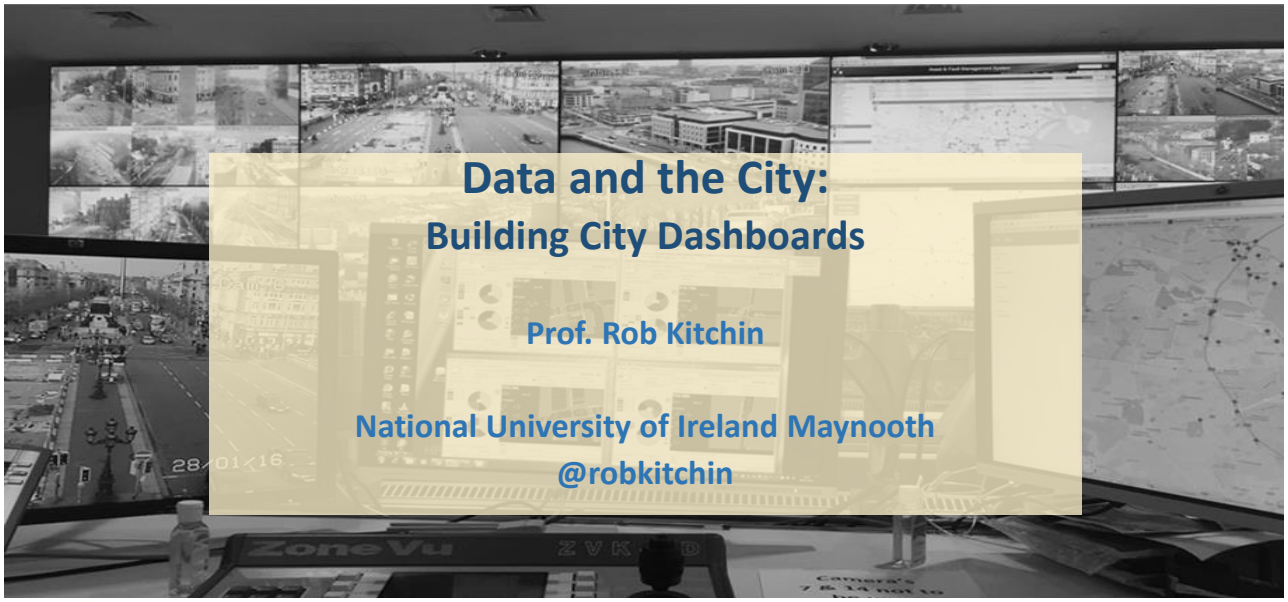


# Data and the City:
## Building City Dashboards

**Prof. Rob Kitchin**

**National University of Ireland Maynooth**
**@robkitchin**

Building City Dashboards

Maynooth University National University of Ireland Maynooth | Social Sciences Institute

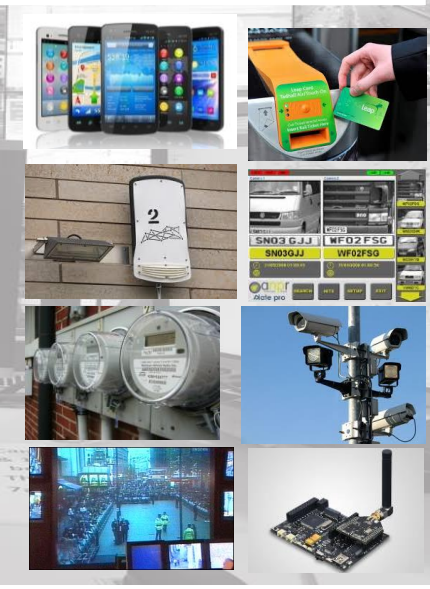
Science Foundation Ireland sfi For what's next

## Data and the city

- Rich history of data being generated about cities
- Long had *data-informed urbanism*
- Urban data are a key input for:
  - understanding city life
  - solving urban problems
  - formulating policy and plans
  - guiding operational governance
  - modelling possible futures
  - tackling a diverse set of other issues
- Being complemented and replaced by *data-driven urbanism*

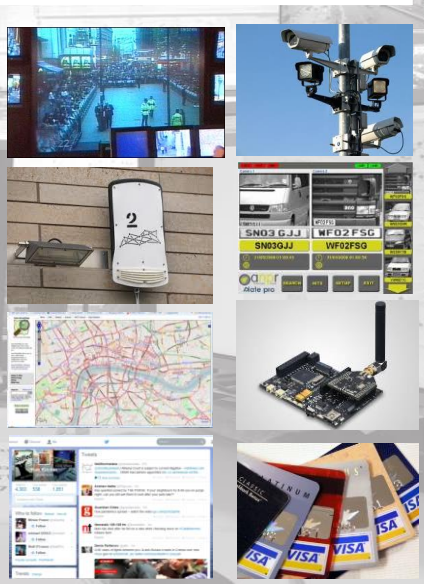
# Smart city tech / urban big data

| Domain | Example technologies |
|---|---|
| **Government** | E-government systems; online transactions; city operating systems; performance management systems; urban dashboards |
| **Security and emergency services** | Centralised control rooms; digital surveillance; predictive policing; coordinated emergency response |
| **Transport** | Intelligent transport systems; integrated ticketing; smart travel cards; bikeshare; real-time passenger information; smart parking; logistics management; transport apps |
| **Energy** | Smart grids; smart meters; energy usage apps; smart lighting |
| **Waste** | Compactor bins and dynamic routing/collection |
| **Environment** | Sensor networks (e.g., pollution, noise, weather; land movement; flood management) |
| **Buildings** | Building management systems; sensor networks |
| **Homes** | Smart meters; app controlled smart appliances |
| **Civic** | Various apps; open data; volunteered data/hacks |



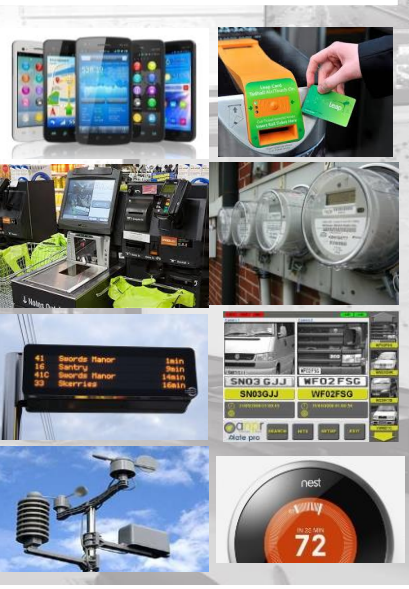
# Urban big data

- Directed
  - Surveillance: CCTV, drones/satellite
  - Public admin records
- Automated
  - Automated surveillance
  - Digital devices
  - Sensors, actuators, transponders, meters (IoT)
  - Interactions and transactions
- Volunteered
  - Social media
  - Sousveillance/wearables
  - Crowdsourcing
  - Citizen science

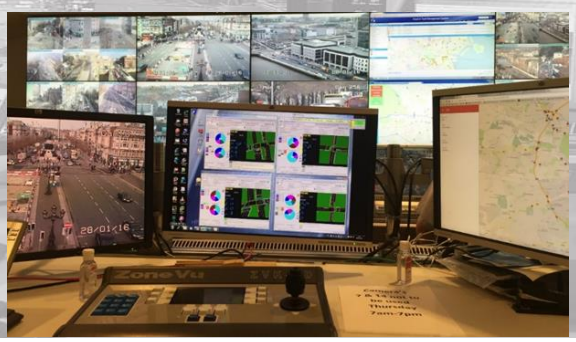


# Urban big data

- Diverse range of public and private generation of fine-scale (uniquely indexical) data about citizens and places in real-time:
  - utilities
  - transport providers, logistics systems
  - environmental agencies
  - mobile phone operators
  - app developers
  - social media sites
  - travel and accommodation websites
  - home appliances and entertainment systems
  - financial institutions and retail chains
  - private surveillance and security firms
  - remote sensing, aerial surveying
  - emergency services
- Producing a data deluge that can be combined, analyzed, acted upon











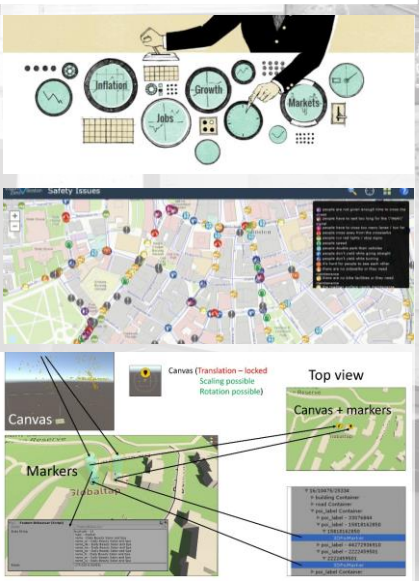


# Urban Dashboards

- Dashboards provide a visual means to organize and interact with data
- Act as cognitive tools that improve a user's 'span of control' over voluminous, varied and quickly transitioning data
- Enable a user to explore the characteristics and structure of datasets and interpret trends
- Power and utility of urban dashboards are their claims:
  - to show in detail and often in real-time the state of play of cities
  - to translate the messiness and complexities of cities into rational, detailed, systematic, ordered forms of knowledge
  - to enable us to know the city *as it actually is* through objective, trustworthy, factual data

# BCD/Critical data studies

- Critically reflect on city dashboards through six issues:
  - epistemology
  - scope and access
  - veracity and validity
  - usability and literacy
  - use and utility
  - ethics
- Posed as six questions designed to expose the *politics* and *praxes* of city dashboards
- Heuristic for examining other data-driven technologies



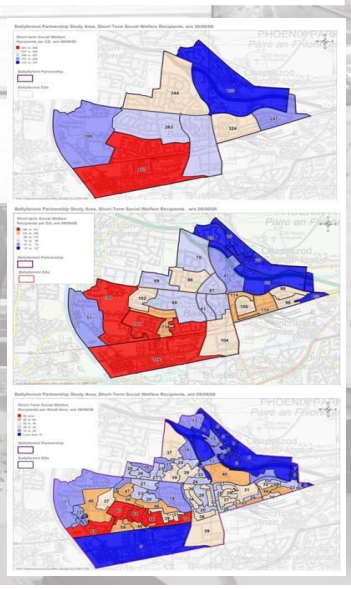

# How comprehensive and open are city dashboards?

- **Scope and access**
- Dashboards process and display quantitative data that are generated recurrently so can be tracked over time/space
- Enormous amount of information about cities absent
- Ignores the metaphysical aspects and intangibilities of urban life
- Significant gaps and silences in the data that are displayed
- Is the dashboard open for public viewing? Are data generated are available for re-use?
- Level of openness varies across administrations and places
- Access to data a significant issue in the building of the Dublin Dashboard
- Even when data are available there are often issues related to data measurement, data formats and media, metadata, data standards, modes of sharing

# To what extent can we trust city dashboards?

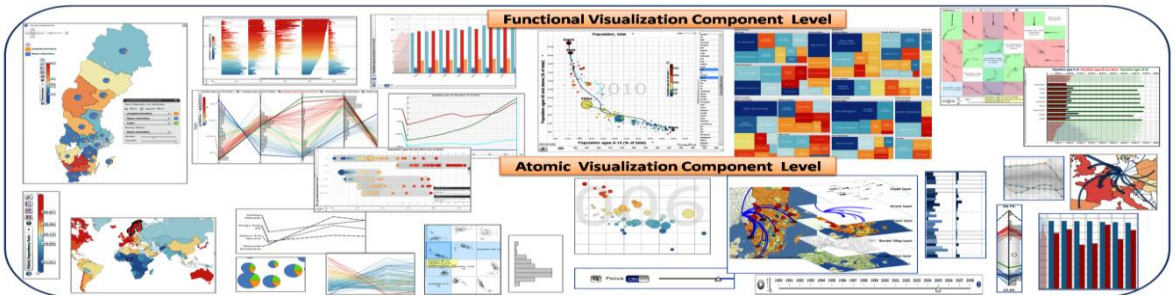
- **Veracity and validity**
- Data quality
- Appropriateness of the method used and other methodological issues
- Validity of the analysis and interpretation

- Instrument and human error and bias; abstraction, representation, generalisation and calibration
- Data shaped by technical instruments of varying specification and parameters, handling procedures, scientific norms and standards, scientist behaviour and organisational processes
- Often published without metadata: measurement, sampling frame, handling, veracity (accuracy, fidelity), uncertainty, error, bias, reliability, calibration, lineage
- Rarely are the algorithmic black-boxes exposed so that calculations are open to scrutiny
- There are issues such as MAUP and other ecological fallacies that shape interpretation



# How comprehensible and useable are city dashboards?

- **Usability and literacy**
- Assumption enable urban data to be explored and analyzed in an easily digestible and intuitive way without the need for specialist skills or knowledge
- There are three practical issues – navigation of site, use of tools, and data/analytics literacy
- Sometimes not at all clear how to display data, change data layers, perform analysis, interact with data
- Data and analytic literacy is highly variable
- Affect use and utility



# The BCD Project

- Funded by SFI for 4 years
- Fundamental and applied research

- 4 work packages
  1. Data access, quality and standards
  2. Multi-modal interaction
  3. Data analytics and modelling
  4. Data literacy and outreach

- Open science, open source, open data
- Low cost, low maintenance
- Inform best practice; specify framework
- Lighthouse/follower model: Dublin/Cork
- Partners: Four Dublin LAs; Two Cork LAs; CSO; OSi

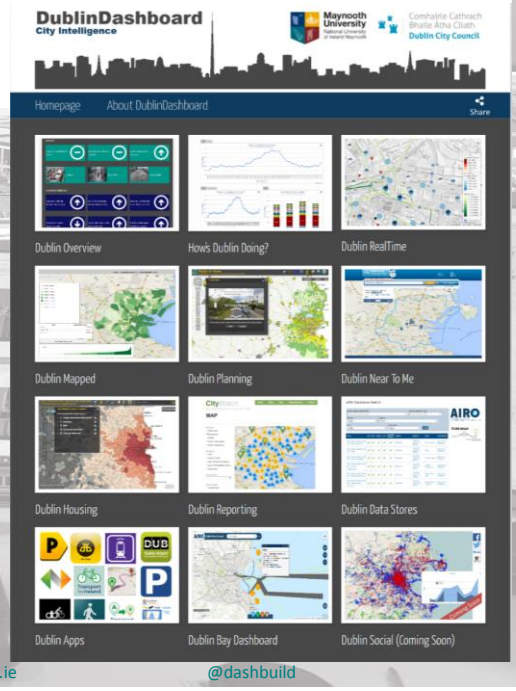


# Dublin Dashboard

- Funded by ERC & SFI
- Launched in 2014

- real-time information
- interactive maps/graphs
- location-based services
- indicator trends
- open and big data
- city reporting

- Interactive data viz, maps, LBS, query tools, benchmarking
- dublindashboard.ie

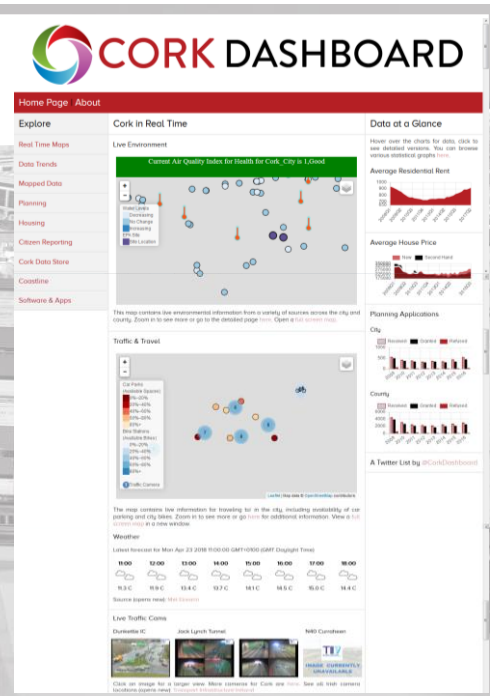


# Cork Dashboard

- Funded by SFI
- Launched in 2017

- Data types:
  - Public administration;
  - Official statistics;
  - Operational;
  - Scientific;
  - Crowdsourced;
  - Locative and social media data;
  - Derived

- corkdashboard.ie

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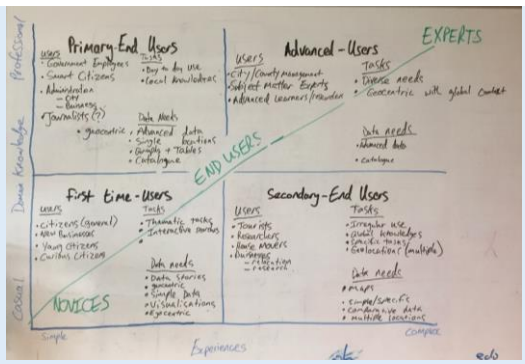
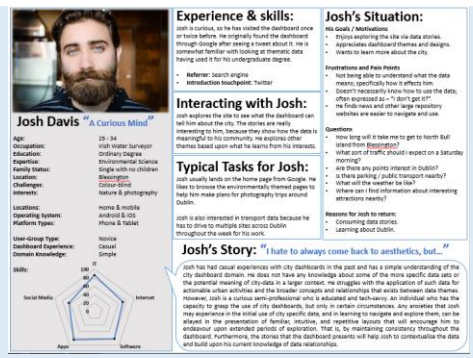
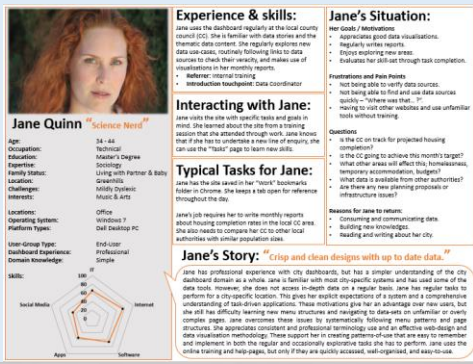
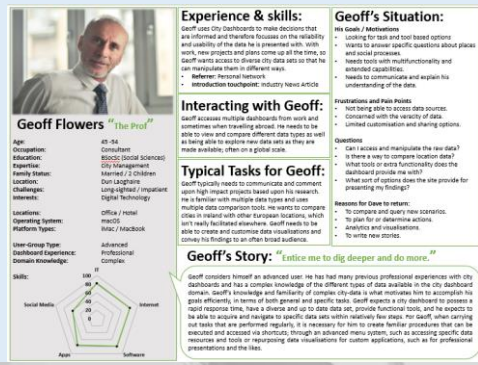
## Personas



# Dashboard re-design

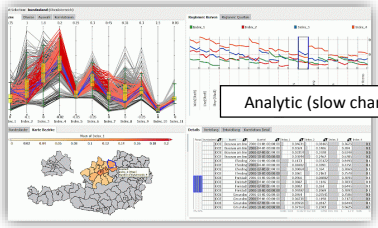
Increasing Visualization Complexity

*Explanative*
*(communication of insights)*

*Explorative*
*(discovery of patterns)*


Data stories


Dashboard (fast chart)



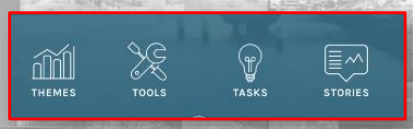
Analytic (slow chart)

*Novice | Casual*

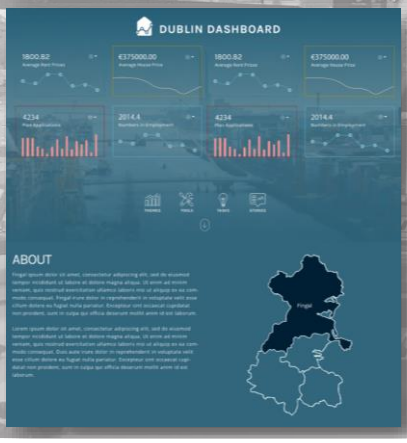
*Advanced | Professional*

Increasing Contextual Information

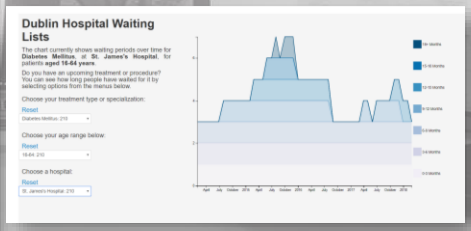
# Dashboard re-design



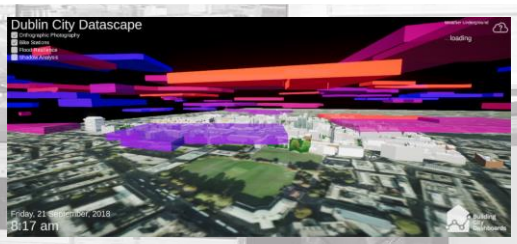


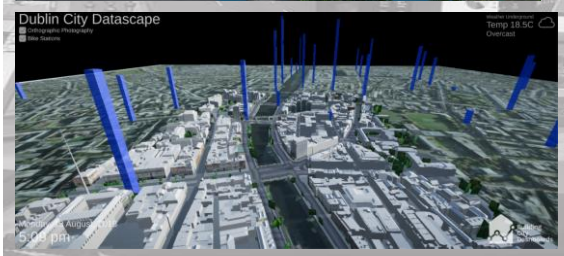





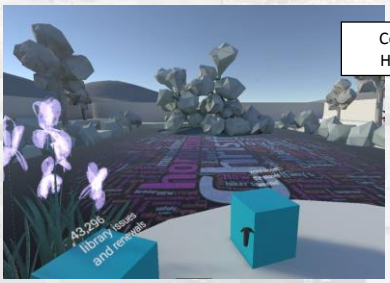



# VR/AR/Web3GL




# Working with data artists




Cordula Hansen

Jeffery Weeter

Maria Mencia


Conor McGarrigle

- Creative interpretations of urban data by four artistic collaborators
- ‘Writer in residence’: data stories

# Conclusion

- Urban data is proliferating, as are ways to make sense and act on those data
- City dashboards are one way to collate, process, visualize, analyze and share urban data, and are becoming more common
- How do we create city dashboards that are effective at communicating about the city at the same time as heeding critiques?
- We advocate:
  - re-imagining dashboards, explicitly recognizing their inherent politics, praxes and contingencies
  - designing based on user feedback, design principles, openness and reproducibility

Building City Dashboards

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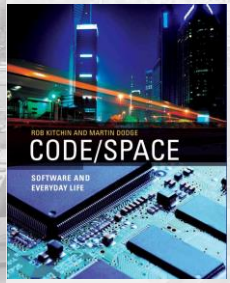
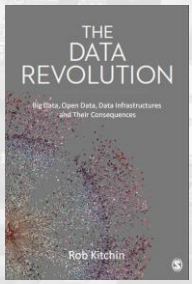
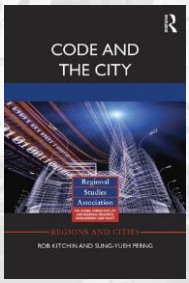
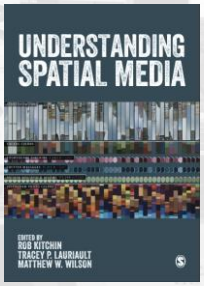
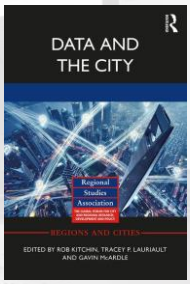
Rob.Kitchin@mu.ie
@robkitchin
https://www.maynoothuniversity.ie/people/rob-kitchin

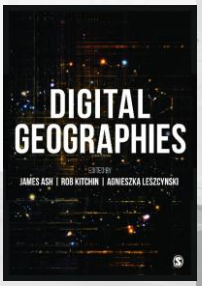
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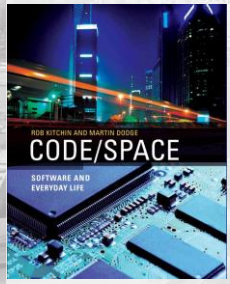


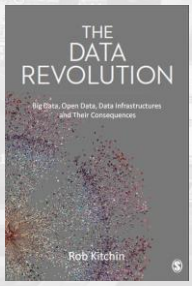


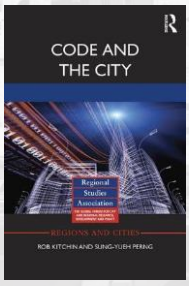


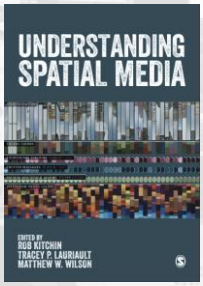


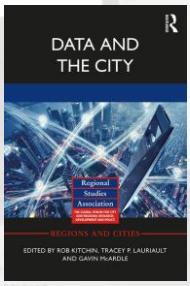


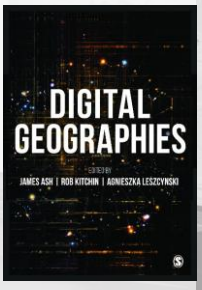


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