 2023, Multilateral Development Banks collectively allocated a record $74.7 billion to low- and middle-income countries, with 67% directed towards climate mitigation and 33% towards adaptation efforts. Notably, 38% of this funding was mobilised from private sector sources (Multilateral Development Banks, 2024).

While data-driven interventions hold immense potential to support environmental sustainability, they may also introduce or exacerbate harms and threaten to be most destructive for those already living in vulnerable conditions. Such a negative outcome would contradict the international development community's core SDG principle to "leave

no one behind". There is already growing evidence indicating that underlying socio-economic inequalities are mirrored in digital inequalities as well as inequalities in climate resilience (Gillwald and Partridge, 2022; Milanovic, 2016; United Nations, 2017; Chancel et al, 2023). However, the interaction of data-driven green initiatives with these inequalities, particularly in African contexts, remains poorly understood and underexplored.

As such, this proposed research explores the question, "What risks emerge when data initiatives are used to support green transitions, specifically in the presence of socio-digital inequalities in African contexts, and how do we manage these?".

To this end, a conceptual framework is constructed that combines Ulrich Beck's global risk theory (1992) with relevant human rights frameworks (e.g., the Universal Declaration of Human Rights (UNGA, 1948) and the African Charter on Human and Peoples' Rights (OAU, 1981). Our framework defines "risk" as "uncertain outcomes with respect to something we value," and therefore understands risks as having both negative and positive dimensions (Beck, 2006). This broad view of risk enables a more comprehensive approach to understanding and managing risk, addressing both potential harms (notably the deepening of socio-digital inequalities) and the benefits of digital interventions in environmental sustainability efforts (Van der Spuy, 2023; Van der Spuy et al., 2024).

The co-existence and interchange between positive and negative outcomes is especially pertinent in the context of data-driven green solutions, given that the use of data for environmental ends can in itself have detrimental environmental effects (c.f., Beck, 1995).

Embedding Beck's account of risk into the human rights frameworks relevant to African contexts means that the potential benefits and harms of data-driven green solutions are understood in terms of how they advance, protect or impede human rights. Among the virtues of adopting human rights frameworks are the global consensus of certain instruments (e.g., the Universal Declaration of Human Rights) and an emphasis on economic, social, cultural, and civil rights (e.g., the African Charter on Human and Peoples Rights). This emphasis is salient given the potential and uneven implications of climate change on populations, nations and the environment.

We will examine the utility of our framework by applying it to select cases from African contexts. This application involves identifying and defining risks, mapping relevant stakeholders, and assigning responsibilities for the management of these risks. To do so, the research will draw from Research ICT Africa's After Access survey data, which serve as the only nationally representative household surveys on digital technology access and use across multiple African countries (Gillwald & Mothobi, 2019). The data has been disaggregated to reveal digital inequalities at the intersection of multiple groups, for

example, to show patterns in digital access and use between women of different ages, dwelling locations, income and level of formal education.

Drawing on this data, we use Helsper's notion of "socio-digital inequalities" to analyse data-driven green initiatives in African contexts faced with inequalities that span social and digital dimensions. These inequalities are understood as 'systematic differences between groups, countries, and regions in the opportunity and ability to engage (or to decide not to engage) with ICTs in ways that facilitate beneficial outcomes across all domains of everyday life while avoiding negative outcomes for [oneself] and others now and in the future' (Helsper, 2023). From a policy perspective, an important focus of the research is how data-driven green solutions may give rise to what Beck calls "organized irresponsibility". This is a phenomenon that occurs when multiple stakeholders—including traditionally powerful institutions like governments, development partners, and technology vendors – conceal, deny, avoid or even redistribute the responsibility for risk management (Beck, 2009). "Risk arbitrage", in turn, happens when the responsibility for risk management is redesignated along asymmetric power relations, so that the intended beneficiaries of data-driven green initiatives (in this case), end up being responsible for managing associated risks (Curran, 2018).

The proposed research makes several important contributions. At its core, the study develops a novel conceptual framework that it tests through African case studies and supports with demand-side household survey data and desktop research. Moreover, the work addresses a critical gap in understanding the intersection of risk, socio-digital inequalities, and environmental sustainability in Africa, and brings vital African perspectives to global governance discussions. Beyond its theoretical contributions, the research offers urgent, practical recommendations for managing risks in data-driven green initiatives.

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Addressing AI's Hidden Sustainability Costs: Challenges in the EU AI Act and Ireland's Digital Policy.

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Keywords: Data Centres, digital policy, sustainability, AI Act, Ireland

Abstract

Discussions on Big Data and AI have moved away from the narratives of "immateriality" that shaped digital discourse over the past two decades. Scholars, industry leaders, Civil Society Organisations, and policymakers now recognise the profound material entanglements of AI and Big Data, as well as their dependence on human labour and natural resources such as minerals, water, and electricity.

The global expansion of data centres exemplifies this shift, initially driven by social media platforms adapting to the demands of Big Data and now further accelerated by the rise of AI. Large-scale AI models, such as ChatGPT and Gemini, require vast resources, from human labour for data annotation to the energy-intensive infrastructure necessary for their operation. Research on Generative AI indicates that a single AI-generated response can consume significantly more energy than a traditional search query. As AI systems become increasingly embedded in everyday digital life, digital policy must address new governance challenges, including the sustainability risks posed by the widespread adoption of generative AI. Ireland has become a focal point in research on data centres, as its policy and regulation have created a 'fertile ground' for major tech companies to invest in data infrastructure development, which now accounts for a significant portion of the country's energy consumption.

Our paper examines these issues within the framework of EU regulation, and the digital policy of Ireland, focusing on the AI Act and its predecessor documents that laid the groundwork for its adoption.

The EU framework is particularly significant as the first comprehensive and legally binding AI regulation, adopting a risk-based approach to AI governance. However, we argue that despite its notable advancements, it remains inadequate in addressing AI's sustainability risks. Relying heavily on a number of Floating Point Operations (FLOPs) as a criterion to categories systemic AI risks, such an approach only captures partial understandings of sustainability risks thereby rendering sustainability impacts on environment and communities as 'hidden costs' along the AI supply chain. A comprehensive and effective risk assessment and categorization necessitates an holistic approach to the AI supply chain in order to highlight these hidden costs across development, deployment and continuous operation of AI applications. This perspective, as it will be shown, is missing from the EU framework and the ways in which it recognises AI-related risks.

This paper has therefore a dual focus, exploring both the policy implications of data centres and their sustainability issues in Ireland and the EU. Firstly, the paper will deploy evidence from Ireland to demonstrate the practical limitations of AI policy when applied in cases of what we describe as "extreme infrastructural constraint" for sustainability. In Ireland, the tech hub leadership role with EU operations headquartered locally has enabled the expansion of cloud infrastructures and construction of high concentrations of 'hyperscale' data centre campuses in the Dublin suburbs. In 2023, 21% of the country's electricity was used on a daily basis to support European cloud-based activity (alongside other 'colocation' providers) creating strain for utilities and the policy makers regulating them. Policymakers and utilities regulators is instructive for the growth of such infrastructure on a wider basis across the EU.

On the other hand, from a regulatory perspective, the tech industry argues that data centres are the essential engine of AI growth — and all of the economic growth that it promises. The data centre industry is keen to shield itself from overt AI policy, shifting policy debates to discussions of energy efficiency. In Ireland, we have seen how the distinction between infrastructure (and efficiencies) and data-driven applications (and AI policy) has been artificially maintained — data centres are considered critical for AI, yet information about their operation is treated as proprietary and remains undisclosed by regulators and policymakers at the behest of the industry. By citing the need to protect sensitive information and trade secrets,

the AI industry further obstructs AI governance and exacerbates the lack of transparency regarding the operational costs of emerging technologies.

In this paper, we intend to present preliminary answers to the question: what are the implications of rendering these infrastructures 'critical' to AI growth if their hidden sustainability costs are shielded from the regulatory frameworks of AI? In this sense, we will argue that we need to overcome artificial regulatory distinctions and policy omissions to fully consider AI systems impacts along the supply chain.

Our perspective will inform policy questions beyond Ireland and provides a basis to critically examine sustainability omissions in the EU regulatory framework. Our paper will analyze references to sustainability in key EU policy documents, including the Coordinated Plan on Artificial Intelligence (2021), the Energy Efficiency Directive (revised in 2023), and the AI Act (ratified in 2024), together with Ireland's original and updated National AI strategies. We argue that these documents indicate that the EU acknowledges the need for sustainable AI but this does not translate into clear guidelines for transparency regarding AI infrastructures (data centres particularly) or into specific policies that illuminate and ensure sustainability requirements across the AI supply chain.

By focusing on the AI Act, as a legally binding regulation for EU member states, we will seek to demonstrate how to acknowledge and respond to contradictions between the declared goals for 'sustainable AI' across EU documents and the AI Act's limited provisions on sustainability through its risk categorisation approach.

Finally, our paper will propose regulatory updates that explicitly incorporate the environmental impact of AI systems as key criteria for risk assessment and governance.

Sustainable Worlds: A Comparative Analysis of Policy Discourses Regarding Green IoT in Europe, the United States, and China.

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Keywords: Internet of Things (IoT), Sustainability, Policy, Framing, Document Analysis, Comparative

Abstract

As billions of connected devices generate vast amounts of data and enable new forms of automation and optimization, policymakers worldwide are considering how Internet of Things (IoT) technologies may advance environmental sustainability (Arias et al., 2018) - green IoT (Zhou et al., 2021). The present analysis explores how the relationship of IoT and sustainability is being conceived in policy discourses across Europe, the United States, and China. By analyzing key policy documents and white papers from national and supranational organizations, we uncover dominant narratives and imaginaries, priorities and premises, regarding the

potential of IoT for sustainable development, departing from the conceptual perspective of framing theory (Scheufele, 1999).

Our study addresses the following three research questions: 1) Which affordances (Gibson, 1979) of the IoT do policy discourses identify and promote in Europe, the U.S., and China? 2) In what distinctive ways is IoT being integrated into sustainability policies in Europe, the U.S., and China, respectively? 3) What are some of the main differences and similarities across regional green IoT policies?

Our sample consists of 22 documents - policy briefs, reports, and whitepapers - from (supra)national organizations in Europe (e.g., European Commission), the U.S. (e. g., Cybersecurity and Infrastructure Security Agency), and China (e.g., The State Council of P.R. China). Documents were selected to capture a range of policy perspectives from each of the three regions. We accessed the websites of the various agencies and entered the search terms 'IoT' OR 'Internet of Things' AND 'sustainable' OR 'sustainability'. Following a manual review of search results, we curated a dataset of 22 policy documents: 5 from the European Commission, 10 from the U.S. federal government, and 7 from China's state-level government. The sample includes publications from 2015 - 2025 in English or Chinese.

Our analysis relies on document analysis, which entails a qualitative close reading to ascertain how IoT, sustainability, and their interrelations are framed in different categories of documents and across the three regions. We complement this with the 'What is the Problem Represented to Be' (WPR) method (Bacci, 2009; 2012), which highlights assumptions regarding present problems and proposed solutions associated with IoT, revealing implicit ideologies and underlying politics. Together, the two methods allow us to infer and critically reflect on representations of problems and solutions embedded within these texts: What, exactly, is the problem or crisis at hand (e.g., climate change, urban inefficiency, economic development), which implicit premises inform definitions of problems and solutions, and what alternative premises and arguments are excluded or silenced (Suchman, 2023)? By clarifying the ideological motivations driving the discursive dynamics of policy documents, the paper not only identifies key policy topics regarding IoT systems, but also explores how the different political regimes of the three regions conceptualize challenges and opportunities for the governance and regulation of IoT.

Findings reveal distinct differences in the linkages between IoT and sustainability across the three regions. In Europe, there is a pronounced focus on values and ethics guiding human- technology interaction, alongside opportunities leveraging measurement and information technologies, exemplified by initiatives such as

“Destination Earth”, a digital twin project for environmental prediction and crisis management. Digital technologies, including IoT, are framed as integral to sustainability policies, with an emphasis that the digital sector itself must adopt green principles.

A defining characteristic of the European approach is the framing of digital and green transformations as twin, interdependent challenges that must be addressed hand-in-hand.

In the U.S., IoT is portrayed both as a driver of economic and technological innovation and as a source of significant security and privacy risks, raising serious concerns around national security, consumer protection, and digital resilience. Policy documents highlight IoT’s affordances such as operational efficiency through automation, remote control, and real-time data processing; enhancement of health and personal well-being via remote diagnostics, elder care, and fitness tracking; infrastructure resilience including smart energy grids and connected transportation; and improved public services enabled by data-informed decision-making. At the same time, the documents address major concerns including security gaps related to device and data protection, weak encryption, inadequate authentication, privacy risks from extensive data collection and profiling, and the lack of universal standards, regulations, and certification schemes.

China’s IoT policy framework strongly emphasizes digital transformation, including advancing the digital economy and integrating digital technologies into traditional industries. It also expands IoT innovation and applications, and builds new infrastructure by strengthening foundational networks and supporting next-generation connectivity - particularly through mobile IoT and intelligent connectivity initiatives designed to facilitate seamless interconnection of devices and enable smart applications across industries. The country also highlights standardization and security frameworks to ensure interoperability, safety, and data protection in networks, to enhance standards and security, and to promote smart governance for integrated policy and regulatory effectiveness.

Across regions, notable similarities exist. All recognize IoT as a strategic enabler for digital transformation and economic growth. Each emphasizes the critical need for security, privacy, and standardized frameworks and focuses on IoT applications that improve infrastructure, public services, and industry. However, distinct regional differences emerge: Europe strongly emphasizes ethical considerations and the dual challenge of synchronizing green and digital transitions; the United States balances innovation promotion with addressing significant security and privacy

risks; and China adopts a centralized, government-led approach prioritizing infrastructure development, robust standards, and coordinated governance.

This study makes two contributions to the emerging field of green IoT and associated policy and governance issues. First, we offer one of the first comparative analyses of how IoT is framed within policy discourses regarding sustainability across three geopolitical regions: Europe, the U.S., and China. By scrutinizing policy documents from these regions, we uncover distinct approaches to having IoT technologies serve sustainability goals. Second, our methodological contribution demonstrates how qualitative document analysis can effectively map policy discourses concerning technological innovation and sustainable developments. The systematic identification of dominant framings will support further studies of the rapidly evolving domain of green IoT.

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AI Governance and Social Equity: A Comparative Study of Regional Divides in a Global Context.

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Keywords: AI Governance, Social Equity, Digital Divide, AI Divide, AI Strategies, Global North, Global South, Cultural East, Cultural West, Sustainable Development, SDG

Abstract

This paper examines the status and effectiveness of countries in protecting social equity through their AI governance frameworks, and their readiness to tackle this global challenge. It conducts an empirical analysis of national AI strategies in a global context, exploring the divides between the Global North/South and Cultural East/West. In the AI era, increased supercomputing power and advancements in Big Data technologies have enabled AI to create significant opportunities across all major policy areas (Duan, 2019).

However, these technologies also present unprecedented risks, such as exacerbating social inequities and reducing employment through AI automation (Agarwal, 2018). Given the expected profound impact of AI on the future of work and employment, maintaining social equity is crucial. This includes preventing the displacement of vulnerable groups like low-income and low-skilled workers, enhancing training and education initiatives, and protecting those who may not be able to make the AI transition. Such measures are essential to ensure the sustainable development of AI and to achieve the United Nations' Sustainable Development Goals (SDGs), including no poverty (SDG 1), quality education (SDG 4), gender equality (SDG 5), reduced inequalities (SDG 10), and decent work and economic growth (SDG 8).

Through the analytical lens of social equity, AI automation presents two major implications. First, it contributes to structural unemployment. Second, it creates a structural mismatch in job skills. Neither of these social equity concerns can be resolved by the market or individuals alone (Frederickson, 2019). However, at the same time, the threat of job disruption can be transformed into opportunities for social equity with proper governmental efforts during digital transformation. AI surpasses humans in only specific areas of work.

Work can be analyzed along two dimensions: the level of social interaction and the degree of optimization required (Lee, 2018). Jobs that require minimal social interaction and are primarily optimization-based are more susceptible to AI automation. Conversely, jobs that demand social skills and creativity face the lowest risk of replacement by AI. In this context, humans augmented by AI have enormous potential for job recreation. With the rise of AI, a division of labor between humans and AI emerges, based on their comparative advantages (World Economic Forum, 2023). This allows human workers to maximize their social and creative intelligence, which distinctly sets them apart from AI.

Facing the global challenge of social equity in the AI era, policymakers and scholars must proactively address the transformations AI introduces to social equity, rather than passively waiting for optimal outcomes to emerge spontaneously (Wong et al., 2024). To mitigate the negative effects of AI on job disruption, literature suggests approaches such as reduction, redistribution, and retraining. “Reduction” involves decreasing working hours and promoting job sharing, which, while potentially lowering wages, can minimize unemployment. Given that non-social and optimization-based jobs are likely to be replaced by AI, a critical social equity concern should be to protect the income and living standards of employees most susceptible to automation. Education and retraining are crucial for enabling citizens to thrive in a digitally transformed economy. Policymakers should intensify efforts in these areas to facilitate a mutually beneficial coexistence with AI automation. Equipped with skills in social and creative intelligence, employees are less likely to be sidelined in this “natural selection” and more likely to prosper in the AI-driven job market. However, it is insufficient to declare education the “silver bullet” for all social equity challenges in the AI era. Policy options like Universal Basic Income (UBI) should also be considered to ensure social equity for all.

Despite the prevailing focus on AI for economic growth, there is a notable imbalance with research on AI for social equity (Blessett et al., 2019). To address this gap, we will conduct a content analysis of the national AI strategies of major countries globally. This analysis will assess whether governments are adequately prepared for ensuring social equity in their AI governance and will examine potential divides across traditional boundaries such as Global North/South and Cultural East/West.

The study will include representative countries from four categories:

Global North/Cultural West: e.g., US, UK, France, Australia

Global North/Cultural East: e.g., Singapore, Hong Kong, South Korea, Japan

Global South/Cultural West: e.g., Turkey, Nigeria, Egypt, Brazil

Global South/Cultural East: e.g., India, Vietnam, Philippines, Thailand

These documents will be analyzed using qualitative content analysis focusing on the theme of social equity in the AI era, employing both inductive and deductive coding methods. The OECD.AI Policy Observatory will serve as the primary database for accessing AI documents from these countries, supplemented by an extensive online search to ensure comprehensive study coverage. Ultimately, this paper will evaluate whether there is a new "AI divide" in terms of social equity between the Global North/South and Cultural East/West and to what extent the proper policies and measures as discussed in the literature review and theory sections are adopted by governments of those countries. The conclusion will provide policy and theoretical recommendations based on our findings and relevant theoretical frameworks.

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Brokering biodiversity knowledge: the role of market-led initiatives.

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Keywords: Biodiversity, Finance, Investor Networks, Knowledge Brokers

Abstract

In 2022, the United Nations Biodiversity Conference (COP15) adopted the Kunming-Montreal Global Biodiversity Framework (GBF), often referred to as the "Paris Agreement of Biodiversity". The GBF provided a global set of goals and targets to halt and reverse nature loss by 2030, including the aim to mobilize $200 billion of both private and public capital annually. As a result, institutional investors are increasingly aiming to integrate biodiversity-related considerations in their investment strategies.

Earlier research has highlighted the role of market-led initiatives in facilitating institutional investors with needed knowledge to facilitate this process. These initiatives take a science-based approach to facilitate standard setting and impact measurements (e.g. Taskforce for Nature-Related Financial Disclosures) or accounting frameworks and methodologies (e.g. Partnership for Biodiversity Accounting Financials). However, the are risks of greenwashing -and more specifically science-washing (Borie and Bracking, 2024)- are prevalent in biodiversity finance, as biodiversity cannot be captured by a single metric such as carbon emissions in climate finance. Organizations active at the science-policy interface, often described as knowledge brokers in the STS literature, can play a political role in the mediation process through 'orchestration', 'ideational alignment' and 'calibration' (Littoz-Monnet, 2020).

To assess the role market-led initiatives play in the knowledge-mediation process we conduct in-depth case studies of three investors networks holding in-depth interviews with key actors. Additionally, we collect data through observations at industry meetings. We find that investor networks perform as knowledge broker with a primary focus on the 'orchestration' of the process, but to a lesser extent create spaces for 'ideational alignment' and 'calibration' of scientific knowledge.

Session 4D: Digital & Data-driven Transformations in Governance

Governance considerations in a time of digital and sustainability transition.

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Keywords: Public Sector, Public decision-making, Artificial Intelligence, Sustainable Development, Twin

(Virtual Presentation)

Abstract

The coming fifth industrial revolution represented by Artificial Intelligence (AI) promises society-wide paradigm shifts in ways of knowing and doing. This is paralleled by ongoing efforts to achieve sustainable development. While this Twin Transition (Muench et al., 2022) is garnering much interest, little attention has been paid to the place of public servants within it.

To address this gap, this presentation seeks to understand AI-Policy-Sustainability interfaces from the perspective of public servants, in relation to the following research questions:
1. What is the role of the public sector in steering and mediating the AI and sustainability transitions?
2. How might public sector processes and government objectives themselves be directly influenced by these dual shifts?
3. How can public servants navigate the Twin Transition within their daily practice?

Quests for both the attainment of sustainability and the proliferation of AI are longstanding. Sustainable development has been a globally accepted idea from 1972 and clearly articulated goal from 1987 (United Nations, 1972; World Commission on Environment and Development, 1987), and AI ostensibly from the 1950s with the work

of Turing (1950), Samuel (1959) and McCarthy (2006). Yet, their paths to realisation and current momentum are somewhat different.

On the one hand, sustainability has been progressing incrementally, encouraged discursively by regular intergovernmental conferences and commitments, but practically progressing at insufficient speed if we are to ensure human flourishing within planetary boundaries (Richardson et al., 2023). Despite recurring crises that could serve to tangibly illustrate a need for expedited change, Baumgartner and Jones' (1993) notion of punctuated equilibrium leading to a new normal has failed to materialise.

On the other hand, until recently, AI has arguably been the domain of tech 'nerds' and sci-fi fans. General discourse and popular culture have seemingly focussed on what it could be if fully realised, while in the background more limited automation has quietly woven its way into our lives. Yet, in 2022 AI did realise something of a punctuated equilibrium with the release of Chat-GPT. It and the proliferation of other generative tools its release ushered in provided a salient introduction to AI for the broader populace, leading to a demand and race for more (e.g., Kohler, 2025).

Such commonalities and differences have implications for how the public sectors that support our elected officials go about developing and implementing policies that set the terms for what is desired and accepted within our societies. Bureaucrats are shapers, but also themselves shaped by such transitions (Burch, 2018). Thus, there is a need to deeply consider what longstanding public decision-making norms and practices will help determine the futures we realise through the Twin Transition, and which will be abandoned.

This presentation will explore these different facets of transition from the perspective of the public sector and servants to understand possible institutional metamorphosis pathways and pitfalls in the face of dual whole of system transformations.

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Proactive-by-Design: The Future of Governance Beyond Bureaucracy?

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Keywords: Public service, proactive public service, proactivity, one-stop government

Abstract

Proactive public services refer to services that anticipate citizens' needs and provide timely interventions without requiring formal user requests. This is achieved by using existing data on individuals to verify their eligibility for a service and trigger its provision. These services leverage data, digital infrastructures, and cross-agency coordination to offer benefits such as increased convenience, better citizen outcomes, and greater service efficiency.

However, the shift to proactive public services also raises challenges, such as safeguarding autonomy, ensuring inclusivity, addressing legal and privacy concerns, and managing the complexity of integrating existing systems, to name just a few. While the transition is gaining traction in practice, many approaches often remain ad-hoc, due to limited shared knowledge and scarce documentation of practices and experiences. This is also observed in scientific literature with only a few studies available on the topic and a limited understanding of what proactivity entails, its benefits, and challenges associated with their implementation.

While there is growing momentum towards proactive service delivery, challenges persist in defining appropriate levels of proactivity, ensuring legal compliance, and

securing citizen trust. This study aims to bridge these gaps by analysing key enablers, barriers, and existing practices for successful implementation.
To do so, we conducted a Systematic Literature Review (SLR across Scopus, Web of Science and Digital Government Research Library. Despite the popularity of the topic at the level of discourse and practical developments in public administration across Europe, academic research on proactive public services remain scarce. Our SLR applied minimal exclusion criteria and yielded only 18 relevant studies. Moreover, most of these studies focus on selected areas of public service proactivity and are largely conceptual in nature.

Results suggest that proactive public services can streamline citizen-government interactions, enhancing efficiency and accessibility while reducing bureaucracy. Minimizing citizen effort emerged as the top benefit, with seamless service delivery as a core goal. For citizens, these services can simplify daily life, particularly aiding vulnerable groups by removing barriers to essential services, thereby promoting equality by ensuring eligible individuals receive services automatically, thereby reducing information gaps and administrative costs. Governments can shift from merely approving requests to actively delivering user-centric services, improving trust and operational performance. While an attentive government model enhances responsiveness, a no-stop government model maximizes efficiency by delivering services automatically.

Key motivators for proactive service provision include increased digital adoption, vast data availability, citizen-centricity, and the need to streamline interactions with government agencies. Social, technical, and service quality factors influence citizen acceptance, while automation -or at least augmentation- and AI-driven decision-making present both efficiency gains and risks related to control, fairness, and accountability.

A major challenge is the lack of a clear understanding of proactivity, what it means and how to determine the appropriate level of proactivity for different services. Public services do not simply fall into reactive or proactive categories but exist on a spectrum of proactivity. This is shaped by factors such as the effort required from citizens, the actor triggering the service, and the level of interaction and information needed. Overall, the level of proactivity in public services can be influenced by technological, governance, and contextual elements. Multiple drivers shape proactivity, including social (clarity of information and practitioner readiness), technological (databases and infrastructure), legislative (legal compliance and flexibility), ethical (clear communication of changes), and political (management attitudes and enforcement).

Furthermore, the complexity of proactive services makes standardization difficult, and citizens' readiness to accept them remains uncertain. There is also a lack of well-defined service design methodologies and robust quality assessment. However, several recent attempts have been made to propose proactive public services design principles have been recently made.

Despite growing interest, several open issues hinder the advancement of proactive public services. First, there is no consensus on how to define or measure appropriate levels of proactivity across service types, which complicates design efforts. Second, while personalization is a key benefit, it raises unresolved ethical concerns around data use, transparency, and explainability, particularly when services leverage sensitive or inferred data sources such as social media. Moreover, citizens' readiness and acceptance of such services remain poorly understood, with limited empirical insights into trust, control preferences, and opt-in versus opt-out mechanisms. Lastly, current design frameworks often lack systemic integration of legal, ethical, and user-centric perspectives, limiting their real-world applicability. Addressing these gaps requires both methodological innovation and cross-disciplinary dialogue, including greater engagement with users and practitioners through co-design and participatory development approaches.

While proactive public services are often seen as the future of public administration, it is relevant to acknowledge that not all public services can be fully proactive, though many can integrate proactive elements. The suitability of proactivity depends on service characteristics and user acceptance, with the main challenge lying in balancing democratic values with economic efficiency when designing such services.

This study not only explores the benefits of proactive public service delivery but also critically examines the potential drawbacks and barriers as well as explore existing practices, including best proactive services design practices, to offer a balanced view for informed decision-making and strategic agenda setting. However, given the limited academic literature identified through our SLR, our future study will complement and triangulate the synthesized insights with a grey literature review and expert workshops with scholars and public officials. The ultimate objective of this study is to provide actionable recommendations for EU Member States and policymakers, offering guidance on how to modernize public services through proactivity, while safeguarding citizens' rights and aligning with core EU public values.

Governance through Geotagging: Interpretations from the Indian state.

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Keywords: Digital governance, bureaucracy, policy implementation, data work, India

(Virtual Presentation)

Abstract

Introduction
Geotagging is the process through which geographic location information is linked to media such as photographs or videos. This paper examines the adoption of app-based geotagging by India's Ministry of Rural Development to monitor public infrastructure and government operations, and subsequent implications for bureaucratic governance. Using interviews and policy documents, I investigate how local bureaucrats understand and engage with geotagging, revealing tensions between its intended purpose and its perceived function within government operations. By mandating geotagging for an increasing number of assets and activities—such as rural employment and housing projects—the state integrates three types of "evidence": visual (photographs), temporal (time stamps), and spatial (geographic location). However, the interpretation and utilization of this data vary significantly across different bureaucratic levels, raising critical questions about (un)intended impacts of digital technology integration into policy implementation. By examining how bureaucrats interact with geotagging technology in their daily work, the study uncovers the nuanced ways in which digital evidence is produced, interpreted, and contested within governance structures.

Research Question
How do local bureaucrats in India perceive and engage with geotagging, and what does this reveal about the intersection of technology, governance, and bureaucratic practice?

Background and Motivation

Within the lower rungs of India's mammoth bureaucracy, geotagging takes on a life of its own and becomes the focus of everyday work practices, performance monitoring meetings, government orders, and citizen complaints. Studying geotagging provides a helpful entry point to understand the evolving everyday practice of bureaucracy and governance with and through digital technologies. On the surface, the contrast between paper-based processes to provide evidence of welfare delivery and app-based geotagging is dramatic. Paper-based bureaucratic processes are known to be slow and prone to corruption. On other hand, digital technologies increase the transmissibility of information and are thought to be more efficient and transparent. However, in this study, I move away from grand narratives of technical success and failure. Instead, I draw attention to the quotidian aspects of how geotagging operates beyond a tool of "technical rationality" (Noir and Walsham, 2007). While there has been much work on India's biometric identification system, Aadhar, and citizen-facing digital systems, governance technologies such as geotagging that function largely intra-bureaucratically, hidden from plain view, have received limited attention.

Within the grandiose narratives of 'Digital India,' which promises "maximum governance, minimum government," the geotaggers themselves and the actual work of geotagging are rendered invisible. Adopting a socio-technical approach, I draw on literature from science and technology studies, sociology of organizations, and anthropology of the state to explore geotagging as a governance tool. While policy makers view geotagging as a mechanism for enhancing transparency and accountability, local bureaucrats tasked with its implementation often see it as a routine obligation with little practical utility.

Methods

The research employs a mixed method approach, drawing on two years of participant observation, ethnographic interviews with local bureaucrats, and an in-depth analysis of policy documents.

Key Findings and Contributions

I contribute to growing work on the experience of digitization by examining the perceptions of lower-level bureaucrats who engage directly with the task of geotagging and the data generated through it. Beyond individual perceptions of this technology, I show the role it plays in intra-bureaucratic relations within the Indian state as an organization. In doing so, I seek to highlight the contradictions in how geotagging is presented and how it is experienced within the state.

Findings indicate that while policymakers emphasize the evidentiary value of geotagged data in promoting transparency, local bureaucrats largely disregard the visual component of the data. Instead, they perceive geotagging as a bureaucratic formality necessary to unlock funding from higher levels of government.
Here geotagging data becomes a symbol of knowledge (Hoeyer and Wadmann, 2020), leading to visibility and meaning generation through its very act of being captured rather than the content of the geotag. The geotag becomes a self-referential sign, its veracity secondary to its existence (Hoeyer and Wadmann, 2020; Leonardi and Treem, 2020). This transformation blurs the line between meaningful and meaningless work, raising questions about the perception of geotagging as either a mundane task or a meaningful contribution to governance processes.

Thus, this study contributes to ongoing debates on digital governance by demonstrating how technological interventions do not function in isolation but are embedded within pre- existing bureaucratic logics and hierarchies.

Furthermore, as data collected through geotagging is increasingly used to train algorithmic models, this research provides insights into the shifting dynamics of data work, statecraft, and the growing role of technology in governance. The study also raises critical questions about the implications of "technology creep" in bureaucratic decision-making and the governance of digital data as evidence.

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Session 4E: Private Sector Data for Public Interest in the EU – Government-Business Data Relations

Toward a Business Case for Data Collaboration: Deepening the 9Rs Framework to Incentivize Private Sector Data Access for Public Interest Re-Use.

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Keywords: B2G data sharing, 9Rs Framework, Incentives, Business case for data sharing, Regulatory

Abstract

Despite the growing consensus on the societal benefits of data reuse—ranging from improving public services to enhancing scientific discovery—voluntary private sector data sharing remains the exception rather than the norm. Prevailing policy efforts have focused predominantly on regulatory mandates, interoperability standards, and technical infrastructures. However, they often fail to address a critical missing piece: the absence of clear, compelling business incentives for firms to voluntarily collaborate through data. Without an articulated value proposition, data sharing is perceived by many private sector actors as a reputational, legal, and strategic risk rather than an opportunity.

This paper seeks to fill that gap by deepening and operationalizing the 9Rs Framework—a structured taxonomy of nine business rationales for private sector data reuse in the public interest—and empirically testing its resonance across firms and sectors.

The 9Rs Framework, developed by The GovLab, groups nine distinct incentives into three broad return-on-investment (ROI) domains:

1. Knowledge & Insights: Reciprocity, Rectifying Errors, Research & Insights, Reproducibility
2. Brand Equity: Reputation, Responsibility, Recruiting Talent
3. License to Operate: Regulatory Compliance, Revenue Generation

These "Rs" represent different manifestations of strategic logic that companies might adopt when considering data collaboration. Each R captures a distinct value proposition—from improving data quality to enhancing brand trust or generating new revenue streams. However, the framework has yet to be empirically validated across the diversity of firm types, industries, and jurisdictions.

Research Objective and Contributions

This paper aims to empirically refine and test the 9Rs Framework to better understand which incentives firms actually recognize, pursue, and communicate internally when evaluating the prospect of data collaboration. Specifically, the paper contributes:

- A structured analysis of how firms from different sectors and regions interpret and prioritize each "R."
- A typology of "R variants" that reflect firm-specific and sector-specific nuances in language, implementation, and strategic intent.
- A set of empirically grounded hypotheses on what conditions (regulatory, reputational, operational) catalyze or constrain the operationalization of each incentive.
- A deeper conceptual understanding of the barriers to implementing a business case for data sharing, especially regarding legal uncertainty, ROI ambiguity, and internal misalignment.

Methodology

The paper will be based on a Delphi-style study involving 100 corporate data stewards—executives and managers responsible for data strategy, compliance, or innovation—drawn from diverse sectors (e.g., finance, telecom, retail, health tech, mobility) and geographic regions (North America, Europe, Asia-Pacific, Latin America). Over multiple rounds of structured inquiry and reflection, participants were asked to:

- Rank the perceived relevance of each "R" to their organizational context.

• Describe actual examples of when and how they've acted upon each incentive.
• Identify barriers to implementation and language used within their firms.
• Evaluate how sectoral regulation (e.g., GDPR, the EU Data Act, competition law) supports or hinders the pursuit of each incentive.

Earlier Findings and Discussion

Earlier analysis from 9Rs applications in organizations such as Mastercard, Cuebiq/Spectus, UK Power Networks, Swisscom, and Google.org reveals that the perceived salience of each "R" varies widely across sectors and firm types:

• Reciprocity was highly valued in sectors where data ecosystems and federated analytics (e.g., in health or sustainability) are critical, but less so in traditional B2C industries wary of losing competitive advantage.
• Reputation and Responsibility were consistently emphasized in highly regulated and consumer-facing sectors, where brand trust is central to business continuity.
• Revenue Generation showed the greatest variation: while platform firms like Wikimedia Enterprise monetize open data through tiered API models, others view revenue-linked sharing as cannibalistic or strategically risky—especially in markets with unclear demand signals or regulatory guardrails.
• Reproducibility was appreciated in research-heavy firms or those partnering with academic institutions, but often misunderstood in operational contexts outside the sciences.

There is also a widespread semantic misalignment: many firms used terms such as "data partnerships," "shared value," or "innovation platforms" to refer to practices aligned with the Rs, but did not explicitly associate these actions with a broader strategic framework or return-on-investment model.

Hypotheses To be Tested through the Delphi Study

Building upon these previous findings, the paper will also test a set of additional hypotheses, including:
• Firms with embedded "data-for-good" teams are more likely to recognize Responsibility and Recruiting Talent as business-relevant incentives.
• The presence of a dedicated data stewardship role correlates with a more nuanced understanding of Reciprocity and Rectifying Errors.
• Legal ambiguity, particularly around data liability and competitive risk, is the most commonly cited barrier across Rs.
• Sector-specific regulation (e.g., ESG reporting, data localization laws) can either act as a catalyst (for Regulatory Compliance) or constraint (for Revenue Generation).

Implications for Policy and Practice

Our findings seek to have actionable implications for both policymakers and private sector leaders. For policymakers, the 9Rs Framework can serve as a diagnostic tool to tailor incentive-compatible engagement strategies, such as aligning regulatory requirements with reputational and reciprocity-based logics.
For firms, the framework provides a vocabulary and evaluative tool to internalize data reuse as a strategic asset, not a liability. Moreover, the sector-specific variants of Rs can inform the design of modular governance templates, co-investment models, and legal agreements that reflect diverse business logics.

Finally, this paper will propose a roadmap for integrating the 9Rs into data collaboratives, data-for-good alliances, and digital public infrastructure. By empirically grounding the business case for data reuse in real-world motivations, this paper seeks to shift the paradigm from mandates to mutual value—bridging the persistent gap between data abundance and data use for public good.

Intervenability and the Shallow Structuring of Data Governance in EU Data Spaces.

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Keywords: Data Space, Data Reuse, Intervenability, Data Access, Data Portability, GDPR, EHDS, Data Governance Act, Data Act

Abstract

The concept of data spaces in the European Union (EU) has evolved as part of the region's strategy to create a single market for data, in an attempt to boost data sharing with a view to promote innovation and competition. This development has been driven by various policy and legislative initiatives over the past five years. The idea of data spaces emerged from the European Data Strategy, released in 2020.

This strategy outlined the creation of Common European Data Spaces across multiple sectors to encourage data sharing and enhance innovation and competitiveness. Data spaces are presented as a paradigm shift in data governance. This is because they aim at incentivising decentralised or federated, interoperable, and sovereign approach to data sharing and usage. New regulatory frameworks such as the Data Governance Act (DGA), the Data Act (DA) and the European Health Data Space (EHDS) intend to contribute to such a paradigm shift. In an attempt to foster data reusability, they, among other things, introduce bespoke rights focused on data access and portability.

Intervenability in data governance refers to the ability of data principals—whether natural or legal persons—to exert some form of control over data practices that involve or affect them. Intervenability can pursue at least two different objectives: reusability

and contestability. Reusability refers to the ability of data principals to repurpose data for new or different uses. Contestability refers to the ability of data principals to challenge, dispute, or seek redress for data practices that improperly involve or adversely affect them.

The main goal of this paper is to unpack the concept of intervenability in the context of data spaces. This paper proceeds in two steps. It first argues that while the General Data Protection Regulation (GDPR) has not been specifically set up for data spaces, intervenability in data spaces should be viewed as a layered concept in which the GDPR functions as the foundational contestability layer benefiting data subjects, while the emerging rights in the Data Act and EHDS act as bridge rights pursuing rationales that are complementary to contestability. While at first glance, the Data Act and the EHDS seem to duplicate and extend key GDPR provisions, they primarily focus on reusability as opposed to contestability. Unpacking these distinct regulatory rationales through a layered approach makes it possible to assess both the strengths and limitations of regulatory frameworks and identify gaps that must be addressed to ensure meaningful intervenability and, ultimately, to justify the cumulative application of these frameworks in data spaces.

This paper therefore rejects a distributive approach to the interplay of the GDPR, the DGA, the DA and the EHDS. This view makes sense because it helps safeguarding the prerogatives of data subjects, who enjoy a wide range of fundamental rights protected by the Charter of Fundamental Rights of the European Union. This view implies, among other things, that the GDPR right to access remains a useful prerogative when DA and EHDS rights are held by natural persons.

Second, deconstructing the DGA, DA and EHDS this paper suggests that intervenability in a data space context should be assessed on the basis of at least five dimensions: interoperability, non-discrimination, privacy and data protection, input legitimacy and output legitimacy.

Interoperability – Refers to the ability of data providers and data users within a data space to seamlessly exchange data for reuse. It ensures that data can flow across different stakeholders without unnecessary technical barriers. Interoperability is key for enabling effective data reuse: it ensures reliability and consistency across various systems and applications.

Non-Discrimination – Ensures that access to and participation in a data space is fair and does not favour certain stakeholders over others. It prevents dominant players from restricting or controlling data access in a way that disadvantages smaller stakeholders,

or specific user groups. Non-discrimination is key for enabling diverse data reuse, making a broad range of data users potentially eligible.

Privacy and Data Protection – Focuses on ensuring that personal and sensitive data within the data space is handled in compliance with privacy law and the full range of data protection principles, including purpose limitation, lawfulness, fairness and transparency, data minimisation, integrity and confidentiality, accuracy and accountability. Privacy and data protection is key for preserving a high level of fundamental right protection in the context of data reuse.

Input Legitimacy – Focuses on the process of decision-making authorising data reuse and the participation of stakeholders. It is concerned with who gets to participate, how democratic the process is, and whether all relevant voices are heard. It emphasises procedural fairness, transparency, and accountability. Input legitimacy is usually talked about in terms of social license and would require to be effective granting rights not to authorise or to object to such data reuse. The idea of a "social license" means that data reuse should be accepted by of the wider community. Input legitimacy is key for prioritising data reuse that, at least initially, holds the potential to advance the social good.

Output Legitimacy – Focuses on the outcome of data reuse. It is concerned with whether data reuse produces results that benefit the wider community and would require to be effective granting rights to terminate data reuse and ask for restitution. Output legitimacy is key for auditing data reuse to determine whether its potential has been realised and to create a feedback loop that should inform future data reuse decisions.

This paper examines regulatory frameworks impacting data spaces in light of these five dimensions and shows in particular that input legitimacy does not necessarily imply GDPR consent. Moreover, output legitimacy is relatively weak. Limited ex post transparency obligations are introduced, e.g. for data altruism organisations, as well as limited ex ante disclosure, e.g. for health data access applicants.

The DGA, DA and EHDS primarily focus on setting up rules and procedures for data access and protection, even in the context of public-private data exchanges. Yet, output legitimacy would require additional mechanisms to measure and assess whether data reuse delivers meaningful benefits and/or pursue the public interest when such evidence is relevant.

Data for Green. (G2B) Data Sharing and State as a Platform.

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Keywords: Energy law, data law, data sharing, ESG, State as a Platform

Abstract

Research question

The energy sector is undergoing a profound transformation marked by the convergence of the energy transition and digitalisation. Data underpins this twin transition of the energy sector. At the intersection of energy law and data law, this paper seeks to assess the suitability of current legal frameworks to effectively support the ongoing energy transition within an increasingly digitalised energy ecosystem. Central to this inquiry is the evaluation of whether the existing legal framework applicable to non-personal data adequately address the requirement to share data for green purpose. This paper focuses more specifically on the role of public authorities in the sharing of data between (private) stakeholders for green purposes: what roles play public authorities in the sharing of data for the energy transition?

Research methodology

This study analyses the current European Union legal sources relevant to data in the energy sector. The fourth energy package, the financial regulations applicable to commodities, together with the recently enacted digital regulations constitute the main source of analysis.

Abstract

The role of public authorities in the sharing of data is not new but it has evolved significantly over time. From an initial focus on democratic purposes it has shifted to embracing economic objectives and now, increasingly, societal objectives such as data for green. In the early stages of opening of information from public authorities, data sharing was predominantly driven by democratic goals, aiming to empower citizens to control State's activities. As the European Union introduced law to govern data sharing in the nineties, the focus shifted towards leveraging information for business purposes.

More recently, another shift occurred, with data sharing purposes aligning more closely with societal goals, and in particular sustainability which is the focus of this paper.

This evolution is illustrated by the energy sector, where data is becoming a catalyst for green energy initiatives. Data is not only used by public authorities to supervise activities in their traditional role as 'State as a Regulator', it is also used to intervene into economic or societal activities through their developing role as 'State as a Platform'. Data has become a formidable tool for public interventionism through (i) transparency but also (ii) right of reuse/open data. Digital technologies enable the establishment of central data platforms by public authorities allowing them to (re)share data. Public authorities leverage on their central role in data sharing to act as State as a Platform.

This notion encapsulates the concept of a State leveraging data not just to supervise but to actively support and catalyse economic or societal activities, and functioning as a central data platform to redistribute data between the various stakeholders. These platforms serve as a nexus where data initially collected from businesses by public authorities (B2G data sharing) are then made accessible to the public (G2B data sharing). In the energy sector, this is illustrated by the ENTSOE Transparency Platform (Regulation (EU) No 543/2013) or Inside Information Platforms (IIP) under REMIT (Regulation (EU) No 1227/2011) organising the sharing of 'raw' data. This trend continues and expand now to 'aggregated' data / 'report' through the European Single Access Point (ESAP) (Regulation (EU) 2023/2859) which will organise the publication of ESG data.

Evolution from G2B to B2G2B data sharing. There is a growing call for companies disclosure especially in relation to sustainability. This range from disclosing details about the functioning of algorithms used by businesses in commodity trading to ESG data. Public authorities also participate to this disclosure of data between private stakeholders. They increasingly publish the data they hold (G2B data sharing), but often these data originate from the private sector and have been collected initially as part of supervision purpose in their role as State as a Regulator (B2G data sharing). Renaming it into Business-to-Government-to-Business (B2G2B) acknowledges that not only the public entities share 'public' data with businesses, but that businesses as well contribute 'private' data to other private stakeholder through the intermediary of public entities. It emphasises the role of State as a Platform in the sharing of data.

Taxonomy of data sharing from raw data to report. Another interesting evolution is the granularity of the data shared. It has evolved along a continuum from raw data to aggregated reports. Raw data represents the unprocessed, granular information. As data sharing practices progress, there is a shift towards processing and aggregating this

raw data, and communicating reports synthesising view of aggregated data with added context and analysis.

These approaches can accommodates diverse needs and preferences, but it remains open whether stakeholders need granular or more aggregated data to conduct the energy transition. G2B data sharing for green : a good fit? Public interest objectives in general, and the transition to sustainability in particular, necessitate a wide range of data. This is due to the intricacy and intertwining of sustainability challenges (energy, transport, health, etc.).

Consequently, resolving these challenges heavily depend on gaining access to numerous datasets from various entities. In this context, it is necessary to determine whether the State as a Platform is capable of delivering access to large and varied datasets required by the energy transition? Concerns on the effectiveness of access to data for green by data recipients are raised as many public platforms established by law focus on transparency purposes but does not clearly allow for a right of reuse of the data. Data recipients must also comply with various legal and technical requirements when accessing to different platforms - whether private (such IIP under REMIT), hybrid (ENTSOE Transparency Platform) or public (ESAP).

Additionally, on the side of the data holders, there is a perceived inadequacy in addressing the protection of their rights. As the same data flows through different platforms it is subject to different level of legal/technical protections. Overall, the existence of different platforms may open-up access to new data, but the disparity of their legal regimes also undermine seamless reuse. This underscores the need for a more consistent framework for data sharing across the different platforms.

Shaping Organizational AI Governance: Insights From An Explorative Comparative Case Study Among Four Dutch Public Sector Organizations.

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Keywords: AI governance, Public Sector Organizations, Responsibility

Abstract

Introduction
Academic literature on AI governance is growing. In particular we see that many academic studies and grey literature propose instruments, frameworks and models for AI governance. However, these frameworks are still at a conceptual and theoretical level (Wirtz, Weyerer, Kehl, 2022; Sigfrids et. al., 2022). There is limited insight on the functioning of AI governance in practice. The few empirical studies that are available focus on one specific instrument, for example the three lines of defence model (Sattlegger & Bharosa, 2024), public procurement (Dor & Coglianese, 2023), the role of algorithm review boards (Hadley, Blatecky & Comfort, 2024) or ethics committees (Schuett, Reuel & Carlier, 2024). The goal of this study was to gain insight into the emergence of organizational AI governance, to gain insight into the various governance instruments that organizations adopt and how organizations experience this. Therefore the central research question in this study was: How are organizational AI governance practices shaped in the public sector?

Research methodology

In this study we adopted the definition of organizational AI governance of Mäntymäki et al.: "a system of rules, practices, processes, and technological tools that are employed to ensure an organization's use of AI technologies that aligns with the organization's strategies, objectives, and values; fulfils legal requirements; and meets principles of ethical AI followed by the organization" (2022, p.2).
In order to answer the research question we applied a qualitative research design using case studies.
In this study we conducted an explorative analysis of algorithm and AI governance in four Dutch public sector organizations. We selected a diverse set of public sector organizations for this research. Given the exploratory nature of the research varied as much as possible on different organizational characteristics such as: size in number of employees, type of government organization and maturity of the algorithm and AI governance. The following four cases were selected: a small municipality, a large municipality, a province and an executing agency. The selected cases were analyzed via a combination of desk research and sixteen semi-structured interviews.

Key findings
We find that the drivers and incentives for setting up organizational AI governance varies among the cases and that the way that the AI governance practices are shaped differ.
We find that the way AI governance practices are shaped differ depending on three aspects:

1) The type of risk classification. Organizations are busy with organizing compliance with the AI Act. High risk AI applications have more formal and strict procedures then low risk AI applications. We observe that the case studies mainly focus on setting up AI governance procedures for high risk AI applications.
2) Type of AI technique used. Generative AI applications have different guidelines and policy. This is due to the nature and availability of Generative AI applications. Organizational guidelines on generative AI are mainly focused on awareness among all employees of an organization. On the other hand, machine learning applications are often available for a limited number of employees within an organization.
3) Party that is developing the AI application. Governance procedures also depend on how the AI application is developed and by whom it is developed. Procurement terms and conditions are a leading governance instrument for AI applications that are bought externally. On the other hand, governance practices for in-house developed AI applications are more elaborate and often structured according the AI lifecycle model.

However, we do find that all organizations take into account the following common elements as part of their organizational AI governance practices: formalization of roles and responsibilities, oversight and control mechanisms, attention to ethical

considerations as part of governance processes and attention to AI literacy and awareness among employees. Moreover we find that data governance is a fundamental part of AI governance. The case studies illustrate that for a successful organizational AI governance it is essential to invest in data quality, data infrastructure and data access within the organization.

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Panel: Session 5A

Comparing notes on the progress and outlook of national data strategies in Europe. Learning from and for the Dutch Data Strategy

Speakers:

Tim **Faber** - Ministry of Interior and Kingdom Relations, The Netherlands

Anne Fleur **van Veenstra** - TNO Vector; Universiteit Leiden, The Netherlands

Anastasija **Nikiforova** - University of Tartu, Estonia

Iryna **Susha** - Utrecht University, The Netherlands

Adrianna **Michałowicz** – University of Lodź, Poland

Chair(s):

Devin **Diran** – TNO
Thijmen **van Gend** – TNO

Keywords: Data Strategies, Data Driven Policymaking, Collaboration, Governance

Abstract

Countries have been actively developing and implementing national data strategies to harness the potential of data for economic growth, innovation, and societal benefits. The EU has been at the forefront of creating a cohesive data strategy, with the European Data Strategy aiming to create a single market for data, allowing it to flow freely across sectors and member states. Key legislative measures include the Data Governance Act and the Data Act, which focus on data sharing, access, and reuse. Some key examples in Europe include Germany's data strategy which emphasizes data sovereignty, innovation, and the ethical use of data. It includes initiatives like the GAIA-X project, which aims to create a secure and federated data infrastructure. France's strategy focuses on open data and data sharing, with a strong emphasis on public sector data.

The French government has launched several initiatives to make high-value datasets available for public use. Since 2021, the Netherlands is working on the Intergovernmental Data Strategy (IBDS).

About IBDS
From the energy transition and housing shortage to debt, poverty, and medical care. Government data is essential to address societal challenges, for accountability, oversight, execution, and policy.
To address bottlenecks and take advantage of the potential presented by responsible data usage, the Intergovernmental Data Strategy was established. IBDS addresses 4 key questions: What is permitted? What is possible? What helps? and What inspires? Ministries, implementing organizations, and umbrella organizations of municipalities, provinces, and water boards worked closely together to create the IBDS. On November 18, 2021, the House of Representatives received the IBDS. It sets an ambitious goal for the future and strives for the proper use of data for social responsibilities.

Consequently, it aligns with the objectives of the Work on Implementation (WaU) endeavor and the workagenda Value Driven Digitalization. To achieve the ambitions in the IBDS, the program Realization IBDS kicked-off in 2022, spearheaded by ICTU and overseen by the Ministry of the Interior and Kingdom Relations. ICTU is a not-for-profit organization key to every ICT project at public organizations in the Netherlands. TNO is the research partner of IBDS and other partners include Verdonck, Klooster & Associates and Pels Rijcken.

The key pillars of the data strategy are:
• Improve and unify the way that data is used. What is desired, what is permitted, and what is possible?
• Create system features that apply to the whole government, such as a federated data system that improves data findability and data sharing. A intergovernmental knowledge center is established that preserves and disseminates best practices and lessons learned and encourages the development of data skills.
• Using tangible use cases with societal value. For instance, for challenges related to housing, healthcare, energy transition, and nitrogen. The development of the required system functionality is sped up by these use cases.

While progress is ongoing, challenges remain, in particular in the implementation of these data strategies. Key challenges include:
- Disparities in Data Capabilities: there are significant differences in data capabilities and infrastructure between government organizations. This disparity affects the consistent implementation of data strategies across governments. (IBDS)

- Data Quality and Interoperability, ensuring high-quality data and interoperability between different systems remains a challenge. There is a need to build data-sharing links between government agencies or outside research partners, however, systems and data methods are frequently internally focused or directed toward agency-specific supervision.
- Privacy and Security Concerns: Balancing data accessibility with privacy and security is a critical issue. Compliance with regulations like GDPR adds complexity to data management.
- Skills Gap: There is a growing need for skilled professionals who can manage and utilize data effectively.

This panel aims to foster the knowledge exchange and collaboration between researchers and practitioners working on national data strategies worldwide and in particular Europe. The panel invites (paper) presentations on subjects such as:

- The challenges faced by National data policies, strategies, agenda's or action plans and strategies to accelerate implementation and increase impact.
- The implications of European developments such as the Digital Decade, the European Data Strategy and associated acts and initiatives on national data strategies.
- Co-creation of national data strategies, agenda's or action plans.
- How is collaboration designed and implemented within governments and between public sector, private sector and citizens?
- How can researchers and practitioners work together in the development and implementation of data strategies?
- Best practices on effective and efficient instruments and projects to implement data strategies and monitor progress.
-Strategies to improve support for the implementation of data and data analytics in the government processes, encompassing both policy making and public service delivery.

The panel has the following structure:
- Plenary presentation on IBDS: the Dutch strategy for promoting data use & collaboration in Dutch governments. This presentation will be provided by either the Ministry of the Interior and Kingdom Relations or ICTU.
- Panel Discussion about the abovementioned subject. This discussion will be moderated by TNO with the Ministry of the Interior and Kingdom Relations, ICTU or other IBDS partners participating.

Session 5B: Data Law & Governance for the Digital and Green Transitions

Balancing Digitalization, Data Protection, and Sustainability: Reconciling GDPR Principles with EU Green Objectives.

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Keywords: Data protection, green deal, digitalization, XR technologies

Abstract

At the heart of current European Union (EU) policy and lawmaking lie two key objectives: the green and the digital transitions; each of these involving different processes and technologies to achieve their goals (Celeste and Dominioni 2024). From a regulatory perspective, on the one hand, the green transition has resulted in different legislations such as the Net-Zero Industry Act, the Directive on repair of goods or the Nature Restoration Law. On the other hand, the digital transition has resulted in legislation such as the General Data Protection Regulation (GDPR), the Artificial Intelligence Act (AI Act), the Digital Services Act (DSA) or the Digital Markets Act (DMA).

While there is some overlap where both transitions can coincide, certain elements from each one may conflict and hinder the intended objectives of the other. For example, it has been pointed out that as data centres evolve into critical infrastructure for supporting the digital economy, their power consumption has reached unprecedented levels, escalating operational costs and raising environmental concerns (Veeramachaneni 2025).

In this paper, specifically, we aim to focus on the green transition's objective to prioritise energy efficiency and develop a power sector based largely on renewable sources1 and the objective of the digital transition concerning the protection of people's rights2 in the digital context.

To analyse the interplay between these two objectives, we will use a case study concerning extended reality (XR) technologies, which include virtual, augmented and mixed reality (Barfield and Blitz 2018), with the development of the metaverse at the edge of these developments (Cheng 2023). Among its many applications, XR technologies can enable remote engagement in activities beyond mere spectating through traditional audiovisual technologies. For example, besides just watching a car race on television, a person can 'sit' in an XR cockpit and pretend to be the pilot while the race is taking place. This kind of remote participation can contribute to support green objectives by reducing the carbon footprint associated with travel to and from events as well as replacing physical activities with immersive digital alternatives.

However, these digitalization activities must abide by the legal framework established for these purposes. While many EU laws have been passed in the last years, the GDPR is a crucial component of this regulatory framework (Papakonstantinou and De Hert 2022). For example, one of its core principles is data minimization, which mandates the reduction of data collection to the minimum necessary for a specific processing activity to avoid unnecessary exposure of personal data to risks (de Terwangne 2020).

Returning to the car race case, the transmission of public events where online users participate remotely might involve recording individuals who are not the focus of the activity (namely, the audience at a car race). Implementing safeguards, such as the anonymization of individuals to mitigate the processing of personal data (for example, blurring individuals' faces), might be a necessary step, depending on how this provision is interpreted. Notwithstanding this fact, adopting these safeguards could involve additional processing activities, which might require further resources, particularly energy consumption. Thereby, a potential conflict with green objectives could lay behind this decision.A similar logic might be applicable to other principles. For example, storage limitation might condition how the relevant timeframe for keeping recordings (and by extension using resources to power a data centre) for future replays is determined.

Moreover, the principle of lawfulness, fairness and transparency, that can be under pressure when trying to reconciliate data protection with green objectives. In this sense,

and returning to our case study, it might be argued that the data from the public might only be processed under certain legal basis, such as legitimate interest.
When addressing the balancing process in this legal basis, green objectives might steer the analysis towards one side.

In other words, the dichotomy we face is whether compliance with certain data-related provisions, particularly GDPR's principles and protection of user's personal data, might jeopardize the achievement of green objectives. To guide our analysis, we present the following research question: 'Should EU green objectives be considered when data controllers interpret and apply data protection principles?'

Given the current state of the literature, it is worth exploring how these objectives can be integrated into the application of data protection framework in specific situations. This issue should be examined in light of key judicial developments regarding the extent to which data controllers should adopt certain safeguards in designing processing activities and the existing guidance from data protection supervisory authorities as well as legal scholarship around key principles and concerning how data protection should interplay with other legal regimes, particularly the EU Green Deal regulatory framework.

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What does Justice mean in the Twin Transitions? An analysis on the pitfalls of digitisation of the energy sector and the role justice plays in these spaces.

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Keywords: Twin Transition, Energy Justice, Clean Energy Systems

Abstract

As the effects of climate change become more apparent every year, it is imperative that our economies become climate neutral. The EU is attempting to do so by 2050 through a 'green transition', including transitioning into decarbonised and sustainable clean energy systems. Simultaneously the EU is building capacity in its digital economy, focusing on the digital transformation of industry through the use of digital technologies such as AI, 5G, the Internet of Things, edge computing and robotics, as well as the digitisation of government services and public administration. The EU has linked the success of the energy transition to this digital one, with the argument that digitising, automating and optimising can increase efficiency in resource use and increase the adoption of more climate-friendly everyday technologies (JRC 2022).

This paper explores the pitfalls of this strategy of digitising energy systems and their connected value chains in the name of the energy transition. By using Boltanski and Thevenot's 'Orders of Worth' (1991) as a framework for analysis, we argue for a perspective that goes beyond identifying the generic concerns of privacy and transparency of digital technologies, and that uncovers the tensions that exist when these different technological domains converge. We show that the values of the green and civil orders of worth are incommensurable with market and industry orders of worth. Values of the market and industry orders such as market competitiveness or reliability and planning, cannot be used to measure and realise sustainability or solidarity – which are central values of the green and civil orders.

Hence, we argue that the policy objectives of the green transition, specifically that of a fair, just and inclusive transition, embody the values of the green and civil orders, cannot be realised by through technocratic digital transition policies and measures.

In this paper we argue that given the narrow competencies of the EU, there is a tendency to formalise complicated problems into issues that are solvable through technocratic measures. For instance, in the energy sector the problem of ensuring affordable access to energy is formalised to an issue of the managing energy prices and is typically 'solved' through regulation of energy tariffs and through the promotion of competition in the energy market. However, such solutions do not necessarily address the problem, resulting in injustices and inequities, such as energy poverty to persist.

This paper shows that EU policymakers are aware that such injustices must be addressed in order to avoid social resistance and realise the green transition, as is evidenced by their social policies to address energy poverty in the EU. Despite this, EU clean energy transition policies still limit their ability to address these injustices by focusing on the narrowed perspective of consumer empowerment, rather than the empowerment of citizens.

Using the concept and principles of energy justice, this paper maps out the other injustices that would be left unaddressed if the EU takes a purely technocratic approach to "solve" the issues persisting in and because of the energy systems. In examining the rationale behind linking the digital transition to the green transition, this paper notes how in fact increased digitisation and datafication can burden the energy systems.

The paper goes on question whether there should be an alternative framing to the twin transitions to ensure that injustices are addressed. The paper concludes by examining the role the law in this space, including the formalisation of vital concepts and relationships, and examine how the existing EU legal framework aligns with the green order of worth and allows for the transition to clean energy systems to be more just, inclusive and fair.

Regulating Indonesia's Digital Economy: Balancing Growth, Inclusion, and Governance

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Keywords: Digital Economy, Data Governance, Digital Taxation, Regulatory Framework, Digital Divide

Full paper is accepted for publication in the Data & Policy journal.

Video Presentation: https://youtu.be/QMdeCQIwaio

Abstract

Indonesia's rapid digital transformation generates massive economic opportunities while posing new regulatory challenges. This study examines how Indonesia's digital economy is governed through key regulatory domains – electronic commerce, data governance, and digital taxation – and assesses their impact on inclusive growth. The research utilizes an integrated theoretical lens, drawing on Institutional Theory and Digital Divide Theory, to analyze how formal rules and on-the-ground access to technology together shape outcomes.

The research employs a multi-method approach, including comparative analysis with India, the European Union, and Singapore, to understand how different regulatory models influence market participation, business compliance, and digital inclusion. The findings reveal significant regional disparities in internet access and digital business adoption, with rural and remote areas lagging behind urban centers. Small and medium-sized enterprises (SMEs) face disproportionate compliance burdens under current regulations, a gap partly addressed through cooperative initiatives like the Indonesia–Japan Track 1.5 Public-Private Partnership.

A key insight is the complex impact of data localization policies: while strengthening digital sovereignty and user privacy, strict localization requirements can raise operational costs and deter foreign investment.
The paper concludes with policy recommendations for improving regulatory implementation, expanding digital infrastructure and literacy, and fostering international cooperation to ensure Indonesia's digital economy regulations promote equitable growth across its diverse archipelago.

Potentials of Administrative Informatics for the Analysis of Policymaking. Notes on the Integration of Administrative Informatics into the Policy Cycle.

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Keywords: Policy Cycle; Twin Transformation; Administration Informatics.

Full paper is accepted for publication in the Data & Policy journal.

Video Presentation: https://youtu.be/uPsrktLWPRo

Abstract

The coupling of the disruptive processes of digitalization and the green transformation in a so-called "Twin Transformation" is already being considered a strategic step within the EU and is discussed in the academic sphere. Strategically, this coupling is necessary and meaningful to realize synergies and to avoid counterproductive effects such as rebound effects or lock-in effects, particularly given the time constraints imposed by climate change. The European data strategy does not only call for the establishment of various data spaces, such as the data space for the European Green New Deal, but also for the opening, integration, and utilization of European data for stakeholders from administration, business, and civil society. Considering this, it is argued that administrative informatics as a discipline could be integrated as an additional analytical perspective into the political science heuristic of the policy cycle. This integration offers substantial added value for analyzing and shaping the policy processes of the European Green transformation. Moreover, this heuristic approach enables the ex-ante prediction of changes in policymaking based on the theories, models, methods, and application areas of administrative informatics. Building on this premise, the paper provides insights into the application of the proposed heuristic using the example of the European Green transformation. It analyzes the resulting implications for the analysis of policymaking considering an increasingly digitalized public administration.

Visionary Leadership and Support for Digital Transformation: The Mediating Role of Meaningfulness.

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1. Leiden University

Keywords: Digital transformation, change management, leadership

Abstract

As public organizations face increasing pressure to adapt to technological advances, it is critical to understand the preconditions for achieving digital transformation. Digital transformation refers to a future state in which organizations rely significantly on information, computing, communication, and connectivity technologies for their core operations (van de Ven & Poole, 1995; Vial, 2019). This transformation requires organizations to prioritize flexible organizational structures and internal innovation to adapt to ongoing technological advances (Gasco-Hernandez et al., 2022; Mergel et al., 2019). As such, digital transformation can be understood as a shift from traditional 'Weberian' bureaucratic principles to a focus on innovation, experimentation, risk-taking, and the adoption of agile methodologies (Gasco-Hernandez et al., 2022; Giest & Klievink, 2022; Mergel et al., 2019; Wise, 2002). Employee support is often highlighted as a critical antecedent to the implementation of such organizational change which may affect organizations' core identity and value proposition (Herold et al., 2008; Wright et al., 2013). Yet, the factors influencing employee support for digital transformation and how public managers can influence it are underexplored. In the present study, we examine how leaders' vision communication influences employee support for digital transformation and how this relationship is mediated by perceived change meaningfulness.

Digital transformation has proven to be a complex process for many organizations (Kempeneer & Heylen, 2023), and studies in both the public and private sector have identified employee resistance as one of its main challenges (Haug et al., 2023; Vial, 2019).

[1]

For example, a longitudinal case study by Poláková - Kersten et al. (2023) demonstrates a digital transformation in a utility company failed because of resistance from IT staff due to an "identity misalignment" between the digital transformation, which involved risk-taking, agility, and experimentation, and the organization's core mission of providing high levels of safety and efficiency. Similarly, qualitative research by Tracey & Garcia (2024) shows how nurses developed workarounds when faced with the implementation of an algorithmic system because it did not align with their perceptions of the value of their work.

Change management scholars have identified leadership's crucial function in creating employee support for change (Fernandez & Pitts, 2007; Higgs & Rowland, 2005, 2010; Kotter, 1996; Kuipers et al., 2014; van der Voet et al., 2014). Especially, leader vision communication, the communication of a future image of the collective with the intention to persuade others to contribute to the realization of change (Stam et al., 2014; van Knippenberg & Stam, 2014), is seen as a characteristic of outstanding leadership and key for motivating employees towards change. Nielsen et al. (2023) qualitative study of leadership behavior during digital transformation highlights the importance of vision communication. They show how public leaders were able to drive a municipality's digital transformation through "communicative resources" that addressed employees' "hopes, delays, and concerns". Still, our understanding of how leader vision communication actually contributes to employee support for change is limited (Yukl, 2010).

The first aim of this study is to examine how two distinct visions influence employee support for digital transformation. While it is often assumed that leaders can increase support for change through vision communication (Bass & Riggio, 2006; Borins, 2002; Burke, 2002; Conger & Kanungom, 1998; Yukl, 2010), others point out the tension between the long-term and ambiguous aspirations that are communicated in a change vision and the day-to-day work of employees (Carton, 2018; Langeler, 1992; Simons, 1999; Trope & Liberman, 2010). We test the effect of two distinct types of visions on employee support for change: (1) an aspirational vision that inspires and depicts the long-term benefits of the change for the organization, and (2) an operational vision that explains employees how they can contribute to the change in their day-to-day work. We develop distinct scales to measure these two types of vision communication and test how they influence employee support for digital transformation.

Our understanding of the effects of leader vision communication is also constrained by limited insights into the underlying mechanisms through which it influences work outcomes (van Knippenberg & Sitkin, 2013; van Knippenberg & Stam, 2014; Venus et al., 2019). Therefore, the second aim of this study is to examine how perceived meaningfulness of change mediates the effect of the two types of leader vision communication.

Meaningfulness, employees' perception that they understand the complex system of goals in the organization and its relationship to their work (Tummers & Knies, 2013), is associated with many workplace outcomes such as work engagement and motivation – and also with support for organizational change (Higgs & Rowland, 2005; Matland, 1995; Rosso et al., 2010; van der Voet et al., 2017).

In the context of digital transformation, societal meaningfulness—how employees perceive the impact on socially relevant goals—and personal meaningfulness—how they perceive the benefits to their own job security, opportunity, or status—are critical to understanding employee support for these changes (Tummers, 2013; van der Voet et al., 2017). Figure 1 summarizes the theoretical expectations.

In summary, we answer the research question: How does leader aspirational and operational vision communication influence employee support for digital transformation, and how is this effect mediated by perceived change meaningfulness?

We will test the relationships proposed in the conceptual model by conducting a survey among employees from various departments within the Netherlands' Ministry of Infrastructure and Water Management. The Ministry recognizes that rapid digital advancements—such as big data, AI, the Internet of Things, and robotics—offer significant opportunities to enhance its operations. To capitalize on these innovations, it has developed a digital transformation strategy, outlining necessary changes in organizational structure, processes, and culture. This makes it a compelling case for exploring employee support for digital transformation.

While data collection is ongoing, we aim to obtain ~500 responses. A two-step structural equation modeling (SEM) approach will be used to evaluate the measurement model's fit with the empirical data and to test the hypothesized relationships (Anderson & Gerbing, 1988).

Implementing Algorithm Transparency.

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1. Leiden University

Keywords: Algorithmic transparency, algorithm register, policy implementation, policy innovation theory

Abstract

Policymaking efforts are being undertaken around the world by legislatures and industry to regulate artificial intelligence. A key part of these programs is algorithm transparency, which aims to make the internal design of algorithms visible to the public. Under the EU AI Act, in Article 50, it mentions the transparency obligations of AI providers and deployers to ensure appropriate traceability and explainability and well inform users of the AI system they are interacting with regarding its impacts on rights, legal status, and eligibility. Despite this, current literature on algorithmic governance raises many conceptual and practical problems with the idea of applying disclosure principles to algorithms due to their complex technical and organizational make up.

Will governments learn to master the implementation of algorithm transparency? We investigate two rival hypotheses that seek to provide an answer to this question. Policy innovation theory suggests that technology innovation processes follow a period of rapid growth, experimentation, and learning that organizational capacity and institutionalization eventually bring to a state of implementation and policy maturity (Borrás, 2011; Tolbert, Mossberger & McNeal, 2008). An alternative theory, the policy ambiguity model, suggests that ambiguity and conflict are a unique force in the implementation that limits its success (Arnaboldi & Lapsley, 2009; Fowler, 2023; Matland, 1995).

Algorithm register is one of the transparency policies with a policy goal to enhance digital rights and algorithmic transparency and should be implemented among

government entities to publish algorithmic information about its usage, models, and reasons for the uses. This practice was initiated by urban governance experts and city advocates and later was embraced by central governments and integrated into national action plans in countries like the Netherlands, UK, and Canada.

During the implementation of algorithm disclosure, it remains unclear whether there is a divide between who conceives of AI transparency policies and those who are asked to implement them (Nieuwenhuizen, 2025). Policy innovation theory suggests that new technologies can stimulate the creation of novel institutional frameworks, including platforms, arenas, and innovation ecosystems (Sørensen & Torfing, 2022), which could ultimately achieve collaboration, self-accelerating outcomes, and public values. In contrast, the theory of policy implementation highlights the risks of policy ambiguity, where misunderstandings can arise. This ambiguity can lead to varied interpretations and inferences about the preferred definitions and administrative results of a policy (Baier et al., 1986; Matland, 1995), undermining the effectiveness of policy implementation.

We examine the case of algorithm transparency in the Dutch public sector, in particular the case of the "Algorithm Register of the Dutch Government (https://algoritmes.overheid.nl/en)," which is a repository of published information for impactful public-use algorithms. Using various kinds of policy documents, we will take an exploratory case study approach to examine the recent history, policy context, policymaking process, and key policy actors in the implementation of the Dutch Algorithm Register.

We evaluate its success and limitations and explain why its implementation has so far taken the path it has. This case study could advance our theoretical understanding of algorithm transparency and provide implications to similar paths and followers in future planning and implementation about what can be done to address its shortcomings.

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Algorithmic Collusion in EU Competition Law: Decoding the Puzzle.

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Keywords: Algorithms, antitrust, regulation, collusion

Abstract

Algorithmic tacit collusion—where pricing algorithms replicate human tacit collusion—poses a significant challenge to existing antitrust frameworks. Under Article 101 TFEU and Section 1 of the Sherman Act, collusion requires an agreement or concerted practice, neither of which is present in cases of pure tacit collusion. Consequently, algorithmic tacit collusion, like its human counterpart, remains outside the scope of current antitrust enforcement. This exclusion is based on two key justifications: first, that tacit collusion results from firms acting independently in response to market conditions, making it an inevitable consequence of oligopolistic market structures rather than a deliberate anticompetitive strategy; second, that genuine tacit collusion occurs only under highly specific and often unrealistic market conditions, limiting its real-world impact.

If one accepts that algorithmic tacit collusion is merely a digital extension of human tacit collusion, it follows that both should be treated the same way under competition law, i.e. they should be considered lawful. However, this assumption is not uncontested. Some scholars argue that algorithmic pricing strategies actively create the conditions necessary for collusion, thereby introducing an element of intentionality that brings them closer to concerted practices rather than spontaneous oligopolistic interdependence. From this perspective, algorithmic collusion could, in some instances, be reclassified as a form of unlawful coordination, justifying intervention under Article 101 TFEU.

However, such an approach applies more convincingly to algorithmic explicit collusion, where algorithms actively facilitate communication or coordination between firms, rather than to cases of pure tacit collusion.

We argue that the real distinction between human and algorithmic tacit collusion lies not in its legal classification but in its practical implications. While human tacit collusion remains largely a theoretical construct—difficult, slow, and costly to achieve—algorithmic tacit collusion is broader in scope, more stable, and significantly easier to implement. Pricing algorithms enhance the likelihood and sustainability of collusion by lowering traditional market barriers, reducing reliance on explicit communication, and improving coordination, detection, and enforcement mechanisms. Most importantly, they reshape structural market factors, such as transparency and interaction frequency, making tacit collusion feasible even in environments where it was previously improbable.

These developments call into question the long-standing justification for tolerating tacit collusion under competition law—namely, its theoretical and exceptional nature. As algorithmic pricing transforms tacit collusion from an abstract possibility into a widespread, market-wide challenge, the debate over whether and how to regulate such behavior becomes more pressing. Addressing this issue requires moving beyond the traditional antitrust framework and considering a broader set of regulatory solutions. To this end, this paper systematically maps the range of policy proposals aimed at addressing algorithmic tacit collusion, focusing on both antitrust-based and regulatory approaches.

We categorize these solutions into de iure condito remedies, which rely on reinterpretation and enforcement of existing legal frameworks, and de iure condendo proposals, which involve legislative or regulatory reforms. Additionally, we introduce a novel concept—outcome visibility—which seeks to bridge the conventional divide between antitrust and regulatory approaches.

The outcome visibility theory, originally coined by Ai Deng, is based on the premise that collusive outcomes—whether achieved through human or algorithmic means—are observable to human decision-makers. Under this framework, firms should be held accountable for the supra-competitive outcomes produced by their pricing algorithms, even if they claim to lack full understanding of the algorithmic decision-making process.

The key argument is that firms benefit from collusive pricing and can recognize that they are making supra-competitive profits despite unchanged market conditions. Therefore, once firms become aware that their algorithms are tacitly colluding, they should be obligated to intervene and restore competitive pricing.

This approach shifts the focus from the process leading to collusion to the inaction of firms in response to observable collusive results.
Unlike traditional antitrust enforcement, which requires proving an agreement or concerted practice, outcome visibility seeks to prevent firms from passively benefiting from algorithmic tacit collusion by imposing a duty to act upon recognizing supra-competitive pricing.

While this framework presents challenges—including determining the precise moment at which firms become aware of algorithmic collusion and the practicalities of intervention—it offers a promising regulatory mechanism distinct from a blanket prohibition of tacit collusion. Unlike conventional antitrust measures, which focus on proving explicit agreements or facilitating practices, outcome visibility targets firms' failure to restore competition once collusive equilibria emerge.

Furthermore, this approach could complement the compliance-by-design framework, which mandates firms to design pricing algorithms in a way that minimizes the risk of tacit collusion. The two mechanisms could function together: ex ante obligations would require firms to adopt preventive measures, while ex post obligations under outcome visibility would compel them to rectify collusive outcomes. Firms failing to comply with both would face heightened penalties.

Clearly, implementing this framework requires careful legal and economic consideration, as well as potential legislative changes at the EU level. The enforcement structure could leverage existing investigative powers of competition authorities to detect collusive pricing patterns and require firms to take corrective action. An alternative route would be to interpret firms' passive acceptance of algorithmic tacit collusion as a tacit anticompetitive agreement, thereby bringing such cases within the scope of Article 101 TFEU.

Rather than offering a purely descriptive analysis, this paper critically examines the current state of the debate, reconstructing its key dimensions and exploring potential paths forward. In doing so, we aim to contribute a meaningful piece to the evolving puzzle of algorithmic tacit collusion.

Towards Sustainable NLP: Low-Rank Factorization for Efficient and Energy-Aware FlauBERT Inference

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Keywords: Artificial intelligence; sustainability; low-rank factorization; NLP; energy consumption; compression

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Abstract

This study explores the application of low-rank factorization to reduce the computational and energy costs of the FlauBERT model, a French counterpart to BERT, while preserving its accuracy for natural language processing tasks. Large-scale language models are known for their high resource demands, yet most companies do not systematically measure energy consumption, particularly during AI model inference. With the rise of cloud computing, energy consumption is largely transferred to service providers, often without considering optimization techniques like compression or reduction in deployed models. Low-rank factorization approximates weight matrices with reduced-dimensional representations, decreasing the number of parameters and computational complexity. Our approach applies this method to the attention layers of FlauBERT, evaluating its impact on energy consumption. Experiments were conducted using a sentiment analysis task, measuring accuracy, inference energy efficiency, and the importance of continuous monitoring. Results show that moderate compression maintains competitive accuracy while significantly reducing energy consumption, making the model more sustainable for real-world applications. The findings highlight the potential of structured compression techniques in minimizing the environmental footprint of AI models. Future work will explore further refinements and alternative strategies for model compression, emphasizing the importance of integrating energy-aware AI development in enterprise strategies. Additionally, policymakers and industry leaders should consider incorporating energy-efficient AI deployment strategies to ensure responsible and sustainable technology adoption. Addressing AI's energy consumption during inference can lead to significant cost savings and a reduced environmental footprint, making sustainability a core pillar of AI innovation.

Session 5D: Digital & Data-driven Transformations in Governance

Participating in and for Futures: Decentralised 'Personal Data' Architectures.

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Keywords: Participation, Personal Data, Decentralisation

Abstract

This abstract introduces a work-in-progress project designed to identify the conceptual, theoretical, technical, regulatory and empirical opportunities and limitations of using Person-Centric Architectures (PCA) for: (i) the production of ecologically relevant information to aid transitions to more sustainable, more circular, economies, and relatedly, (ii) the production of people-centred measures of wellbeing to better reflect the multi-dimensional ways individuals evaluate their lives. Known variously as PCA, Personal Data Stores (PDS) or Personal Information Management Systems (PIMS) they are related to but not directly equatable with Digital Wallets or Agentic Wallets. Various combinations of these software architectures - each with notable distinctions in design and capacities for storage, use and processing of personal data - share a common goal: to give individuals more control (over their data) in digital economies.

Whilst various architectures of this kind have been proposed since the 1990s, widespread adoption has not yet materialised. With a push to digital identity implementations in the UK and EU, and a research and investment wave currently

underway in the US on the related topics of data ownership and 'decentralised AI' this may be set to change. Examples of digital wallets, which are integrated to different extents with personal data storage capabilities, include those designed by DataSwyft, Inrupt, DataSapien, Personium and Mydex.

Despite their common, if somewhat intractable, goal, closer inspection of PCAs reveal a distinct set of visions for future (personal) data economies. Marked design differences include (i) questions of data model, for example between those built with Linked Data principles (e.g. the Solid protocol which supports the Inrupt digital wallet) or a bespoke repertoire of Application Programming Interfaces (APIs) designed for compatibility with any data format, and, (ii) questions of compute (e.g. nature and extent of compute / processing capacities that these wallet / storage architectures can support).

We are interested in understanding the potential role that various instantiations of these architectures could have as new empirical sources for, as well as new conceptual measures of, environmental and the many aspects of wellbeing and quality of life. We situate our specific interest in these incoming advances in digital infrastructure amidst a broader policy conversation on three key themes: (i) the challenges and opportunities that digitalisation is posing for National Statistics Offices (NSOs); (ii) the evolving normative arc towards data sovereignty (variously defined) (Hummel 2021) and digital self-determination (Verhulst 2023) in various regions in the world; and, (iii) the longstanding conversation to reevaluate the saliency of macro measures such as Gross Domestic Product (GDP) (Dirksen 2024) in light of, particularly, the measurement quandaries posed by digitalisation and environmental imperatives.

Reflecting this, a new System of National Accounts (SNA) - the first since 2008 - was adopted in 2025 and includes, for the first time, chapters on wellbeing and sustainability as well as a chapter on digitalisation. We therefore feel it is a timely moment to speculate and explore novel avenues for generating statistical evidence for policy making through digital innovations such as PCA. We are exploring the ways in which they could give people a role in shaping the statistical infrastructures that shape policy priorities, direct resources and reimagine democratic participation for the digital age.Initial data collection has taken place at the International Solid Symposium 2025, through follow up interviews and via a survey seeded to the UK Office for National Statistics (ONS). The UK ONS has a history of taking a leading role: to develop approaches to estimate the value of environmental flows and assets (both based on the UN SEEA central framework); to measure changes in the environment and biodiversity; and to devolve the production of statistics including exploring the opportunities of using artificial intelligence. The UK ONS does not, however, have a formal conceptual and empirical framework for monitoring the Circular Economy (unlike the EU).

The interviews and survey are exploring the generation of statistics related to a number of objectives such as the transition to a circular economy, pollution prevention and control and the protection and restoration of biodiversity and ecosystems, among other sustainability and quality of life indicators.
We are seeking to understand better what the key measurement challenges that NSOs are facing in terms of data sources for such measures and the challenges they are encountering when working with private data not collected for the purposes of official statistics production. The Solid workshop and follow up interviews are exploring a range of technical aspects of the PCA with the aforementioned statistical objectives in mind.

An ancillary goal of this project is to grow a conversation between engineers, statisticians, academics and policymakers about the potential role of PCA in collecting, sharing and generating the information needed for new approaches to evaluating socioeconomic wellbeing. Part of what we are grappling with are the well understood conceptual and material tensions that arise when combining subjective and objective measures of wellbeing (Fleurbaey & Blanchet 2013). Useful discussions of these measurement quandaries, in the context of the digital economy (Brynjolfsson & Collis 2019), draw attention to the trade-offs between relevance to wellbeing and precision (for the purposes of policy-making) at the core of these epistemological tensions.

This project is also inspired by research using modelling (e.g. agent-based) techniques to devise and evaluate policy interventions. The epistemological emphasis on 'bottom up' measurement is in harmony with the idea underpinning this project, however, what PCAs may offer, with access controls at the level of individuals, is a role for people to have more say in what the measurement (and evidence-based policy) priorities ought to be. To avoid too severe a relinquishment of control to highly sophisticated tools of prediction or imputation (particularly at times of waning public trust), or to well intentioned but nonetheless somewhat paternalistic behavioural interventions or 'nudges', it's important to explore how individual and collective agency could be built into (new) 'decentralised' (in simplest terms: as in decision-making) architectures for data sovereignty. This is the case whether they are built and deployed by private technology companies or government institutions. Data collection is ongoing and we expect to deliver initial findings later in 2025.

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Taking Stock of Urban Data Governance in German Small Towns

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Keywords: Data Governance; Small Towns; Urban Data; Municipal Administration, Evidence-based Sustainable Development.

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Abstract

As data are becoming increasingly important resources for municipal administrations in the context of urban development, formalization of urban data governance is considered a prerequisite to systematic municipal data practice for the common good. Unlike for larger cities, it is unclear how common such formalized data governance is in rural districts and small towns. We therefore mapped the current status quo in small municipalities in Germany. In a systematic online approach, we searched for policy documents on data governance in all metropolitan regions, all rural districts and a quota sample of nearly a sixth of all German small towns. We then performed content analysis of identified documents along pre-defined categories of urban development. Results show that hardly any small towns dispose of relevant policy documents. Instead, rural districts seem somewhat more active in formally defining data governance. Identified policy documents tend to address mostly economic activities, social infrastructure, and demography, whereas *Housing* and *Urban design and public space* are among the least mentioned categories of urban development.

Enhancing Human Rights Monitoring with AI: The Civic Space Pulse Data Transformation Framework.

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Keywords: - Civic Space, - Human Rights Monitoring, - Generative AI, - Artificial Intelligence, - Data Transformation, - Public Freedoms, - Open Data Sources, - Situational Analysis

Abstract

The increasing scale and complexity of human rights challenges demand innovative approaches to data gathering, integration and analysis. The human rights ecosystem's work in tracking the enjoyment of public freedoms is hindered by the fragmentation and inconsistency of available data. Human rights information comes from diverse, unstructured sources such as news reports, social media, satellite imagery, and field interviews, among others. There is a lack of coherent baseline data and inconsistent categorisation of events across open data sources, very few of which apply human rights definitions. Digital technologies are fundamentally reshaping how we monitor human rights, yet critical questions remain about the role of artificial intelligence in this sensitive domain: How can AI enhance monitoring capabilities while ensuring data integrity and compliance with standards? How do we balance automation with human oversight in human rights work?

This abstract begins to address these questions by introducing the Civic Space Pulse Data Transformation (CSPDT) framework, an innovative system that transforms how we collect, process, and analyse human rights data on the enjoyment of public freedoms. The framework enhances human rights monitoring by operationalising metrics on the

health of civic space, including repression of public demonstrations, targeted attacks on human rights defenders and civil society organisations, and internet shutdowns.

Current human rights monitoring faces three key challenges: the overwhelming volume of unstructured data, the varying quality of sources, and the need for rapid response to prevent violations and protect vulnerable populations.
While existing frameworks like the Berkeley Protocol provide guidance for digital investigations, they do not fully address the scalability requirements of monitoring complex, cascading crises. The CSPDT framework advances the field by offering a novel integration of AI technologies with human rights expertise, demonstrating how automated systems can augment human judgment in human rights monitoring.
Built by the Office of the United Nations High Commissioner for Human Rights (OHCHR), CSPDT introduces several methodological innovations.

First, it introduces a novel application of multimodal generative AI models that align with OHCHR-defined taxonomies, enabling standardised processing of diverse data sources, generating thematic datasets aligned with established human rights definitions. Second, it implements a multi-tiered approach to data quality assurance that combines automated validation with expert oversight and further verification. Third, it develops a deduplication strategy that operates at both event and victim levels. Fourth, it implements automated trend and anomaly detection across high velocity data, contributing to enhanced early warning and situational analysis capabilities.

Our research contributes to ongoing debates about AI's role in human rights work by providing evidence of how automated systems can enhance human rights monitoring. The framework demonstrates how carefully designed systems can maintain human agency while enhancing the scale of monitoring capabilities.

Early implementations of CSPDT reveal both the potential and limitations of AI in human rights monitoring. While the framework significantly improves processing speed and coverage, it also highlights the continuing necessity of human oversight in verifying and analysing the data on alleged violations. We see several critical areas for future research and debate, including the balance between automation and human agency in human rights work; the potential for bias in automated monitoring systems and strategies for mitigation; the possibility to scale the rapid assessment data production methodology to other human rights themes and issues.

This research advances both theoretical understanding and practical implementation of AI in human rights monitoring. By presenting a concrete framework that addresses current challenges while raising important questions about future developments, it

aims to stimulate debate about the evolving relationship between technology and human rights protection.

Session 5E: Bridging the Gap: The role of Data Intermediaries in the Creation of Urban Digital Twins

Enhancing Urban Digital Twins for Heat Transition: AI-Powered Heat Demand Modeling for Municipal Policymaking.

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Keywords: Urban Digital Twins, Municipal Heat Planning, Heat Demand Estimation, Artificial Intelligence, Physics-Based Machine Learning, AI-based decision support

Abstract

Introduction
Climate change poses a significant risk, and municipalities play an essential role in mitigating this challenge by setting plans and enforcing policies toward renewable energy sources. Germany's recent heat planning law (Wärmeplanungsgesetz [1]) requires municipalities to create comprehensive heat plans by 2026-2028, depending on the population size. However, putting this into practice is only possible through

extensive data collection, advanced modeling, and specialized expertise, which is challenging to many local planning authorities. The ENERsyte[2] platform aims to address this gap by providing a digital twin for municipal heat planning, integrating various data sources and Artificial Intelligence (AI) powered tools to support decision making.

One of the essential steps in municipal heat planning is conducting a status quo analysis to assess current heat consumption patterns and predict future demand. In the absence of measured data, estimating accurate building heat demand becomes a key challenge for municipalities. Physics based simulations are generally precise but computationally expensive and challenging to scale for entire cities. On the other hand, machine learning models, although fast, lack transparency and explainability, making them less reliable for decision support. This trade off between accuracy, scalability, and interpretability makes it challenging to employ the best approaches for heat transformation.

Background and Approach

One powerful modeling tool for building heat demand estimation is TEASER[3], an open source urban energy modeling framework designed to generate simulation-ready Reduced Order Models (ROMs) in Modelica. To simplify complex heat modeling, TEASER provides building archetypes estimating thermal properties with minimal input data. TEASER also supports dynamic simulations and retrofitting scenarios, leading to valuable insights for energy efficiency measures.

Despite TEASER's advantages, running physics based simulations for thousands or millions of buildings would be computationally intensive. This makes real-time simulations impractical for an interactive digital twin like ENERsyte. At the same time, purely AI driven models often lack the required transparency for policymaking.
To solve this, we propose a hybrid approach that combines physics based modeling with machine learning, which enables fast, scalable, and explainable heat demand estimation. To achieve this, we train a surrogate model on the simulation data generated using TEASER. This method allows ENERsyte to provide real-time insights while maintaining accuracy and interpretability.

Methodology

To train a surrogate model for heat demand estimation, we first generate a synthetic dataset for building heat demand using TEASER. Since running simulations for every possible building configuration is infeasible, we use a systematic sampling approach to ensure the dataset is representative. This dataset must include variations in building

characteristics, climate conditions, and energy efficiency levels to enable the model to generalize across different buildings and municipalities.
To cover the input space completely, we use the allocated categories for categorical parameters and Latin Hypercube Sampling (LHS) for numerical variables. To capture the climate variations, we generate samples for different climate zones across Germany. Once the input data is assembled, we use TEASER to generate simulation-ready models for each parameter combination. These models are simulated using Modelica tools, and the resulting heat demand data is paired with the input to train the surrogate model. For training the surrogate model, we selected XGBoost[4] as our initial model. This model is fast to train, can handle different data types, and provides feature importance analysis. We trained the model on 80% of the data and evaluated the performance on the remaining 20% using Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and R^2 score (Coefficient of Determination).

Finally, the trained model will be integrated into the ENERsyte platform, allowing municipalities to perform real-time heat demand estimations on ENERsyte's existing dataset or municipalities' privileged data.

Results
The trained surrogate model demonstrated strong performance on the held-out 20% test set, achieving a Root Mean Squared Error (RMSE) of 3530.4 kWh/year, a Mean Absolute Error (MAE) of 2189.9 kWh/year, and a coefficient of determination (R^2) of 0.9995. These results indicate that the surrogate model effectively approximates the heat demand estimates generated by Modelica simulations using TEASER. The related predictions for the 1440 buildings in the test set were generated in approximately 5 milliseconds, demonstrating the model's suitability for real-time use in municipal digital twins.

Conclusion
By integrating a physics based machine learning model for heat demand into ENERsyte, we provide municipalities and urban planners with a powerful tool for heat transformation planning. This approach enables fast and cost-efficient scenario testing and decision support, which helps municipalities comply with the heat planning law (Wärmeplanungsgesetz). By streamlining these processes, ENERsyte helps municipalities make informed decisions and accelerate their transformation into more sustainable, energy-efficient urban environments.

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Spatial Temporal Graph Neural Networks for Urban Digital Twin Modeling.

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Keywords: UDT, STGNN, Green Deal Data Space, Data Altruism, household consumption

Abstract

Urban Digital Twins (UDT) are increasingly vital for modern urban planning, serving as virtual replicas of cities that integrate real-time data and advanced technologies to simulate, analyze, and predict urban processes. A critical focus of UDT is modeling household resource consumption, which can benefit companies, public administration, and citizens. However, challenges such as limited data availability, poor data quality, and lack of interoperable privacy-preserving methods hinder effective UDT construction. The EU's Data Governance Act and Green Deal Data Space initiatives offer potential solutions by facilitating voluntary data sharing and secure collaboration.

In this context, Spatial Temporal Graph Neural Networks (STGNN) present a promising approach to model consumption in cities for UDT construction, due to its capacity for extrapolation of partial data and simulation of various policy scenarios. Despite recent advancements, further research is needed to determine the effectiveness of these models in real-world scenarios, assess their accuracy, and ensure privacy protection.

1. Introduction

Urban Digital Twins (UDT) are increasingly important for modern urban planning. These virtual replicas of cities integrate real-time data and advanced technologies to simulate, analyze, and predict urban processes and events. While the concept of digital twins originated in the industrial domain, where they simulate scenarios or predict future events, applying this concept to cities introduces additional complexity.
Urban environments involve multiple interacting domains, numerous variables, and a high degree of unpredictability. For this reason, many UDT approaches focus on modelling some aspects of the city separately. One important aspect of UDT is resource consumption in households, including electricity, water and gas. Having accurate predictions about this consumption of resources would be very beneficial. Companies could achieve better infrastructure planning and cost savings, public administration could improve policymaking and reduce environmental impacts in cities, and individual citizens could be more aware about their consumption.

For this approach to work, UDT needs high-resolution data on individual household consumption. However, researchers and policymakers often struggle to obtain such data. Limited availability and poor data quality are among the main challenges identified for constructing digital twins (Weil et al. 2023). These issues, along with a lack of interoperable privacy-preserving methods, hinder the construction of effective UDT.

2. Problem formulation

In the European Union, two related initiatives could offer potential solutions to share data effectively for building an UDT. On the one hand, Data altruism organizations are entities recognized under the Data Governance Act (DGA) (European Parliament 2022) that facilitate the voluntary sharing of data by individuals and companies for the benefit of society. On the other hand, The Green Deal Data Space (GDDS) (European Commission. Joint Research Centre. 2024) intends to provide a secure framework to foster collaboration and data exchange between organizations working in sustainability initiatives.

While these approaches will facilitate data sharing, it is very unlikely that they will allow obtaining the data of all the households of a city. Data Altruism initiatives that try to convince individuals to share their data will probably have only partial penetration in the population of a city. Similarly, entities participating in the GDDS will only be able to provide data with some restrictions like aggregation or anonymization. Therefore, constructing UDT based on data from these initiatives will require extrapolating time series data from certain points to the entire city.

3. STGNN-based approaches for UDT

Modelling UDT with Spatial Temporal Graph Neural Networks (STGNN) offers an interesting research perspective. Because of its capacity to capture spatial and temporal correlations, these models could be used to extrapolate partial data to an entire city and incorporate contextual variables into the model that would allow simulating different policy scenarios (M. Jin et al. 2024).
Also, the system could potentially be used to generate synthetic data that could be shared within data spaces initiatives such as the GDDS. In recent years, multivariate time series forecasting modelling with graphs has emerged as a promising technique that improves the performance of more traditional approaches (Wu et al. 2020; Guo et al. 2022; Wei et al. 2023; Zhuang et al. 2024; Wang et al. 2024).
Also, initial research suggests that similar techniques could be used to extrapolate data from some data points to another households for whose data is not available (Zheng et al. 2023; Cini et al. 2021). Similarly, a modified approach could be used to create high precision synthetic data.

4. Open challenges

Before effective implementation in UDT in real-world scenarios, there are some challenges that need to be addressed(G. Jin et al. 2024) . First, it is crucial to determine the effectiveness of these models in real world scenarios. Determining how many data points are necessary to build an effective model, or the required spatial distribution and other characteristics of the data for the model to work, are still open challenges.

Second, appropriately determining the accuracy of extrapolation models and what-if scenarios may be complicated with different data than the one the model has been trained with. Finally, privacy aspects should be carefully considered. Accurate extrapolations of data may generate may invade privacy of people not participating on data altruism initiatives. Also, sharing this data or insights should be respectful with all the people affected.

5. Conclusion

While STGNN based approaches holds great promise for UDT modelling, addressing data availability, model accuracy, and privacy concerns is crucial for their effective implementation.

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Designing for the Urban Twin Transition: Data Intermediary Challenges in Prototyping Data Collaboratives - A Case Study from Milan.

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Keywords: Data collaboratives, local data ecosystem, data-centric services, prototyping

Abstract

The European Commission (EC) has been actively addressing the regulatory and organizational barriers hindering the European Data Market through its comprehensive European Data Strategy. By implementing key legislative frameworks, such as the Data Act, the Data Governance Act, and the Interoperable Europe Act, the EC aims to foster cross-sectoral data sharing. While these regulations address organizational and technological limitations, it is unlikely that, by themselves, they will suffice in overcoming the contemporary challenges in data-driven innovation. Beneath the regulatory level, meso-/micro-level initiatives (e.g., sense-making, engagement, mission building, prototyping) must be developed to provide data holders with a compelling reason to collaborate around data and create both economic and public value (Bartolomucci & Leoni, 2024).

The data collaboration challenge primarily emerges as a matter of conflicting perspectives, and current views often assume that collaboration is inherently beneficial. In reality, private data providers may refrain from participating in data collaboration initiatives due to insufficient incentives and high risks (e.g., privacy infringement) (Alemanno, 2018). For public sector bodies, the successful integration of new data sources into their activities necessitates alignment with existing operational routines and political mandates (Klievink et al., 2017).

Meanwhile, data beneficiaries, such as citizens, often rely on intermediaries to access data through usable digital products or services.
It becomes clear that while high-level regulation can provide the frame for micro-level data practices, the alignment of interests among actors potentially engaging in new data ecosystems cannot be fully addressed by such general regulations. Instead, this alignment depends on contextual dynamics, particularly given that data is a non-rivalrous, intangible asset whose value is contingent upon its contextual use (Floridi, 2014).

This paper explores the key collaborative, representational, economic, and political challenges that data intermediaries face when designing and developing twin transition values within the urban context, contributing to existing research in this direction (Galasso et al, 2022; Liva et al., 2023). The insights presented are drawn from a practice-oriented case study based on a 'data-centric' collaborative process aimed at analysing and interpreting the impact of the Salone del Mobile.Milano and Design Week on the city of Milan in 2024. The study involved a heterogeneous group of public and private data holders, who engaged in exploring their respective datasets to generate comprehensive insights. By examining how data holders navigate their own datasets and collaborate across sectors, the study highlights the operational dynamics and challenges inherent in creating a functional data collaborative. This approach not only offers a deeper understanding of the event's urban footprint but also demonstrates how data-centric processes can support policy-making in complex urban contexts, contributing to the broader goals of the twin transition in urban data ecosystems.

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Closing Plenary Session: **Powering the Data Transition – Rethinking Digital Sustainability**

Speakers:
Karen **van der Zanden** - Chair Expert Group Sustainable Digitalization / House of ESG, The Netherlands
Stijn **Grove -** Dutch Data Center Association, The Netherlands
Claire **Groosman -** Top Sector Energie, The Netherlands
Inge **Sonnenschein -** Alliander Digital Strategy, The Netherlands

Chair: Frits **Bussemaker** – Dutch National Government, The Netherlands

Abstract

As the global digital transition accelerates, IT now accounts for around 10% of global energy consumption—a share expected to grow rapidly. Yet, this increasing demand is straining existing energy infrastructure, with energy shortages already slowing down digitization efforts. This closing plenary brings together experts from the public and private sectors to discuss how energy companies, data centers, and governments can work together to improve energy efficiency and build a more sustainable digital future. Key topics include responsible policies, corporate strategies for smart data processing, sustainable data center integration, and collaborative approaches to grid stability. The panel will also explore how we can move beyond efficiency toward a holistic vision of digital sustainability.


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