

Growth of the global higher education estate: Challenges ahead

Alexi Marmot, Bartlett Faculty of the Built Environment
for Institute of Education, Centre for Global Higher Education Seminar
3 Nov 2016

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Global Commission on Learning Environments

We are an interdisciplinary centre for research and training concerned with the design of learning environments. Our aim is to address spatial and educational problems in order to achieve benefits for quality learning across all life stages. We deliver innovative teaching and specialized consultancy informed by our research.

Teaching and Training

Consultancy

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- Education and space conference
- BGCLE seminar: Higher Education and Social Spaces
- Doctoral Network: Design, Learning and Agency

Partner faculties

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Resources

Tweets by @UCLlearning

- UCL Global Health @UCLGlobalHealth Fascinating article on migration from Niger to Libya, from UCL researchers themigrationist.net/2016/07/06/lab...
- Labouring in a Conflict Zone: Lucr... By: Julie Snorek, Victoria Sibson and ... themigrationist.net

NOV
24

Space meets education: Bartlett - Institute of Education Research Exchange

by The Bartlett

Free

REGISTER

DESCRIPTION

Two of UCL's world leading research groups, the Bartlett Faculty of the Built Environment and the Institute of Education, cordially invite you to a fast-paced event where key research themes are explained from diverse disciplinary perspectives. Together we'll learn from one another, identify subjects for joint research ventures and generate new knowledge on the interface of education and space.

Covering several key themes, colleagues across The Bartlett and IOE will present recent research. Alan Penn, Dean of the Bartlett and Alison Fuller, Pro-Director: Research and Development for the IOE will conclude by leading a discussion around emerging joint research directions. The event will be followed by refreshments and networking.

Presentations: 4-6pm

Refreshments & Networking: 6pm onwards

Themes

- Digital Environments
- Sustainability and Learning Outcomes
- Learning Spaces
- Educating the Future
- Future Research Themes

DATE AND TIME

Thu 24 November 2016

16:00 – 19:00 GMT

[Add to Calendar](#)

LOCATION

UCL, exact location to be confirmed

[View Map](#)

FRIENDS WHO ARE GOING



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- 1. Demand growth**
- 2. Controlling HE estate growth**
- 3. Challenges ahead**

1. Demand growth

- Student numbers
- Scale of capital investment
- Types of university estates
- Design business + imagination

HE students x million

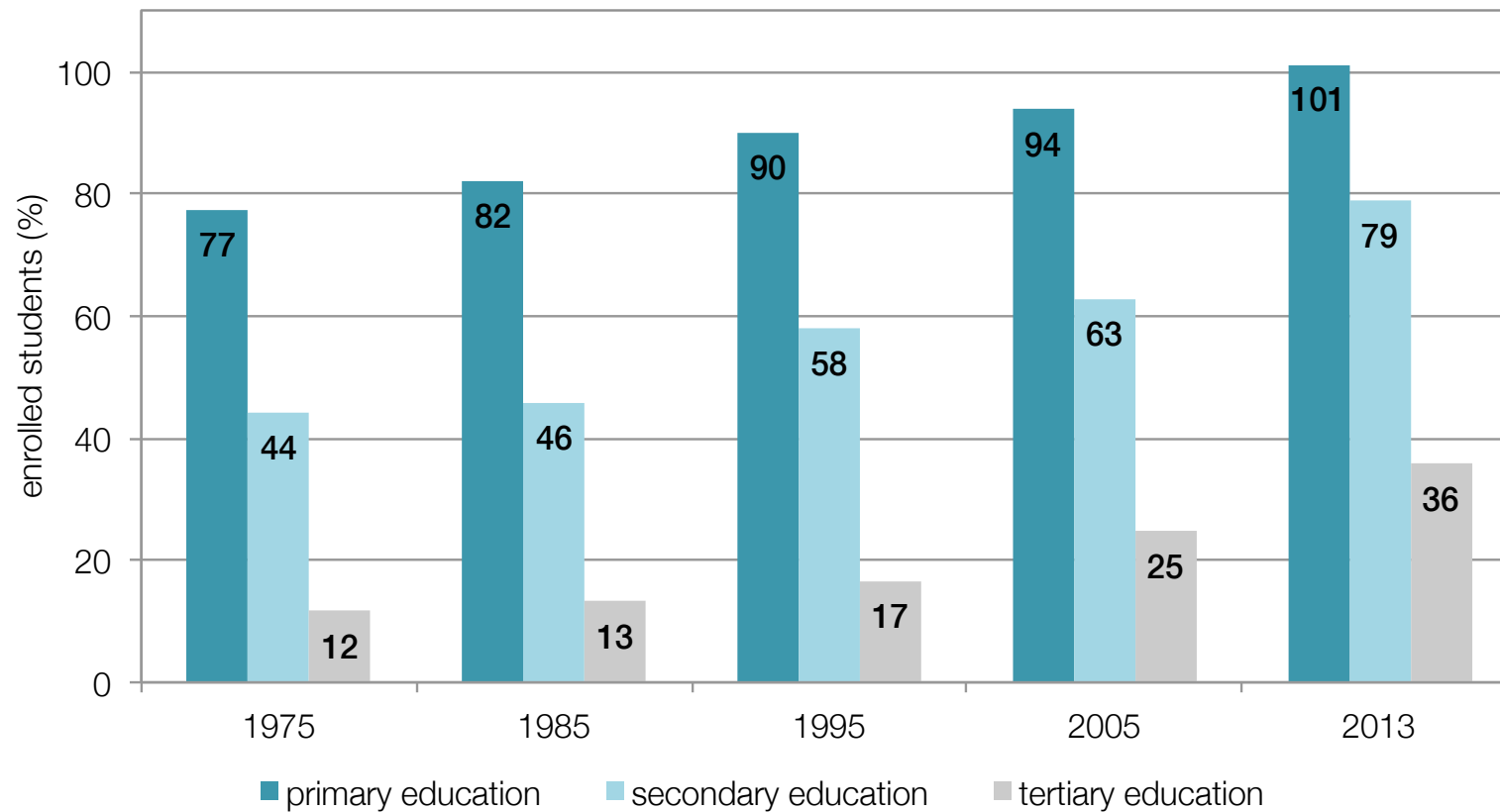
1900 0.5

2000 100

2009 150

2015 180



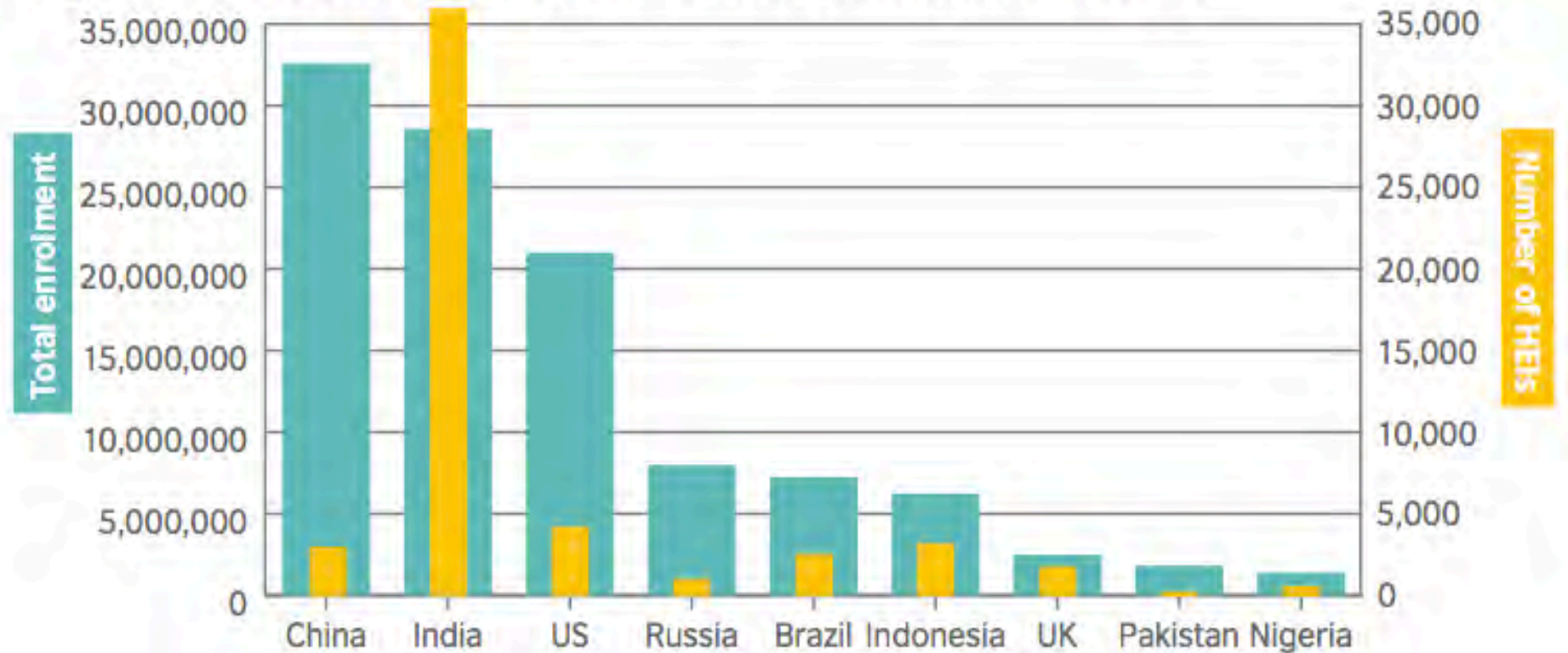


Source: UN DESA and World Bank data on Gross Enrolment Ratio (GER)

Missing data: Sudan, Bolivia (primary); Sudan, UAE (secondary); Ethiopia, Sudan, Iraq, Uzbekistan, DPR Korea, Camerouns, Niger, Mali (tertiary).

Note: GER can exceed 100% due to inclusion of over-aged/under-aged students because of early/late school entrance & grade repetition.

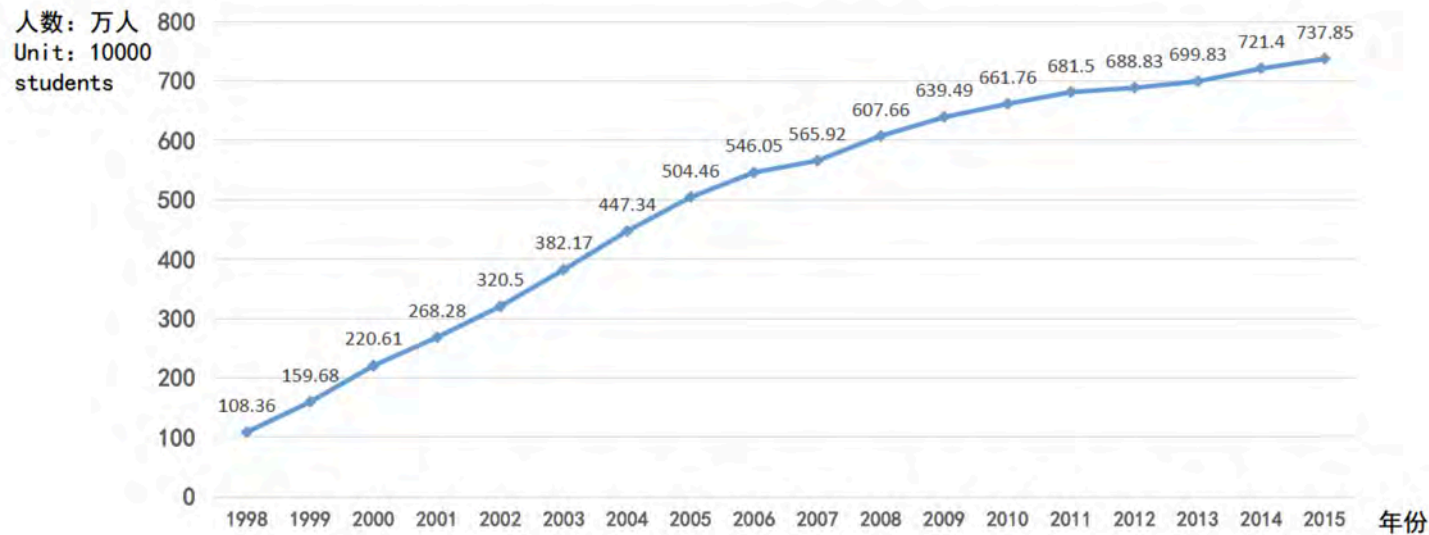
Figure 1: Total enrolments and number of HEIs⁴



Source: British Council, World Bank (June 2015) *Managing Large Systems* p7
http://www.britishcouncil.org/sites/britishcouncil.uk2/files/3.6_managing-large-systems.pdf

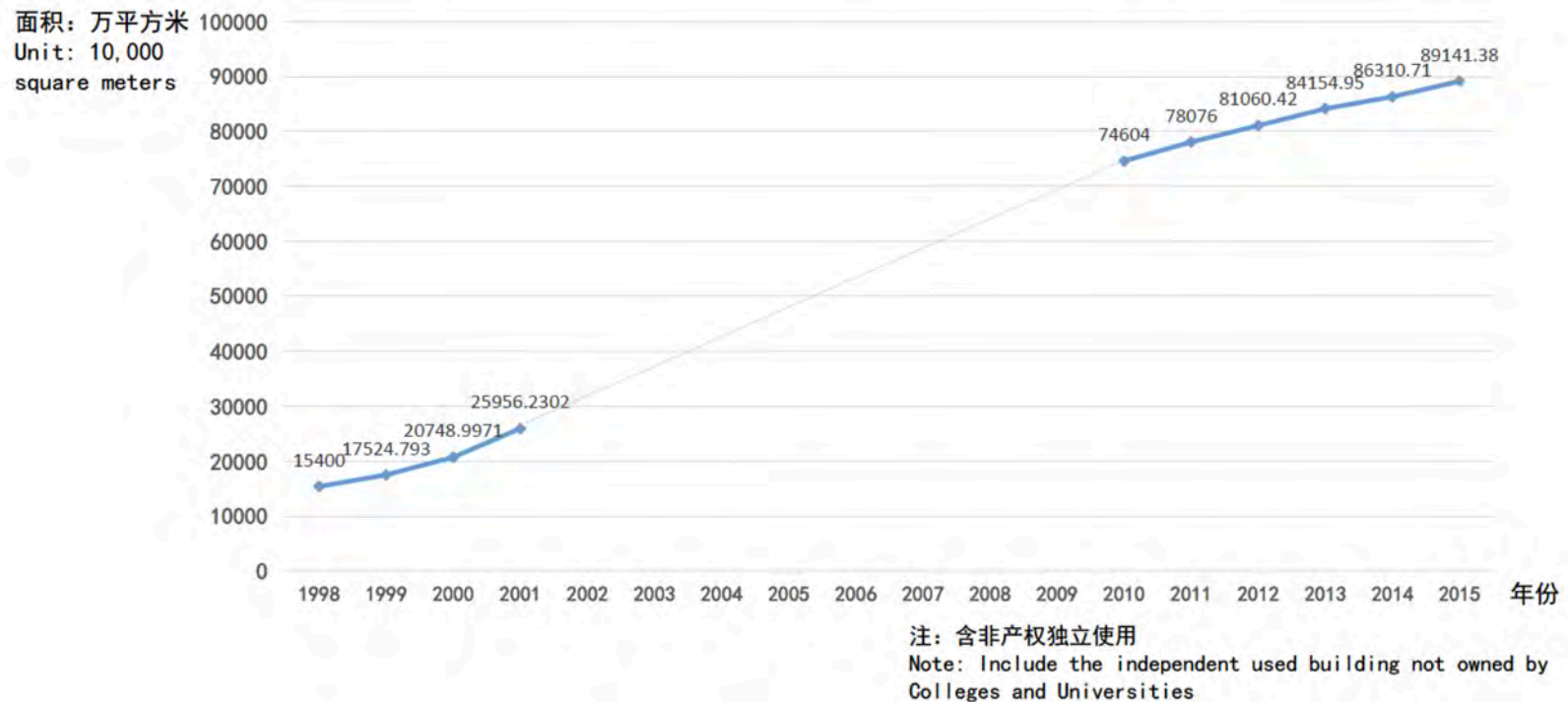
➤ Data of the Universities' Development in China 1998-2015

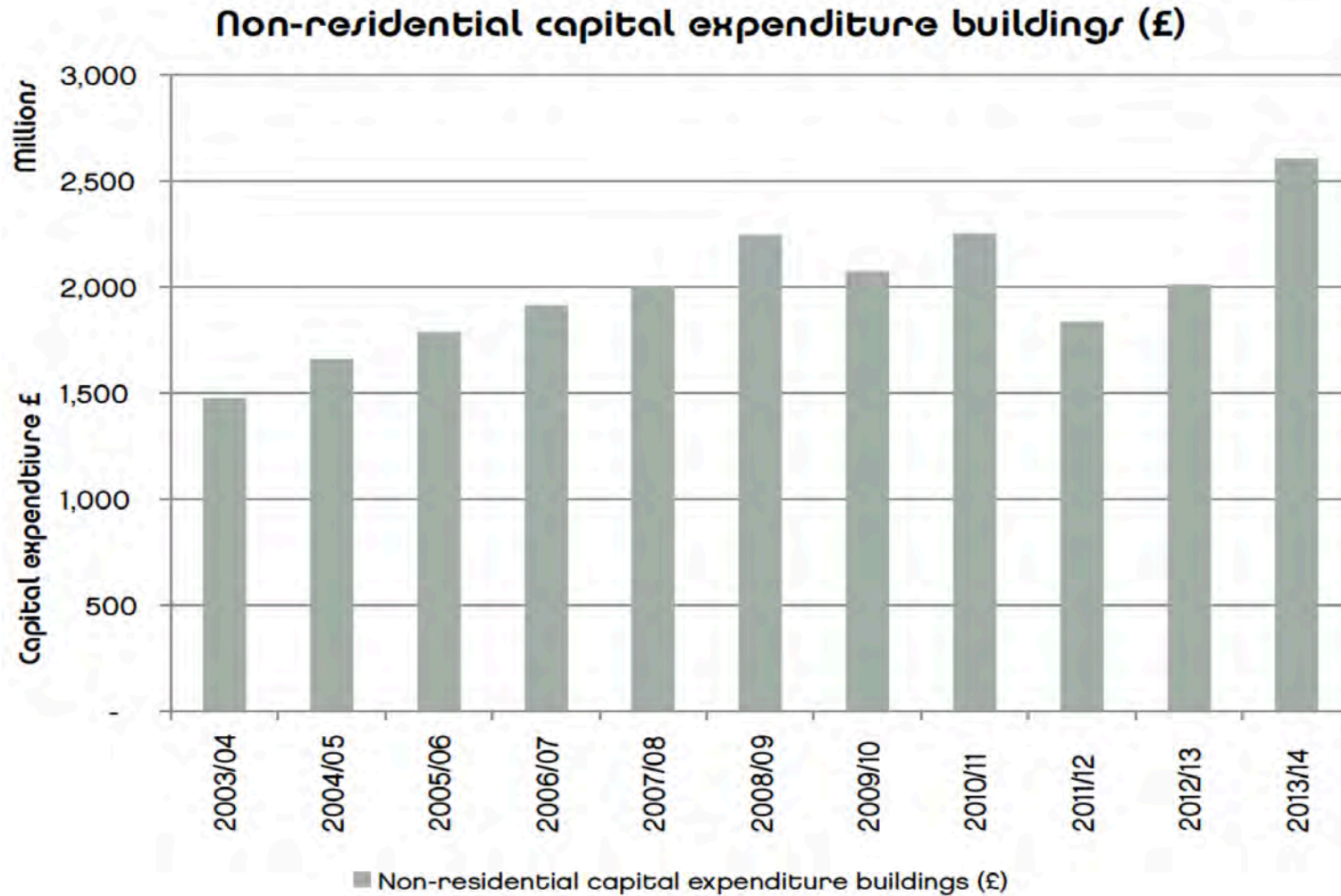
1998-2015高校招生（本专科）人数统计图
Chart of the Number of New Undergraduate Students Enrolled in Colleges and Universities
1998-2015



➤ Data of the Universities' Development in China 1998-2015

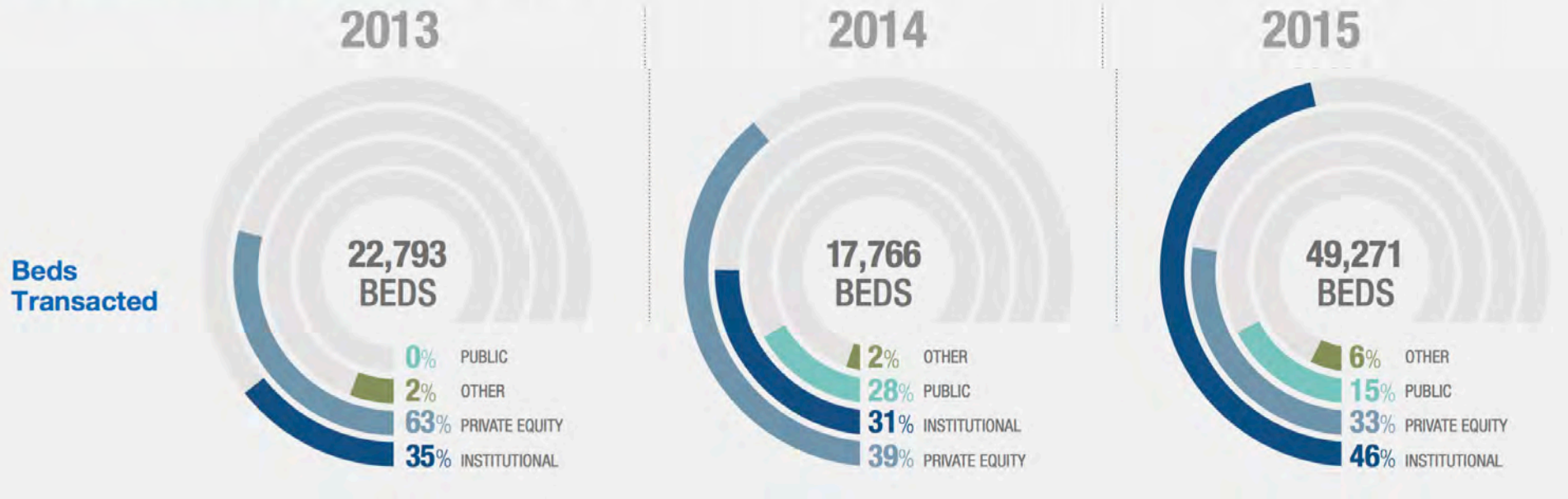
1998-2015高校校舍建筑面积统计图
Chart of Building Area of Colleges and Universities 1998-2015





| | |
|-------------------|-----------------------------|
| Total HE students | 1.7 mill. |
| Total HE space | 21 mill. sq.m. GIA |
| All HE income | £28 bill./an. |
| Property capex | £ 2.5 bill./an. |
| Property opex | £ 2 bill./an. |
| Russell Gp capex | £9 bill. over 4 yrs 2013-17 |

UK student assets transactions Jan to Dec 2015



£5.1bn
 spent on 172 assets
 throughout 2015.





Multi-university city

Guangzhou University Town, masterplan SOM
Source http://www.som.com/projects/guangzhou_university_town_four_villages

International branch campuses

eg Nottingham University in Ningbo, China and Malaysia



| Top branch campus hosts | Number of branches | Top branch campus origin | Number of branches |
|-------------------------|--------------------|--------------------------|--------------------|
| UNITED ARAB EMIRATES | 42 | UNITED STATES | 104 |
| CHINA | 37 | UNITED KINGDOM | 45 |
| MALAYSIA | 14 | AUSTRALIA | 19 |

Source:

Photos Nottingham University; Data from Savills *Spotlight World Student Housing 2016/17*
<http://pdf.euro.savills.co.uk/global-research/spotlight-world-student-housing-2016-2017.pdf>



Top: Stanford Centre at Peking Uni opened 2012;
Bottom: NYU, Shanghai, opened 2013, 55,000 sqm.
Source: <http://www.nyu.edu/shanghai/academics/facilities-services.html>
[http://scpk.fsi.stanford.edu/fellowships/
stanford_center_at_peking_university_faculty_fellowship_program](http://scpk.fsi.stanford.edu/fellowships/stanford_center_at_peking_university_faculty_fellowship_program)

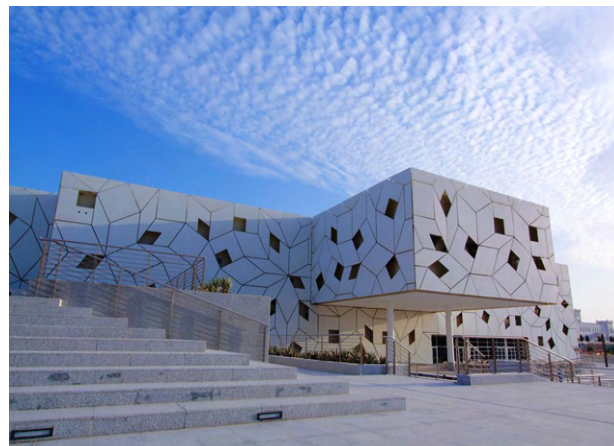


Masdar University City, Abu Dhabi, UAE, MIT collaboration
'The university builds the city.'

Multi-university start-ups

Hamad Bin Khalifa University, Qatar

- UCL-Q
- Carnegie Mellon U
- Virginia Commonwealth U
- Georgetown U
- Cornell
- Texas A&M
- Northwestern
- HEC

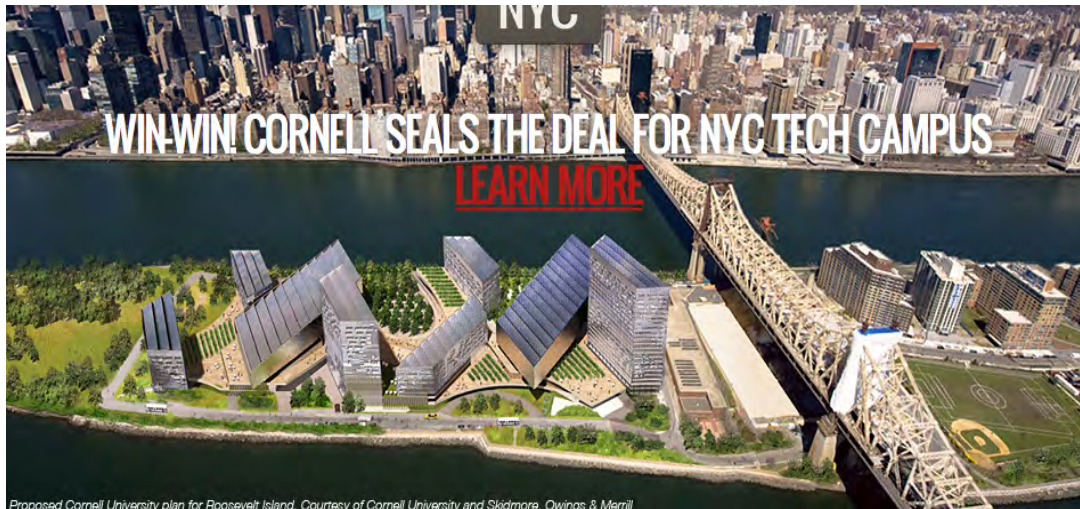


The Bartlett

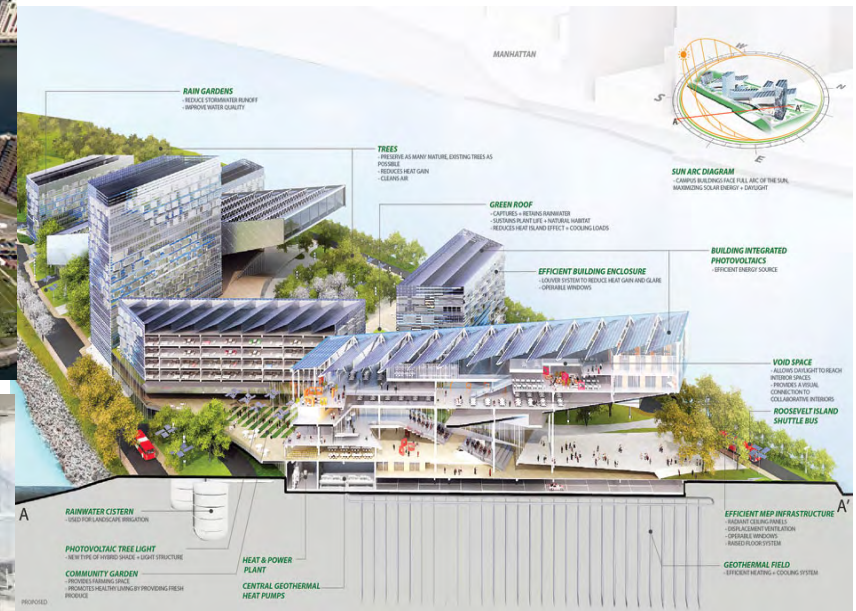
Nazarbayev Uni., Kazakstan

- Carnegie Mellon
- Pennsylvania
- NUS
- UCL
- Cambridge
- Duke
- Pittsburgh
- Wisconsin





Proposed Cornell University plan for Roosevelt Island. Courtesy of Cornell University and Skidmore, Owings & Merrill



Cornell + Technion – Cornell Tech *Silicon East* for NYC



Cornell University | This site | Contact | Search

CORNELL TECH Roosevelt Island Campus Project

Welcome to Cornell Tech's Roosevelt Island Construction Project site. This website is designed to provide updates to the community about construction progress and provide a forum for important construction announcements for the project.

THE CAMPUS PLAN

Project Documents
 Construction Updates
 Construction & Community Task Force
 Roosevelt Island Community Space Hours
 Contact Us
 Photos

LATEST UPDATES

OCTOBER 31, 2016
Air Quality Monitoring October 21
 Air Quality Monitoring October 21 (10/21/16)
 TAGGED: PROJECT UPDATES

OCTOBER 24, 2016
Air Quality Monitoring October 7
 Air Quality Monitoring October 7 (10/11/16)
 TAGGED: PROJECT UPDATES

OCTOBER 13, 2016
October 10 - October 21 Look Ahead
Roadwork and Central Utility Plant - Installation of Foam Glass on the exterior masonry of the Central Utility Plant (CUP) will continue through this period. Repairs in the equipment maintenance area on the CUP roof are being installed through this period. The stainless steel facade panels for the north face will be installed in this period and continue through the end of the month. Concrete curb and sidewalk installation continues on the south side of the South Loop Road. Curb work on the East Road will be complete in the beginning of this period. Stormwater filtration and biofiltration systems at the ...
 Read more »
 TAGGED: TONY WIKEN LOOKAHEAD

NYU/Cornell Tech development, Roosevelt Island NYC, 200,000 sqm, site preparation 2016.
 Source: <http://www.nytimes.com/2013/04/14/education/edlife/cornell-nyc-tech-planned-for-roosevelt-island-starts-up-in-chelsea.html>; <https://construction.tech.cornell.edu>

“Imperial West is the College’s major new campus, co-locating world class researchers, businesses and higher education partners to create value from ideas, for the benefit of society on a local, national and global scale.”



Source: <http://www3.imperial.ac.uk/imperialwest>;
<http://www.fulhamchronicle.co.uk/fulham-and-hammersmith-news/local-fulham-and-hammersmith-news/2012/08/08/not-enough-affordable-homes-at-west-london-shard-says-mp-82029-31577108/> <http://imperialfolly.org.uk/> accessed 12/05/13; <http://www.timeshighereducation.co.uk/news/imperial-college-londons-new-1bn-campus/2002304.article>

Higher Education Network
the architecture of universities

Flashy university buildings: do they live up to the hype?

Universities love a flagship building that sets them apart from the rest. But are they being designed with learning and research in mind?

● University buildings that break the mould - in pictures



The Ocad building strides above Toronto on its colourful skinny legs. Photograph: Alamy

Sponsored by:

FAULKNERBROWNS ARCHITECTS

About this content

Alexi Marmot

Architect Alexi Marmot is professor of facility and environment design at UCL, and founding director of AMA

Monday 21 September 2015 10.00 BST



Universities, suggested the late Sir David Watson (professor of higher education at Oxford, vice-chancellor at Brighton) can be viewed as property companies with education tacked on. Estate issues consume vast amounts of time and money - and prompt emotional debate - within universities.

Everyone's aim is to create noble buildings and campuses that will attract talented staff and students, boosting the university's standing in the competitive international league. But some new buildings end up attracting criticism and controversy - they're judged weird and kinky, and they fail to fulfill their function as icons.

Starchitects break conventions

Ambitious university leaders bring together the powerful combination of "starchitects" and wealthy sponsors eager to provide funds for flagship buildings

Alexi Marmot 21 Sep 2015 in <http://www.theguardian.com/education/2015/sep/21/flashy-university-buildings-do-they-live-up-to-the-hype>



Dr Chau Chak Wing, UTS Management School, Sydney
Architect: Frank Gehry Photos: A.Marmot



University of Chicago William Eckhardt Research Center | VIEW PROJECT

1 OF 55

ALL DESIGN THOUGHT LEADERSHIP PEOPLE STATS

The world needs educational environments that inspire the brilliant thinking and creativity required for 21st-century learning.

Educational facilities must attract the brightest students, faculty members and researchers with spaces that support innovation in learning and teaching. The most effective classrooms are dynamic forums for dialogue and interaction. Whether it's a digital library or a classroom that doubles as a multimedia studio, technology is enhancing the learning experience in exciting ways.

From campus master plans to the design of academic and research buildings as well as recreation and wellness facilities, HOK leads many significant education projects that will attract and retain the next generation of students.

Early in the design process, we test program requirements and look to optimize a building's configuration to reduce operating costs and maximize our client's capital investment. We're always looking for more efficient, cost-effective and sustainable solutions while providing the highest quality learning environments.

CONTACT



Riccardo Mascia
Business Opportunities - Education
riccardo.mascia@hok.com

For job inquiries, please visit Careers

PROJECT TYPES

- Academic Buildings
Academic Medical Centers
Campuses
Classrooms



DESIGN
HOK is designing Kuwait University's new College of Architecture and College of Computing Sciences and Engineering buildings.



DESIGN
Cardiff University has selected HOK to design a \$110 million Translational Research Facility as part of the institution's plan for its Innovation Campus.



DESIGN
The University of Glasgow has appointed HOK to design a new 150,000-sq.-ft. research hub in Glasgow, Scotland.



DESIGN
Athletic Business has named the University of Chicago's William Eckhardt Research Center, where the research extends from the sub-molecular scale to the expanses of the universe.



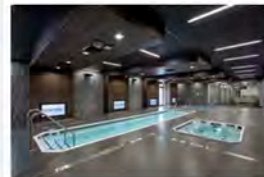
DESIGN
The University of Wisconsin-Stevens Point broke ground on a new 176,500-sq.-ft. Chemistry Biology Building.



DESIGN
Watch a behind the scenes tour of construction progress on Clemson University's new Football Operations Facility, scheduled to open in 2017.



DESIGN
A Tradeline article features the University of Chicago's William Eckhardt Research Center, where the research extends from the sub-molecular scale to the expanses of the universe.



DESIGN
The University of Louisiana at Lafayette's new Athletic Performance Center has become a central hub for student-athlete development.



DESIGN
HOK's design of an innovative new practice center for the NBA's Atlanta Hawks and Emory Healthcare will blend sports medicine, athletic care and high-performance training.



DESIGN
The University of Missouri-St. Louis has unveiled its new College of Optometry Patient Care Center.



DESIGN
HOK's Nate Appleman explores the role of master planning in the long-term success of educational campuses.



DESIGN
Steel construction is complete for the University at Buffalo Jacobs School of Medicine and Biomedical Sciences, which will bring together academic and research teams when it opens in 2017.



DESIGN
The University of Chicago...

Projects

58 results

FEATURED

ALL

university



FILTER

BY DATE

A-Z



Arizona State University, College Avenue Commons



Arizona State University, Sun Devil Marketplace



Banc of California Stadium



Biola University Campus



Biola University, Blackstone Hall



Biola University, Center for Science, Technology & Health



California State University, San Marcos, Field House



California State University, Long Beach, Blair Field



CenterWest



CIT-ULACIT



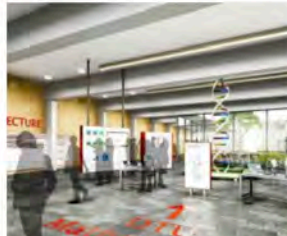
CIT-ULACIT: Brand Design



Columbia University Medical Center



Comcast Center



Danmarks Tekniske Univeritet



Deloitte University



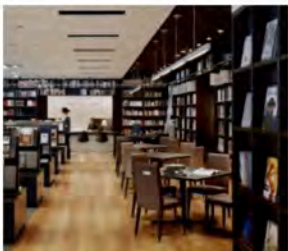
The Duke Endowment



Duke Kunshan University



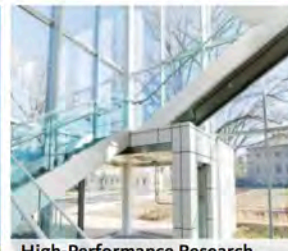
The George Washington University Charles E. Smith...



Hakuhodo



Hangzhou Shimao Huajiachi



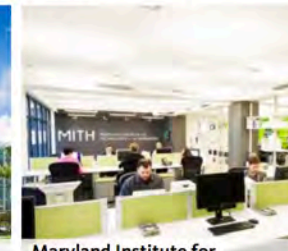
High-Performance Research Computing Center at...



Keck Hospital of USC, Public Spaces & User Experience...



Lynn University, Mohammed Indimi International Business...



Maryland Institute for Technology in the Humanities



Work

Services

Practices

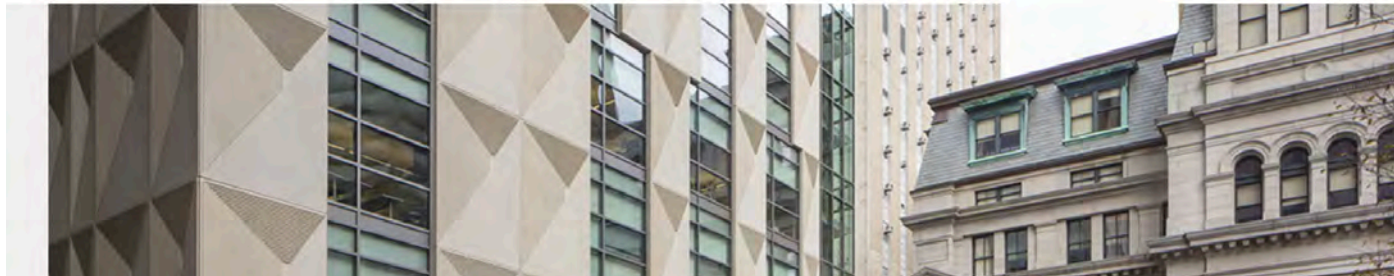
Blog

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Higher Education

Design at the intersection of disciplines.



Featured Work

[See all Higher Education](#)

Project

Designed for Inquiring Minds



University of San Francisco
San Francisco, CA, USA

Project

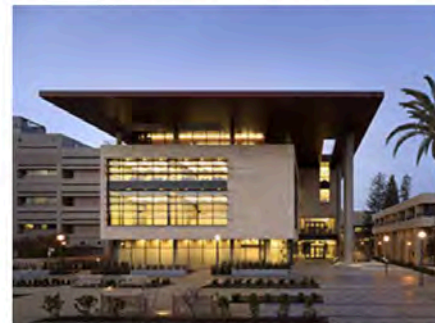
Executive Education



Cass Business School, City University London
London, UK

Project

Learning Comes to Life



Stanford University
Palo Alto, CA, USA

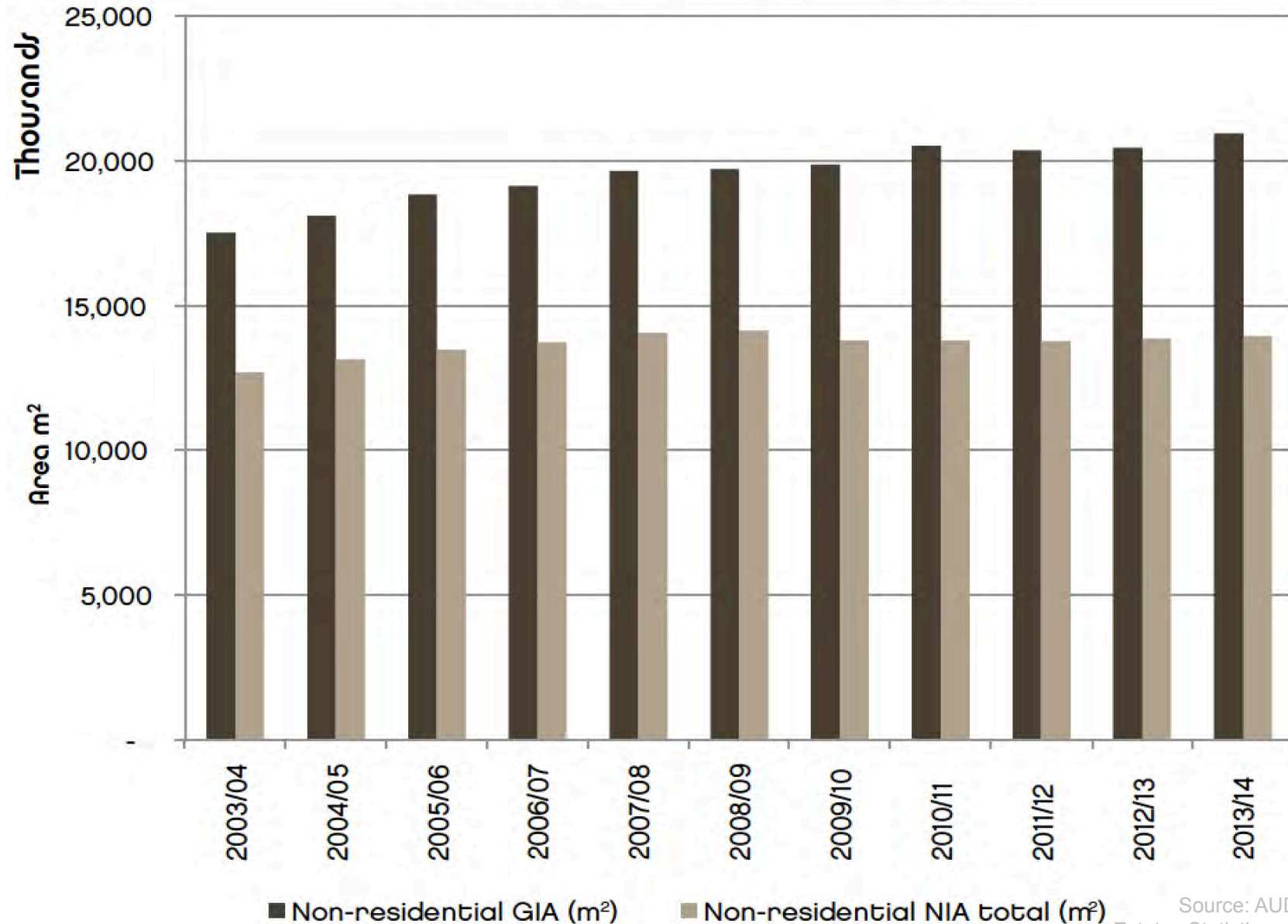
2. Controlling HE estate growth

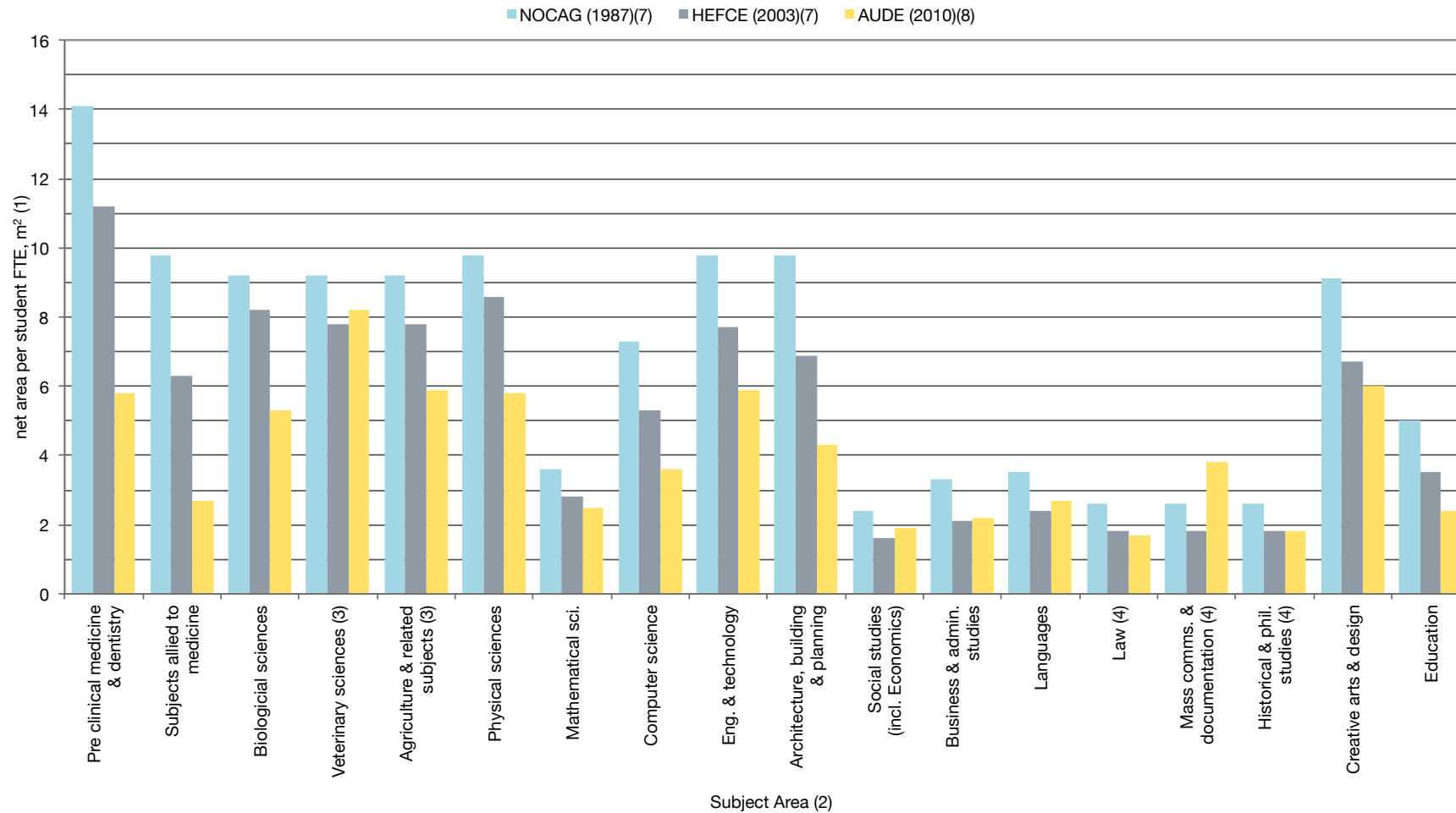
- Monitoring and standards
- Efficiency of space
- Efficiency of time

‘ . . . continuing drive towards efficiency . . .

(so that one may hardly be seen reading a book in one’s office – if indeed one is allowed to retain an office to oneself).’

Size of Estate (Net and Gross)





Source: AMA from SMG (2006) *Review of Space Norms* and AUDE (2010) *Space Assessment Models and Space Profiles*

(1) NOCAG & HEFCE apply different space standards to UG (illustrated), PGT & PGR student FTEs, whereas AUDE does not differentiate.

(2) AUDE subject areas differ slightly from NOCAG & HEFCE - closest match is used.

(3) NOCAG/ HEFCE applies to 'Agriculture & Forestry/ Veterinary Sciences'.

(4) NOCAG/ HEFCE space standard applies to 'Humanities'.

(5) Clinical Medicine; Clinical Dentistry; Psychology; Geography & Economics; Archaeology have no AUDE standards, so are omitted.

(6) AUDE space standards are based on assumptions of volume of activity, hours of delivery, and ratios of staff:students & academic:support staff.

(7) Net area assumed to be NIA. (8) AUDE area is NIA/student FTE.



3. Delivering value from the higher education estate





Universities will:


- Develop a balanced scorecard of metrics that will be used to demonstrate estates performance in efficiency and effectiveness, and report on these annually to improve accountability
- Further enhance improvements in space use and utilisation and delivering value from the higher education estate, and provide robust estimates of the efficiency savings being delivered from these changes
- Develop a package of tools and guidance material that will support senior leaders and estate professionals to make more informed strategic choices about the university infrastructure

Key messages

The last decade witnessed a substantial public investment in the higher education estate, which in turn has delivered significant returns. Overall, the quality, condition and suitability of university infrastructure have all improved. The percentage of space rated in the top two categories of building condition has increased by over 19 percentage points (to 78%), and the percentage of space rated as 'excellent' and 'good' with regards to functional suitability is now 85% – an increase of nearly 22 percentage points.

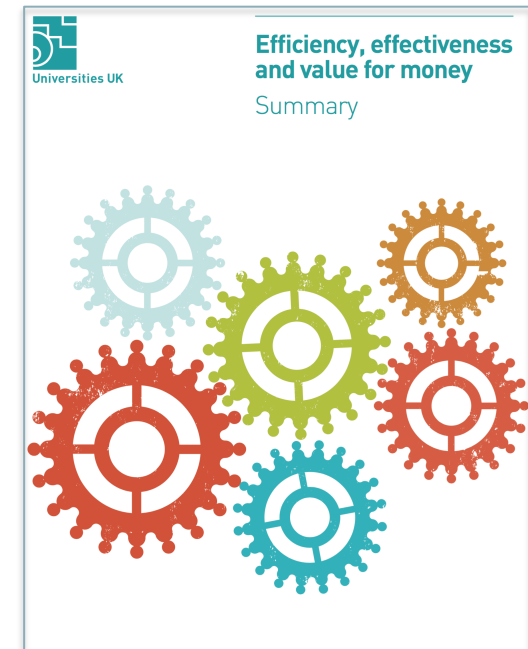
Trends in space use in universities demonstrate significant efficiencies. Analysis of data from the last decade shows that:

- Total net non-residential space per FTE student is down by over 8%. 
- Teaching space per student FTE is down by nearly 17%. 
- Academic office per academic staff FTE is down by 0.5%. 
- Support office space per support staff FTE is down by nearly 11%. 

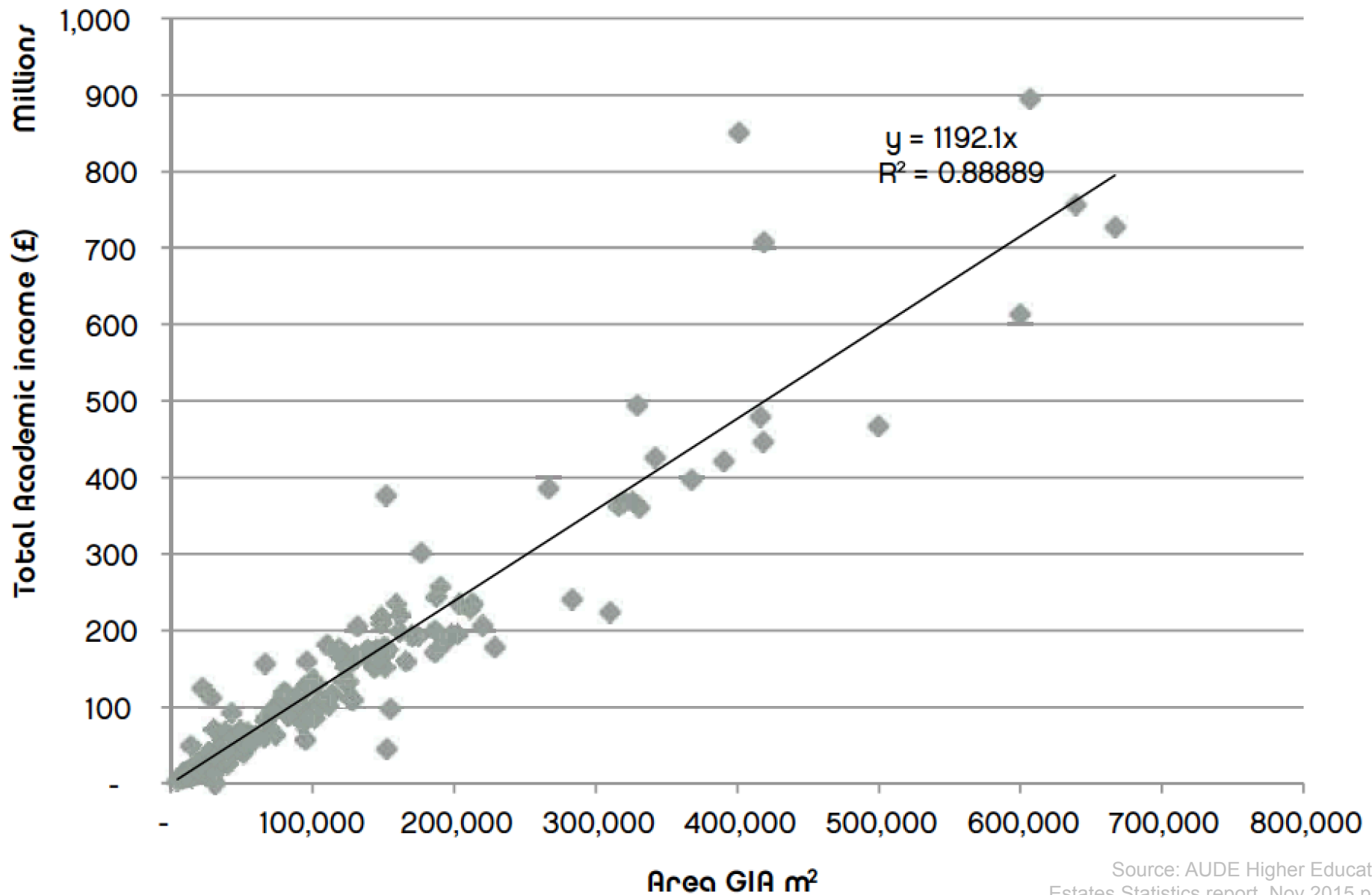
Analysis commissioned by AUDE and UUK estimates that over the last 10 years, efficiency gains from better use of space total £886 million. Total income related to the estate size increased substantially over the last decade. In real terms, income per student and member of staff went up by over 21% over the last decade, and income per square metre increased by over 34% over the same period. This indicates a more efficient and effective use of space over the period. 

The efforts of estate management teams to improve energy efficiency have reduced the sector's carbon footprint. Without improvements to energy efficiency and space use, nearly 1.2 billion kg of additional carbon dioxide equivalent emissions would have been released.

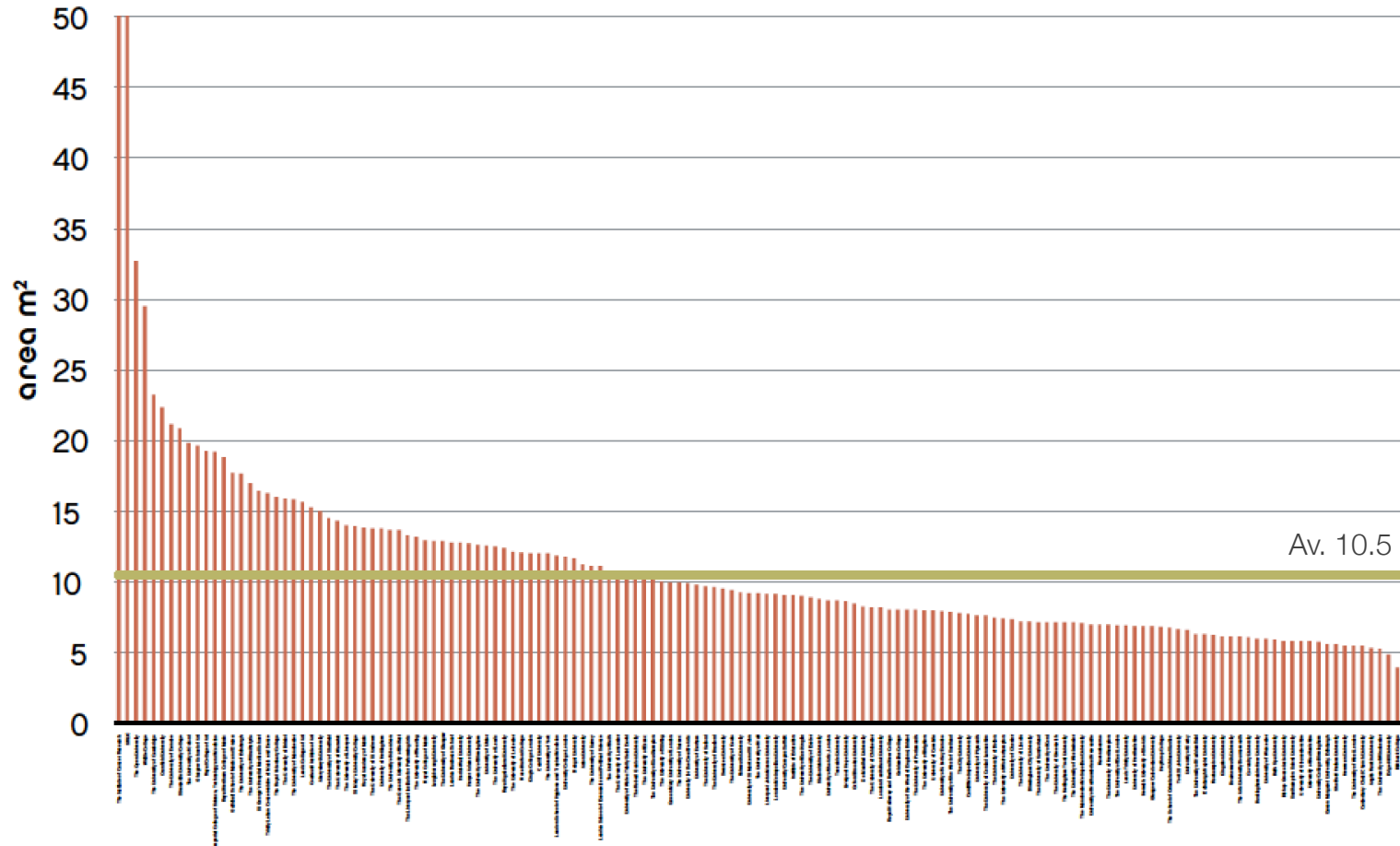
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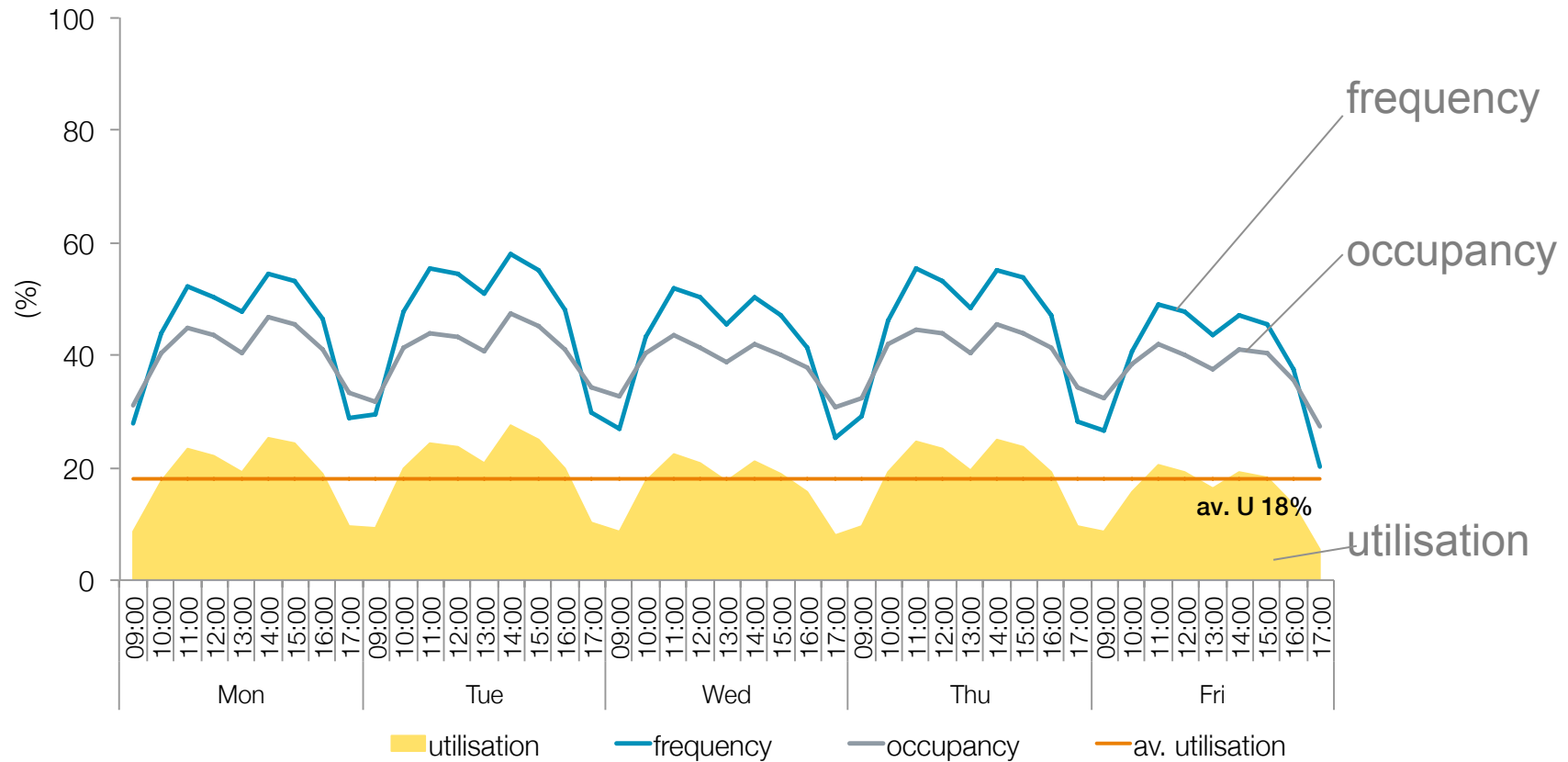
Institution research & teaching income v Academic estate (GIA)



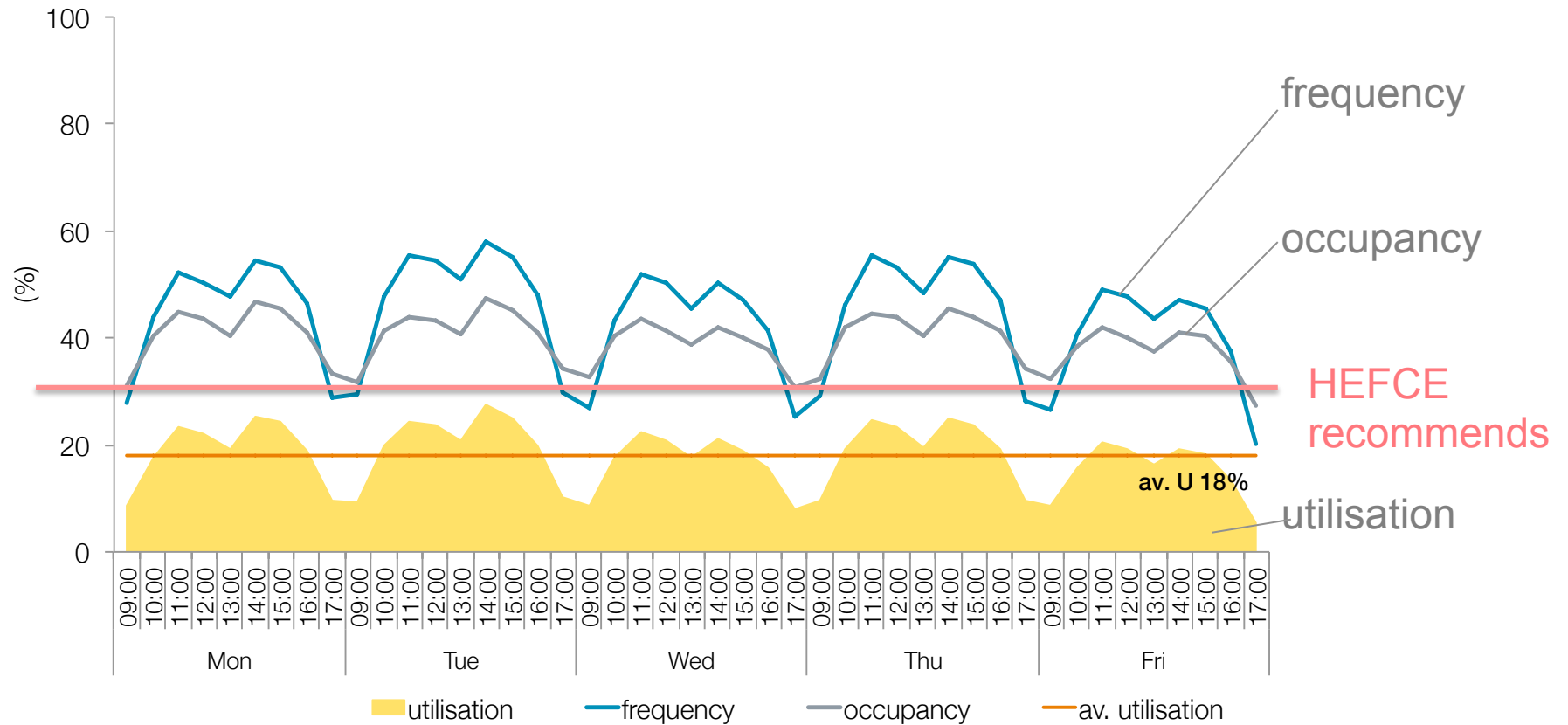
Academic space (GIA) per staff and student FTE



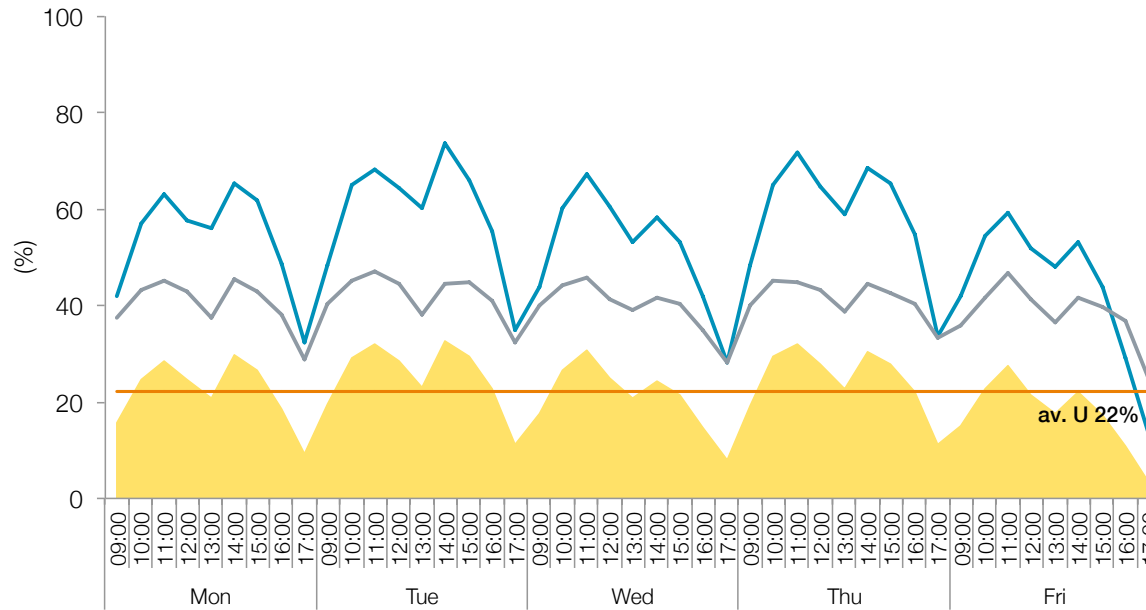
■ Academic space per FTE (staff and student)
■ Academic space per FTE (staff and student) Mean value



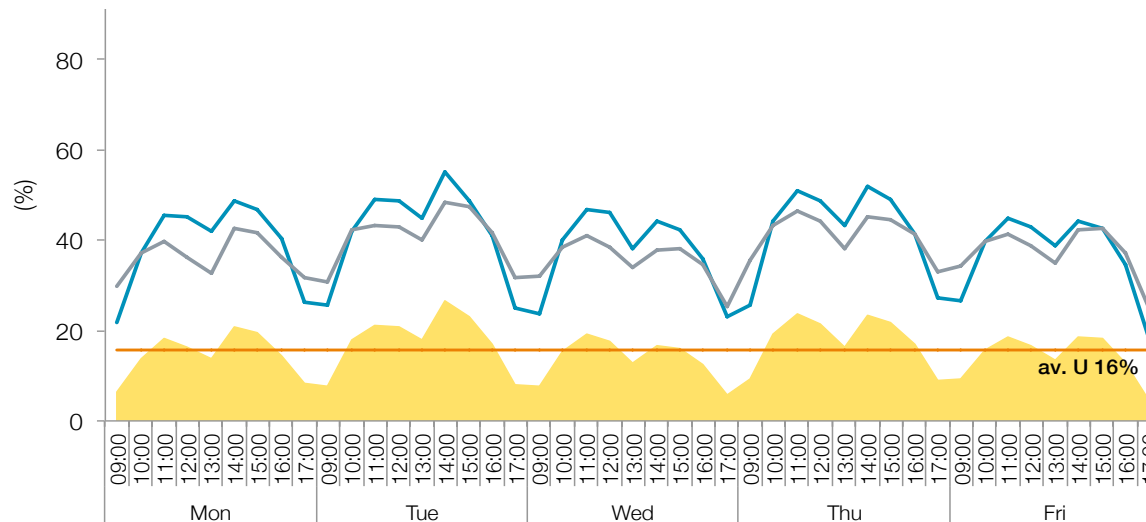
Source: AMA WorkWareLEARN database, Chrono-Space utilisation meta-data from 35 surveys of 9,040 spaces/rooms with 235,098 seats, observed hourly in busy weeks.



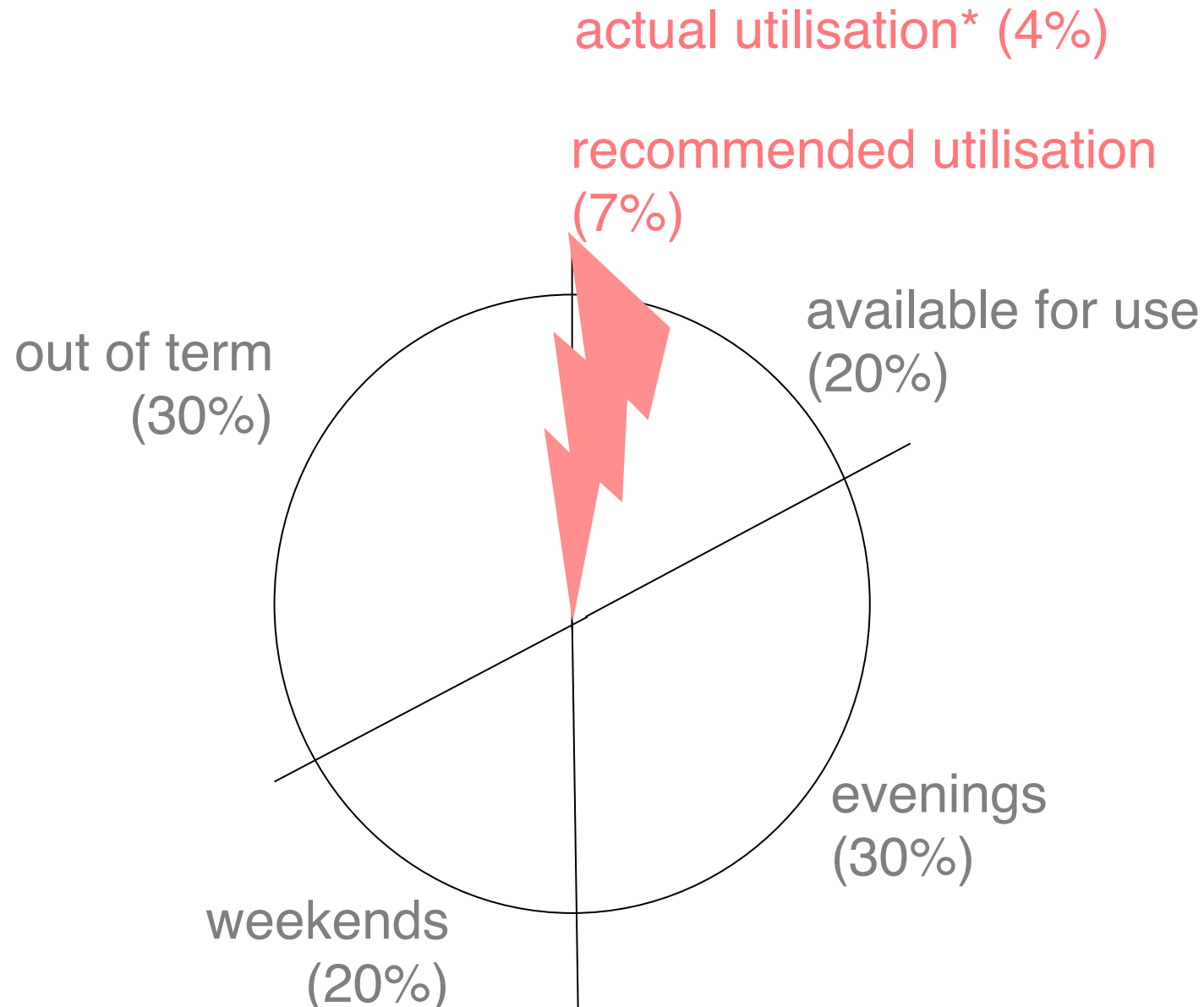
Source: AMA WorkWareLEARN database, Chrono-Space utilisation meta-data from 35 surveys of 9,040 spaces/rooms with 235,098 seats, observed hourly in busy weeks
 Utilisation = % frequency x % occupancy



Centrally bookable rooms
 1,135 spaces, 52,672 seats
 Average utilisation 22%



Locally bookable rooms
 1,391 spaces, 35,055 seats
 Average utilisation 16%



Recommended utilisation based on HEFCE is 30% of the time available for use, term-time 9am-5pm

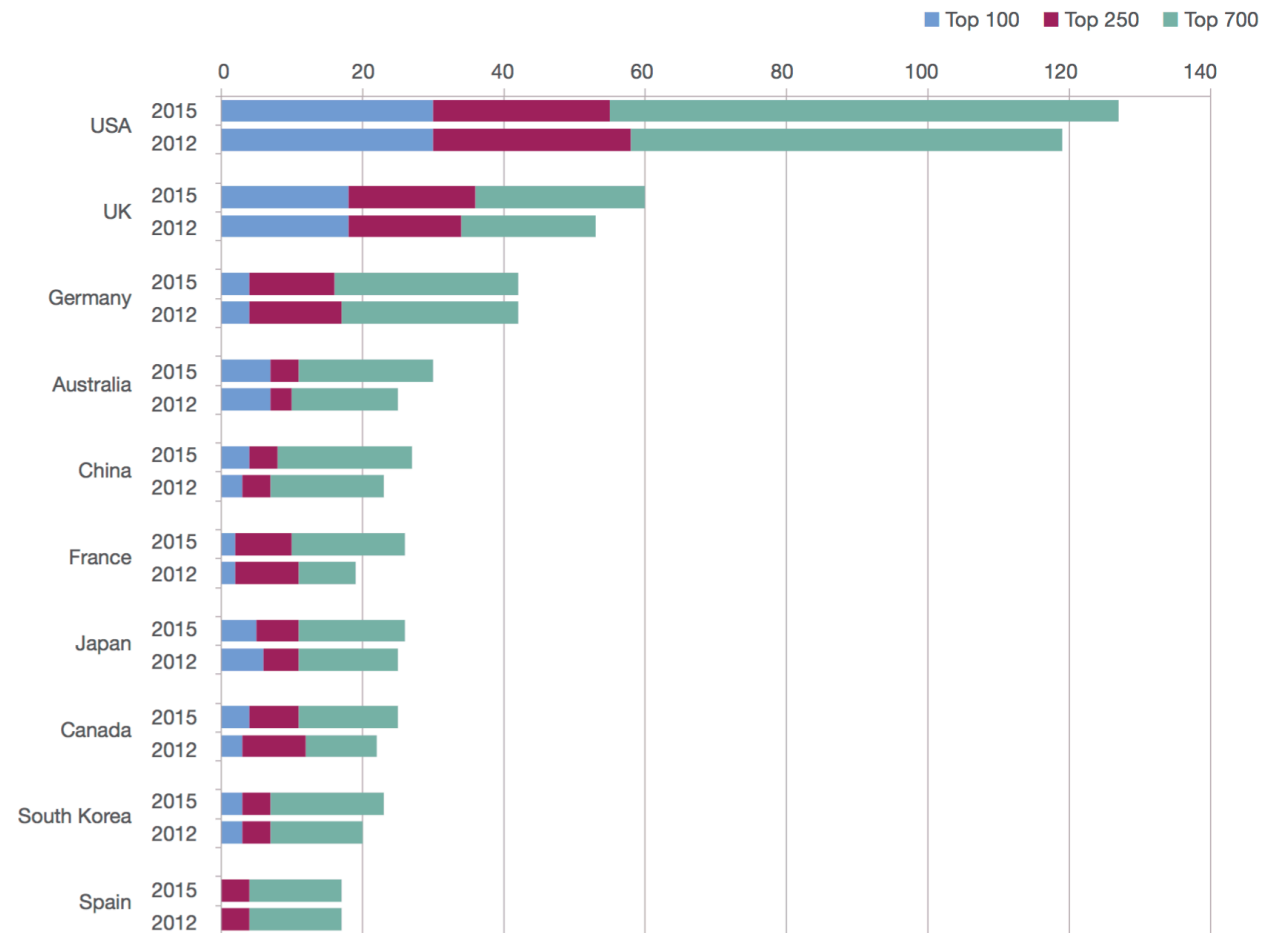
*Actual utilisation based on meta- data from AMA WorkWareLEARN database, equivalent to 4% annual utilisation

3. Challenges ahead

- **Invisible vs powerful estate**
- **Disruptive innovation: digital learning**
- **Spaceless growth & sustainability**
- **Space-learning-research: knowledge gap**

Number of ranked institutions

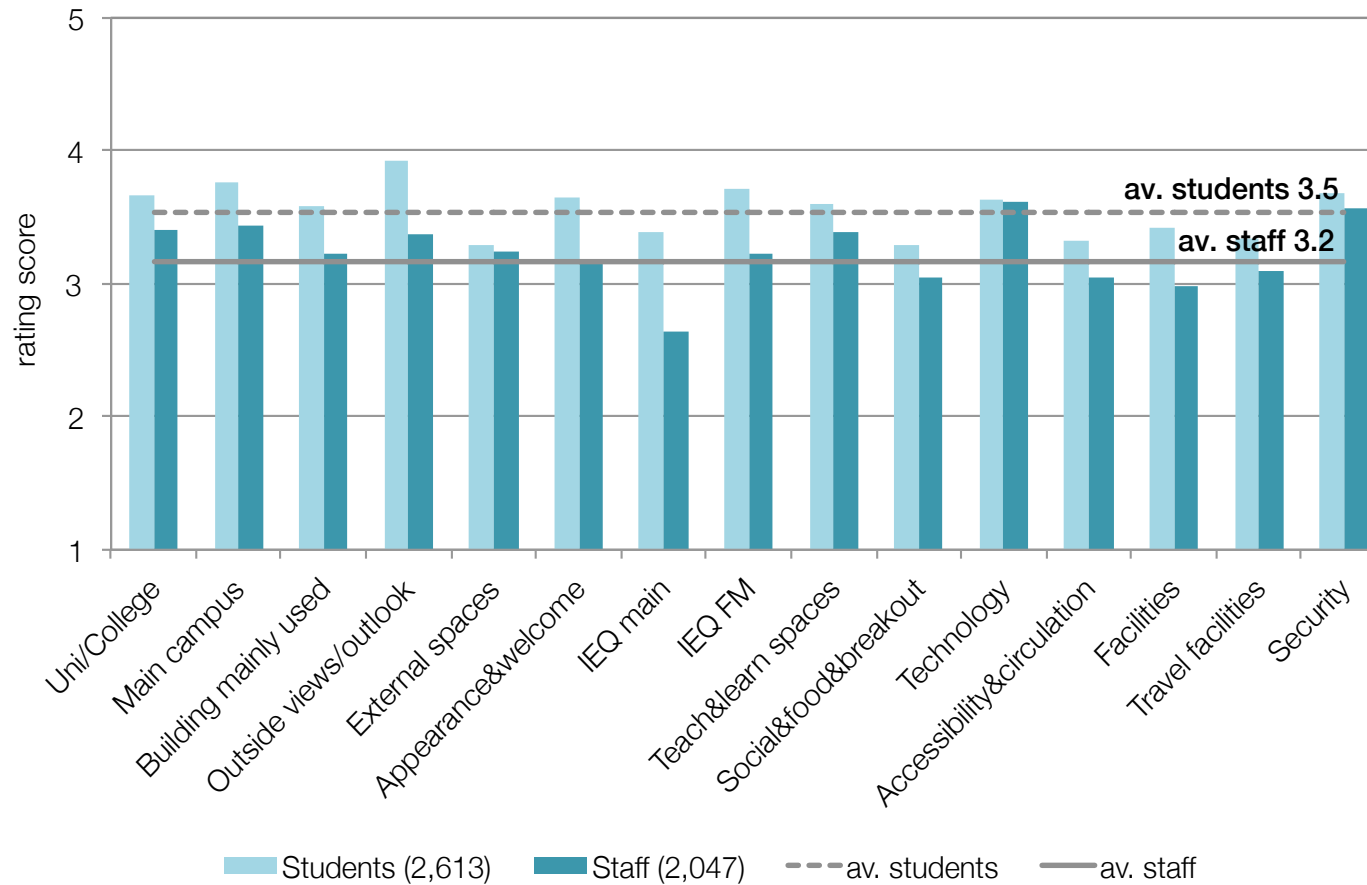
QS World University Rankings, Top 10 countries, 2015 vs 2012



Source: QS, Savills World Research

- **NSS until 2016**
- **3 of 22 questions on Learning resources**
- *‘The library resources and services are good enough for my needs’*
- *‘I have been able to access general IT resources when I needed to’*
- *‘I have been able to access specialised equipment, facilities or rooms when I needed to’*

- **NSS from 2017**
- **3 of 27 questions on Learning resources**
- *‘The library resources (eg books, online services and learning spaces) have supported my learning well’*
- *‘the IT resources and facilities provided have supported my learning well’*
- *‘I have been able to access course-specific resources (eg equipment, facilities, software, collections) when I needed to’*



Source: AMA WorkWare Questionnaire, satisfaction ratings for estate features

*“online learning is a
disruptive innovation
for traditional universities”*



HWET FE GARD
na mæcaþ dædan. þeod cyming
þym æt þanon huda æþe lincas alle
þre medon. oþc feold scepas sceap
þreacum monegū mæghum moode seol
oþ ceah esode eonl syddan aqere þea
þea sceap þandon he þæt þroþre soð
þæc undre polenum þeod myrdan þa
oð þæt him æghyle þætta zomb se cean
oþe hion þade hytan seolde zomban
syldan þæt god cyming. Ðan aþra þæt
aþeac comed zang in seacum þone zed
seolde polce zopþre þraon dæpfe on
zete þne æt þraon aldre. Lange
hyle him þæt lip þætta puldæc þæt l dæd
þeald aþe þæt zang. Ðan þæt þæt
ol ad þde þraon seolde seolde seolde
landum in seacum þætta seolde seolde
se þreacum þraon seolde seolde seolde



7.2 The scribe Ezra, detail from the *Codex Amiatinus*, late 6th c. (Florence, Biblioteca Mediceo-Laurenziana)



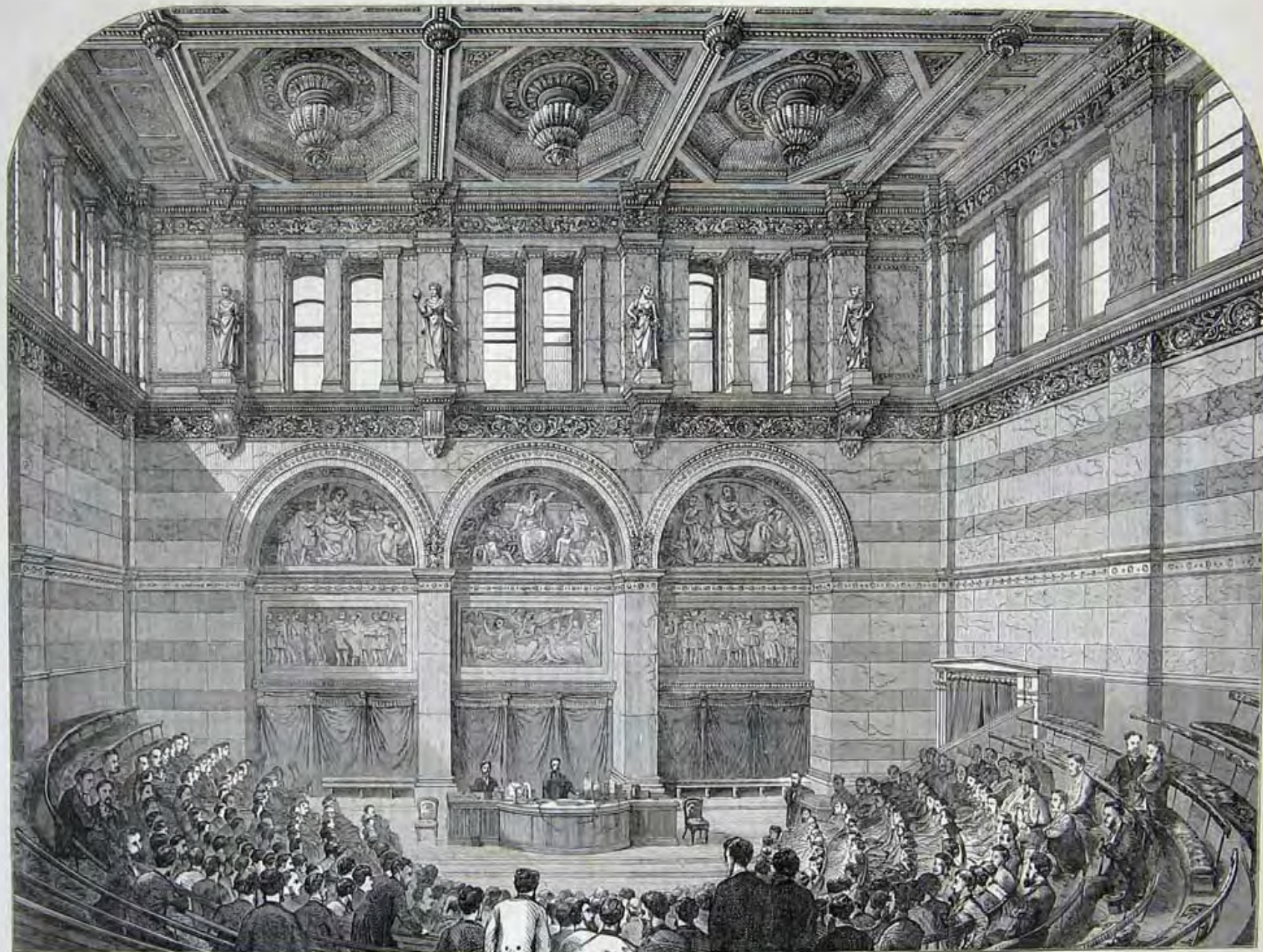


learning space design -

“built pedagogy”



Source]:<https://upload.wikimedia.org/wikipedia/commons/8/8c/>
The Anatomy Lesson.jpg



THE ILLUSTRATED LONDON NEWS DEC. 2. 1871.—521

THE LECTURE THEATRE, LONDON UNIVERSITY, BURLINGTON GARDENS.

Source: <http://www.wholesale-prints.net/MAA1871/MAA1871524.jpg> accessed 11/05/201


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ASA2015
2-4 December
Melbourne
Australia

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2-4 December
Melbourne
Australia




The problem with the lecture



Lectures are recorded and available to students within minutes. Many students are choosing not to attend lectures but rather listen online (or not at all). This empty theatre is a common scene by around Week 3 of semester.

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**HBX LIVE
CLASSROOM**

- Squeezed footprint
- Better timetabling, better real time use data
- Different timing to academic year
- Different delivery modes
- Shared resources
- Better estate operations

- Knowledge gap
- Complex relationship
- Decision-making complexity in practice

THANK YOU

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