What smart campuses can teach us about smart cities: a case study on open data

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- Background

- Methodology

- Findings

- Discussion

- Conclusion

- Smart Cities gained momentum due to rapid urbanisation, pressing urban challenges and dramatic threats to urban sustainability (Dameri and Cocchia, 2013; Gil-Garcia, Pardo and Nam, 2015)
  - Open data is often considered one of the key components of 'smart city' projects (Näslund, 2017)
  - Open data is data that "anyone can access, use or share" (the Open Data Institute)
- Smart Campus from 2000, largely focused on particular digital technologies:
  - video-conferencing systems (Kaneko et al., 2000)
  - use of smart cards (Halawani and Mohandes, 2003)
  - information platforms such as the wired/wireless and virtual private networks (Cui-ping, 2012)
  - cloud computing and the Internet of Things (IoT) (Qian, 2011; Nie, 2013)
  - ubiquitous sensor technologies (Guo and Guo, 2015)

➢ What is the role of opening campus data to the public for a 'smart campus' and how smart campuses can provide testing grounds for smart cities

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- Short study (January-April, 2017)

- A public university in the United Kingdom, with over 32,000 students combined in the U.K. and overseas campuses
  - developing a 'smart' vision for its campuses in the last two years
  - the development of a data platform to make data open is key to this process

- 23 interviews with key stakeholders (qualitative analysis):

Pie chart legend:
- Faculty staff and researchers — 10
- Management and services — 4
- Estates Office — 3
- Student Union — 3
- Management of a neighbouring university — 2
- City Council — 1
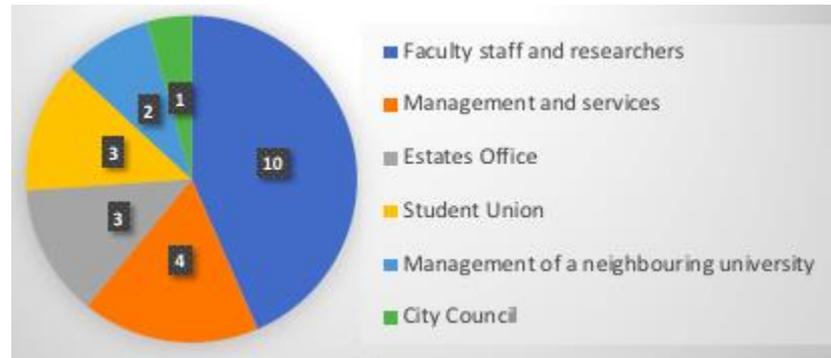
- 205 stakeholder survey (quantitative analysis)

  - *Explore ethical issues associated with data-driven smart solutions such as the use of personal data: how much people are willing to share and what are the implications of collecting such data. Answer the key questions and build the foundations for further work.*

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**Please indicate your age (pick one):** (205 responses)

- Under 20
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- 60-64

11.2%
14.6%
8.8%
12.2%
8.8%
13.7%
11.2%
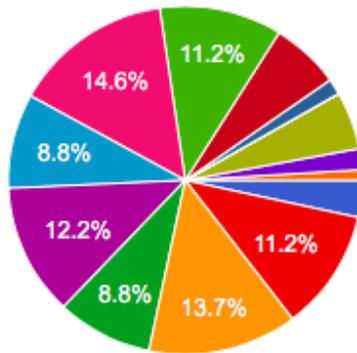
Please indicate your gender (pick one):

47.8%
45.9%

- Female
- Male
- Rather not specify
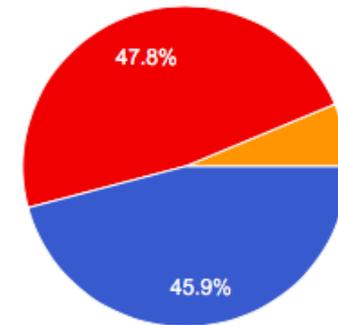
Please indicate your status on campus (pick one): (205 responses)

37.1%
21%
8.3%
26.8%

- Undergraduate student
- Master's level student
- PhD level student/Researcher
- Academic staff
- Administrative, Professional and Management staff
- Technical staff
- Visitor
- Other

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Benefits of open data on campus
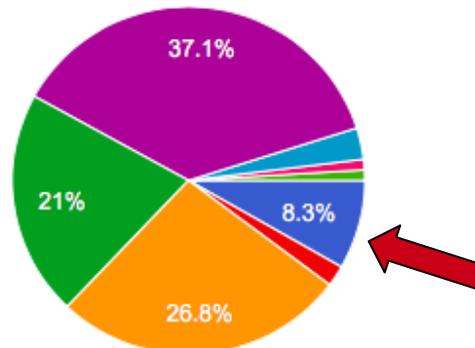
Groups of benefits	Stakeholder groups		
	Administrative and management staff	Academic staff and students	Public visitors and city
Reputation and trust	• Credible rankings and performance achievements • Open to public	• Trust in university achievements	• Perception of campuses as open to public
Data analysis	• Free data analysis • New insights for improved decision making and planning	• Using campus data as learning material • Practicing data analysis skills applicable in many disciplines	• Community members can analyze data • Integration with the city open government data portal
Services and resource utilization	• Higher uptake of campus services • Better utilization of resources	• Timely information about services on campuses	• Better participation in campus events and activities
User engagement	• More engaged students and public	• Higher engagement with campuses	• Higher engagement with campuses

"Not all will care but those who do care are the most vocal. The university needs to be proactive in providing information."

"There is a big push from public to be green but how can we trust the rankings if we cannot find information supporting it?"

"It gives a good reputation of being open if you have a good pool of data and can get analysis for free."

- privacy and security of the data as one of the main challenge

- with appropriate data protection and anonymization measures in place the University should be able to release the data about its operations

- the University should acknowledge the reputational risk involved in how data is being handled and used

- user perceptions of how their data is used imposes a significant risk, which needs to be mitigated by carefully following the data protection regulation and communication

- the first step would be to implement the process of consent to collect the data and provide full information on how data is being used and an option to opt out

Category	Share (%)	Use (%)
Use of energy in buildings	67%	27%
Use of the hoppers buses	67%	25%
Use of water in buildings	63%	25%
Parking on campuses	60%	26%
Card access to buildings	58%	24%
Library access	57%	20%
Access to public wifi on campuses	48%	16%
Swipe data for bike sheds	47%	15%
Class attendance	47%	26%
Journal downloads	45%	24%
Card readers on public transport	40%	12%
University smart phone apps (Open Day App etc.)	38%	13%
Access to public wifi on buses	37%	11%
Purchases at the on-campus outlets	33%	13%
Login to devices such as computers	32%	16%
Location of people on campuses	29%	25%
Video such as CCTV	29%	9%
Access to websites	24%	11%
None of the above	9%	27%
Other	8%	9%

- Over 90% of respondents are willing to share at least some of the data to improve services on campus

- Benefits from sharing personal data and how in particular data would be handled and used (e.g. anonymized) need to be better explained to gain user consent to using and making these data publicly available

- empirical work related to conceptualizing a 'smart campus' is fragmented with the focus on technology

- handling and releasing data about campus openly and easily accessible could be central to a 'smart campus' concept

- the kinds of data that people are willing to share to improve the campus vary – the more private the data is to the users the less they are willing to share

- an opportunity for the University to open data about building management and transportation quickly to enable potential benefits

- releasing open data that potentially is more personal will require additional work

- a smart campus should be underpinned by open data accessible to anyone

- study participants mostly agreed that these risks could be mitigated by following appropriate data protection and anonymization mechanisms

- "[The] campus is a city within a city" - City Council Official

- extent to which this could be true was outside the scope of this study and will need further investigation

- Usage of data and making data about campus available freely has several potential benefits.

- Although people associate 'smart' initiatives with data privacy issues, when presented with the benefits many users felt that they would share their data.

- Benefits of using them needs to be explained and adequate data privacy and protection measures put in place.

- Open data for smart campus needs to be further investigated to create the right framework for data release and use and to understand how it could provide valuable lessons for open data initiatives in smart cities.

Thank you!

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General awareness about smart city/smart campus concept:

- Are you familiar with a concept of 'Smart City'? What does a 'Smart City' mean to you?
- In your opinion, can we assess the city's 'smartness'?
- What parallels can be drawn between a 'Smart City' and a 'Smart Campus'? What should the University do to transform into a 'Smart Campus'?
- Similarly, what measures do you think should be used to assess campus' 'smartness'?
- Who should participate in developing a 'Smart Campus' strategy? How should 'Smart Campus' engage with the students and other stakeholders?
- What are the key benefits of a 'Smart Campus'?

Current initiatives on campus:

- Do you know of any initiatives on campus that in your opinion qualify as 'Smart Campus' initiatives? Who is in charge?
- How do you think these initiatives could and should be integrated in a comprehensive 'Smart Campus' strategic plan?
- Are you aware of any public data platforms at the University?
- Are you aware of any online platforms or other feedback mechanisms where the students can report any issues?

University data collection and storage:

- What personal and other data is being collected by the University that you are aware of?
- Do you know specific datasets, who administers them and where are they stored?
- Is it or should it be assessable by public? Where? Who should be responsible for making these data available and updated?
- What other data would you like to see collected and available?
- What are the key challenges in gathering and using the data?
- What are the opportunities to use the data? What are the challenges on campus that you think could be addressed with data?

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II.   Questions related to data collection and usage

2.1. Insights into user data helps understand their needs, improve existing services and create new ones. Often data can be used by third parties to innovate and offer new solutions. Assuming the data is kept secured and has been anonymized, which kind of personal data do you believe **should be shared** to help improve the university campuses and services (tick all that apply)?

- ☐ Card access to buildings
- ☐ Class attendance
- ☐ Use of the hoppers buses
- ☐ Card readers on public transport
- ☐ Access to public wifi on campuses
- ☐ Access to public wifi on buses
- ☐ Login to devices such as computers
- ☐ Location of people on campuses
- ☐ Access to websites
- ☐ Video such as CCTV
- ☐ Parking on campuses
- ☐ Purchases at the on-campus outlets
- ☐ Use of energy in buildings
- ☐ Use of water in buildings
- ☐ Swipe data for bike sheds
- ☐ University smart phone apps (Open Day App etc.)
- ☐ Library access
- ☐ Journal downloads
- ☐ Other/please specify:_____
- ☐ None of the above

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2.2. Assuming the data is kept secured and has been anonymized, if you could gain access, which kind of data would be <u>interesting or useful to you</u> (tick all that apply)?

- ☐ Card access to buildings
- ☐ Class attendance
- ☐ Use of the hoppers buses
- ☐ Card readers on public transport
- ☐ Access to public wifi on campuses
- ☐ Access to public wifi on buses
- ☐ Login to devices such as computers
- ☐ Location of people on campuses
- ☐ Access to websites
- ☐ Video such as CCTV
- ☐ Parking on campuses
- ☐ Purchases at the on-campus outlets
- ☐ Use of energy in buildings
- ☐ Use of water in buildings

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- ☐ Swipe data for bike sheds
- ☐ University smart phone apps (Open Day App etc.)
- ☐ Library access
- ☐ Journal downloads
- ☐ Other/please specify:_____
- ☐ None of the above

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