Digital Utilisation Data Collection - Frequency and Occupancy of learning and teaching spaces in real time

Big Data and Analytics

TEMC Conference, Melbourne

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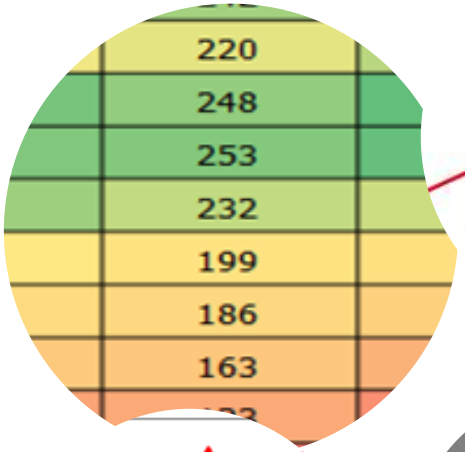

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Introduction

A little about RMIT University:

- Dual sector University
- Across all campuses we have 84,000 students and 5,000 FTE staff
- Three campuses within metropolitan Melbourne
  - Melbourne CBD
  - Bundoora (20kms from City)
  - Brunswick (6kms from City)
- Two campuses in Vietnam
  - Saigon South
  - Hanoi
- Onshore Australia approx. 489,000m2 (GFA) with a further 7,000m2 due to open shortly.
- Within Australia: 110 buildings

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Planning and feasibility

What we were doing:

- Effective use of RMIT's built environment is a key objective to accommodate future growth.
- Traditional annual physical space audit requires.
- Audit report only provides snapshot of frequency & occupancy.
- 2015 audit found 28% booked but not used over the one week period.

We needed a solution to:

- Improve the quality and frequency of data.
- Be automated real time capability in providing frequency and occupancy data.
- Integrate with the timetable system, Syllabus Plus.

Period	Monday	Tuesday	Wednesday	Thursday	Friday
08:30	160	164	158	178	156
09:30	228	237	231	223	217
10:30	245	255	252	258	239
11:30	235	246	242	251	243
12:30	211	216	220	235	209
13:30	245	257	248	264	239
14:30	248	254	253	263	235
15:30	233	244	232	229	208
16:30	207	208	199	197	138
17:30	190	190	186	176	101
18:30	150	168	163	136	81
19:30	105	117	123	89	52
20:30	65	70	65	48	37

0+	65+	127+	189+	250+
0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%

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Digital Data Collection Methods Available

1. Infrared Beam with a receiver and transmitter on either side of a door.
2. Thermal sensors, installed above an entrance.
3. Wireless access points (WAP) track mobile devices.

Data Driven Analytics can also provide:

- Quality of service for student facilities.
- Retail space optimisation.
- Space design and allocation.
- Logistics planning – special events etc.
- Air conditioning utilisation.

For all Solutions, consider:

- How the space entrance set up.
- How wide is the entrance.
- Layout and proximity of WAPs.
- Frequency of data you wish to capture.
- What kind of Occupancy do you wish to capture.
- Is power or POE available at the entrance.

Horizontal Wired / Wireless People Counting Sensors

Overhead People Counting Sensors

Mobile Device to WAP

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Proof of Concept Findings

Mobile Device

- Easy to implement, utilising existing wireless access points (WAPs).
- Links to possible wayfinding solutions, acts an indoor GPS.
- Integrate with learning analytics.
- Provides security in movement tracking.
- Most devices used by an individual on a day was 17.
- Privacy concerns.
- Accuracy concerns.

Thermal Sensor

- Counts anonymously by tracking body heat.
- Dual view, thermal lens (for counting) and Video Lens (for auditing).
- Counts INS and OUTS to determine room occupancy.
- Requires installed systems and considerable hardware to implement.
- Does not recognise the identify of a person walking past the sensor.

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Implementation of Thermal Sensors

Procurement and Implementation in 2016 of Thermal Sensor Solution.

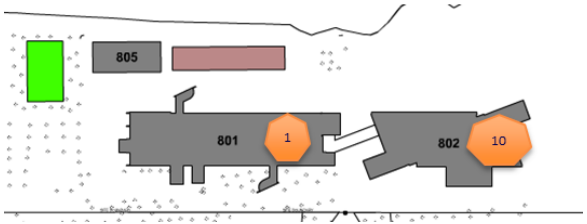
Integrated with Syllabus Plus (Timetable system)

315 counters devises installed in 220 rooms.

Selected rooms:

- with historically low utilisation
- over all campuses
- covering all Colleges and Sectors

Vietnam campus



City campus

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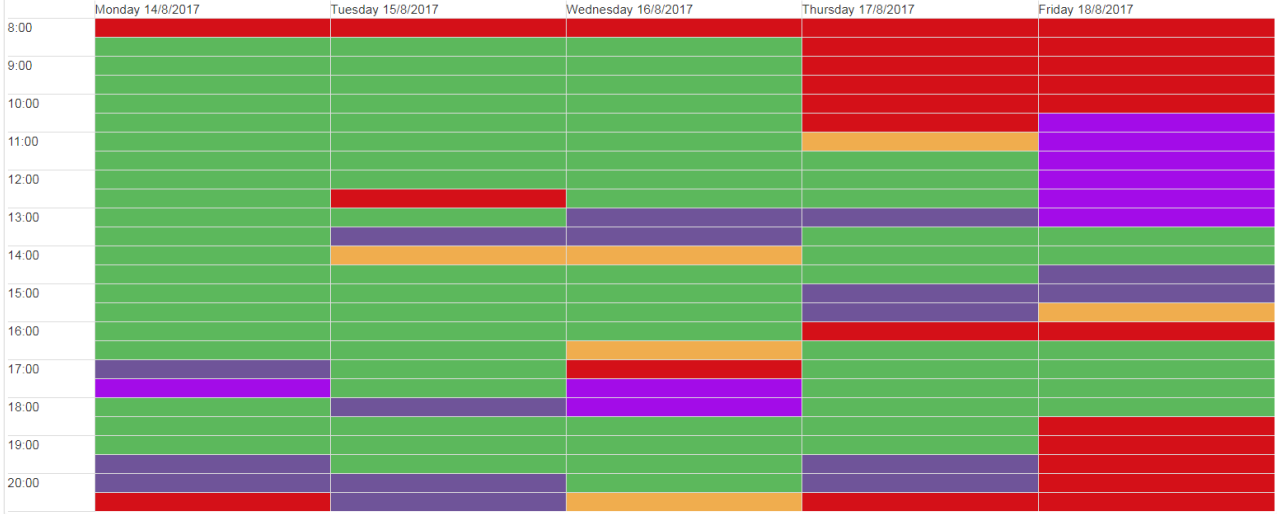
Working with the data - Frequency

Weekly room view

Peak Occ.	Freq. By Room	Freq. By Seat	Occ. By Room	Occ. By Seat	Utilisation	Booking Freq.	Booking Occ.	Booking Util.	Attendance Efficiency
43	61.5	61.5	32.2	32.2	19.8	76.9	84.1	64.7	30.0

Non Used in Core Period	Non Used in Non Core Period
No Show	Used Period
Squat	Early Finish



Result:

Immediate adjustment to timetable resulting in space being freed up

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Weekly reports to Colleges

Result:

- Better understanding of student behaviour
- Greater awareness of wasted space
- Initiating culture change

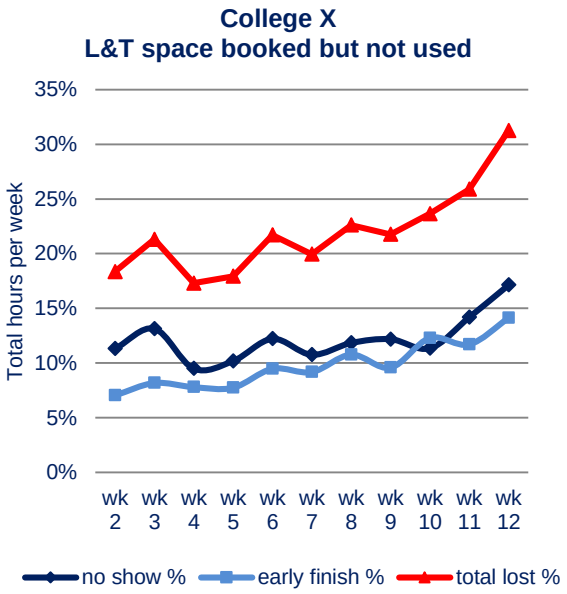
Wasted Time Report

Semester 1, 2017
Teaching week 11, 15 - 19 May (5 active days)

College X

Total Hours Booked	Total Hours Used	Total Hours No Show	Total Hours Early Finish	Total Hours Lost
871	645.5 74%	123.5 14%	102 12%	225.5 26%

	Total Hours Used	Total Hours No Show	Total Hours Early Finish	Total Hours Lost
School A	97	8	10	18 (16%)
School B	124.5	15.5	22	37.5 (23%)
School C	60.5	11	10.5	21.5 (26%)



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Booked vs used space
Actual vs expected attendance

Result:

- Rooms of smaller size, show greater attendance ratio
- Unbooked use is a reasonable contributor to our space use

		% of used vs booked	expected vs actual attendance
Capacity 10 - 28	Early Finish	14%	
	NoShow	26%	
	Unbooked use	9%	31%
	Used	52%	55%
Capacity 29 - 48	Early Finish	9%	
	No Show	17%	
	Unbooked use	12%	28%
	Used	62%	51%
Capacity 50 - 99	Early Finish	9%	
	No Show	15%	
	Unbooked use	8%	20%
	Used	68%	45%
Capacity 100 - 353	Early Finish	7%	
	No Show	16%	
	Unbooked use	11%	7%
	Used	66%	32%

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Collaborating with RMIT Learning Analytics

Result:

- Deeper analysis of space counter data
- Matching space counter data with other University data sets
- Assist L&T development

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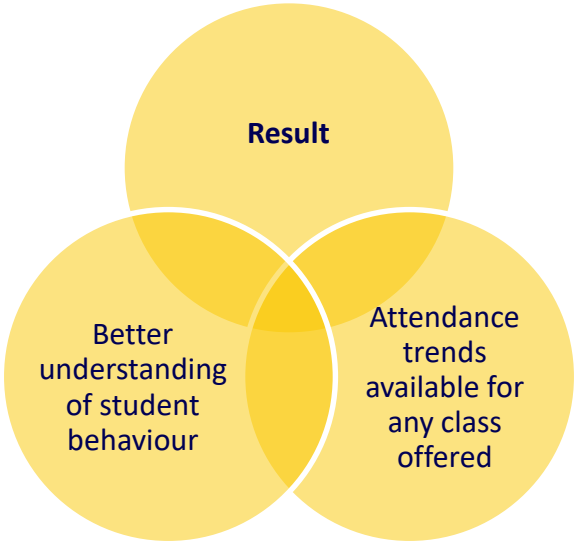
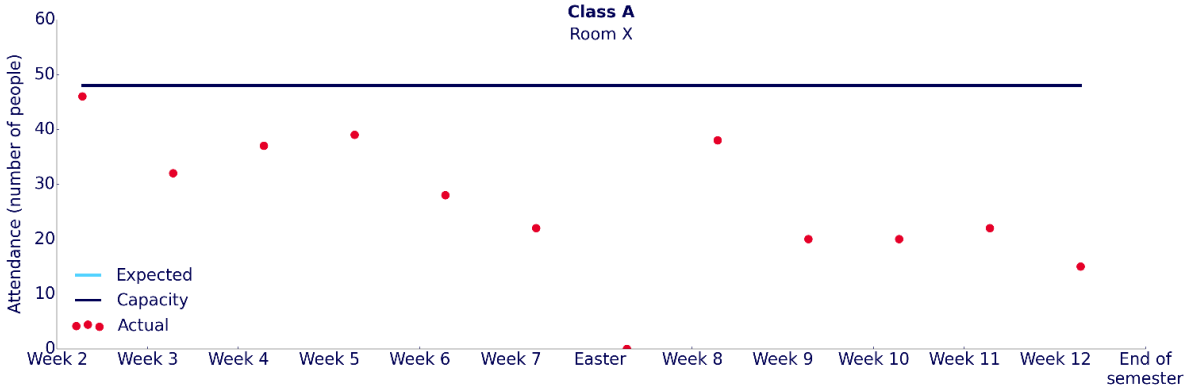
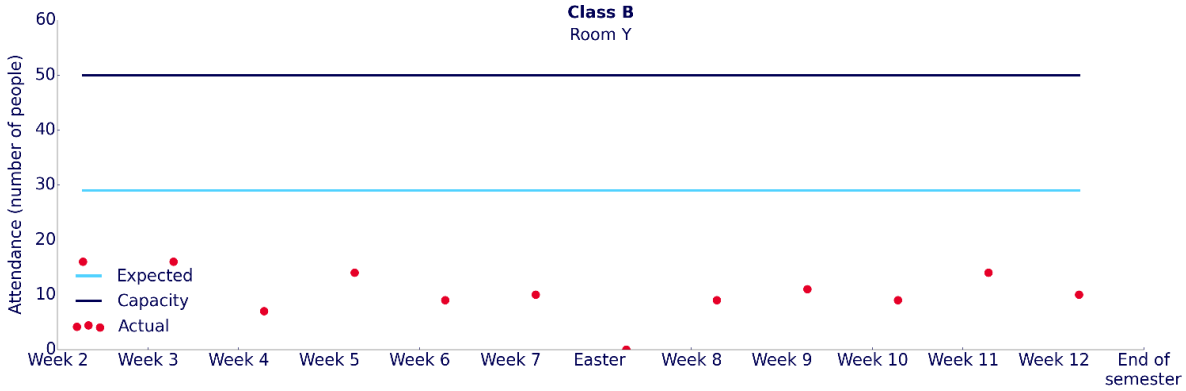
Attendance per activity over time







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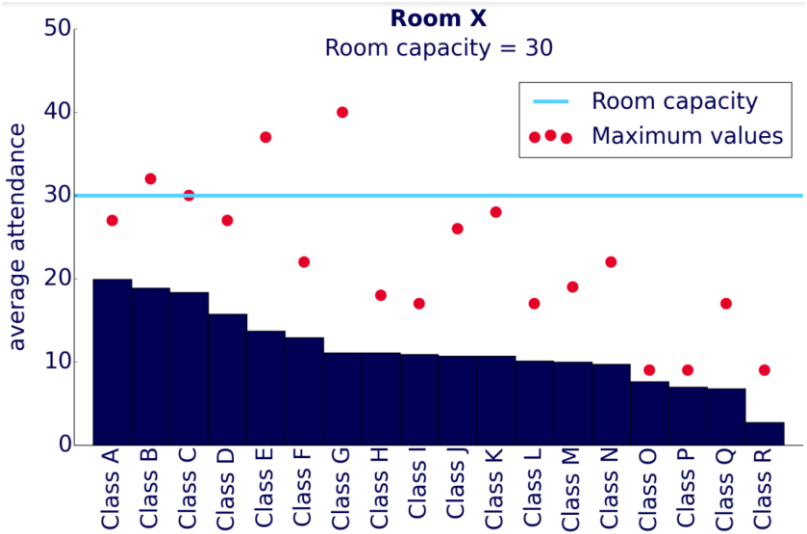
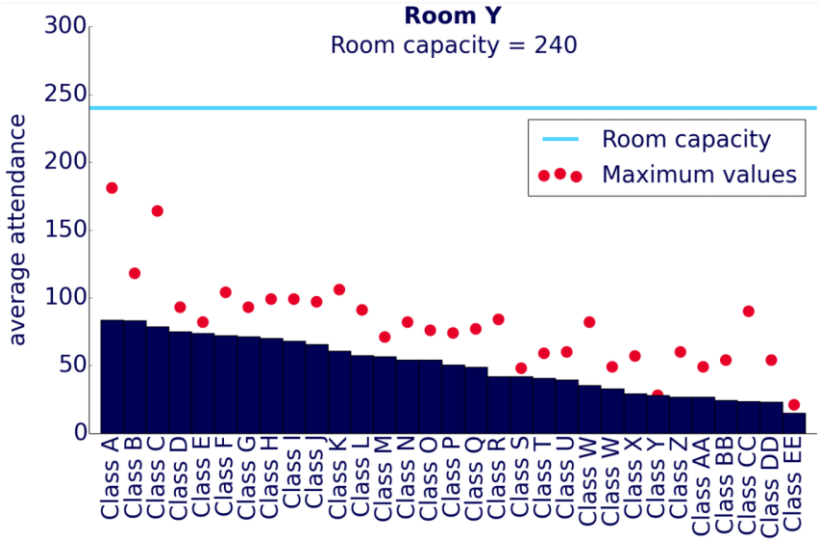
Average/maximum attendance per room over time





Result:

The average attendance is below the room size

Large rooms are show worse occupancy outcomes

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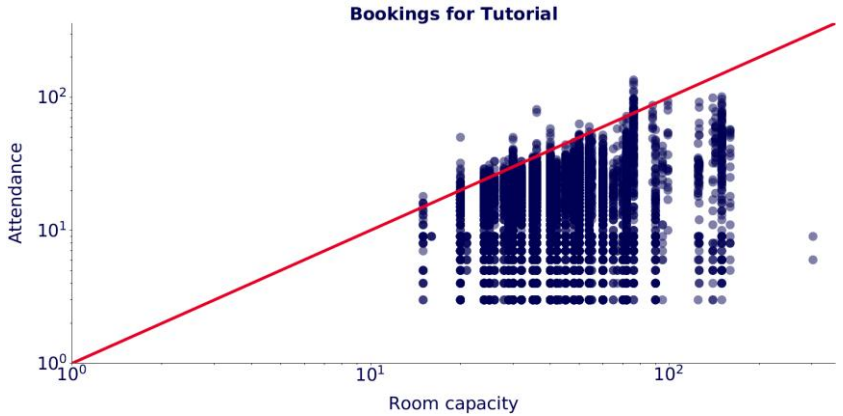
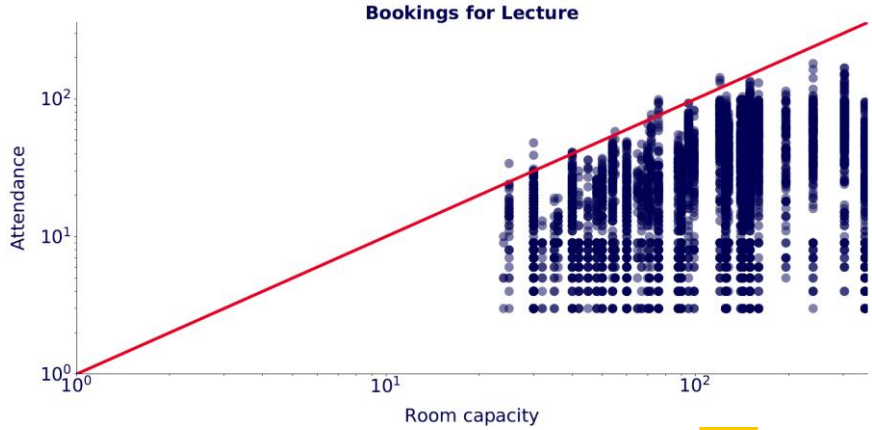
Attendance by activity type over time

Result:

Overall attendance below ideal attendance





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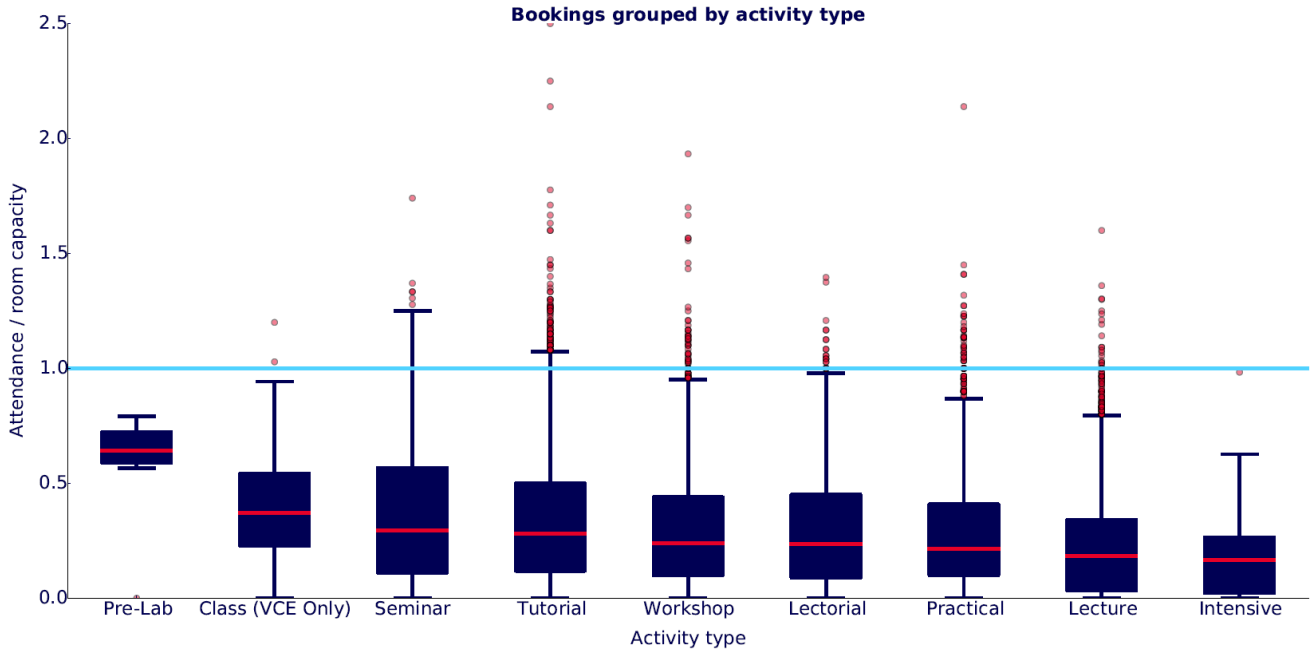
Average attendance by activity type

Result:

Activities with higher level of engagement shows greater average attendance



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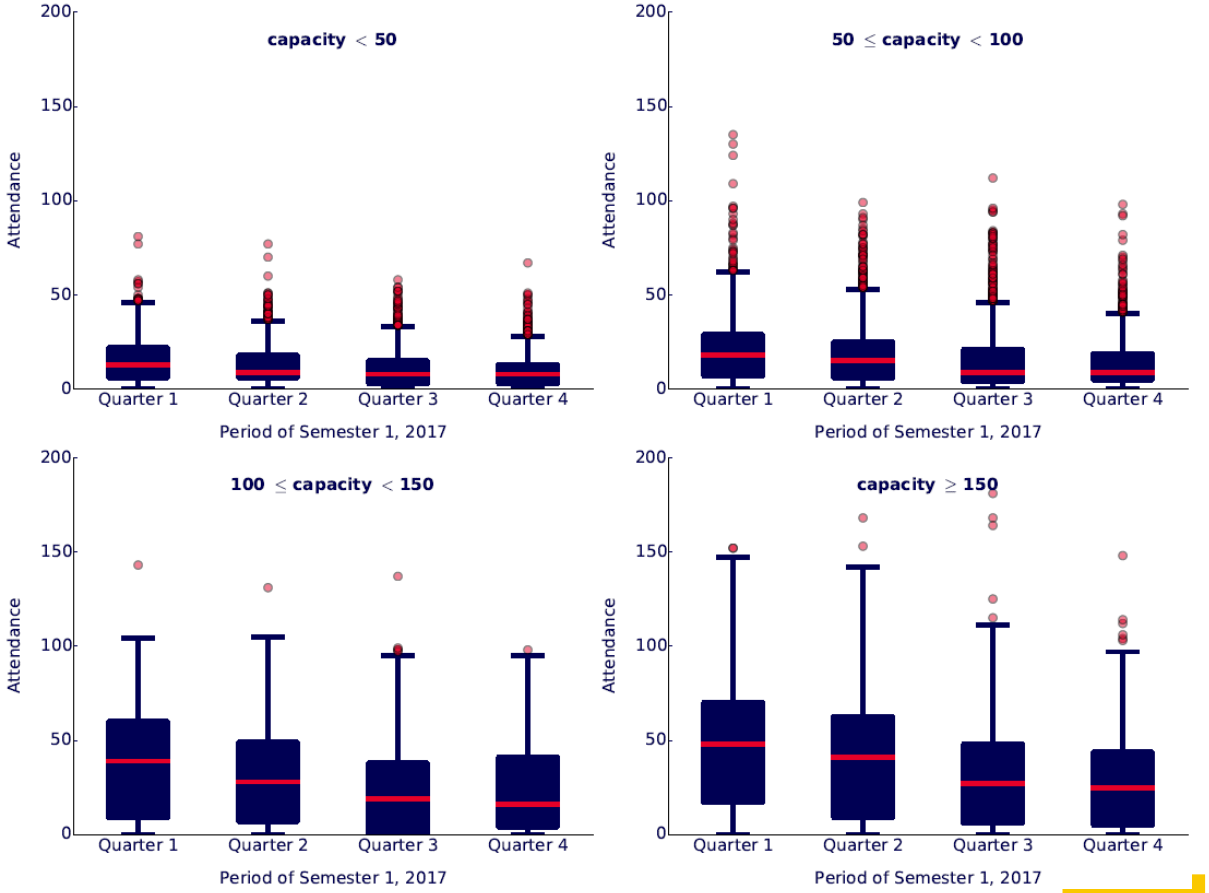
Average attendance per capacity band over time

Result:

- Small rooms have better average attendance over time
- Average attendance in larger spaces drops significantly over time



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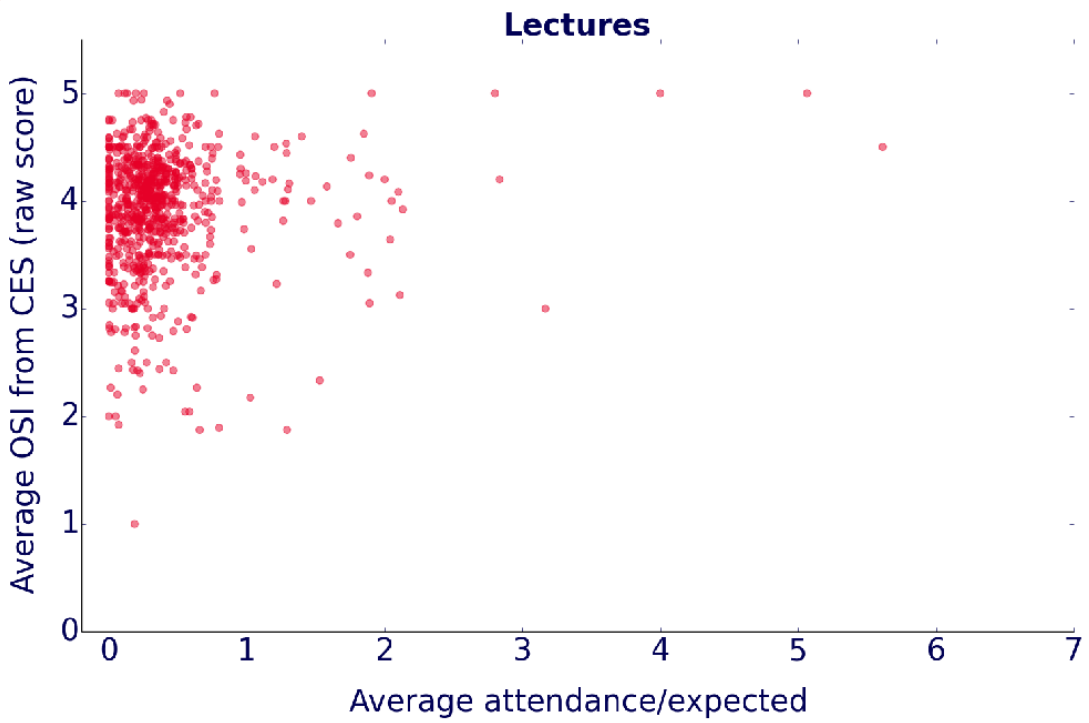
Matching space counter data with other data sets

Result:

- No immediate correlation between attendance and OSI score, more research required
- Matching room type with OSI score did not show correlation at this time, more research required



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What next

Operations

- Identify usage pattern & trends overtime
- Develop footfall data for detailed population profile
- Use Data to support improved planning and strategic decision making

Research

- Continue research with full year data
- Explore link of low attendance with online activity
- Use other data sets to analyse space counter data

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Questions?

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