

UK Higher Education Space Management Project

Review of space norms



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Executive summary

Purpose of the study

The UK Higher Education Space Management Group commissioned this study to research the scope for providing updated space norms for the higher education (HE) sector.

Background to space norms

Space norms are usually expressed as an 'allowance' of non-residential space per student. The allowance is made up of different types of space, such as general purpose and specialist facilities, and other non-teaching facilities, such as offices. It varies according to academic discipline.

Norms used to be published by the University Grants Committee (UGC) and the Polytechnics and Colleges Funding Council (PCFC). They were based on observations and assumptions about how students in different disciplines were taught, such as how many hours and what type of teaching activity was needed, staff:student ratios and areas per workplace, for example the area per student in a lecture theatre or a laboratory.

They were widely used both by individual institutions and by the UK HE Funding Councils for a range of purposes, including assessments of institutions' capacity to accommodate student growth and to inform the size of new building projects. Norms were never intended to be seen as requirements for, or entitlements to, space.

The UK HE Funding Councils have not published any new or updated space norms for over 15 years. Space management guidance in the 1990s moved away from a space norms or standards approach to space planning and management, towards the view that each higher education institution (HEI) should decide for itself the amount and type of space that it needed.

Despite the length of time since norms were last updated and the policy shift away from them, they continue to be used by many HEIs. The survey of space management practice carried out in Phase One of the Space Management Project ('Review of practice' 2005/25 at www.smg.ac.uk/Phase_1_reports) found that some 45 per cent of respondents used UGC or

PCFC norms or space weightings, often with modifications. Space norms often provoke strong views, both from those in favour and from those against. Feedback from the Phase One survey suggests that while some HEIs do not want updated norms, others would welcome them.

Estimation of updated UGC and PCFC norms

Since the last update of norms, there has been a decline in the amount of space available per full-time equivalent (FTE) student. Although the size of the HE estate has increased, it has not kept pace with the growth in student numbers. Either space is being used more efficiently, or academic activities are being delivered differently, or both.

This study estimates the updated equivalent of UGC and PCFC norms based on the size of the estate and numbers of staff and students across different disciplines using data from 2003-04.

This was done for two reasons:

- to provide an updated 'broad brush' re-estimation of UGC and PCFC norms for those HEIs which have continued to find them useful
- to assess the scale of the change that has taken place when measured in terms of performance against norms: we made a comparison between a reference year (1991-92) and 2003-04.

This exercise was broad brush only because of some differences in definitions and data availability between the two years. We have set out the re-estimated norms in this report and our analysis found that on average the sector is operating at 80 per cent of the prediction based on UGC norms and at just under 80 per cent of the PCFC norms.

Conclusions on the feasibility of updating norms

In this study we investigated the feasibility of updating UGC and PCFC norms by examining the way in which the norms were originally derived. Both UGC and PCFC norms were a function of series of coefficients, including:

- total hours of on-campus contact or learning hours per week per student

- breakdown of those hours into different types of activity, for instance lecture theatre hours, seminar hours and laboratory hours
- total hours that space is available per week to be used, for instance 40 hours
- predicted frequency and occupancy rates for space use, that is planned utilisation
- space standards per workplace in teaching, learning, research and support spaces
- definition of discrete subject groups or disciplines
- staff:student ratios by discipline or subject group
- professorial:other academic staff ratios by subject group
- academic:support staff ratios by subject group.

Across the sector, the coefficients have changed since the norms were devised. We explored whether it would be feasible to update them on a sector-wide basis, and if there was still sufficient consistency between HEIs to enable such a sector-wide approach to be useful.

We concluded that it would be technically feasible to construct new norms, but that the changes that have taken place in HE and the diversity across the sector render it difficult to select a range of coefficients for their calculation which would be applicable across the board. Given this diversity we do not think it is appropriate to recommend a single set of norms for use across the sector.

However, we also concluded that the concepts underlying the development of norms should be

retained, because the principles of basing an assessment of capacity or space need on what activities are to be delivered and how that might be done are still relevant. Without an assessment of this type, it is difficult to know whether an HEI, or any organisation, has broadly the right amount and type of space.

Framework for calculating indicative space needs

In this study we developed a method to calculate indicative space needs which shares much of the general approach that underpins UGC and PCFC norms. However, the method assists HEIs in estimating space needs based on their own particular profile of academic activity and methods of delivery. This approach is likely to be of most interest to HEIs which would like to better understand the capacity of their estates; to start from first principles in getting an insight into what type and how much space may be needed; and to model the effect of changes in student and staff numbers.

The method is intended to be flexible and transparent. It takes the form of a framework which can be used to generate indicative space predictions for types of space and by student FTE for all or part of an HEI, based on staff and student numbers and a series of default coefficients to assist calculations. HEIs can override the default settings if they consider that alternatives would better reflect their own circumstances and requirements. The more generously the coefficients are set, the greater will be the estimated indicative space calculation, and vice versa.

Key components

1.	Input data on student and staff numbers, and contact hours and some space categories	To be provided by HEIs
2.	A series of coefficients generating indicative space profiles for most space categories	Default range provided which can be modified by HEIs
3.	Output calculations	Generated by the interaction of 1 and 2 for a range of space types

The output can then be compared with existing space provision. It is also possible to compare the indicative space profile generated by the framework with the sector-wide analysis, which is incorporated in the SMG model for benchmarking the size of the estate and calculating the cost of having an estate kept in good condition and fit for purpose. The model is available to HEIs on the SMG web-site, www.smg.ac.uk/the_model.html.

Introduction

This report by Kilner Planning and London Economics to the UK HE Space Management Group sets out the results of a study into the feasibility of providing updated space norms for the higher education sector.

The study is one of a series of research projects carried out as part of the UK Space Management Project (SMP) under the direction of the UK HE Space Management Group (SMG). The SMG is supported by the four UK funding bodies for higher education: the Higher Education Funding Council for England (HEFCE), Scottish Funding Council (SFC), Higher Education Funding Council for Wales (HEFCW) and Department for Employment and Learning (in Northern Ireland) (DEL).

This report outlines what HE space norms are and why they were developed. It explores views for and against their use, and looks at how substantial numbers of higher education institutions (HEIs) continue to use them, or modified versions, despite the last updates being some 15 years ago. It outlines the way space norms used to be calculated, and provides a broad brush re-estimation of University Grants Committee (UGC) and Polytechnics and Colleges Funding Council (PCFC) norms on the basis of the current staff and student numbers and floorspace across the sector. The report then sets out the conclusions from the research into feasibility of developing updated norms. For HEIs interested in this aspect of space management, it describes a framework which can be used to give an indication of space needs based on an HEI's individual profile of academic activities.

Overview of the UK HE space management project

All published reports, and previous research mentioned in this document, are available on the web at www.smg.ac.uk under Reports/tools.

Phase one	Review of practice	<i>July 2005</i>
	Drivers of the size of the HE estate	<i>July 2005</i>
	The cost of space	<i>July 2005</i>
Phase two	Promoting space efficiency in building design	<i>March 2006</i>
	Impact on space of future changes in higher education	<i>March 2006</i>
	Managing space: a review of English further education and HE overseas	<i>September 2006</i>
	Space utilisation: practice, performance and guidelines	<i>September 2006</i>
	Review of space norms	<i>September 2006</i>
	Space management project: case studies	<i>September 2006</i>
	Space management project: summary	<i>September 2006</i>

HE space norms: their role and development

The term space norm is often used in HE to describe an allowance of space for a given set of activities. It is usually expressed in square metres of non-residential space per student in different academic disciplines. The allowance comprises different types of space, such as general purpose and specialist teaching facilities and other non-teaching areas, such as offices.

The UGC began to use space norms in the 1960s following the Government's decision to expand provision for higher education. It issued a series of publications on them until the late 1980s. Many of these were part of the UGC's 'Notes on Control and Guidance for University Building Projects', or NOCAG.

From the outset, norms were never intended to be entitlements to a specific amount of space, nor were they a rigid, formulaic approach to assessing space need. They were introduced to provide a common system of helping to assess the capacity of existing accommodation and of defining the scale and composition of new building projects designed to accommodate growth. The function of university space norms was set out in the UGC publication, 'Planning norms for university buildings', 1974:

'They are used for two main purposes: first in the establishment of unit area allowances on the basis of which expenditure limits for new building or adaptation are set; and secondly as providing an initial yardstick for the assessment of capacity of existing buildings. In neither case are they used as blunt instruments. ... So far as the assessment of capacity is concerned, the norms essentially provide a point of departure for the process of assessment, not a rigid formula for the calculation of capacity.'

The UGC norms were based on surveys in the 1960s and 1970s about how institutions planned and used space. They distilled a wide range of information and assumptions about course

composition and study patterns into a series of space allowances. Elements of the norms were updated by the UGC from time to time, but the underlying interaction of the coefficients upon which they were based remained largely unchanged. The last major update of the UGC norms was published in 1987.

When the PCFC was established in England in 1989, it developed its own separate guidance on norms. These were published in 1990. The same method was used to develop the norms, but the area allowances by discipline were different, reflecting the teaching methods used for different activities by PCFC institutions.

No new or updated norms have been published by the Funding Councils since 1990. Over time, the Funding Councils' role in providing capital funding diminished, and they stopped issuing advice on appropriate amounts and composition of space. Instead, they took the position that each institution should decide for itself how much space it provided and how that space should be organised.

The HEFCE Circular 1/93, 'Strategic estate management', signalled a move away from a space norms/standards approach to space management. It commented that the Council was reviewing the performance indicators it would use for considering efficiency in estate use 'and may consider replacing current space standards with weightings indicating the relative space needs of the different academic subject categories and types of research activity'. It subsequently undertook an exercise to determine space weightings between different subject or cognate groups. The results were contained in a report, by Touche Ross and Grimley in 1995, 'Space weightings'. That study provided some insight into how space was being used by discipline across the sector as a whole, but it did not address the question of how to calculate space need.

The National Audit Office study of space management in HEIs in Wales in 1996 commented that norms were widely perceived as

being outdated and not reflecting current patterns of teaching delivery. It noted:

‘...(HEIs) are complex, diverse, multi-faceted organisations and the size, cost and nature of the estates in which they operate and the profile of academic activity undertaken within them varies enormously. Therefore, attempts to calculate universal measures of the space requirement have proved insufficiently flexible to be meaningful and do not provide a sound basis for planning capital developments.’

Since that study 10 years ago, there has been no further sector-wide investigation into space norms.

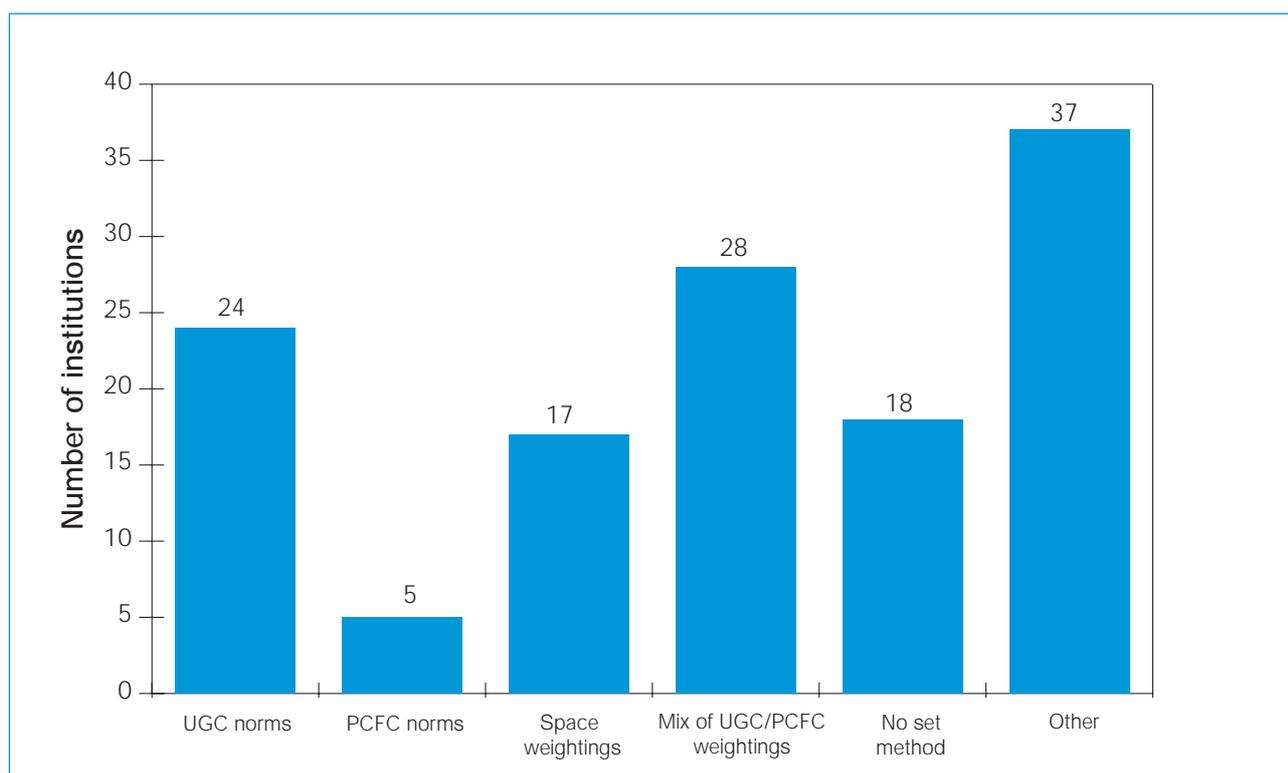
Use of norms today

Despite the length of time since norms were last updated and the policy shift away from them, norms have continued to be used by many institutions. They use them for a range of purposes, primarily to assess space needs, plan new space and as a management tool to assist the allocation of space between users and departments.

As recently as 2003-04, the SMP survey of space management practice across the sector found that some 45 per cent of respondents used UGC or PCFC norms or space weightings, often with modifications. Others had developed their own norms, while 13 per cent of respondents did not use any set method for determining how much space was needed. UGC norms were used more commonly than PCFC norms, as illustrated in Figure 1.

As the SMG Phase One report, ‘Review of practice’, noted, 27 per cent of HEIs use other methods as well or instead of norms and weightings. Institutions that use other methods frequently use norms or weightings as well. Where sources were given for these, the most common were standards or norms which were developed by the institutions themselves, advice from consultants, external sources, such as Wellcome Laboratory Guidelines, and former Department of Education and Science (DES) design notes. In some cases, institutions had developed reference areas, which were institution-specific space norms similar in approach to the UGC formula.

Figure 1: Types of space norms/standards in use



Examples of institutions' usage of standards/norms

'...PCFC norms with a reduction in the general and specialist elements of each norm by 50 per cent and 30 per cent respectively, with the exception of one school that primarily uses specialist teaching space for course delivery'.

'UGC norms are adjusted to the institutional staff:student ratios. Results of norms are examined for a band of -10 per cent to -30 per cent of adjusted UGC norms, with -20 per cent as a performance target.'

'...devised own space reference areas based on UGC standard area per workplace but take account of hours of instruction given to undergraduates'.

In the survey, institutions were asked if they made adjustments to the standards/norms in use. Thirty four per cent said yes. Most of the examples given were reductions.

Arguments for and against norms

Comments made during the survey and subsequently at SMG seminars on the output from Phase One showed that there are some strongly-held and divergent views on the value of norms.

Those who find them useful cite advantages such as:

- their objectivity and transparency
- their credibility with, and acceptance by, space users
- even if they do not provide the complete answer, they are at least a good starting point
- they are a means of benchmarking performance
- having a common system avoids the need for everyone individually to 'reinvent the wheel'
- they are reasonably easy to use

- they give some guide to relative space needs between different departments and users.

Conversely, HEIs not in favour of norms comment:

- although it might not have been the original intention, they are too often seen as rigid and prescriptive
- they are a blunt instrument and their inflexibility led to them quickly becoming outdated
- they do not deal with bad fit or the quality of space
- they cannot capture the diversity of the sector
- rather than having externally generated standards, it should be up to each institution to decide how much space it has and what that is made up of
- other space management tools, such as space charging, can be used to determine what is financially sustainable and to encourage effective and efficient use, and that in turn drives the amount of space to be provided.

Against this background, we set out to assess the scope for providing updated norms for use as one of a wide range of space management tools available to HEIs.

Outline of UGC and PCFC space norm methodology

Reviewing the methodology used to derive the UGC and PCFC norms is an essential starting point for assessing the feasibility of developing a new sector-wide system and identifying what key factors would need to be updated. In this section we give a summary of key issues with further background information set out in Annex 1.

The UGC norms had three main components:

- departmental academic areas
- non-departmental academic areas
- non-academic areas.

The departmental academic areas were calculations of notional unit areas expressed in terms of square metres of usable space per FTE student for some 20 subject groups, such as Humanities and Engineering. Added to these subject-based calculations were university-wide allocations for non-departmental academic areas (lecture theatres and libraries) based on student numbers. Allocations for the non-academic areas were also based on student numbers, with different allocations depending on the size of the institution.

The notional unit areas for each subject group were derived from observations and assumptions about how students in each subject group studied and were taught. These included:

- how many hours of, and what type of, activity needed to be delivered
- the size of the teaching group
- the staff:student ratios
- how many hours the space was available for study
- what areas per workplace were needed for different activities.

Different assumptions were used for different disciplines. The interaction of these input measures, or coefficients, generated a series of allowances for different types of space, which in turn were distilled into a single square metre figure, or notional unit area per student FTE by subject group. The non-departmental academic areas were calculated using similar principles.

The PCFC methodology was based on similar principles, but varied the assumptions about planned utilisation and areas per workplace, in part because of different delivery methods and space standards in the polytechnics and colleges sector in England. The norms were also expressed as a single area allowance for students in each of the nine PCFC programme areas, which rolled up all types of academic and non-academic space together.

Estimation of norms implied by current estate size and student numbers

It is clear from trends in Estate Management Statistics (EMS) data and from the space management survey that HEIs are operating with a reduced amount of floorspace per student FTE and that where they still use norms, they often adjust them downwards by substantial margins. Either space is being used more efficiently, or activities are being delivered differently, or both.

This study estimated the updated norms at which HEIs were implicitly operating based on the size of the estate and numbers of staff and students in 2003-04. This was done for two reasons:

- to provide an updated broad brush re-estimation of UGC and PCFC norms for those HEIs which have continued to find them useful
- to assess the scale of the change that has taken place when measured in terms of performance against norms – in effect an assessment of how the efficiency factor at which the sector is operating has changed over time.

The exercise also included a comparison with a reference year to determine how far performance against norms and efficiency factors has changed across the sector and, where possible, to see what the changes have been for individual HEIs.

We chose 1991-92 as the reference year because many institutions at that time were using UGC or PCFC norms. It was the first time that reasonably robust data were available on floorspace for much of the sector. Both the UFC (Universities Funding Council) and the PCFC carried out floorspace surveys in 1991. Also, the Pearce Report, 'Capital funding and estate management', which raised the profile of space management and the cost of space, was issued in 1992.

The main data sources for the reference year are the space audit of the PCFC sector carried out by surveyors Geddes Sampson, the PCFC's

calculations of space need in 1991-92, and assessments prepared by the UFC in 1991 to support the work of the group involved in the Pearce Report. Data for 2003-04 are taken from the Higher Education Statistics Agency (HESA) and EMS.

The calculations are only broad brush owing to some changes in definitions between 1991-92 and 2003-04 and lack of data on some aspects. For example, there are differences between the definition of usable space used in the UGC norms, space net of circulation in the PCFC norms and net internal area as given in EMS. For the UGC calculation, there is no information available on the amount of equipment-dominated space, and no allowance has been made for special collections and reserve book stores in libraries. The calculation of space FTE student numbers for the PCFC calculations is approximate as HESA does not collect data on evening only students.

In order to carry out both the UGC and PCFC calculations for 2003-04, HESA cost centre data for staff and students were mapped onto UGC subject groups and PCFC programme areas. No changes were made to any of the coefficients used to derive the original norms, with the exception of updated academic staff:student ratios for the UGC norms. This change was made because NOCAG stated that notional academic unit areas for subject groups would need to be adjusted to reflect up-to-date ratios. As such, this modification was a recommended component of the methodology. Other than that, there was no alteration to any of the underlying assumptions about hours of instruction or patterns of use.

UGC norm estimation

There is some data available on UGC norm calculations for 1991-92 from analysis done to support the Pearce Report working group. It found that in 1991, across the sector (just over 60 universities), there was a 7 per cent excess of floorspace on average across all subject groups compared with a norm-based calculation of teaching space need. The calculations were more robust for some subject groups than others. In particular, analysis of pre-clinical and clinical subject groups was complicated by the relationship with the Department of Health.

For 2003-04, an estimation of implied norms was made for all HEIs, including former PCFC institutions, which had the necessary HESA and EMS data. HESA data were used to calculate updated staff:student ratios for the subject groups. A total of 97 institutions were analysed. At the aggregate level, it was found that HEIs were operating with 80 per cent of the prediction based on UGC norms, excluding any allowance for equipment-dominated space, special collections and sponsored research. There was substantial variation between institutions, ranging from 31 per cent to over 200 per cent.

An estimation of the 2003-04 net area per FTE student by subject group is shown below. Table 1 also includes the NOCAG 1987 figures for comparison. The differences in 2003-04 figures are a function, first, of the changed staff:student ratios and, secondly, of a reduction of 20 per cent across the board to reflect the current position across the sector. If the staff:student ratios had been held constant, the reduction would have been greater than 20 per cent, because for almost all subject groups the norms would have allowed for a larger component of staff office accommodation.

Table 1: Comparison of 1987 NOCAG and 2003-04 estimated space allowances

1987 NOCAG subject group FTE space allowances						2003-04 Estimation of allowances implied by space/student numbers					
Subject group	Academic staff: student ratio	UG m ²	PGC m ²	PGR m ²	Allowance inc for academic staff	Subject group	Academic staff: student ratio	UG m ²	PGC m ²	PGR m ²	Allowance inc for academic staff
Pre clinical medicine & dentistry	1:8	14.1	14.1	20.4	3.8	Pre clinical medicine & dentistry	1:8	11.2	11.2	16.2	3.0
Clinical medicine	1:6	6.5	6.5	22.2	5.2	Clinical medicine	1:2.6 ²	10.5	10.5	23.0	9.5
Clinical dentistry	1:6	10.5	13.0	16.2	4.2	Clinical dentistry	1:6.6	6.6	8.0	10.0	12.6
Studies allied to medicine and dentistry	1:8	9.8	12.3	18.4	3.8	Studies allied to medicine and dentistry	1:16.2	6.3	8.3	13.1	1.5
Biological sciences	1:9	9.2	12.2	19.1	3.4	Biological sciences	1:6.8	8.2	10.6	16.1	3.6
Psychology	1:11	8.2	10.5	19.5	3.0	Psychology	1:14	6.0	7.8	15.0	1.9
Agric & Forestry/ Veterinary science ¹	1:9	9.2	12.2	19.1	3.4	Agric & Forestry/ Veterinary science ¹	1:7.7	7.8	10.2	15.7	3.2
Physical sciences	1:8	9.8	12.3	18.4	3.8	Physical sciences	1:6.3	8.6	10.6	15.5	3.8
Mathematics	1:11	3.6	3.6	5.0	1.3	Mathematics	1:12.2	2.8	2.8	3.9	0.9
Computer sciences	1:11	7.3	10.2	11.2	2.2	Computer sciences	1:15.1	5.3	7.6	8.4	1.3
Engineering & technology	1:9	9.8	16.6	17.9	3.2	Engineering & technology	1:9.3	7.7	13.1	14.2	2.5
Architecture, building and planning	1:8	9.8	9.8	9.4	2.3	Architecture, building and planning	1:16	6.9	6.9	6.6	0.9
Geog & Economics	1:14	5.4	6.8	7.1	1.0	Geog & Economics	1:12.6	4.4	5.5	5.7	0.9
Social studies	1:12	2.4	2.4	4.9	1.2	Social studies	1:17.3	1.6	1.6	3.6	0.7
Business	1:11	3.3	3.3	5.0	1.3	Business	1:22.2	2.1	2.1	3.5	0.5
Languages	1:10	3.5	3.5	5.2	1.4	Languages	1:14.6	2.4	2.4	3.8	0.8
Humanities	1:11	2.6	2.6	5.2	1.3	Humanities	1:15.7	1.8	1.8	3.8	0.7
Archaeology	1:10	5.5	6.8	7.2	1.4	Archaeology	1:8.8	4.5	5.6	5.9	1.3
Art, design, music & drama	1:10	9.1	9.1	8.8	1.9	Art, design, music & drama	1:16.4	6.7	6.7	6.4	0.9
Education	1:11	5.0	5.0	4.8	1.3	Education	1:19.1	3.5	3.5	3.4	0.6
						Catering & hospitality management ³	1:21.4	5.8	8.1	13.6	1.1

¹ Additional allowance for special additions

² Staff:student ratio likely to be affected by inclusion of clinical staff

³ Additional subject group included to allow for this cost centre

UG Undergraduate

PGC Postgraduate course

PGR Postgraduate research

PCFC norm estimation

We made a similar estimation for PCFC norms with data for 1991-92 based on the final Geddes Sampson survey data and PCFC space norm calculations for 84 polytechnics and colleges in England. At that time, on average, these institutions were operating at 91.2 per cent of PCFC norms. There was wide variation, ranging from 184 per cent in the case of a specialist music college to 40 per cent for one college of higher education.

We did a broadly equivalent calculation for 2003-04 for 127 HEIs across the UK, including former UGC institutions, which had the necessary EMS data. Given that the PCFC norms did not make any provision for research, research space was excluded from the calculations. The result showed that in 2003-04, the sector was operating at 79.5 per cent of PCFC norms – a reduction of some 13 per cent since 1991-92. Again, there was wide variation, from 35 per cent to 193 per cent.

A comparison of individual institutional performance between 1991-92 and 2003-04 is complicated by the many changes and mergers which have taken place. For the 50 HEIs which are broadly recognisably the same in both years, they were operating at 91.6 per cent of norms in

1991-92 and are now at 67.5 per cent. This is a reduction of 26.3 per cent.

An estimation of sector-wide PCFC norms for 2003-04 is given in Table 2. Based on the figures for the sector as a whole, the original norms are reduced by 20.5 per cent for each programme area.

Conclusions on feasibility of updating norms

The outline of how UGC and PCFC norms were calculated shows that they were a function of a series of coefficients. The key ones were:

- total hours of on-campus contact or learning hours per week per student
- breakdown of those hours into different types of activity, for instance lecture theatre hours, seminar hours and laboratory hours
- total hours that space is available per week to be used, for instance 40 hours
- predicted frequency and occupancy rates for space use, that is planned utilisation
- space standards per place in teaching, learning, research and support spaces
- definition of discrete subject groups or disciplines

Table 2: Estimates for PCFC norms

Programme area	1990 Space norm (m ²)	2003-04 Estimated norm (m ²)
Engineering	15	11.9
Built Environment	9.5	7.6
Science	15	11.9
IT and Computing	11	8.7
Business	8	6.4
Health and Life Science	10	8
Humanities	7.5	6
Art and Design	14	11.1
Education	9.5	7.6

- staff:student ratios by discipline or subject group
- professorial:other academic staff ratios by subject group
- academic:support staff ratios by subject group.

Calculations of norms are highly sensitive to variations in these coefficients. Nevertheless, at the time of their original formulation, the UGC concluded that there was enough consistency among universities to enable sector-wide norms to be generated. This was with the recognition that if there were a significant alteration in any of the core coefficients, then the norms would need revising. The PCFC reached a similar conclusion, but it did not adopt all the coefficients already used by the UGC. In particular, it used a higher predicted utilisation rate and the space standards were slightly lower. This was partly for policy reasons and partly to allow for different teaching practices in the former polytechnics and colleges.

Across the sector, there have been changes in the coefficients listed above since the norms were devised. The key issues are whether it would be feasible to update these coefficients on a sector-wide basis, and if so, whether there is still sufficient consistency between HEIs to enable such a sector-wide approach to be of practical benefit.

Discussion of the main coefficients

Contact and learning hours

Changes in pedagogy and the shift towards student-centred and blended learning are well-documented, but there are no sector-wide data on trends in contact hours or on hours of self-directed study in different types of space. Although guided learning hours are recorded for each student in further education in England, there is no equivalent in higher education.

Over the course of the SMP, information has been provided by a number of HEIs which gives some insight into the way that courses are constructed in terms of numbers of hours of lectures, laboratory-based activities etc. Some

HEIs can provide this information quite easily via timetabling systems covering all teaching space. Others needed to seek at least some information – particularly on hours of use of specialist space – from departments and faculties.

In general terms, the data show that science subjects have more hours than humanities, but there are marked variations between the institutions for similar subjects both in total number of hours and how they break down into different activities. From the data available, the indications are that there is not enough consistency to generate a meaningful series of assumptions about composition of different subjects in order to provide a robust foundation for recalculation of norms.

Hours available

The existing norms are based on assumptions about the availability of time Monday to Friday. They ignore activities in the evening, at the weekend and outside term time. However, many institutions are now operating on a longer working day and this can have a marked effect on the space norms. For example, if the coefficient for hours available is set at 12 hours per day rather than eight, it increases capacity by 50 per cent.

Planned levels of utilisation

The same is true of planned levels of utilisation. For instance, calculations based on planned frequency and occupancy rates of 50 per cent will generate a much larger space norm than a planned rate of 80 per cent. Data from EMS and the SMP space management survey show wide variations in planned utilisation rates and targets adopted by HEIs.

Space standards

Both the UGC and PCFC norms used a series of space standards for given activities, such as for office workplaces and for different teaching activities. As part of the management practice survey HEIs were asked if they used space standards and if so to provide details of what those were. The findings were that 47 per cent of respondents use space standards. Where

information was given on the standards being used most relates to office areas. See below.

Examples of space standards used

'...management offices 20 m², other single offices 9 m², other office space 7.5 m².

Professors and heads of schools 20 m², other academic staff 15 m², support staff 8 m².

'...10 m² for non-academic and administrative staff and a standard computing area of 3.5 m²'.

'...use a planning norm for office space of around 6-8 m²'.

'...policy of providing not more than 10 m² per FTE staff in new and replacement space'.

'...offices 7 m² and laboratories 3 m² per workplace'.

However, there was insufficient information to provide comprehensive data on the space standards for workplaces now being used in the sector. Nor does EMS provide data at such a level of detail. In addition, some external funding bodies require space to be provided in accordance with their own specifications which may be different from those which would otherwise have been adopted by HEIs.

Staff numbers and ratios

Our analysis of the norms based on estate size and student numbers included a calculation of the staff:student ratios across the sector by HESA cost centre for 2003-04. As expected, in most cases these show substantial increases in the numbers of students per member of staff from the figures used in NOCAG. They also show wide ranges within cost centres by institution. This degree of variation would make it difficult to include a meaningful academic office space component within the notional unit area per FTE by cost centre.

Conclusions on coefficients

This discussion of key coefficients underpinning norms highlights that some data are not collected on a sector-wide basis, such as the hours of instruction and of self-directed learning that make up courses in different disciplines. Nevertheless, from the information which is available it can be seen that there is substantial diversity in delivery of activities between HEIs, for example in teaching and learning methods and in staff:student ratios. There are also widespread variations in timetabling practice and increasing blurring of the boundaries in space types.

While it would be technically feasible to construct new norms, the changes that have taken place in HE and the degree of variation across the sector render it difficult to select a range of coefficients for their calculation which would be applicable to the full range of institutions. The sector has moved from the position of relative homogeneity at the time that the original UGC norms were developed, and where the assumptions about practice were generally relevant to most universities. Given this diversity, it is concluded that it would not be appropriate to recommend a single set of norms for use across the sector.

However, such a conclusion does not mean that the concepts underlying the development of norms need, or should, be abandoned. The principles of basing an assessment of capacity or space need on what activities are to be delivered and how that might be done are still relevant. It could be argued that without an assessment of this type, it is difficult to know whether an HEI, or any organisation, has broadly the right amount and type of space. It may be investing resources in more space than it needs or in facilities which are no longer required. Likewise, if it has plans to change the range and scale of activities in the future, it is hard to know if its estate has the scope to deliver those objectives and how it might need to change and adapt.

Framework for indicating space need

Institutions can use the principles on which norms are based to build up a framework and generate an indicative profile of their own individual space needs.

Such a method provides a set of internal, institution-specific space norms for HEIs for different types of activities or for faculties/departments. This method is similar to that already used by some institutions, and it also has elements in common with the calculation of space factors which have been widely used in North America, and with the Learning and Skills Council model for assessing space need in further education colleges in England.

This method would assist an HEI in estimating space needs based on its own particular profile of academic activity and ways of working, its methods of delivery and the type of space considered appropriate for different activities. HEIs can therefore adopt the series of coefficients which best suit their own circumstances.

The advantage of this approach is that it allows for institutional diversity, and the content of the framework can be modified to reflect changes in activities or practices or to model a range of potential scenarios. It generates an indicative space profile for all or part of an HEI in terms of amount and type of space and by student FTE. These can then be compared with actual space available. A disadvantage is that although the basic structure of the approach can be supplied to HEIs, they need to provide the core input data to populate it and they need to decide on the coefficients which would be appropriate for them. As such, initially at least, it would take longer to work through than the application of a single set of externally generated norms.

In this context, such an approach is likely to be most useful for HEIs which would like to better understand the capacity of their estates; to start

from first principles in getting an insight into what type and how much space may be needed; to model the effect of changes in student and staff numbers and the impact of other changes in institutional objectives.

The remainder of this section describes the approach and its uses in more detail.

Range of potential framework outputs

This method can be used to derive an indicative space profile consisting of some or all of the following for an individual HEI.

Guide to total area and subtotals by space type

- Total core teaching area and breakdown of teaching area by type
- Total learning area and breakdown of learning area by type of space
- Total office area and breakdown of office area (teaching, research and administration/support) by type
- Total core research area and breakdown of research area by type of space

Guide to area per student FTE

- By space type
- By department or faculty

The framework allows for calculations to be done initially at the level of faculty/department or other preferred grouping/unit of users, which can then, if desired, be aggregated to institution-wide level. HEIs may choose to look at all space types or to focus on particular elements, such as offices or specialist teaching space.

Composition of the framework

One approach to developing the framework is available for HEIs to download from the SMG web-site at www.smg.ac.uk. It includes the framework in a spreadsheet and a user guide to explain how an indicative profile of space needs can be developed. Annex 2 contains an extract from the spreadsheet.

This spreadsheet is not the only way of expressing the calculations, and HEIs may prefer to develop their own methods using the same principles. In general, however, the core components of the framework will be the same. The indicative space profile will be built up from the same basic set of input measures and coefficients.

HEIs will need to provide the staff and student input data themselves. The framework will not function without input data on student and staff numbers and on event hours per week for different types of space. HEIs need to enter their own data. The data may be held in a number of different formats and locations. In some HEIs, the necessary information may be held centrally. In other cases, it might be located with individual departments or faculties.

HEIs will also need to make decisions on the key coefficients, although default settings are supplied for many of these in the framework to act as an initial starting point for the calculations.

The coefficients in the model which generate an indicative profile of space need are:

- length of the academic year
- length of the core timetabled week
- target frequency of use of workplaces
- target occupancy rate of workplaces
- area per workplace and ancillary allowances.

A flexible and transparent approach

The framework has been set up with a series of default coefficients to assist calculations, but where highlighted on the spreadsheet these can be overridden with alternatives. In this way, HEIs can base the calculations on their own existing or preferred practice. The default settings are based on some examples of existing practice in the sector as found during the course of the SMP, but they are not recommendations, nor are they set to generate maximum efficiency in space use. As our discussion of key coefficients in the previous section concluded, there is a wide range of institutional practice and what might be appropriate in one institution may be unsuitable in another. The framework has been set up to have the flexibility to accommodate institutional diversity and to reflect the actual range of activities in an institution and the particular way it carries out those activities.

The model is set out in spreadsheet form so that the interaction of the input data and coefficients is transparent, and so that it is possible to track the effect of changing input data (for example future student number projections) and/or the coefficients (for example varying the area per workplace or the target utilisation). Thus, if the input data remained unchanged, but if weeks in the academic year and the hours in the core week were increased; if the target frequency and occupancy rates were raised; and if the area per workplace was reduced, the overall prediction of space need would fall. Conversely, the more generously the coefficients are set, the larger the total area that is predicted. The framework could be used to model different scenarios to get the preferred balance of affordability and quality of working and studying environment.

Key components

1.	Input data on student and staff hours, and event hours and some space categories	To be provided by HEIs
2.	A series of coefficients generating indicative space profiles for most space categories	Default range provided which can be modified by HEIs
3.	Output calculations	Generated by the interaction of 1 and 2 for a default range of space types

Comparison with existing space

Once the framework has been developed, the results can be compared with space available, although allowance must be made for the fact that the output from the framework will be a general indicator of space need only. It will not be a firm prediction because, as with the original norms, it would need moderation to allow for individual institutional characteristics such as bad fit, individual room sizes, historical estates, split sites, the configuration of existing buildings and the impact of legislative compliance on space use.

The comparison can be made in terms of the following:

- total space – predicted by space type and existing
- number of workplaces by type – predicted and existing
- area per workplace by space type – predicted and existing
- space per FTE student/member of staff – predicted across the institution and by faculty/department and existing
- predicted levels of utilisation (both frequency and occupancy) with scheduled and surveyed rates (where the latter are available).

Comparison with SMG model

It is also possible to compare the indicative space profile generated by the framework with the sector-wide analysis incorporated in the SMG model (www.smg.ac.uk/the_model.html) for benchmarking the size of the HE estate and calculating the cost of having an estate kept in good condition and fit for purpose.

Link with other SMP space management tools

The space management methods described in this report have close links with other components of the SMP, particularly the report on the impact of design on space efficiency and on space utilisation (HEFCE 2006/09, available on the SMG web-site).

Annex 1: UGC and PCFC space norm methodology

This annex gives a summary of the methodology used to derive the UGC and PCFC norms.

UGC norms

These norms were intended to give an estimation of the academic capacity of existing or new buildings. ‘The estimated or calculated numbers of FTE students that can be accommodated to space standards in line with the Committee’s planning norms within the usable areas available for a given purpose.’ (NOCAG 1987 paragraph 140.)

The UGC norms had three main components: departmental academic areas; non-departmental academic areas; and non-academic areas.

The departmental academic areas were calculations of notional unit areas expressed in terms of square metres of usable space per FTE student for some 20 subject groups, such as humanities and engineering. The area per FTE for each discipline included allowances for:

- teaching space (excluding lecture theatres)
- academic offices and research laboratories
- non-academic offices and stores
- teaching and post-graduate laboratories
- laboratory ancillaries.

These departmental unit/norm areas were not intended as either maximum or minimum allowances or entitlements, but as a basis of calculating a total area within which departments would normally be expected to function reasonably and above which there should be a special justification.

Added to these subject-based calculations were university-wide allocations for non-departmental

academic areas (lecture theatres and libraries) based on student numbers.

Allocations for the non-academic areas listed below were also based on student numbers, with different allocations depending on the size of the institution:

- administration
- social, dining and sports facilities.

Sponsored research space and equipment dominated areas were in addition to these allowances

As well these FTE based calculations, NOCAG provided space standards for different HE activities such as general teaching (1 m² per place for lecture theatres for instance), offices and teaching laboratories. The standards were intended as a means of checking overall calculations, and it was recognised that they would need adjustment in many situations.

The departmental notional unit areas and the additional non-departmental areas and non-academic areas per FTE were based on a series of observations and assumptions about the hours and type of activity for which space had to be provided, on planned utilisation, and the areas per place needed to accommodate those activities.

The way in which these assumptions interacted to generate a departmental academic area for each subject group can be illustrated by taking one subject as an example. The example used below is architecture, building and planning. The space norm for an FTE undergraduate in this subject group was given in NOCAG 1987 as 9.8 m² of usable space. The academic staff:student ratio was given as 1:8. This figure was made up of four separate space components as shown in Table 3.

Table 3: Components of norm

Architecture, building and planning	m ² per FTE undergraduate
Academic offices, tutorial teaching and research	2.3
Admin/technical offices and storage	0.65
Seminar rooms/group teaching	0.35
Specialist subject facilities	6.5
Total	9.8

Each of these components was calculated as follows:

1. **Allowance for academic offices, tutorial teaching and research:**

Office space of 18.5 m² per professor (including 6.5 m² for tutorial space)

Office space of 13.5 m² per academic member of staff (including 6.5 m² for tutorial space)

Assumption made about the ratio of professorial to other academic staff

Assumption for this subject group that the academic staff:FTE student ratio was 1:8

Research space was included additionally per member of academic staff. For this subject group it was 4.6 m² for a drawing board

2. **Allowance for admin/technical offices and storage:**

Office space of 7 m² per secretarial staff at ratio of 1 per professor and 1 per 4 academic staff plus 1 administrator with an office of 7 m² and a chief technician with an office of 9.3 m²

3. **Allowance for seminar/group teaching:**

It was assumed that there was a notional 30 hour teaching week

There would be one hour of seminar/group teaching

The utilisation factor was 20 per cent

The area per workplace was 1.85 m²

Thus, $1/30 \times 5/1 \times 1.85 = 0.31$, say 0.35 m²

4. **Allowance for specialist subject facilities:**

Allowance of 6.5 m² to cover 4.6 m² for a drawing office/studio place plus 40 per cent extra for ancillaries and storage.

The same method was used to calculate areas for each of the other subject groups but with different assumptions used about space standards, hours needed for different types of space and staff:student ratios. The UGC norms

as set out in the NOCAG 1987 publication were based on staff:student ratios for 1980-81.

Non-departmental academic space was calculated using similar principles. There was an allowance of 0.5 m² per FTE for lecture theatres for almost all subject groups based on:

Notional 30 hour week

8 hours of lectures per student FTE

Frequency factor of 66 per cent

Occupancy factor of 75 per cent

Area per place of 1 m²

Thus, $8/30 \times 3/2 \times 4/3 \times 1 = 0.5 \text{ m}^2$

For libraries the allowance was 1.25 m² based on one reader place per six FTE students at 0.4 m² plus a book stack allowance of 0.62 m² and an addition for administration.

PCFC norms

Before incorporation, polytechnics and colleges in England used DES Design Notes to inform space need and assess capacity. There was a range of methods, for example Design Note 45 used a space norm of 14.5 m² per space FTE student to generate a predicted size for polytechnics. By the end of the 1980s, the PCFC concluded that on average institutions were operating with substantially less space than the Design Notes predicted. It introduced a new system of space norms for PCFC institutions in its 'Guidance on estate management' (1990) with reduced area allowances to reflect the practice of the time. The PCFC norms were around 15 per cent less than some of the previous DES methods of calculation. The new system was intended to be an incentive to economy and efficiency, and from its introduction there was a presumption that unless HEIs were operating below the area predicted by the norms, they were not using their resources efficiently.

The PCFC norms were based on area allowances per space FTE for each of the nine academic programme areas used by the Funding Council. They covered both specialist and non-specialist areas. Non-specialist space included pooled teaching, libraries, staff accommodation,

administration, sports and catering facilities. They were based on the input measures similar to those in the UGC norms but with some different assumptions about planned utilisation and areas per workplace. There was no allowance for research space.

patterns, the move to more student-centred learning and a longer working week. There have been no published changes to either set of norms since 1990.

Table 4: Norms for each of the programme areas

Programme area	Space norm (m ²) *
Engineering	15
Built Environment	9.5
Science	15
IT and Computing	11
Business	8
Health and Life Science	10
Humanities	7.5
Art and Design	14
Education	9.5

* Areas were net of circulation

PCFC norm-based space need calculations were very simple to undertake. Student numbers were calculated in terms of space full-time equivalents for each programme area and then multiplied by the area allowance. Space full-time equivalents used specific weightings used to convert different modes of attendance to FTE numbers. For instance, a weighting of 0.22 was applied to part-time students and zero to evening only students. The resulting figure could then be compared with actual space available to assess whether there was an under or over provision of space. Actual space was divided by the norm-based calculation to generate an efficiency index. An index greater than one indicated more space was available than the norm predicted.

Both the UGC and the PCFC recognised that norms would need to be kept under review to take account of changes in higher education, for example in response to changing teaching

Annex 2: Spreadsheets to accompany framework for indicating space need

List of abbreviations

EMS	Estate Management Statistics
FE	Further education
FTE	Full-time equivalent
HE	Higher education
HEFCE	Higher Education Funding Council for England
HEI	Higher education institution
HESA	Higher Education Statistics Agency
NOCAG	The University Grants Committee's 'Notes on Control and Guidance for University Building Projects'
PCFC	Polytechnics and Colleges Funding Council
SMG	Space Management Group
SMP	Space Management Project
UFC	Universities Funding Council
UGC	University Grants Committee

