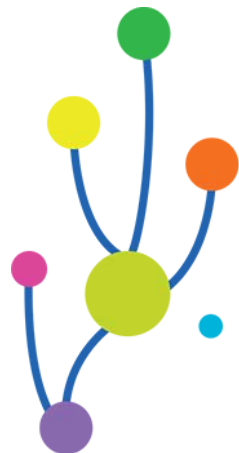


The role of big data in exploring and informing lifelong learning

Prof Mike Osborne

Dr Catherine Lido



Urban Big Data Centre

An ESRC Data
Investment



University of Glasgow



THE UNIVERSITY of EDINBURGH



University of
Reading



The
University
Of
Sheffield.

UIC UNIVERSITY OF ILLINOIS
AT CHICAGO



University
of Glasgow



The Urban Big Data Centre (UBDC) is a research resource promoting the use of innovative methods and complex urban data to address global city challenges.



Urban
Big
Data
Centre

An ESRC Data
Investment

Our Objectives:



Develop novel solutions for using and sharing urban big data



Provide high quality training and outreach activities



Deliver cutting-edge research

www.ubdc.ac.uk

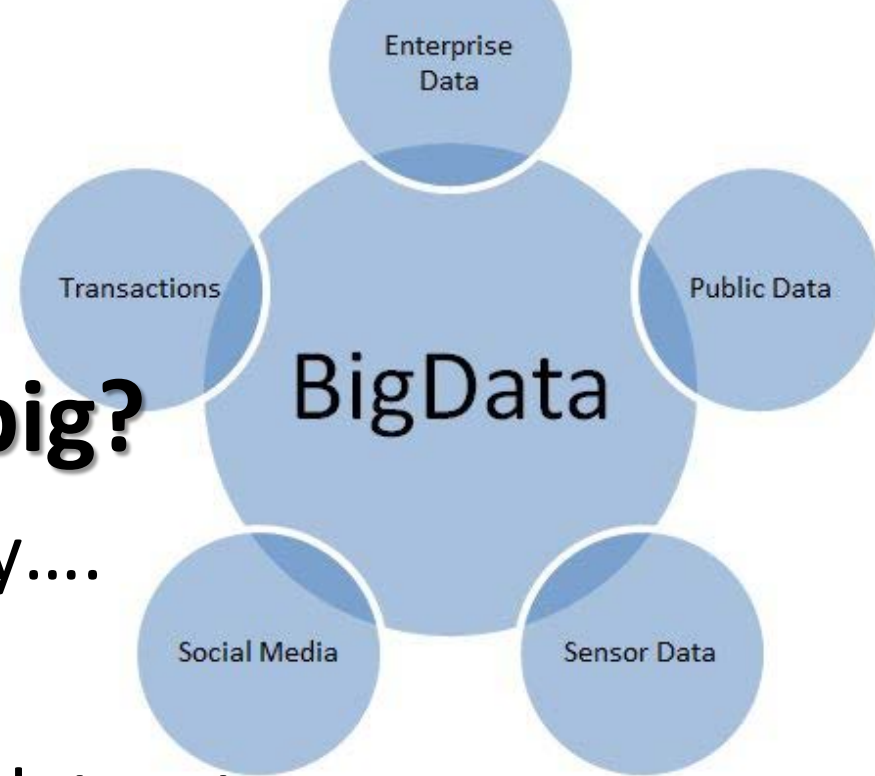


@UrbanBigData

LinkedIn  urbanbigdata

- **What makes data big?**

- Volume, Velocity, Variety....
- Verification & Value
- Existing large/ complex datasets
- Online, real time, social media data, videos
- The 'internet of things' (e.g. computer chip/ sensor data).



UBDC Data Sources

- Open data
- Grey literature
- Commercial data
- Governmental data
- Academic research
- Citizen science
- Environmental
- Transportation
- & more!

Potential Users

- Public
- Academic
- Governmental / Policymakers
- Commercial
- Citizen scientists
- **YOU!**

UBDC Remit

- Open and Proprietary Data Portals
- Open Source Toolkits
- User Environments
- Integration of GIS and Big Data Information
- Data Linkage
- Data Manipulation
- User Training
- Data Visualisation



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University
of Glasgow

UBDC System

- 384 Cores
- Minimum of 6 Gig of RAM per core
- 700 Terra-bytes of Storage
- 10 Gigabit enabled link to JANET
- IPv4 and IPv6 enabled
- Multi operating system support



Traditional Uses of Big Data in Education

- Government policy & academic push for big data usage in education (ESRC)
- Relatively niche topic in education, but “clearly beginning to grow” (Eynon, 2013, 273)
- ‘Learning analytics’ mainly aimed at efficiency and cost-effectiveness in education delivery (e.g. Niemi & Gitin, 2012)
- Descriptives for participation levels
- Goals of transparency, competitiveness & evaluating performance (e.g. schools, teachers)
- Inform administrator decisions...



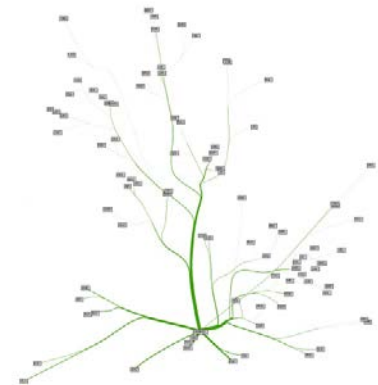
Future of Big Data in Education

- Apply these tools to “empower, support and facilitate practice and critical research” (Eynon, 2013, 273)
- Ex: Spatial interaction modelling & geodemographic analysis to develop a national model of participation in HE (Singleton, Wilson & O’Brien, 2012)
- Modern technological advances allow us to explore the learners’ journey literally...

DEPARTMENT OF GEOGRAPHY

UCL

Results –
Hampshire
Schools to
Universities



Integrated Multimedia City Data (iMCD) Project

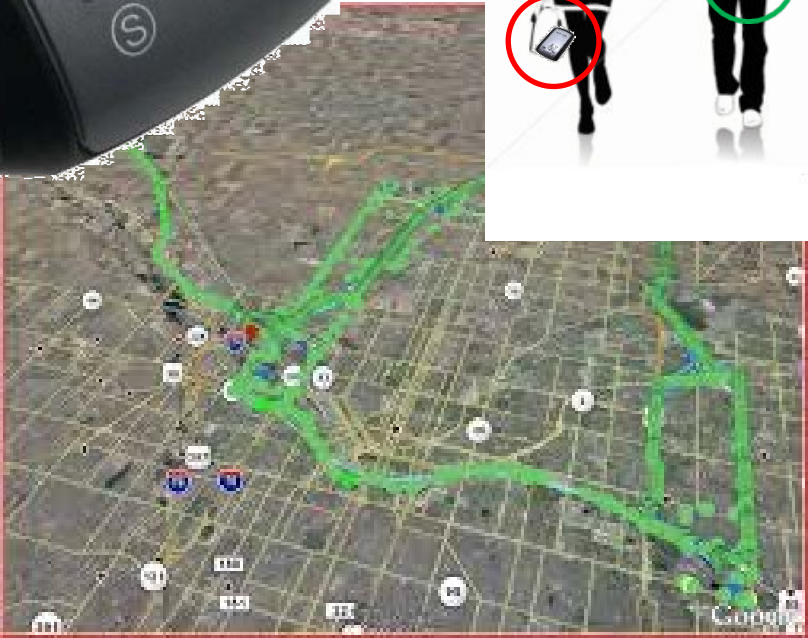
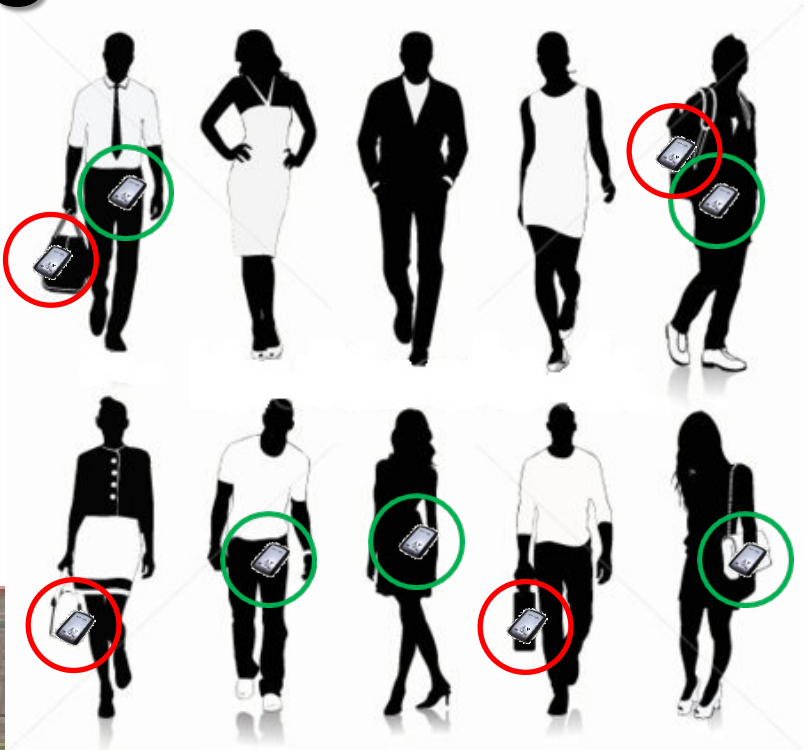
- Lead Investigator:
Vonu Thakuriah
- Co-Investigators:
Mike Osborne
Gwilym Pryce
Zhenhong Li
Jinhyun Hong
Mark Livingston
Iadh Ounis
Joemon Jose
Craig McDonald



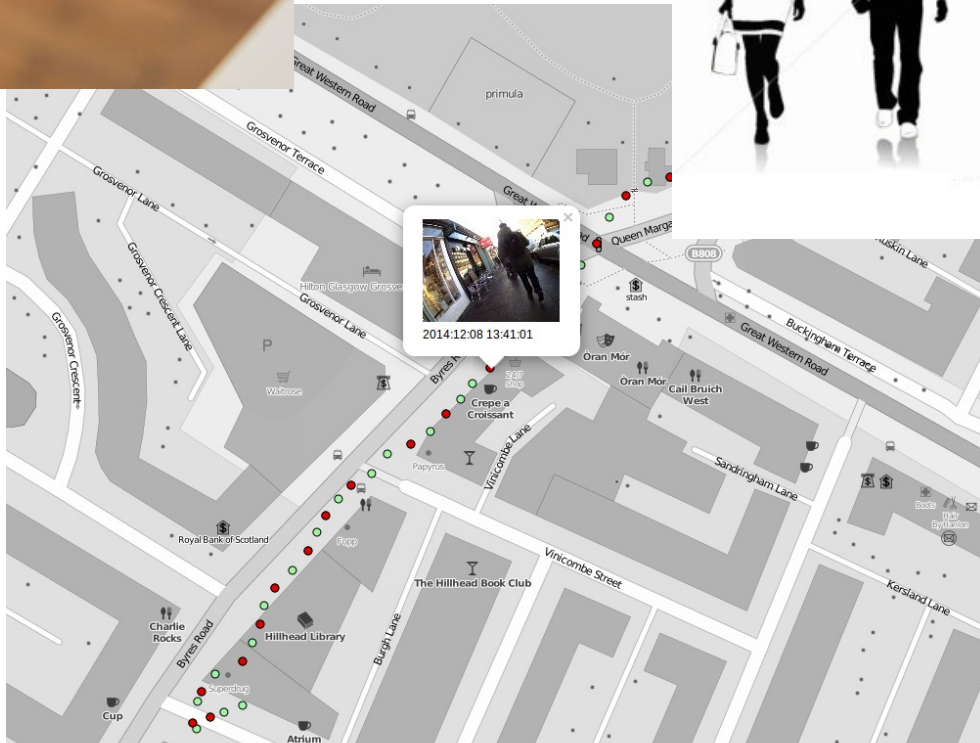


- Integrated Multi-media City Data Project
- Managed by Mark Livingston
- 1500 Household Survey
- GPS data
- Life logging and sensing data
- Glasgow Memory server (social media capture)
- To be made available to the public
- Participant engagement with results

GPS



Lifeloggers

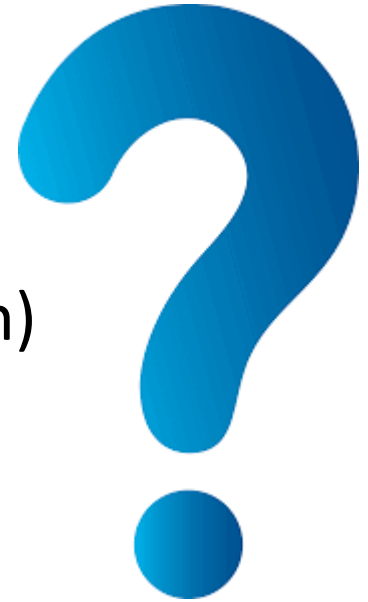


Survey measures

- Individual & household demographics
- Attitudes, values
- Literacy/ knowledge and
- Behaviours in 5 domains:
 - **Sustainability**
 - **Transport**
 - **Education/ skills**
 - **Cultural/ civic activities**
 - **ICT/ technology**



Education Questions



Existing survey measures incorporated include:

- AES= Adult Education Survey (English Version)
- ALLS= Adult Lifelong Learning Survey
- BHS= British Panel Household Survey
- Britsocat= British Social Attitudes Survey
- CFLS= Consumer Financial Literacy Survey
- NALS= National Adult Learning Survey
- NIACE= National Institute for Adult Continuing Education
- ONS= Office of National Statistics Survey
- PIAAC= Programme for International Assessment of Adult Competencies
- SLS= Skills for Life Survey
- UNESCO= Open Educational Resource Survey

Education Emphasis

- Lifelong Learning
- Formal Learning
- Informal Learning
- Non-formal Learning
- Family Learning
- Attitudes towards Learning
- Literacies- English, Foreign Language, Maths & Financial, Health, Environmental



iMCD Outcomes

- Data will yield a three dimensional picture of peoples' daily activity, mobility, participation in formal, non-formal and in-formal learning (in the workplace, community, family etc.)
- These will be examined alongside wider attitudes and literacies: health, financial, political, sustainable, maths & foreign language.
- Ultimately to promote behavioural interventions to improve the lives of citizens within the city of Glasgow and beyond.

Future research avenues: The case of adult learners

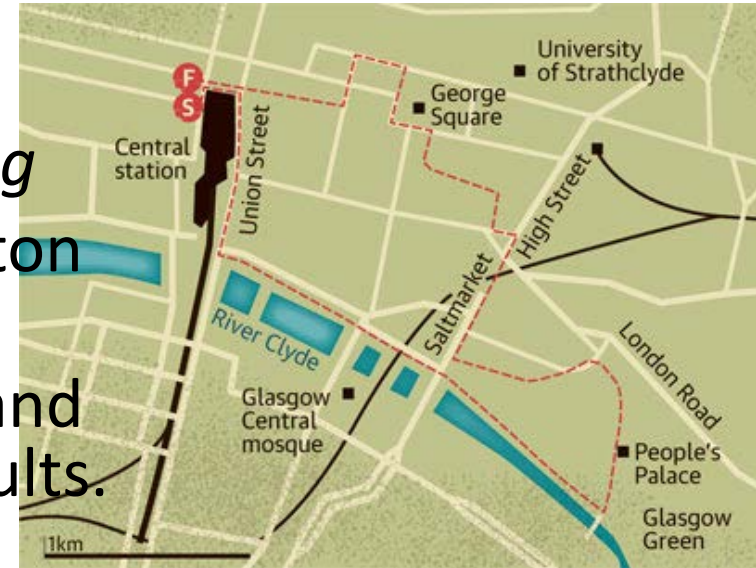


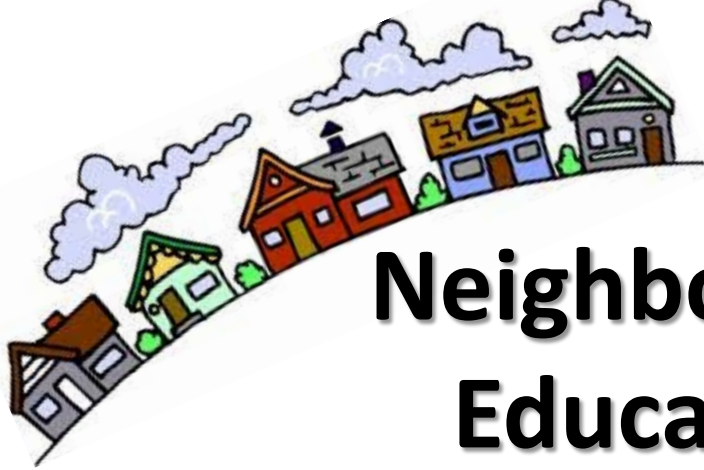
- Policy Futures in Education

Big Data, Cities and Lifelong Learning

Prof Mike Osborne, Dr Mark Livingston
& Dr Catherine Lido

- Sub-sample of learning engaged and non-engaged adults and older adults.
- How are they engaging and why?
- Analyse demographics, sustainability, political/ cultural, housing and transport variables for predictors of lifelong learning...
- Where are engaged learners going (where are they based)?
- What are they seeing? Doing (inside & outside learning environments)?





Follow-on project: Neighbourhoods, housing & Educational opportunity

- Prof Mike Osborne & Keith Kintrea
- Unequal educational outcomes are a key policy concern, reflecting vital national questions about the competitiveness of the UK and Scottish economies, and about social mobility and social justice. Education Scotland has highlighted place-based differences in educational outcomes as a key factor ‘holding Scotland back’. This project aims to develop new understandings of the drivers of place-based educational inequalities, including neighbourhood factors, to inform educational and urban policy.

Novel Analyses: Train Delays in the City

Dr Dyaa Albakour & team

- **Web service** for obtaining information about train delays
→ support **train delay visualisation**
- Service features:
 - Geo-spatially querying for train stations
 - Querying for delayed train services
 - Given a train station and a date, obtain a list of delayed services*
 - Aggregation and time series of delays
 - Given a train station and a date, obtain an hourly time series of delayed trains, percentage of delays, etc.*
 - Aggregation by train services
 - Delays over rail segments
 - Linking with twitter data

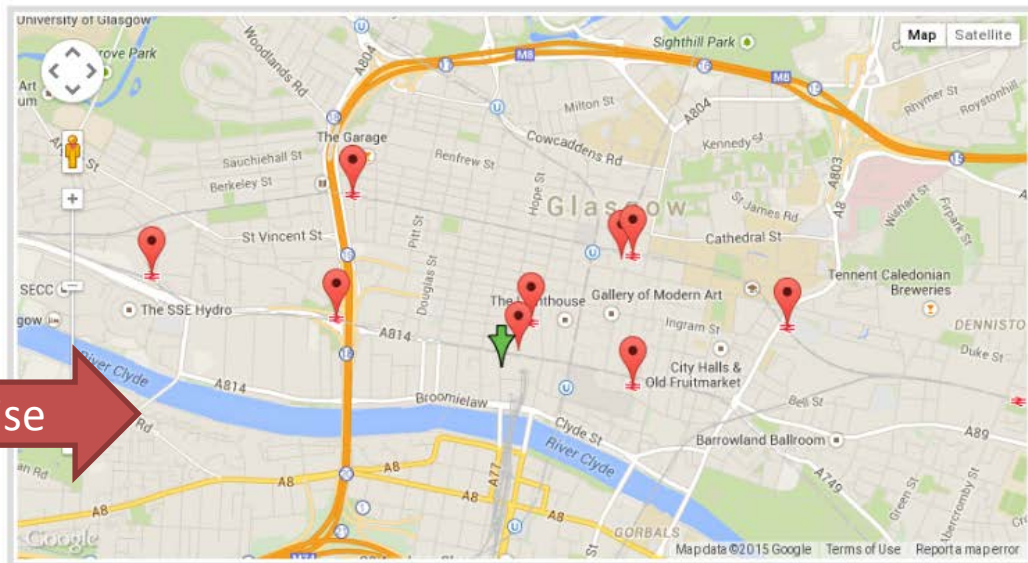
Train Delays in the City

List of train stations

Raw Data

```
{
  "averageDelays": 0,
  "dateString": "2014-11-26 06:00:00",
  "numberOfDelayedTrains": 6,
  "percentageOfDelayedTrains": 0.15789473684210525,
  "timeInMillis": 1416985200000
},
{
  "averageDelays": 0,
  "dateString": "2014-11-26 07:00:00",
  "numberOfDelayedTrains": 0,
  "percentageOfDelayedTrains": 0,
  "timeInMillis": 1416988800000
},
{
  "averageDelays": 0,
  "dateString": "2014-11-26 08:00:00",
  "numberOfDelayedTrains": 2,
  "percentageOfDelayedTrains": 0.05263157894736842,
  "timeInMillis": 1416992400000
},
}
```

Train Delays Home



visualise

- Train Stations
1. Charing Cross (Glasgow) Rail Station
 2. Exhibition Centre (Glasgow) Rail Station
 3. Anderston Rail Station
 4. Glasgow Central Rail Station
 5. Glasgow Central Low Level Rail Station
 6. Argyle Street Rail Station
 7. Glasgow Queen Street Rail Station
 - 8. Glasgow Queen Street Low Level Rail Station**
 9. High Street (Glasgow) Rail Station

Glasgow Queen Street Low Level Rail Station

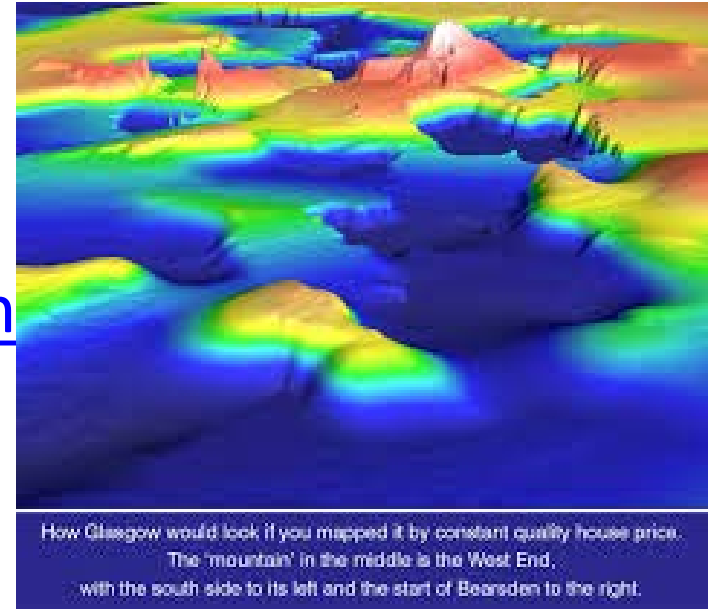
Timeline of delay ratio



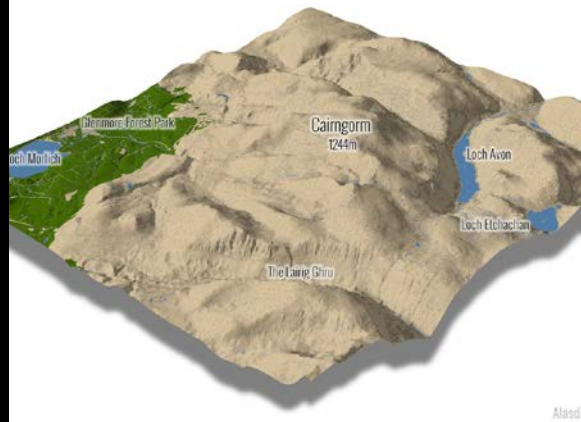
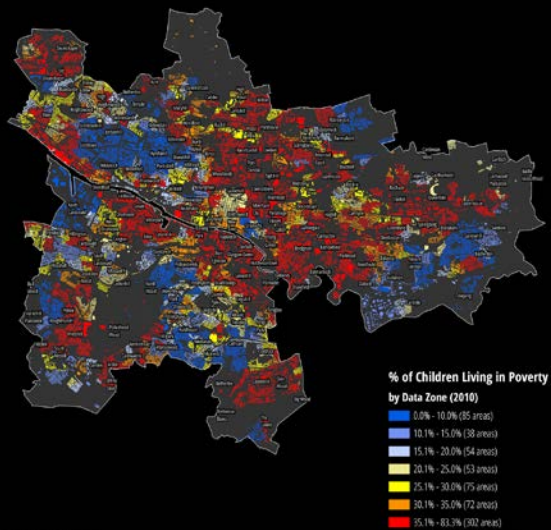
Novel Research Visualisations

- Prof Gwilym Price (Co-I):
- Dr Alisdair Rae:
- <http://www.undertheradar.com>
- <http://www.gonnaemapit.com/>

Cairngorm Mountain and Surrounding Area



Child Poverty in Glasgow



The North West



Novel Research Questions

- If we can triangulate social/ news media (e.g. the Glasgow Memory Survey) with survey, gps and 'big datasets', we could...
- Investigate spikes in participation in relation to events (identified through social media discussions and newsfeeds).
- Investigate the key factors influencing participation in geographic locations of cities.
- Collect citizen reactions to city-linked photo data, maps of their area and topical city events
- Develop stronger relationships between citizens and their local institutions of further and higher learning through these informal and formal data.

Caution



“It is argued that: (1) Big Data and new data analytics are disruptive innovations which are reconfiguring in many instances how research is conducted; and (2) there is an urgent need for wider critical reflection within the academy on the epistemological implications of the unfolding data revolution, a task that has barely begun to be tackled despite the rapid changes in research practices presently taking place. After critically reviewing emerging epistemological positions, it is contended that a potentially fruitful approach would be the development of a situated, reflexive and contextually nuanced epistemology.”

Kitchin (2014, 1)

Conclusions

Thus, “while big data and analytics are not panaceas for addressing all of the issues and decisions face by higher education administrators, they can become part of the solutions” (Picciano, 2012, 9)