GEMS

Guidance on the Effective Management of Space for Scotland's colleges

August 2009

A report for the Scottish Funding Council prepared by
AMA Alexi Marmot Associates in association with haa design and IPD

Scottish Funding Council
Alexi Marmot Associates
haa design
IPD

Contents

Executive Summary

Scotland's 43 colleges are pivotal to progressive change in Scotland. Because of the importance of the college estate in helping to deliver an effective learning experience, and the financial sums involved, it is essential that colleges have an estate of the right size and quality, and the tools to manage it well.

The Guidance for Effective Space Management (GEMS) has been prepared to help colleges to identify appropriate space for their activities, and to use it well through effective space management. They are also designed to assist the SFC in ensuring that college space is appropriate, particularly for new capital investments.

The guidelines were developed based on a nine month research study which included a review of the effectiveness and efficacy of existing space management guidance, feedback from colleges on current space management practices, detailed analysis of space management in ten case study colleges and interviews with education space management experts.

GEMS provides a framework and identifies a series of tools to assist Scotland's colleges develop efficient and effective estates which support the delivery of their strategic objectives.

Key features include:

1. A space management process map;
2. Clear definitions of all space measurements;
3. Overall target space norms for strategic use;
4. A proposed proportional split of functions across the estate;
5. Proposed space standards for different types of teaching, learning and office spaces;
6. Realistic utilisation targets for teaching and learning spaces;
7. GEMS calculator for calculating space requirements based on on-site student activity and utilisation of existing space;
8. Recommended performance indicators for monitoring space use over time;
9. Overview of relevant space management tools.

The report concludes with practical recommendations for effective space management, both for ongoing management of the existing estate and when making changes to the estate.

1. The need and objectives for space guidelines

"Colleges are central to (the) vision of a smarter Scotland...(we) need excellent colleges to unlock the full potential of our people"
Promoting Excellence, Scottish Executive (p1)

"Scotland requires an effective and efficient college sector where each college strives to perform to the highest level to maximise the difference it makes to the lives to learners and potential learners"

"Effective colleges have a greater beneficial impact on learners. So do efficient ones because they enable more learners to benefit from the greater number of opportunities they can offer. Colleges are therefore rightly held to account to ensure that the public receive best value for their investment"

Transforming Lives, Transforming Scotland, Review of Scotland's Colleges (p6)

Space management guidelines – the need

Scotland's 43 colleges are pivotal to progressive economic and social change in Scotland through their provision of vocational training and higher education entry qualifications to 350,000 students across diverse geographical and socio-economic landscapes. The college estate of 920,324 m^2 gross internal area (GIA), costs in the region of £54 million to run annually. The Scottish Funding Council (SFC) has invested £350 million in capital projects since 2003, resulting in £565 million of capital expenditure on new college buildings. The Scottish Government has committed to invest further in the sector over the next few years, recognising the need for continued capital investment to clear the maintenance and improvement backlog and sustain new estates and refurbished campuses.

Because of the importance of the college estate in helping to deliver an effective learning experience, and the financial sums involved, it is essential that colleges have an estate of the right size and quality, and the tools to manage it well.

The ongoing challenge for all colleges is to provide space that meets future needs, and helps to deliver a better education. This will be achieved not only through the capital investment programme but through innovative solutions to space use and management within the existing educational estate.

Cost is a key issue. As commercial enterprises colleges need to ensure that their estates are sized and managed to be both effective and affordable. Where savings can be made opportunities to invest more in curriculum delivery can be created.

The GEMS space guidelines have been prepared to help colleges to identify appropriate space for their activities and to use it well. The guidelines are also designed to assist the SFC in ensuring that college space is appropriate, particularly for new capital investments supported by the Council.

The guidance is advisory, not mandatory. It contains suggestions and tools that colleges and their advisers are invited to consult when determining the size of their affordable estate, or allocating and monitoring the use of their existing estate. The guidance complements the following SFC guidance documents:

- Estate Strategy Guidance (Jul 2008)
- Capital Projects: Gateway approvals process guidance (May 2008)
- Sustainable Development Guidance for Estate Managers (Mar 2008)
- Capital Projects: Post Occupancy Evaluation Guidance (Mar 2008)
- Spaces for Learning (2006)

Development of the guidelines

The guidelines were developed during 2008/2009 by AMA, Haa and IPD, with considerable help from college managers, space management experts, and our SFC Steering Group. Thanks are due to all who have helped in this process (Appendix 1).

Space guidelines help managers and designers by supporting:

- strategic decisions on new buildings
- ongoing space management
- the setting out of principles for a fair and logical distribution of space
- provision of environments conducive to learning in both traditional and non-traditional modes of pedagogy
- financial cost control
- sustainability

The space guidelines have been developed from:

- A nine month research study
- Review of the effectiveness and efficacy of existing space management guidance, and the tools deployed by colleges
- Feedback from colleges on space standards for specific subject areas and types of accommodation
- Detailed analysis of space management in 10 case study colleges
- Econometric modelling of determinants of estate size by IPD
- Testing draft guidance with architectural masterplanners familiar with Scotland's colleges (Haa)
- Interviews with education space management experts
- Guidance from a project steering group of SFC, college and university space managers

A detailed report of the background analysis and econometric modelling is available upon request from SFC. The findings of the first stage report have informed the guidance contained in this document and are summarised in Appendix 2.

Drivers for educational change

The guidance has been prepared at a time when changes in pedagogy, IT and sustainability have converged, requiring a spatial response.

New approaches to teaching and learning at a time of expanded educational opportunities and student numbers, increasingly place the learner at the heart of a process designed to cater as far as possible to individual learning styles. The role of the lecturer is changing to that of a learning facilitator who encourages active and independent learning amongst students. Blended learning incorporates traditional methods with IT enabled learning, teacher led sessions with peer to peer learning, and formal teaching with informal, social learning.

Climate change and sustainability are demanding that colleges reduce their energy demand, CO2 emissions, water and waste. Space quantity, allocation and use can all play a key role in delivering sustainability targets.

These space management guidelines incorporate the new spaces arising from these demands. They concentrate on place based delivery of education while acknowledging the growing role of distant and virtual learning.

Guidelines for a diverse estate

Scotland's colleges are extremely varied, spread across a geographical landscape ranging from dense city centre and edge of town sites, to rural greenfield estates and satellite centres serving students scattered over vast areas. Part time students predominate. (Figure 1).

Space for new ways of learning:

"The college's built environment was designed for large classes in relatively few subjects, taught by traditional methods and not self-directed or group study nor digital access"
(Inverness College, Estate Strategy, 2007)

"There is no place for students to spend their non-contact hours other than the refectory and the radically undersized library/LRC"
(Banff & Buchan College, Outline Business Case, 2008)

For funding purposes SFC measures taught activity in colleges in terms of SUMs[1] (Student Unit of Measurement). There is a threefold difference in the number of delivered SUMs from the smallest to the largest college. The difference in estate size is even more pronounced.

The most popular course groupings are family and personal care, health, construction, engineering and management studies - consistently popular in most colleges. According to local employment prospects specialist subjects dominate in select locations. Course popularly will no doubt change over time, something which is beyond the control of individual colleges and to which the educational estate will need to respond.

Figure 1: Profile of Scotland's 43 colleges

Source: eMandate and SFC Infact database, 2006/7

	No.	%
Location		
Urban	30	70%
Rural	13	30%
Campus		
Single	7	21%
Multiple	27	79%
GIA (m2)		
25,000 or more	8	22%
Between 15,000 - 25,000	15	42%
15,000 or less	13	36%
SUMS		
60,000 or more	11	26%
Between 25,000 - 60,000	21	49%
25,000 or fewer	11	26%

Some breakdowns do not equal 43 due to missing eMandate returns for year 06/07

1 Each Student Unit of Measurement (SUM) measures units of 40 taught student-hours. The number of SUMs delivered falling within each of 18 funding subject groups (also known as dominant programme groups) is then re-weighted according to an SFC assessment of the re-source intensity (weighting) of each group, to produce weighted SUMs (WSUMs). More resource intensive programmes (e.g. engineering) result in greater SFC resourcing than for relatively low-cost programmes (e.g. business studies).

2. Good practice in space management

General space management principles

The fundamental challenge of space management is to ensure that suitable space is available, at the right time, to accommodate the number of people who need to use the space and the right equipment.

In practice, space management is part art, part science. The science depends on hard numerical and spatial evidence, while the art requires juggling different spaces across departments throughout the timetable, altering the timetable, and encouraging multiple use of, and sharing of key spaces.

Both time and space are key variables. If suitable space is not available when requested, then the solution may be either to change the time of the activity, or to expand the available space. Case studies illustrate innovative space management through space sharing and clarity on rules of space 'ownership'.

Much can often be achieved with minimal changes to the built estate. The way space is allocated and timetabled, can yield significant gains in space utilisation without significant cost. Building in flexibility of furniture and equipment is another effective minimal change strategy.

Case study: Space utilisation principles

Clydebank College has developed the following space utilisation principles to maximise space use:

- All space belongs to the college;
- Workspaces should be shared;
- Sharing of space between academic departments should be encouraged;
- Teaching space should be centrally booked where possible.

The college has set a target to increase space utilisation by 2% per year to reach an average of 40% by 2013.

Case study: Joint campus development

Borders College is developing a joint campus with Heriot Watt University which will allow cost-effective delivery of tertiary education in a rural location. Operating costs are expected to reduce and space use to increase. A feasibility study is being carried out to identify the likely impact on costs and space use.

Audit Scotland, 2008, Estate Management in Higher Education

Case study: Annual space sharing

The Peterhead Learning Centre at Banff & Buchan College is leased from Aberdeenshire Council and opens from September to May. During summer months this building is the Peterhead Maritime Heritage Museum.

Space management guidance

Space management guidance for colleges needs to be practical, user-friendly for all stakeholders (college board of governors, management, academics, estate management, SFC centre, architects and consultants), and reflect up to date learning demands. It requires a thorough knowledge of the estate, its size, allocation and use. Systems for recording and updating that information are imperative. At a national level, the eMandate system has encouraged annual reporting of college estate data, using standard definitions, since 2003. This has improved understanding of estate management and benchmarking.

Space allocation and flexibility

Space availability can be increased by either increasing the quantity of space available, or adapting existing space into new uses. An effective means of extending available space is to ensure that most teaching and learning space is allocated centrally, not held within the ownership of a particular faculty or department. Evidence shows that centrally timetabled and managed space is better utilised than departmentally controlled space.

Creating multi-functional space with flexible furniture layouts is another extremely valuable and efficient approach to stretching space availability without stretching the space quantity. This technique is particularly suitable for specialist rooms with subject-specific equipment, such as laboratories or catering spaces. If such rooms are designed with a zone of tables and seating for seminar style learning, then they can be brought into use even when the special laboratory or catering equipment is not required.

Specific features of spaces are important in their popularity. Location is significant as staff often prefer to teach close to their office base, and students frequently gravitate towards space that is highly accessible, near entrances, or attractors such as the cafeteria or library. Well designed rooms, for example those with a view and daylight are usually more popular than those which are dark with little outlook. The way in which rooms are furnished and equipped also affects their utilisation. Ensuring all rooms are attractive and of a high quality, with excellent IT connectivity can help to spread demand across a wide pool of rooms. This can often be achieved through small scale fit-out and furniture projects.

Conducting pilot projects in a selection of rooms to experiment with different concepts and ideas for layout, furniture etc. is also an effective way of exploring new ways of using space without making major changes to the existing estate.

Time and timetabling

Many cultural assumptions underpin the time at which teaching is conducted. Most colleges are open for three terms a year, five days per week, mainly during normal working hours of 9am-5pm. This amounts to available annual teaching hours of 1,440 hours per year. Extending the available hours through more teaching weeks, or more daily hours, would instantly add to available capacity, however such actions demand changing deeply held patterns of expectations of students, and of staff contractual hours.

The process of room timetabling plays a significant role in the achievement of well-utilised spaces. The ability to match individual course requirements for space against availability through the academic year is a fine art and can require significant management resource. Typical issues include:

- Planning starts with estimates of student numbers which are usually higher than actual enrolments;
- Course attendees reduce throughout each term resulting in lower than anticipated utilisation;
- Reliance on people reporting that class sizes have dropped during the year;
- Balancing an aspiration to reallocate space due to changing course numbers against a wish not to move students around unnecessarily;
- The need to balance competing demands for general teaching spaces – particularly when current provision does not match well to class sizes;
- Preference for certain rooms based on the quality or location of the space or available IT set up.

Workspace allocation

Workspace for academic and administrative staff can occupy a significant proportion of the overall college estate. The allocation of space to different groups and individuals can often evolve in a piecemeal fashion, based on what is available at the time.

Adopting targets for the amount of space allocated per person or per desk can be a useful way of assessing how well the available space is being occupied. Reviews of who is located where can help to identify opportunities for better co-location of teams and departments. Often rooms can be reallocated or repurposed with little or no structural work by better matching the room size with the number of people who should occupy it. Rectangular rather than L-shaped workstations and flat screen monitors can also help to improve space efficiency.

Section 8 of this report summarises recommendations on best practice in space management for SFC and colleges.

Case study: Building in flexibility

In 2003 the University of Ulster brought together four disciplines in a new Faculty of the Arts. The Foyle Arts building, a listed building from the early 19th century, was refurbished to provide multifunctional space, with an emphasis on flexibility and shared use.

The music recital room has a sprung floor so that it can be used for dance, and rehearsal rooms can be used by anyone. One existing large room has been equipped with a dividing partition allowing use as two parts.

Staff work in open plan areas, which supports collaboration and efficient use of space. A small amount of new space was added at ground and basement level with foundations which would enable a full height extension if expansion is needed in the future.

The total project cost was £1.4 million for 2,713 m^2 GIA

Case study: Open plan modularity

In 2004, South East Essex College relocated to its new site, having outgrown its earlier facilities. The new building offers flexible spaces which can be arranged around class size. It has a series of 500 m^2, column free, open-plan modules that can be linked and sub-divided in different combinations using moveable partition walls.

IT areas, laboratories, administrative offices and learning pods are open plan to enhance flexibility.. A large atrium accommodates 250-seat auditorium and offers multi-functional space that can be used for performance, conferences, exhibitions and other large-scale events.

Case study: Getting maximum return

At London South Bank University a new Admissions & Recruitment Centre (ARC) was created to provide a focal point for student services in an existing administrative building, at a cost of circa £2 million.

The project brought together related functions (admissions, recruitment, student finance) who were previously housed in separate buildings. The centre includes a reception desk and student information point, open plan workspace for staff and small private rooms for discussions with students.

As part of the refurbishment a new glass entrance was designed and installed, creating a new 'front door' for the university, which is highly visible from the road and nearby tube station. The new entrance includes visuals and graphic displays which help enhance LSBU's ability to publicise themselves.

3. GEMS framework

Overview of the GEMS framework

The Guidance on the Effective Management of Space (GEMS) provides a framework and identifies a series of tools to assist Scotland's colleges develop efficient and effective estates which support the delivery of their strategic objectives.

The framework has been developed based on a detailed review of the existing space management processes used by a sample of Scotland's colleges and the range of methods used to calculate future space requirements used by the Scottish Funding Council, the Learning & Skills Council, individual colleges, consultants and their professional teams.

Key features include:

1. A space management **process map**;
2. **Clear definitions** of all space measurements;
3. Overall **target space norms** for use at a strategic level;
4. A proposed **proportional split of functions** across the estate;
5. Proposed **space standards** for different types of teaching, learning and office space;
6. Realistic **utilisation targets** for teaching and learning spaces;
7. **GEMS calculators for calculating space requirements** based on on-site student activity and utilisation of existing space;
8. Recommended **performance indicators** for monitoring space use over time;
9. Overview of relevant **space management tools.**

These are described in more detail in subsequent sections of this report.

A set of simple spreadsheets have also been developed to support colleges in calculating the overall size of their estate based upon the volume of students and curriculum profile. These are described in more detail in Section 6.

When is guidance needed?

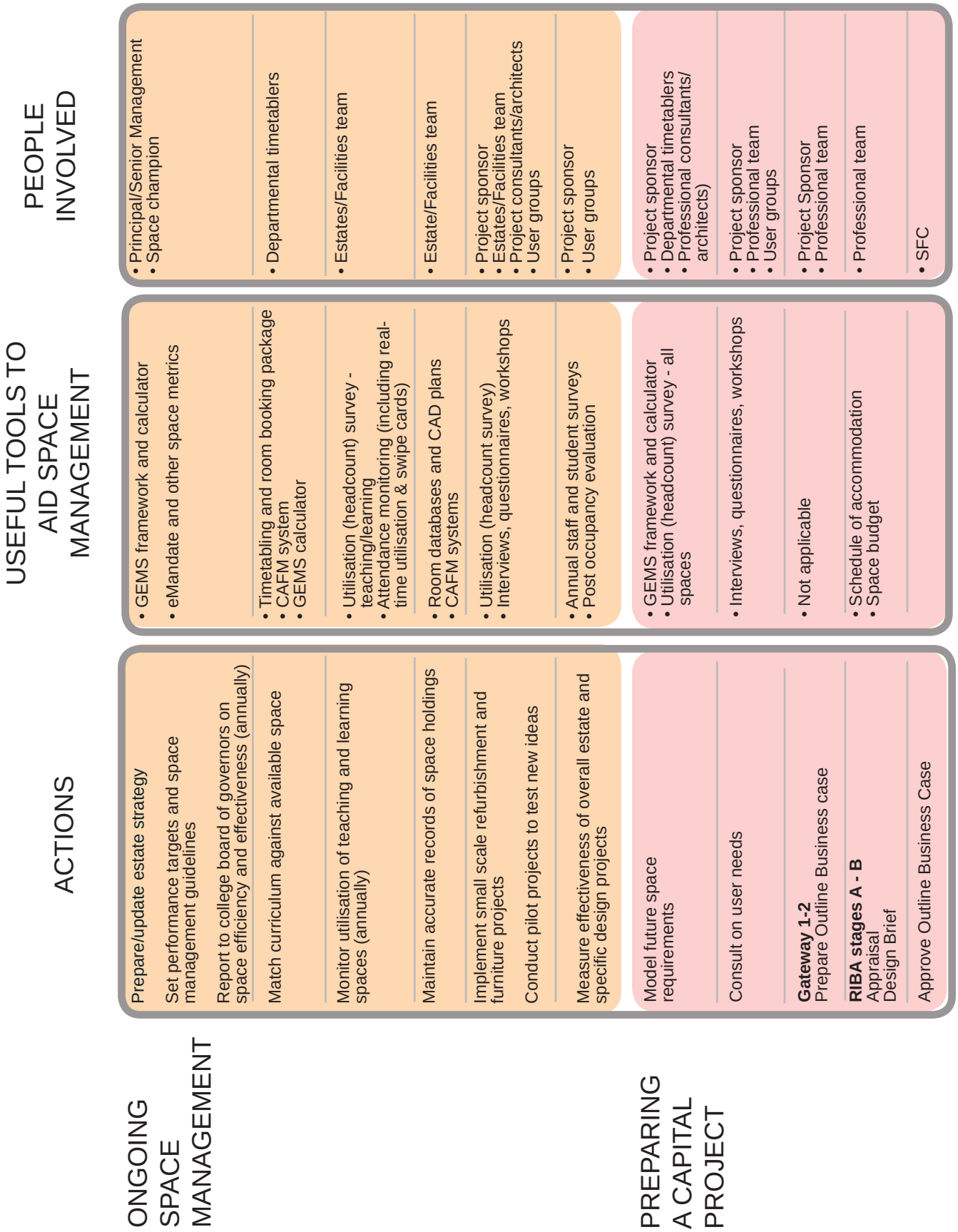
The guidance in this document is conceived for use by colleges when managing existing estates, and in the process of creating new space - both small scale refurbishment projects in existing buildings and large scale capital programmes. The process map overleaf summarises the key stages and uses of the different guidance and tools.

The guidance is helpful in considering all or part of an estate. For example it can be used to find out how much space might be needed for one department undergoing change through either growth or decline in student numbers and course offerings. It can also be used to estimate how much further capacity can be accommodated without constructing additional floorspace. Alternatively it might be used to determine the extent of the mismatch between the type of space needed and space now available or at Outline Business Case to estimate the size of a whole new campus. An especially important feature is that the space calculator can be used to model the effect on space needs of changes in numbers of staff and students, or in methods of academic delivery.

The different people who play a role in actively managing space are identified in the process map.

Figure 2. Space management process map

The diagram below outlines the key actions, tools and actors involved in effective space management



4. Space Definitions, Norms and Standards

Understanding the way in which space across the college estate is being used is a fundamental aspect of good space management.

Numerical analysis of the amount of space allocated to different functions can help build a clear profile of **supply.** This can then be compared against predictions of **future demand** (based for example on changes in student numbers or curriculum profile) to identify where changes may be needed.

The value of this process depends on maintaining accurately measured and up-to-date information on the estate.

All colleges should aim to have a **room database** which includes the measured area of every single space on campus, classified by function. An example structure is provided in Appendix 6.

The room database should be supported by a set of accurate annotated floor-plans, updated each time there is a significant design intervention and otherwise on an annual basis. Larger colleges may wish to invest in a Computer Aided Facility Management (CAFM) system to support this process. These tools are described in more detail in section 7.

Space definitions

As outlined in the *Estate Strategy Guidance (2007)* colleges should know the overall size of their built estate, measured on a Gross Internal Area (GIA) basis. This is the total area of each building measured to the internal face of the perimeter walls. Professional help may be required to develop this baseline.

To support more sophisticated analysis of space requirements colleges should ideally determine the amount of space available for different functions. Gross Internal Area can be broken down as follows:

- **Teaching:** usable space dedicated to classrooms, workshops and associated storage;
- **Learning:** usable space dedicated to self-directed and peer-to-peer learning;
- **Other usable spaces:** all other usable space including staff workspace, cafeterias, reception, general storage etc.;
- **Circulation:** primary horizontal circulation (corridors and routes to fire escape);
- **Core:** 'non-usable' space including vertical circulation, WCs, plant, and internal structures.

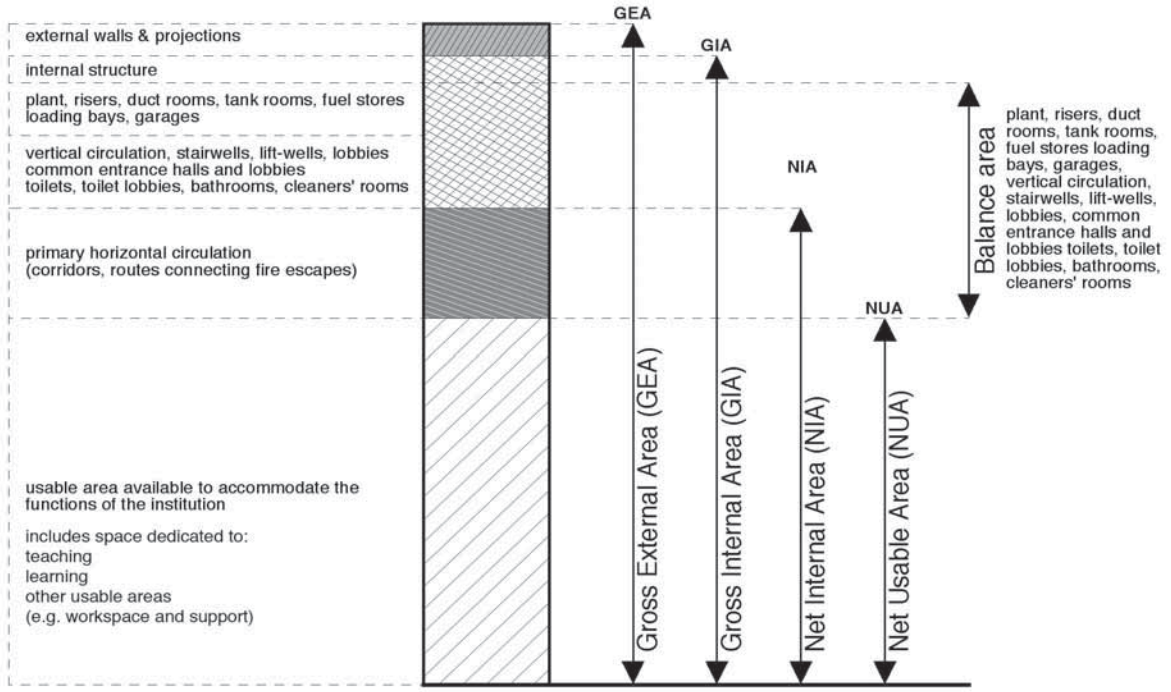


Figure 3: Relationship of area definitions

Source: AMA derived from 'RICS Code of Measuring Practice: A guide for Surveyors and Valuers 5th edition' and eMandate data definitions

Other useful definitions include:

- **Gross External Area (GEA):** Total estate measured to the external perimeter walls (used for planning applications).
- **Gross Internal Area (GIA):** Teaching + Learning + Other spaces + Circulation + Core
- **Net Internal Area (NIA):** Teaching + Learning + Other spaces + Circulation
- **Net Usable Area (NUA):** Teaching + Learning + Other spaces. This is also known as "room area".

Clarity over area definitions is a common problem. Figure 3 clarifies what is meant by the various definitions that are used to describe space. If figures are used for modelling or planning purposes it is important the definition is stated so it is clear which figures are being used. When calculating areas or compiling/updating a space database refer to detailed guidelines on the RICS and eMandate websites.

Efficiency and effectiveness

Space efficient buildings have the minimum space necessary:

- to accommodate the desired functions with minimum 'waste' between net usable and gross internal area (NUA:GIA);
- to accommodate effective teaching and learning per unit of student activity (SUM);

Space efficiency needs to be balanced against its effectiveness. As outlined in *Spaces for Learning (2006)* new modes of teaching and learning can require more space per student in some rooms.

Offsetting these demands may mean that even greater space efficiencies must be sought in other areas of the college.

Space Norm

A space norm is defined as an allowance of space, expressed in square metres, which is multiplied by the number of students (or an equivalent measure of activity) to generate an overall space requirement. It is primarily used to take a high-level (strategic) view on whether the current estate is over- or under-sized.

For a number of years SFC has set a target space norm of three WSUMs per m^2 GIA across a college. A WSUM is an SFC unit of measurement equal to 40 student hours, which is subsequently weighted by subject group based on the cost of course delivery to determine funding allocations.

Target space norms

The following targets are proposed based on analysis of the Scottish college estate:

		eMandate (06/07)	
per m^2 GIA	**Target**	**Mean**	**Upper quartile**
daytime SUMs	2.3 - 2.5	2.0	2.5
SUMs	2.8 - 3.0	2.3	2.9
WSUMs	3.0 - 3.5	2.6	3.2

The target of three WSUMs per m^2 GIA is an average across a college and it should be noted that some space hungry activities (e.g. engineering) will accommodate less WSUMs per m^2 GIA and less space hungry courses (e.g. humanities, computing) will accommodate more.

Statistical analysis of recent eMandate returns found the space norm of three WSUMs per m^2 GIA to be a reasonable guideline although the mean was 2.6. However, since WSUMs include a weighting to reflect funding requirements and also include courses for which no on-site tuition is required, (approximately 15% of the total), a more accurate measure of student activity for the assessment of space requirements is total **annual daytime SUMs,** where:

1 daytime SUM = 40 student hours of tuition on a full, part-time or block release course (9am - 5pm, Mon - Fri)

To determine the total annual daytime SUMs colleges should calculate the total number of SUMs reported in their latest FES return for course codes (05-08, 17-18).

A target range for three space norms have been proposed (see box above) based on the upper quartile achieved in the most recently published eMandate return and an analysis of space use in ten of Scotland's colleges. Colleges can use any of the three norms, but are advised that the daytime SUMs norm is the most accurate of the three. The targets are not mandatory, but rather have been devised to assist colleges take a strategic view on the **spatial efficiency** of their current estate and the impact of any proposed changes.

Many factors will influence the achievability of these targets including the size of the college, the profile of course delivery and the college income.

Functional split

An approximate split of functions of gross internal area (GIA) is given below:

Teaching/Learning	50%
Other spaces	20%
Horizontal Circulation	18%
Core	12%

The proportions are based on an analysis of current and proposed allocation of space in ten colleges currently progressing through the capital grant programme. Similar research conducted on behalf of the Learning & Skills Council on recently built colleges in England shows similar figures[2]. It should be noted that the percentage allocation for circulation is only the normal routes for movement within buildings. Space for social learning and atria, may be integrated with the circulation routes but would be measured separately as part of teaching/learning or other space.

The functional splits are a guide only and may well vary across colleges. In older buildings it is likely that these proportions are harder to achieve.

Research has shown that the proportion of space dedicated to learning has increased over time. Where colleges choose to provide more space to support on-site learning it is anticipated that this will lead to a consequential reduction in the amount of space dedicated to teaching.

Space Standards

A space standard is an average allowance of usable area per workplace within a room or cluster of rooms. It includes all equipment and local circulation within the rooms.

With the emergence of more multifunctional and flexible environments for learning, it has been proposed by some that the value of space standards is diminishing. However the process of designing new environments or assessing existing environments involves, at some stage, breaking it down into a series of component spaces to which an area can be applied (e.g. a space schedule or space budget). Space standards provide one way of checking that an adequate amount of space has been provided for the maximum number of planned occupants and can be adjusted to allow for flexible use of spaces (usually by providing more space per workplace).

Space standards are typically developed for different space types and can be a useful guide for colleges to assess their current allocation of space or for use when developing a space budget for future requirements.

Space standards for teaching, learning and typical office areas are included on the following pages. Standards for teaching spaces have been adapted from the Learning & Skills Council's '*Guidance for Further Education Colleges on the Management of Floorspace (May 2007*)' based on feedback from Scotland's colleges.

Based on responses to a questionnaire circulated to all Scotland's colleges as part of this project the following changes have been made to LSC's areas:

- Inclusion of a new space standard for flexible lecture theatres to support group work and new learning modes;
- More generous provision for general teaching rooms to allow for inclusion of demonstration facilities and sufficient space for wheelchair users;
- Reduced space standard for large scale vocational spaces including catering and beauty salons;
- Inclusion of sports facilities as an extra large vocational space;
- Inclusion of space standards for a range of learning spaces.

The proposed space standards are a guide that can be tailored by colleges to reflect their approach to space allocation. This may include identifying spaces that work best in the college and assessing the amount of space per workplace that has been provided.

Adopted space standards should be clearly communicated across the college. Some benefits of doing so include:

- Providing a basis for judging if department/faculty space is sufficient;
- Ability to identify where there is a poor fit between room sizes and workplace capacity;
- A transparent and fair basis for resolving disputes about space.

It is recommended that colleges and the SFC monitor and review space standards over time, informed by changes in the delivery of teaching, and the approach to learning and working practices.

Examples of spaces are shown in the photographs overleaf.

2 Bond Bryan LLP, 2006, LSC Space Utilisation Study.

Figure 5. Recommended space standards for Scotland's colleges

	SPACE TYPE	SPACE STANDARD (m^2 NUA per workplace)	TYPICAL COURSES
A	**Flexible Use Teaching**		
A1	Lecture Theatre (standard)	1.0	*All*
A2	Lecture Theatre (flexible)	3.0	*All*
A3	Classroom with demonstration facilities	2.5	*All*
B	**Small Scale Vocational** Science/Technology Labs IT Workshops Desk based visual arts Music/Media Labs	3.2	*Art & Design* *Computing* *Information Technology* *Languages* *Printing* *Science & Maths*
C	**Medium Scale Vocational** Bench-based workshops Large scale visual arts (e.g. art studio) Hair Salons	5.0	*Art & Design* *Construction* *Healthcare* *Minerals & Materials*
D	**Large Scale Vocational** Catering Performance Independent Living Beauty Salons Business (simulated)	6.0	*Business & Management* *Food Technology & Catering* *Office & Secretarial* *Performing Arts*
E	**Extra Large Vocational** Installation Trades Motor Vehicles Engineering Brickwork/Masonry/Plaster Sports	7.5	*Construction* *Engineering* *Minerals & Materials* *Sport & Recreation* *Transport*
F	**Learning spaces**	**3.0**	
F1	Library/Learning Resource Centre	3.5	
F2	Open access computing	2.7	
F3	Internet Cafe/Short stay terminals	1.0	
G	**Office spaces**		
G1	Solo office (with meeting facilities)	12.0	
G2	Solo office	10.0	
G3	Desk in shared office	6.0	
G4	Open plan desk	6.0	
G5	Pooled desk (unallocated)	4.0	
G6	Technician workplace	6.0	

Flexible Use Teaching Spaces (space standard 1.0 - 3.0m^2 NUA/workplace)

Standard Lecture Theatre
Dundee College (photo: AMA)

Flexible Lecture Theatre
University of Strathclyde (photo: AMA)

Classroom with demonstration facilities
Aberdeen College (photo: AMA)

Classroom with demonstration facilities
Massachusetts Institute of Technology
(image: Mark Bessette of the Center for Educational Computing initiatives)

Small Scale Vocational spaces (space standard 3.2m^2 NUA/workplace)

Science Laboratory
Aberdeen College (photo: AMA)

IT Workshop
Banff & Buchan College (photo: AMA)

Medium Scale Vocational spaces (space standard 5.0m^2 NUA/workplace)

Bench-based workshop
Forth Valley College (photo: AMA)

Hair Salon
Banff & Buchan College (photo: AMA)

Large Scale Vocational spaces (space standard 6.0m^2 NUA/workplace)

Catering production kitchen
South Lanarkshire College (photo: AMA)

Performance Space
Dundee College (photo: AMA)

Beauty Salon
Clydebank College (photo: AMA)

Independent Living Kitchen
John Wheatley College (photo: AMA)

Extra Large Vocational spaces (space standard 7.5m^2 NUA/workplace)

Bricklaying workshop
Banff & Buchan College (photo: AMA)

Plumbing workshop
Forth Valley College (photo: AMA)

Engineering workshop
Dundee College (photo: AMA)

Motor Vehicle workshop
Dundee College (photo: AMA)

Welding workshop
Dundee College (photo: AMA)

Sports Gymnasium
Forth Valley College (photo: AMA)

Learning spaces (space standard 1.0 - 3.5m^2 NUA/workplace)

Library
Dundee College (photo: AMA)

Learning Resource Centre
Banff & Buchan College (photo: AMA)

Short-stay IT terminals
South Lanarkshire College (photo: AMA)

Wifi cafeteria
University of Wolverhampton (photo: AMA)

5. Space Utilisation

Why measure space utilisation?

Space utilisation in educational environments can be defined as a measure of how rooms and spaces are being used in terms of how and when they are in use and how many people are in them.

It is typically measured by conducting utilisation (headcount) surveys which record the numbers of people observed in different locations.

The measurement of actual space use over time provides evidence on the amount and type of space required to support the college curriculum and associated activities.

While the conduct of a utilisation survey requires an initial cost outlay (in terms of time to collect and analyse the data) it will often be recouped through space savings that are identified or the creation of better balanced space.

Key benefits of conducting utilisation surveys include:

- Data to help match space needs and current provision – identifying overbooking, spare capacity and unsatisfied demand;
- Providing a basis for allocating space when planning new buildings or reconfiguring space;
- Informing changes to the timetabling of spaces and length of teaching day/week;
- Tracking changes over time.

Definitions

- *Utilisation* – a measure of how rooms and spaces are being used – both how often (frequency) and how many people are using them (occupancy)
- *Planned utilisation* – assessment based on timetabling information;
- *Actual utilisation* – assessment based on observations of space in use;

Which spaces should be included?

Traditionally measurement of space utilisation in the education sector has focused on teaching spaces:

- lecture theatres
- general classrooms
- specialist classrooms
- other vocational teaching spaces

The standard utilisation calculation is:

$$\frac{\%\ \text{frequency} \times \%\ \text{occupancy}}{100} = \text{utilisation}$$

Where **frequency** is the number of hours a room is in use as a proportion of the timetabled week and **occupancy** is the average group size as a proportion of the total capacity for the hours the room is in use.

As a minimum all these spaces should be included in the utilisation survey, whether timetabled centrally or by each department or faculty.

It is recommended that surveys also include spaces dedicated to learning including (but not restricted to):

- Libraries
- Learning Resource Centres
- General access IT rooms
- Small IT clusters/touchdown terminals and internet cafes.

Colleges may periodically extend utilisation surveys to inform decisions about space allocation in administrative and support areas including:

- Workspaces (offices, desks)
- Informal seating/break areas
- Meeting rooms
- Print/Copy areas
- Reception/Waiting areas.

A suggested frequency for the conduct of utilisation surveys is given below:

Annually	Teaching & Learning
Every 3 yrs	All spaces
Major capital project	All spaces

Spot checks on the most heavily used types of rooms in the first few weeks of each term are a useful tool to identify areas which can be reallocated to alleviate immediate pressure on space.

GEMS targets for utilisation

Evidence on the actual utilisation in colleges and other educational settings has shown that very careful planning is required to achieve well utilised spaces. Annual eMandate returns have averaged 32-34% utilisation for teaching rooms over the past few years. Concerns about the reliability of this data have been noted due to difficulties in data collection . Data from the higher education sector show universities in the upper quartile are achieving 36% utilisation or higher, with a 12% increase in utilisation across the sector since 2001.

Based on a view that further gains in utilisation can be made across the sector the following targets are proposed for teaching and learning spaces:

	Frequency	Occupancy	Utilisation
Planned	70%	80%	56%
Actual	65%	60%	40%

The actual utilisation target factors in an average absence rate of 30% (including both drop out rates and daily absence). Thus for example if calculations of space requirement are based on a planned utilisation target of 56% it is likely that the actual observed utilisation rate will be closer to 40%.

To achieve these targets requires careful matching of group sizes to available rooms during the timetabling process. Colleges need to consider trends in group sizes over time and the extent to which the capacities of rooms can be flexed over time. Equally however, the planning of teaching activities should not be divorced from the capabilities of the available estate.

Ensuring all rooms are functionally suitable, with consistently good IT and flexibility for a range of purposes (e.g. blackout, audio-visual capability, etc.) can help spread demand across the available space. Use of technology, for example, to link teaching activities across rooms can also help to increase utilisation without making structural changes to accommodate changing group sizes.

Methodology

It is important to time a utilisation survey to coincide with periods of greatest demand. This is to ensure that decisions made on that basis provide sufficient space for peak space requirements. This is typically the second or third week of the autumn term.

A detailed methodology for the conduct of utilisation (headcount) surveys is included in the *Estates Strategy Guidance (2007).* Key points are summarised below.

An example data collection form is included Appendix 6.

Conducting a utilisation survey:

- Five day survey over busiest week (typically October)
- Include all teaching and learning space (including faculty timetabled spaces)
- One trained surveyor per 30-40 spaces
- Hourly observations (8 per day from 9am – 5pm)
- Count number of people in each space (excluding tutors)
- Record capacity of each room (no. workplaces)

Scottish Funding Council, 2007, Estate Strategy Guidance

Case study: Live Meeting

At Imperial College one department has been trialling the use of Microsoft Live Meeting in an academic setting. The system uses a simple interface to enable streaming of a lecture in one room to an overflow room.

During the lecture a mixture of audio, slide sharing and desktop sharing is used to transmit the lecturer's voice and content to the overflow room. Students in the lecture theatre see a normal presentation; in the overflow room they see the images on a large screen accompanied by the lecturer's voice. Technology has also been put in place to transmit drawings on an electronic whiteboard to a second screen in the overflow room.

The pilot has been very successful, a key feature being the simplicity of the system which requires little training.

The College is now planning to roll out the technology more widely and implement greater interaction between the main and overflow rooms using additional features available with the system.

6. The GEMS calculator and its application

The GEMS calculation system is made up of three calculators. Each calculator is designed to help colleges derive target space requirements at different levels of detail:

TOP-DOWN CALCULATORS:

- **Quick calculator (Worksheet 1):** for taking strategic decisions on total GIA required based on SUMs and daytime SUMs;
- **Curriculum-based (Worksheet 2):** for a fine-grain analysis based on a breakdown of daytime SUMs by curriculum area;

Both calculators work by calculating the minimum number of workplaces that would be required for teaching purposes if they were 100% utilised during the teaching year. A target utilisation is then applied to determine the actual number of required workplaces.

BOTTOM-UP CALCULATOR:

- **Utilisation based (Worksheet 3):** for an assessment of required area for and distribution of teaching and learning spaces based on current utilisation.

In addition the spreadsheet contains:

- **Summary dashboard (Worksheet 4):** which shows key metrics and enables comparisons between results from the three calculators

Each calculator contains default variables for key metrics which can be adapted, enabling a high degree of flexibility to model different scenarios including:

	Default in model
Number of available taught hours per year	1,440
Proportion of on-site teaching/learning	86%
Number of self-directed learning hours per week (per SUM)	4
Target planned utilisation	56%
Target actual utilisation	40%
Average space standard for all teaching spaces	3.4
Average space standard for all learning spaces	3.0

A key feature of the calculator is the inclusion of self-directed learning hours as a means of calculating requirements for learning spaces.

Examples of each calculator are shown overleaf.

In each calculator gross internal area depends on:

QUICK CALCULATOR (Worksheet 1)

- No. onsite **daytime SUMs**
- No. onsite **self directed learning hours** per SUM
- **Planned utilisation** for teaching and learning space
- **Average space standard** for all teaching spaces and learning spaces.

CURRICULUM CALCULATOR (Worksheet 2)

- No. onsite **daytime SUMs by dominant programme group**
- No. onsite **self directed learning hours** per SUM
- Linking **daytime SUMs by dominant programme group** to percent of time taught in each space category
- **Planned utilisation** for each space category
- **Average space standard** for each space category.

UTILISATION CALCULATOR (Worksheet 3)

- No. onsite **daytime SUMs**
- **Existing quantities of, and area allocated** to, all teaching and learning spaces
- **Known utilisation** of existing teaching and learning spaces (based on headcount survey)
- **Target actual utilisation** for each space category
- **Existing areas** allocated to other spaces including offices, specialist and support areas, circulation and core.

1. Quick Calculator

1. Summary information

College Name
Date completed
Version

Teaching profile

Teaching weeks per year	36
Taught hours per week	40
Teaching hours per year	1,440

Student profile

Year	2009-10
Total SUMs	50,000
% daytime SUMs	86%
Total daytime SUMs	43,000

2. Teaching Space Requirements (Net Usable Area)

Minimum No. Workplaces	1,194
Target Utilisation	56%
Required No. of Workplaces	2,133
Average space per workplace	3.4
TEACHING SPACE (m²)	7,252

3. Learning space requirements (Net Usable Area)

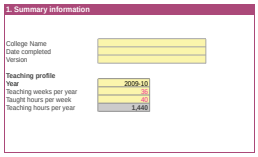
On-site self-directed learning hrs per SUM	4
Total annual hours	200,000
Minimum No. Workplaces	139
Target Utilisation	56%
Required No. of Workplaces	248
Average space per workplace	3.0
LEARNING SPACE (m²)	744

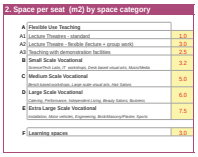
4. Total required area (Gross Internal Area)

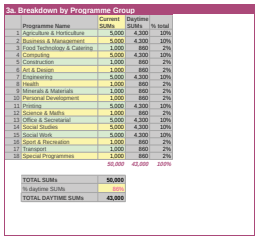
	% GIA	GIA target
Teaching space	50%	7,252
Learning space		744
Other areas	20%	3,198
Circulation	18%	2,879
Core	12%	1,919
TOTAL	100%	15,992
Daytime SUMs per m2 GIA		2.7
SUMs per m2 GIA		3.1

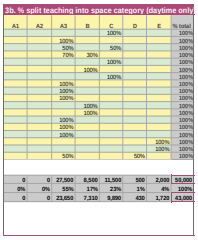
Spreadsheet developed by AMA Alexi Marmot Associates © 2009

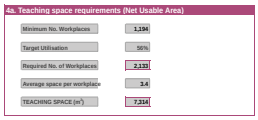
2. Curriculum Calculator

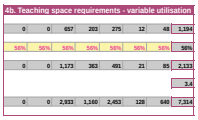


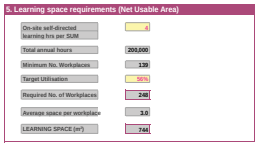


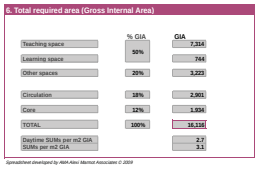












Spreadsheet developed by AMA Alexi Marmot Associates © 2009

3. Utilisation Calculator

1. Summary Information

College Name
Date completed
Version

Teaching profile

Teaching weeks per year	36
Taught hours per week	40
Teaching hours per year	1,440

Student profile

Year	2009-10
Total SUMs	50,000
% daytime SUMs	86%
Total daytime SUMs	43,000

Space category	Area per workplace	No. rooms	No. of workplaces	Area (m²)
Teaching requirements - summary				
A Flexible Use Teaching				
1 Lecture Theatre - standard	1.0	4	200	200
2 Lecture Theatre - flexible	3.0	0	0	0
3 Teaching with demonstration facilities	2.7	18	324	875
B Small Scale Vocational				
1 Science & Technology Labs	3.2	5	90	288
2 Electronics/Computer workshops	3.2	5	90	288
3 Desk based visual arts	3.2	9	90	288
4 Music/Media	3.2	9	90	288
C Medium Scale Vocational				
1 Bench based workshops	5.0	5	50	250
2 Large scale visual arts	5.0	5	50	250
3 Hair salons	5.0	5	50	250
D Large scale vocational				
1 Catering	6.0	5	60	360
2 Performance	6.0	2	20	120
3 Independent Living	6.0	6	60	360
4 Beauty Salons	6.0	5	50	300
5 Business	6.0	2	20	120
E Extra Large Vocational				
6 Installation Trades	7.5	2	20	150
7 Motor Vehicles	7.5	2	20	150
8 Engineering	7.5	2	20	150
9 Brickwork/Masonry/Plaster	7.5	2	20	150
10 Sports	7.5	1	50	375
	3.8	94	1374	5,212

No of rooms	Total capacity	Total Area (m²)	Area per workplace	Room Utilisation (frequency)	Workplace Utilisation (capacity)	Overall utilisation (frequency x capacity)
2a. Teaching - Current space						
2	200	200	1.0	73%	35%	26%
		0	#DIV/0!			0%
20	360	972	2.7	73%	35%	26%
5	90	288	3.2	73%	35%	26%
5	90	288	3.2	73%	35%	26%
10	100	320	3.2	73%	35%	26%
10	100	320	3.2	73%	35%	26%
5	50	250	5.0	73%	35%	26%
5	50	250	5.0	73%	35%	26%
5	50	250	5.0	73%	35%	26%
5	60	360	6.0	73%	35%	26%
2	20	120	6.0	73%	35%	26%
8	80	480	6.0	73%	35%	26%
5	50	300	6.0	73%	35%	26%
2	20	120	6.0	73%	35%	26%
2	20	150	7.5	73%	35%	26%
2	20	150	7.5	73%	35%	26%
2	20	150	7.5	73%	35%	26%
2	20	150	7.5	73%	35%	26%
1	50	375	7.5	73%	35%	26%
98	1,450	5,493	3.8	73%	35%	26%

Expected overall utilisation	Total workplaces (automated)	Total workplaces (adjust)	Room capacity	No of rooms (rounded)	Total workplaces required	Area per workplace	Total area (m2)	% change
2b. Teaching - Future requirements								
40%	128	184	50	4	200	1.0	200	0%
40%	0	0	50	0	0	3.0	0	#DIV/0!
40%	230	330	18	18	324	2.7	875	-10%
40%	57	83	18	5	90	3.2	288	0%
40%	57	83	18	5	90	3.2	288	0%
40%	64	92	10	9	90	3.2	288	-10%
40%	64	92	10	9	90	3.2	288	-10%
40%	32	46	10	5	50	5.0	250	0%
40%	32	46	10	5	50	5.0	250	0%
40%	32	46	10	5	50	5.0	250	0%
40%	38	55	12	5	60	6.0	360	0%
40%	13	15	10	2	20	6.0	120	0%
40%	51	58	10	6	60	6.0	360	-25%
40%	32	46	10	5	50	6.0	300	0%
40%	13	18	10	2	20	6.0	120	0%
40%	13	18	10	2	20	7.5	150	0%
40%	13	18	10	2	20	7.5	150	0%
40%	13	18	10	2	20	7.5	150	0%
40%	13	18	10	2	20	7.5	150	0%
40%	32	46	50	1	50	7.5	375	0%
40%	927	1,312		94	1,374	3.8	5,212	-5%

Learning requirements - summary							
F Self-directed learning							
1 Library/LRC	3.5	1	10	35			
2 Open access computing	2.7	1	10	27			
3 Internet Café/Short stay terminals	1.0	1	10	10			
4 (blank)	3.0	1	10	30			
5 (blank)	3.0	1	10	30			
6 (blank)	3.0	1	10	30			
7 (blank)	3.0	1	10	30			
	2.7	7	70	192			
3a. Learning - Current space							
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
1	10	100	10.0	70%	45%	32%	
7	70	700	10.0	70%	45%	32%	

3b. Learning - Future requirements							
40%	8	11	10	1	10	3.5	35	-65%
40%	8	11	10	1	10	2.7	27	-73%
40%	8	11	10	1	10	1.0	10	-90%
40%	8	11	10	1	10	3.0	30	-70%
40%	8	11	10	1	10	3.0	30	-70%
40%	8	11	10	1	10	3.0	30	-70%
40%	8	11	10	1	10	3.0	30	-70%
40%	56	77		7	70	2.7	192	-73%

Other spaces - summary				
G Staff workspace (incl. personal storage)				
1 Solo office (with meeting facilities)	12	15	15	180
2 Solo office	10	20	20	200
3 Desk in shared office	6	10	40	240
4 Open plan desk	6	0	60	360
5 Pooled desk (unallocated)	4	0	40	160
6 Technician workplace	6	0	40	240
7 (blank)	0	0	0	0
8 (blank)	0	0	0	0
9 (blank)	0	0	0	0
H Support spaces				
7 Meeting rooms	16	3	25	400
8 Group storage	#DIV/0!	0	0	0
9 Print/Copy/Stationery	#DIV/0!	0	0	0
10 (blank)	#DIV/0!	0	0	0
11 (blank)	#DIV/0!	0	0	0
12 (blank)	#DIV/0!	0	0	0
13 (blank)	#DIV/0!	0	0	0
I Specialist spaces				
14 Reception/Information/Admissions	#DIV/0!	0	0	0
15 Cafeteria, Kitchen, Stores etc	#DIV/0!	0	0	0
16 Sports facilities	#DIV/0!	0	0	0

4a. Other spaces - Current space			
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

4b. Other spaces - Future requirements				
15	15	12.0	180	
20	20	10.0	200	
10	40	6.0	240	
	60	6.0	360	
	40	4.0	160	
	40	6.0	240	
			0	
			0	
3	25	16	400	
		#DIV/0!		
		#DIV/0!		
		#DIV/0!		
		#DIV/0!		
		#DIV/0!		
		#DIV/0!		

7. Other space management tools

Colleges have a variety of additional tools to use in managing their space. The main ones are detailed below:

Room databases

A database of information about buildings, rooms and spaces, which comprise the college estate, provides essential information which forms the backbone of good space management.

The database should provide an inventory of each room or space, including a unique ID, the measured net usable area, workplace capacity, ownership, and type (according to a standard nomenclature). Each space should also be tagged with its geographical location (e.g. campus, building, floor). Colleges may wish to begin by listing all rooms to provide an overall net usable area for the estate. The database can be expanded later to include circulation and core to provide a comprehensive view of the overall net internal and gross internal area of the estate.

To support ongoing analysis of the efficiency and effectiveness of the estate the database should be linked to information on space utilisation (from headcount surveys) and any post occupancy evaluation studies which provide evidence on users reactions to the space.

Depending on the size of the college the 'database' may be prepared on software ranging from a simple spreadsheet to more sophisticated proprietary database.

The database should in all cases be supported by an up-to-date and annotated set of electronic floorplans (e.g. AutoCAD or Vectorworks), which shows the unique room/space ID. When building changes are made the database should be updated accordingly.

CAFM systems

Computer Aided Facility Management (CAFM) supports an integrated approach to facilities management. CAFM systems are specialist software which provide a link between computer-based databases and CAD systems (usually autoCAD). They can be either desk-top or web-based.

Typically, CAFM systems track and maintain information including: floorplans; building and property information; space characteristics and usage; employee and occupancy data; and workplace assets (furniture and equipment).

Many systems also provide additional modules for room booking, space planning, cost and people management. Some are linked to maintenance requests and works orders. Systems usually include standardised reporting functions to enable an institution to monitor space use over time.

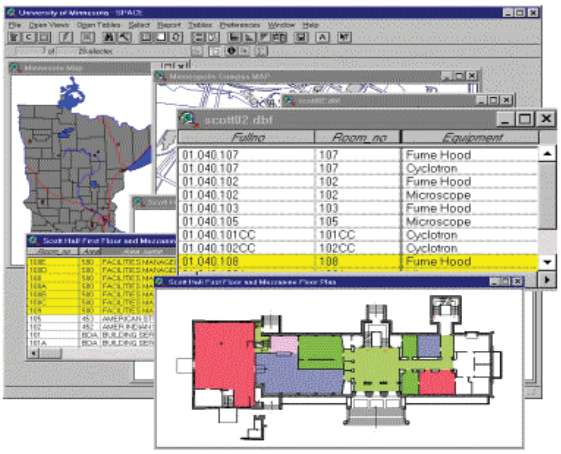


Fig 6: Example CAFM system

Electronic timetabling and room booking

Many colleges are using electronic timetabling systems to manage space allocation across the academic year.

A range of systems on the market provide the ability to link to student records and attendance registration systems enabling real time monitoring of utilisation. Most of these operate with a viewer, allowing the timetabler full access and other staff (and sometimes students) partial (usually web based) access for ad hoc room booking. Some systems provide a web-based wireless display panel outside key teaching and meeting rooms which indicate booking status and allow users to make on-the-spot bookings.

Real time utilisation

Some colleges have also trialled the introduction of access controlled swipe cards which control access to specific teaching rooms. Data can be used to provide real-time data on the number of seats occupied in each room.

Case study: Electronic registration

At Forth Valley College the central timetable is linked to attendance and assessment register production. Therefore all rooms are booked onto a central timetable with class times, staff and subjects.

The college also includes information about what furniture and technology is included in the room to assist the booking process.

Case study: Swipe cards

South Lanarkshire College has introduced identity access cards for staff and students as part of the installation of a new identify management system.

The cards provide access to the new campus building, its car parks and classrooms enabling the college to take attendance records as students access their classrooms.

The cards also provide access to library services and remote access to the college virtual learning environment.

Space Charging

Space charging has developed some credibility in both the higher education and office sectors. The basic premise is that space that is 'free' is less likely to be effectively managed than space with a cost attached. Space charging is considered to provide an incentive for users to actively manage their space and release unneeded space. Bringing finance into the equation can help to bring the cost of space into focus and, if implemented properly, space charging to can help departments release real savings which can be fed back to course delivery.

Few colleges currently employ space charging. Should a college wish to introduce such a system, key requirements are listed below:

- A reasonably accurate record of all space holdings which is capable of being regularly updated and which identifies an area, use or function and occupier;
- A clear, transparent and agreed system for apportioning costs;
- Agreement amongst faculties or departments on which spaces they occupy and will pay for;
- Appropriate resources to deal with the administration and maintenance of the system;
- Commitment from senior management to resolve disputes over space or the charges.

Case study: Space Charging

Space charging has been in operation at Sheffield Hallam since the late 1990's and is a key space management tool for the university.

Departments are charged for the space they occupy plus an apportioned cost for central facilities. Space costs form part of annual business plan discussions and projected space costs are built into business cases for new initiatives to determine their financial viability,

Data from Estate Management Statistics (EMS) show that the university is in the lower quartile for space per student and top quartile for room utilisation and income per square metre. A space modelling exercise has shown that the university operates in substantially less space than might otherwise be predicted.

eMandate and performance indicators

Since 2005 the UK college sector has been gathering data on its performance across a range of metrics as part of the eMandate programme. Colleges should set their own targets for key performance metrics and monitor their performance against the annual sector mean and upper quartile scores. eMandate provides a reporting tool which is available for all colleges to use.

Performance against key metrics should be reported to senior management on a regular basis. The table below shows a selection of metrics, including several from eMandate, which can be used to provide a high level indication of the performance of the estate, or individual buildings, in terms of efficiency, cost, utilisation and sustainability.

The future

Future space management tools are likely to include cheaper web based versions of existing proprietary software; more tools for remote monitoring and sensing of space use e.g. occupancy senors in light fittings or seats sending data for central reporting.

Performance Metrics

	Topic
Current eMandate metrics	
Net: Gross space ratio	Efficiency
Total NIA per SUM	Efficiency
Combined office space per staff FTE	Efficiency
Total property costs per m2 GIA	Cost
Total property costs per SUM	Cost
Total energy consumption per m2 GIA	Sustainability
Frequency Rate (teaching)	Utilisation
Occupancy Rate (teaching)	Utilisation
Utilisation Rate (teaching)	Utilisation
Other metrics	
daytime SUMs per m2 GIA	Efficiency
SUMs per m2 GIA	Efficiency
WSUMs per m2 GIA	Efficiency
Learning space utilisation	Utilisation
Office space utilisation	Utilisation

8. Recommendations for the future

The guidance in this document needs to be deployed by colleges, tested and revised periodically.

It is recommended that SFC should:

- commission detailed ergonomic studies of how space standards are changing with emerging technologies;
- make periodic changes to the guidance once every five to ten years, in response to changed educational and IT demands, and newly available space management tools;
- create a section of the SFC website on Space Management, containing this guidance document, the space calculator, other helpful publications and tools;
- establish an electronic help desk request system to respond to queries;
- hold training sessions in the use of the space management tools from time to time for the benefit of college managers, project sponsors and their advisers.

It is recommended that colleges should:

A. for ongoing space management of the existing estate:

- establish a Space Management Advisory group (possible in association with Scotland's Colleges) that meets annually to share best practice and consider feedback from colleges;
- appoint a Space Champion on the Board or senior management committee;
- establish a Space Management Committee that meets periodically to adjust space allocation;
- set targets and monitor their attainment;
- consider linking with local colleges and universities to share good practice in estate management;
- link policies on Learning and Sustainability with Estate and Space management strategies;
- invest in space management tools appropriate to the college for timetabling, space use recording, etc;
- systematically collect and update space data;
- conduct utilisation surveys at least once annually;
- continually upgrade the existing estate through small changes to the interior design, furniture and IT to fulfil new demands;
- promote the benefits of versatile spaces, equipped with a variety of IT and AV and flexible furniture;
- publicise space management policies to the college stakeholders;
- seek innovative ways of sharing space with other institutions or of extending the hours over which courses are taught.

B. when making changes to their estates:

- fully review all existing spaces, their functional suitability, timetabling and utilisation, to identify gaps;
- consult all stakeholders – academic and administrative staff and students - to identify new possibilities for space effectiveness and efficiency;
- select estate planning and architectural teams familiar with the importance of space management;
- insist that floor area targets and space efficiency ratios are met in the evolution of new building designs;
- conduct post occupancy evaluations at project completion, to document success including effective space management.

The overall aim is for Scotland's colleges to have an effective and efficient estate that is affordable and sustainable, while being responsive to fresh demands.

APPENDIX 1: People Consulted

Scottish Funding Council
Claire Bell
Andrew Chamberlain
Lynne MacDonald
Aileen Ross

Steering Group members

Graham Bell	Edinburgh University
Niall McArthur	Inverness College
Paul Sherrington	Banff & Buchan College
Aileen Ross	Scottish Funding Council
Lynne MacDonald	Scottish Funding Council

Principal College Representatives

Angus Allan	South Lanarkshire College
Miles Fuller	Inverness College
Tom Gorman	Forth Valley College
Brian Hughes	Anniesland College
John Hunter	Jewel & Esk College
Gordon Paterson	Clydebank College
John Pugh	Langside College
Grant Ritchie	Dundee College
Roddy Scott	Aberdeen College
Paul Sherrington	Banff & Buchan College

Space Management Practitioners

Bernard Dromgoole	HEFCE
Grace Kenny	Independent consultant
Sian Kilner	Kilner Planning (SMG Space Management Group)
Graham Montgomery	Archial (previously Jenkins & Marr)
Craig Weaver	Learning & Skills Council

Project Team

Alexi Marmot	AMA Alexi Marmot Associates
Felicity Swaffer	AMA Alexi Marmot Associates
Hugh Anderson	Haa Design
Katherine Strachan Davis	Haa Design
Oliver Gibson	IPD
Adam King	IPD
Tina Bailey	IPD

APPENDIX 2: Findings from review of space use

A review of current and projected space use of ten colleges progressing through the SFC capital grants programme was conducted during 2008 to ascertain both the extent and nature of space management practices across the sector and the effectiveness of existing space management guidance, including standard space norms.

While the review was focused on colleges progressing through the capital grants programme attention was also focused on ongoing space management practices.

Colleges included in the sample were selected by SFC and were verified as a representative sample in terms of spread of sizes, geographic location and gross internal floor area.

The research, conducted over five months, included desktop data analysis of college's own information and comparative data on the college estate (eMandate) and student profiles (SFC Infact Database). In most cases floor areas were taken from the college's own business case.

Visits were also conducted to each college and a space management questionnaire circulated to all 43 colleges in Scotland. A 44% response rate was achieved.

A regression analysis was carried out by IPD to identify factors that predicted the efficiency of an educational estate. 12 colleges provided sufficient data to merit inclusion in the analysis. The results were inconclusive due to the small sample size and complexity of the potential variables.

Key findings include:

Overall floor area

- For all colleges the decision to apply for capital funds was driven by an estate from which it was impossible to deliver a 21st century education;

The ten colleges included in the review were:

- Aberdeen College
- Anniesland College
- Banff & Buchan College
- Clydebank College
- Dundee College
- Forth Valley College
- Inverness College
- Jewel & Esk College
- Langside College
- South Lanarkshire College

The specific objectives of the review were to:

- Ascertain the effectiveness of existing space management guidance;
- Review the efficacy of existing space norms for specific subject areas and types of accommodation;
- Assess the prevalence and effectiveness of central timetabling, space charging and the use of computerised space management databases;
- Establish if there is sufficient consistency across the sector to continue using sector-wide space norms (and if so, confirm the optimum space norms for specific subject areas and types of accommodation)

- A comparison of the gross areas (GIA) shows an overall reduction in area of 9% suggesting some efficiencies are being made;
- Across the sample, a total of 78% of gross area will be provided as either new build space or major refurbishment of existing buildings;
- Space dedicated to teaching makes up, on average, 40% of the total gross area, learning 6% and support, circulation and core the remaining 56%;
- Ratios of net usable: gross internal areas averaged 69% suggesting colleges are being planned to very tight margins (maximising usable areas but providing less generous entrance areas, corridors and lobbies);
- It was not possible to calculate these ratios for existing space as most colleges current accommodation schedules did not contain sufficient detail to enable a comparative analysis;

The professional team

- For most colleges the project sponsor is the Vice Principal – highly knowledgeable about the college but embarking on a major build project for the first time;
- Two larger colleges had appointed an individual with experience of managing major build projects;
- Most colleges relied on appointed architects or consultants in the early stages to help gather data and develop schedules of accommodation;
- The extent to which this was an iterative and collaborative process varied between colleges;

Calculating space requirements

- Colleges and their consultants used several different methods;
- All began with baseline documentation of the current estate – typically including utilisation based on either timetabled or actual use and an analysis of student numbers;
- Some colleges also engaged in a process of staff consultation – usually involving senior management and those involved in timetabling;
- All colleges made use of their own strong network, conducting visits to other colleges, drawing lessons from recently completed or planned projects;

Guidance documents

- Reference was made to different guidance documents to determine area allocations spanning more than 20 years;
- Use of space standards to develop a space budget for the future was standard practice – these differed according to the guidance documents used;
- Little guidance was available for self-directed or peer-to-peer learning spaces or large specialist space (e.g. sports halls, gym areas).

Comparison with LSC space standards for colleges

- Spaces within colleges accommodation schedules were coded against the Learning & Skills Council space standards;
- Both large-scale art spaces and beauty salons are more efficient than the LSC space standard;
- Flexible use teaching spaces are planned more generously;

Space Utilisation

- While some colleges collect utilisation data on an annual basis, most conducted studies as a one-off exercise to help determine space requirements;
- Of the 10 colleges, 8 were able to provide data on utilisation of teaching spaces;
- Average utilisation rates are 34% - comparable to the 06/07 eMandate return;
- Colleges are performing better on frequency of room use (71% average) than seat occupancy (48% on average);
- An ongoing challenge is the accurate mapping of class sizes against room capacities;

Room Timetabling

- Most colleges reported using a centralised timetabling system for the booking of some teaching spaces;
- Few had centrally timetabled all teaching rooms;
- Most timetabling systems operated electronically using a proprietary database;
- A few colleges had linked room timetabling to attendance registers enabling the collection of real time utilisation data;
- There was little evidence of space charging being used as a means of managing space.

APPENDIX 3: Reference documents

Related guidance

Scottish Funding Council, May 2008, Capital Projects: Gateway approvals process guidance.
http://www.sfc.ac.uk/information/information_funding/gateway_approval_process.pdf

Scottish Funding Council, Mar 2008, Sustainable Development Guidance for Estate Managers.
http://www.sfc.ac.uk/publications/Sustainable_Development_Guidance_March_2008.pdf

Scottish Funding Council, Nov 2007, Capital Projects: post-occupancy evaluation guidance.
http://www.sfc.ac.uk/information/information_funding/POE_Guidance_Nov_07.pdf

Scottish Funding Council, Jul 2007, Estate Strategy Guidance,
http://www.sfc.ac.uk/information/info_circulars/sfc/2007/sfc3407/sfc3407_guidance.pdf

Scottish Funding Council, Feb 2006, Spaces for Learning: A review of learning spaces in further and higher education
http://www.sfc.ac.uk/publications/spaces_for_learning_report.pdf

Learning & Skills Council, May 2007, Guidance for Further Education Colleges on the Management of Floorspace
http://readingroom.lsc.gov.uk/lsc/National/Floorspace_Guidance_-_02_05_07_doc_v2__2_.pdf

Relevant guidance from the higher education sector

Audit Scotland, Sep 2007, Estate management in higher education.
http://www.audit-scotland.gov.uk/docs/central/2007/nr_070913_estate_management.pdf

Space Management Group, Sep 2006, Space utilisation: practice, performance and guidelines
http://www.smg.ac.uk/documents/utilisation.pdf

Space Management group, Sep 2006, Managing space: a review of English further education and HE overseas.
http://www.smg.ac.uk/documents/FEandoverseas.pdf

Space Management Group, Mar 2006, Promoting space efficiency in building design.
http://www.smg.ac.uk/documents/PromotingSpaceEfficiency.pdf

CABE, Mar 2005, Design with distinction: The value of good building design in higher education.
http://www.cabe.org.uk/files/design-with-distinction.pdf

Higher Education Funding Council for Wales, 2002, Space Management: A good practice guide
http://www.smg.ac.uk/documents/swanspace.pdf

Other useful references

DEGW, 2008, Effective Working Environments in Further and Higher Education project
http://www.exploreacademicworkplace.com/

JISC, 2007, The Design and Management of Open Plan Technology Rich Learning and Teaching Spaces in Further and Higher Education in the UK
http://www.jisc.ac.uk/whatwedo/projects/managinglearningspaces.aspx

JISC, 2006, Designing Spaces for Effective Learning: A guide to 21st century learning space design
http://www.jisc.ac.uk/uploaded_documents/JISClearningspaces.pdf

APPENDIX 4: Glossary

CAFM system	Computer-Aided Facility Management system - specialist software that provides a link between computer-based space databases and CAD systems.
daytime SUM	A sub-component of SUMs which includes only full, part-time or block release courses.
Dominant Programme Group	A set of 18 broad subject groups, developed by the SFC into which all courses can be categorised for the purposes of translating SUMs to WSUMs.
Estate Strategy	A strategic plan for the college estate which draws its aims from the institutions corporate plan, and establishes the estate needs to achieve these aims.
e-Mandate	A UK national benchmarking system to which all colleges submit an annual return on the use of their estate across key metrics including amount of space, cost, energy and utilisation.
Performance Indicator	Financial and non-financial measures used to help an organisation define and evaluate how successful it is, particularly in relation to long-term goals.
Room database	A computer based database (e.g. Excel) which includes the measured area of every single space across an estate, classified by function.
Self-directed learning hours	The number of hours a student spends on-site at a college engaging in study over and above taught hours.
Space Norm	An allowance of space, expressed in square metres, which is multiplied by the number of students (or equivalent measure of activity) to generate an overall space requirement.
Space standard	An average allowance of usable area per workplace within a room or cluster of rooms which includes all equipment and local circulation within a room.
SUM	Student Unit of Measurement - a unit of measurement developed by SFC which measures units of 40 taught student hours.
Utilisation (actual)	Assessment of how well rooms or spaces are being used based on actual observations of space use.
Utilisation (planned)	Assessment of how well rooms and spaces will be used based on timetabling information.
WSUM	A SUM which has been classified into one of 18 dominant programme groups and reweighted according to an SFC assessment of the resource intensity of the group to produce a weighted SUM

APPENDIX 5: Area definitions

Five definitions of floor area are used in construction projects in colleges: gross external area (GEA), gross internal area (GIA); net internal area (NIA); net usable area (NUA); and balance area. It is imperative that any area stated is qualified by one of these definitions. The following guidelines are derived from the 'RICS Code of Measuring Practice: A Guide for Surveyors and Valuers' 5th edition, and the eMandate data definitions.

GEA Gross External Area (for planning applications)
The area of a building measured externally at each floor level, including all spaces within the building, and perimeter wall thicknesses, external projections, loading bays and garages. It excludes open-sided balconies, fire escapes, canopies, and roof terraces.

GIA Gross Internal Area (for building costs estimation)
The area of a building measured to the internal face of the perimeter walls at each floor level. It includes all spaces within the building, internal structure, walls and partitions, loading bays and garages. It excludes perimeter wall thicknesses and external projections, external balconies and voids over atria.

NIA Net Internal Area (equivalent of net lettable area)
The area within a building that comprises usable areas and primary horizontal circulation. It includes all usable spaces, kitchens and built-in units and cupboards that occupy usable areas, and horizontal circulation. It excludes common entrance halls, atria, landings and balconies; toilets, toilet lobbies, bathrooms and cleaners' rooms; plant spaces (lift rooms, plant rooms, risers, duct rooms, tank rooms and fuel stores); vertical circulation (stairwells, lift-wells and associated lobbies); internal structure (structural walls, columns, piers etc); loading bays and garages.

NUA Net Usable Area (area available in rooms for people to use)
The area within a building available for people to use. It excludes primary horizontal circulation (major horizontal routes that link fire escapes) in addition to all of the above.

Balance Area (areas to enable the building to function)
The floor area planned to enable the building to function. It includes stairwells; entrance lobbies; atria and foyers where the function is solely or primarily for circulation; lifts and lift lobbies; lavatories and toilet lobbies; cloakrooms; cleaners' stores and cupboards; plant rooms, tank rooms, boiler houses, calorifier chambers and fuel stores; loading bays and ducts, that otherwise are included with Gross Internal Area. It includes primary horizontal circulation, fire corridors and smoke lobbies that otherwise are included within Net Internal Area. It excludes everything that is Net Usable Area.

APPENDIX 6: Pro-formas

Copies of the following spreadsheets are available from the SFC website.

a. Example utilisation survey data collection form

BASIC INFORMATION					OBSERVATIONS			BOOKING INFORMATION	
Campus/Building	Floor	Room ID	Description	Capacity	Day	Hour	No. of people observed	Booked (Y/N)	No. of people in booking

b. Example room database

BASIC INFORMATION					SPACE CHARACTERISTICS						OCCUPIER		USAGE INFORMATION			
Campus/Building	Floor	Room ID	Area (NUA m2)	Capacity	Space description	Space category	Space type	Space function	Timetabling information	Booking information	Main Occupier (e.g. faculty)	Sub Occupier (e.g. department)	Condition	% frequency	% occupancy	% utilisation