SPACE PLANNING GUIDELINES

Edition 2

Australasian
Association of Higher Education Facilities Officers

CONTENTS

FOREWORD

Space is one of the major assets of higher education institutions, and on average represents around 20% of the costs of operating an institution. While this incurs a major cost to an institution, the availability of appropriate space is essential to support the teaching, research and community services objectives of our institutions. The provision of the right space is becoming even more important as institutions increasingly compete for students and funding. The management of space is therefore an essential part of an asset management strategy for any institution.

This second edition of AAPPA's Space Planning Guidelines represents a major step forward in the provision of essential planning information for use by facilities managers in the higher education sector. It builds upon the first edition, which was issued in 1998. The first edition, which in itself was a major effort to put together, was tested in practice and a number of workshop sessions attended by representatives from a range of Australian and New Zealand tertiary institutions were conducted to consider improvements for the second edition. While it is clearly recognised that 'one size does not fit all' these guidelines present an excellent basis from which to start to assess space requirements, provide quality advice and develop Benchmarks.

The production of these guidelines has only been possible through a lot of hard work by a number of AAPPA members. Many institutions contributed data, without which the space standards would have been far less accurate. Particular thanks goes to the editorial panel of Colin Tolmie, Darren McKee, Sandra Jones, Andrew Trotter, Gary Bradley and Todd Denham, without whom this publication would not have been possible, and Denis Stephenson who co-ordinated and instigated the publication.

Andrew Frowd
President
AAPPA

1.0 INTRODUCTION – AAPPA SPACE PLANNING GUIDELINES

As anticipated in the introduction to the first edition of the AAPPA Space Planning Guidelines (September 1998) a review of that document has been deemed appropriate. This follows its review at the Melbourne Conference (2000) and the acknowledgement that the first edition was very much a first casting of this information.

It has now been tested in operation over some three years, and comments from members have been received and assessed for inclusion in this second edition. A draft was reviewed at a well-attended workshop during the Canberra Conference (2001) and this final document is a result of these consultative processes, by attendees from Australian, New Zealand and other member countries.

One of the difficulties of norms produced by general practitioners and Government funding authorities is that they are standardised so as to appear appropriate and equitable to all institutions. This standardisation is recognised as clearly inappropriate and unhelpful in resolving space planning matters for Buildings Managers who operate across a wide diversity of campuses with recognisable differences in academic, cultural and climatic conditions.

These Guidelines are specifically developed to provide a base recommendation with clearly defined parameters, which can either be used per se or adjusted and adapted to suit various known situations as they exist in differing campus locations. An example of this is the mix of teaching and research done in universities, and the possible absence of research space in Polytechs and TAFEs. To improve credibility of bids for space it is strongly recommended that proposals simply based on norms be avoided. Reports should be augmented by an overview of requirements taking into account the "needs" of an institution, faculty or department reviewed at the local level.

This second edition is structured similarly to the previous publication, with three main sections providing advice on User Group space based on student and staff load, Guide Utilisation Ratios, and General Space Standards based on room type, with definitions of commonly used terms provided. In preparing capital development feasibility studies, there will be a need to convert useable floor areas (UFA) to a gross floor area (GFA).

This process has not been addressed in these guidelines. Whilst each building type requires individual assessment, this ratio is reported in total campus terms in AAPPA's annual benchmarking report as a guideline. However, further research on this and other gaps in the detailed space recommendations, will enhance a future edition of these guidelines.

Space management continues to be an essential element in total asset management, providing an opportunity for greater utilisation of space and minimisation of capital programs, reducing recurrent operating costs and providing appropriate solutions to client accommodation programs.

The successful outcome of a space management program is enhanced if institutions embrace parameters in a policy document which can be custom designed from guidelines such as these to meet individual strategic plans. This is highly recommended at an institutional level.

The AAPPA Board is pleased to be able to provide this Guideline to assist in the carrying out of these responsibilities for its members.

Denis Stephenson
Divisional Manager, Buildings and Grounds,
La Trobe University,
Editor.

2.0 HIGH LEVEL RATIOS FOR GENERAL PLANNING PURPOSES

INTRODUCTION

This section discusses the broad ratios that can be used for university planning. In essence, they are simply an amount of space typically attributed to a particular university use, based on student load.

The ratios and data tables have been assembled from planning data generally available within the university sector. This section has been updated to reflect feedback received since the first edition, however it would benefit from further regular feedback and benchmarking between the AAPPA universities.

Most would be familiar with the terms GFA, UFA and EFTSU, however it is worth providing some definition from the outset, as space and student load needs to be correctly interpreted and quantified to provide meaningful results when applying the ratios.

- GFA (Gross Floor Area m^2). As defined in the AAPPA Benchmark Survey, i.e. the sum of fully enclosed area and unenclosed covered area.
- UFA (Useable Floor Area m^2). As defined in the AAPPA Benchmark Survey, i.e. floor area measured from the inside face of the walls and deducting all the common use areas (corridors, etc) and non habitable areas (lifts, stairs, service ducts, etc).
- EFTSU (Equivalent Full Time Student Unit). A value representing the student load for a unit of study or part of a unit of study, expressed as a proportion of the workload for a standard annual program for students undertaking a full year of study in a given year of a particular course.
- FTE (Full Time Equivalent). A value for measuring staff resources. Like student EFTSU it is a measure as compared to a standard full time workload.

THE OVERALL PICTURE

In planning it is often useful to take a macro view of the campus and then drill down to seek more detailed information.

When conducting campus master planning, reference to broad ratios based on student load can provide a quick overview to the size a campus could attain in a fully developed form.

TOTAL UNIVERSITY GFAm^2/EFTSU

For a broad 'rule of thumb' planning parameter, 15m^2 GFA/EFTSU [Ref 1] would be considered an Australasian average for university space. This ratio covers all space on a campus except for student housing.

Useable Floor Area (UFA) is typically 70% of GFA, which equates to an average of 10.4m^2 UFA/EFTSU [Ref 1]

AAPPA universities fall into the following broad groups of space holdings [Ref 1]:

	LOW	MID	UPPER
GFA/EFTSU	< 12m^2 /EFTSU	12 to 19m^2 /EFTSU	> 19m^2 /EFTSU
% of university campus in range	33%	47%	20%
Ave. EFTSU/ FTE (Academic)	21.9	14.4	9.8

Table 2.1

A number of factors can contribute to the variation in GFA/EFTSU between universities.

These include:

- The weighting of disciplines that require specialist facilities (such as science laboratories).
- The ratio of staff to students. The table above shows the average EFTSU/ Academic FTE in each range.
- Duplication of facilities in multi-campus universities.

TYPES OF SPACE

The other broad parameters which are useful, relate to types of space on a campus and the breakdown of academic space against faculties or discipline groupings.

Typically, a university is made up of the following broad groupings:

- Academic space (including research space)
- Administrative space (e.g. central administration support)
- Commercial space (e.g. bookshop, cafeteria)
- General teaching space
- Library space
- Student services space (e.g. guild and sport and recreation facilities)
- Other space (anything not in above, including vacant or in transition).

The broad spread of this space in a typical fully developed campus is in the order of:[Ref 2]

GROUP	% of total space on Campus*	m² UFA/Total Campus EFTSU
Academic	43 – 57%	4.5 – 6.0m²/EFTSU
Administrative	9 – 12%	1 – 1.2m²/EFTSU
Commercial	2.8 – 4.2%	0.3 – 0.4m²/EFTSU
General teaching	12%	1.2m²/EFTSU
Library	10%	1m²/EFTSU
Student Services	4 – 8%	0.4 – 0.8m²/EFTSU
Other	8%	0.8m²/EFTSU

Table 2.2

*Student housing is not included

LIBRARY SPACE

Overall provision for library space on a campus is typically in the order of 1.0m²/EFTSU [Ref 2]. Other parameters, which may help in sizing a library facility, include:

- Open stack space/1000 volumes 6m²
- Closed stack space/1000 volumes 3m²
- Reserve collection space/ 1000 volumes 17 to 18m²
- Reader space 0.1 to 0.12m² /EFTSU
- Additional Specialist reader space (e.g Law, Medicine) 0.8m² /EFTSU

The concept of a library building is continually changing due to evolving methods of providing, managing and delivering information resources to students and the community. Detailed planning needs to take these changes into account.

CAFETERIA SPACE

Overall provision for the main student dining area for a campus cafeteria is in the range of 0.09 to 0.1m²/EFTSU [Ref 2].

The kitchen and other ancillary spaces (stores, cool rooms etc) associated with the main dining hall is approximately 50 –70% of the area of the dining hall.

CARPARKING

A broad ratio for the provision of car parking on a campus is in the order of 1 bay for each 4 to 5 EFTSU.[Ref 1]

This ratio should be used with care, as there are a number of factors that impact on the ratio and will vary the requirements for individual campuses.

These include:

- Locality (city, metropolitan, country)
- Available public transport
- Other parking options off campus
- Student demographics
- Available space on campus.

ACADEMIC SPACE

Academic space constitutes about half the space on a typical campus. Within the grouping of academic space, there can be a further breakdown according to faculty or discipline.

The following categories have been accepted from DESTPAC – Appendix E – Classification of Higher Education Discipline Groups.

The data was compiled from a survey of representative universities and is suggested as an AAPPA guideline for general planning.

The guide ratios are useful for an initial assessment of needs for faculty-dedicated space. In each case the university needs to have the current EFTSU totals for a faculty on which the guidelines can be applied.

The ratios shown in the table (right) refer to 'dedicated' faculty space (UFA). The term 'dedicated' refers to space, which is primarily used by one Faculty.

BROAD ACADEMIC CATEGORIES[Ref 3]

Category	m²/EFTSU
Natural and Physical Sciences	10
Information Technology	2
Engineering and Related Technologies	10
Architecture and Building	6
Agriculture, Environmental & Related Studies	5
Health	14
Education	3
Management and Commerce	1
Society and Culture	3.5
Creative Arts	6
Food, Hospitality and Personal Services	6.5
Mixed Field Programs	TBA

The above broad categories can be further broken down to more detail and be customised to suit a particular university environment.

In this way, a university can assess the relevance of the ratios to local campus planning and adapt the ratios over time.

DETAILED ACADEMIC CATEGORIES (Ref 3)

CATEGORY	m²/EFTSU	NOTE
Natural and Physical Sciences		
Mathematical Sciences	3	
Physics and Astronomy	12	
Chemical Sciences	17	
Earth Sciences	10	
Biological Sciences	11	
Other Natural and Physical Sciences	10	
Information Technology		
Computer Science	2.5	
Information Science	2	
Other Info. Technology	2	
Engineering and Related Technologies		
Manufacturing Engineering and Technology	10	2
Process and Resource Engineering	11	
Automotive Engineering and Technology	8.5	2
Mechanical & Industrial Engineering & Technology	14	
Civil Engineering	16	
Geomatic Engineering	7	2
Electrical & Electronic Engineering & Technology	7.5	
Aerospace Engineering and Technology	TBA	1
Maritime Engineering and Technology	TBA	1
Other Engineering and Related Technologies	10	
Architecture and Building		
Architecture and Urban Environment	7	
Building	6	
Agriculture, Environmental & Related Studies		
Agriculture	2	
Horticulture and Viticulture	2	
Forestry Studies	6	
Fisheries Studies	TBA	1
Environmental Studies	11	2
Other Agriculture, Enviro. & Related Studies	5	
Health		
Medical Studies	14	
Nursing	3	
Pharmacy	7	2
Dental Studies	16	
Optical Science	5	
Veterinary Science	18	2
Public Health	5	
Radiography	4	2
Rehabilitation Therapies	6	
Complementary Therapies	8	
Other Health	10	
Education		
Teacher Education	3	
Curriculum & Education Studies	3	
Other Education	3	

Management & Commerce		
Accounting	1	
Business & Management	1	
Sales and Marketing	1.5	
Tourism	1.5	
Office Studies	1	2
Banking, Finance and Related Fields	1	
Other Management and Commerce	1	
Society and Culture		
Political Science and Policy Studies	1.5	
Studies in Human Society	2	
Human Welfare Studies and Services	2	
Behavioural Science	4	
Law	1.5	
Justice & Law Enforcement	1.5	
Librarianship, Information Management and Curatorial Studies	3.5	2
Language and Literature	2.5	
Philosophy and Religious Studies	2	
Economics & Econometrics	1	
Sport and Recreation	7.5	2
Other Society and Culture	3.5	
Creative Arts		
Performing Arts	7	
Visual Arts and Crafts	13	
Graphic and Design Studies	6	
Communication and Media Studies	2	
Other Creative Arts	6	
Food, Hospitality and Personal Services		
Food and Hospitality	6.5	2
Personal Services	TBA	1
Mixed Field Programs	TBA	1

Notes:

1. TBA – To be advised, insufficient data available.
2. Limited or inconclusive data – Use with care.

References:

The data used in this section has been derived from the following sources:

Ref 1: AAPPA Benchmark Survey Report 2002

Ref 2: Compiled from a sample group of AAPPA universities.

Ref 3: Compiled from a survey of the following contributing universities:

University of Ballarat
La Trobe University
Massey University
University of Melbourne
Murdoch University
University of Newcastle
University of Otago
Queensland University of Technology
University of South Australia
University of Sydney
University of Auckland
Victoria University of Wellington
University of Wollongong
Edith Cowan University

3.0 STANDARDS AND BENCHMARKS

INTRODUCTION

Space management is about using standards and benchmarks and planning models to measure how well space is being used and to plan for future needs.

Space data collected through the space information systems and room utilisation audits are compared to established standards and benchmarks to:

- get an understanding of how well space is being used
- identify areas of improvement
- plan for the future.

STANDARDS

Standards are a 'bottom up' approach and define the area required to perform a particular function or activity. For example, area standards can be allocated for an academic office or a teaching room for a certain number of students.

Standards are based on functional requirements for particular activities and are usually well established through precedence and the design process. Changes to area standards for a particular activity are usually difficult to make and mostly result from a review of how the function is carried out or from new design approaches. For example, the use of computers and the development of system workstations have changed the standards for office design in recent times.

BENCHMARKS

Benchmarks are a 'top down' approach and are used to get a big picture view of how space is used. Benchmarks are usually applied at a broad level for comparison purposes.

For example, the Gross Floor Area per student can be compared across universities. This can be useful for assessing how much improvement is possible and for planning for future expansion.

MODELLING

Modelling is the application of standards to known or planned activities to arrive at an internal benchmark for planning purposes.

For example, if the number of academic staff and student numbers for a particular course are known, then standard areas can be applied to calculate the total area required for that course.

Note:

Improvement cannot be managed from the top down. Standards are set at the bottom and are reflected in outcomes at the top.

ALLOCATION GUIDELINES BY SPACE TYPE

ALLOCATION BY POSITION

Position	Office size m² Useable Floor Area	Space Allocated in Laboratory if required for Space Model calculations m² * See note below
Vice Chancellor	28-35	
Snr Executive staff	20-25	
Professor in the position of Pro Vice Chancellor,Dean, Director or Head of Department	18-20	16
Professor/Associate Professor	12-14	16
Director	18-20	16
Head of Department	18-20	16
Academic Staff level B/Snr Lecturer or Snr Research Officer	12-14	16
Lecturer or full time Research Officer	10-12	16
Academic Staff level A share office or open plan	8-10	
Research staff (Academic & General) if office is available otherwise open plan	10-14 8-10	8 8
Research Assistant (Open Plan)	8	8
Academic Visitors – Use offices of staff on OSPRO or bookable hot desking space		
Postgraduate Research Student	4	6

Position	Office size m² Useable Floor Area
Research Fellows, Post-doctorate Fellows, Research Assistants	2 per 12m² office or 8m² in open space
Postgraduate Course work students – it is accepted that these students study as part of general course work. If a room is required in a department for PGC & Honours students it will be allocated on the basis of:	2m² per student to make up room size
Undergrad. student	2m² per student to make up room size

Administrative Staff

Administrative Senior	12-14
Administrative (req office for confidentiality)	10-12
Administrative general – Open plan. Size included space for filing & walkways in open plan area	10
Waiting and Storage spaces	12

Ancillary space will be added under the same formula as the DEST Higher Education Space Indicators for different disciplines

Table 3.1

*Space allocated in a laboratory does not necessarily mean a separate laboratory. This figure can be used to calculate the total size of a laboratory holding a number of staff in a group, or for a specific purpose such as a research group made up of academic and research staff.

ALLOCATION BY FUNCTION

GENERAL TEACHING SPACE	SIZE m²/EFTSU
Teaching Facilities	
General Timetabled Teaching space –	
Seminar/Tutorial	2
Lecture Theatre – Stepped floor – close seating	1.5-1.7
Laboratories	**m² /UFA**
Science (including fume hoods)	5/student
Store and Prep areas	1/student
Psychology & Anthropology	5/student
Store and Prep areas	1/student
Language and Statistics	2/student
Store and Prep areas	1/student
Heavy Engines, Machine Tool and similar	9/student
Store and Prep areas	1.3/student
Strength of materials, electrical machine, building	6/student
Store and Prep areas	1/student
Computer labs (pooled) workstations	2.3/workstation

Studios	**m² /UFA**
Drawing Studios Architecture, Town Planning, Engineering	2.8/student (1st year) 2.2/student (2nd/3rd year)
Design studios postgraduates	2.8/student
Sculpture, metal	5/student
Store	1/student
Ceramics	6/student
Store	2/student
Student Residential	**m²/UFA**
Bed Study	10/student
Dining/Kitchen	1.5/student
Common Room	2/student
Tutor/Warden suite (kitch/living/study/bed/ bath/wc)	30-60

Table 3.2

The space allocations should be taken as guidelines only. However, they are based on the empirical experience of university planners working in the field, and influenced by published standards over many years of operation in Australia and New Zealand. Local regulations and standards related to specific space requirements, especially laboratories, should always be checked.

4.0 SPACE UTILISATION

ROOM AUDITS AND AUDIT DATA

Conducting room audits is an integral part of measuring Space Utilisation Rates. Room auditing involves counting the number of students using the various teaching facilities within a university: this is generally undertaken over all the operating hours for the campus for one week each semester. The data collected via room auditing is collated as Room Frequency and Room Occupancy (see below).

Room Audit data gives an indication of the actual use of an institution's facilities, and should be used in conjunction with room booking and class enrolment data. This data is useful when attempting to grasp the use of facilities within an institution.

Accurate information about the rooms within an institution is an integral part of successful room auditing. Information regarding room use, room types, room ownership, and room capacities is required to enable thorough examination of audit data.

AUDIT DATA

Typically, audit data is analysed using the following performance indicators:

Room Frequency (RF)

Room Frequency is the number of hours the room is in use, during the audit period, divided by the number of hours that the room is available for use, during the audited period.

$$RF = \frac{HrsUsed}{HrsAvailable}$$

HrsUsed = the number of hours the room was in use during the audit period.

HrsAvailable = the maximum number of hours the room could be used during the audit period.

For example:

Room in use: 40Hrs
Room available for use during audit period: 50Hrs

Room Frequency = $\frac{40Hrs}{50Hrs}$ =80%

Table 4.1

Room Frequency pertains to the room being physically in use, not the theoretical use as recorded as bookings on a room booking or scheduling system.

Room Occupancy (Occ)

Room Occupancy represents the average number of students in the room, when the room is in use, compared to the total room capacity. Room Occupancy is independent of Room Frequency.

$$Occ = \frac{\Sigma TotalStudents}{Capacity\ X\ HoursUsed}$$

Total Students = Total number of students counted in the room over the audit period.

Capacity = the maximum number of students the room can hold, usually based on the number of seats in the room.

Hours Used = the number of hours the room was in use during the audit period.

For example:

Total number of students counted in room: 800
The capacity of the room: 80
Number of hours room is in use: 40Hrs

Room Occupancy = $\frac{800}{80x40}$ =25%

Table 4.2

As Room Occupancy is dependent on the accuracy of Capacity, and Capacity is generally an approximate measure (particularly in spaces other than classrooms and lecture theatres), Room Occupancy data can be misleading. Room Occupancy levels above 100% can occur.

A Room Occupancy level in excess of 100% may be due to either overcrowding or reflect how the facility is being used, e.g. a laboratory space may be used as a convenient seminar space between laboratory classes. The number of students may exceed the room's listed capacity as a laboratory.

Another concern with Room Occupancy data is the difference between students enrolled in a course, and the number of students attending the classes. Rooms must be booked to allow for every enrolled student to attend the class, even if this rarely occurs. In these cases low occupancy may not be an issue with the facilities provided.

Utilisation (U%)

U% = RF x Occ

For example:
Room Frequency: 80% Room Occupancy: 25%
Utilisation = 80% x 25% = 20%

Table 4.3

Utilisation combines Room Occupancy and Room Frequency data to give an indication of how the room is being used. Utilisation, as an abstract measure, is only useful as an indicator of rooms requiring further investigation of usage patterns, and comparative assessments.

SPACE UTILISATION RATES

Typical university day

It is recognised that there is no standard 'typical day' at universities in the Australasian region. This is particularly so in relation to the level of use made of evenings in the delivery of programs. Therefore, to enable greater potential for benchmarking, it is recommended that in undertaking utilisation audits, the audit results should be presented in terms of daytime/evening and overall utilisation.

For the purposes of utilisation the following standards are recommended for formulation of room frequency, occupancy and utilisation rates:

Recommended Typical Day/Week		
	Hours per day	Hours per week
Typical daytime session	8.00am – 5.00pm	45Hrs (9hrs x 5days)
Typical evening session	5.00pm – 9.30pm	22.5Hrs
Typical overall week		67.5Hrs

Table 4.4

The indicative space utilisation rates appearing below are based on a typical overall week of 67.5 hours.

Theoretical utilisation

This is a notional concept and is not intended as a practical performance measure.

It is possible to calculate a theoretical utilisation (TU) rate for a facility:

$$TU\% = \frac{SCH}{Capacity\ X\ HoursAvailable}$$

SCH = School Contact Hours to be delivered

Capacity = Sum of room capacities

Hours Available = Total number of hours for which the rooms are available for room use over the period in which the SCH are to be delivered (e.g. 1 semester = 13 weeks x 67.5 hrs per week).

It is possible to use theoretical utilisation as both a maximum possible achievable utilisation, as it assumes all classes are attended, and a planning tool for new facilities.

For example:
SCH: 150,000 Capacity: 5 rooms of 40 = 200 Hours avail.: = 13 weeks x 67.5Hrs = 877.5Hrs
$= \frac{150,000}{200 \times 877.5} = \frac{150,000}{175,500} = 0.86 =$ *enough space available*

Table 4.5

INDICATIVE "GOOD PRACTICE" SPACE UTILISATION RATES [1]

Space Type [2]	Target Room Frequency	Target Room Occupancy	Target Utilisation
Lecture Theatres – large (250 + seats) – medium (180 – 250 seats) – small (60 – 179 seats)	75%	75%	56%
Teaching – large flat floor teaching areas (non-theatre) – classrooms – tutorial rooms	75%	75%	56%
Computer Laboratories [3]	75%	75%	56%
Laboratories [4]	50%	75%	37.5%
Workshops [4] – engineering, metalwork, woodwork, psychology, children's studies	50%	75%	37.5%
Studios – architecture, painting & drawing, sculpture, ceramics, textiles, printmaking, dance, drama	75%	75%	56%
Practice Rooms – dance and music – music	80%	75%	60%
Meeting Rooms [5]	45%	75%	34%

Table 4.6

Notes:

1. The Space Utilisation Rates shown in the table above are indicative only and are based on a typical overall week of 67.5 hours.
2. Given the disparate space types used by institutions throughout Australasia the Space Types used in this table are intended to be broad/generic descriptors.
3. Many universities operate some Computer Laboratories on a 24Hr/7 day-a-week access basis. Calculation of utilisation of these facilities is recommended as being calculated, in the first instance, for the standard typical overall day hours of operation. A utilisation result may also be determined for the 24Hr/7 day-a-week use (168Hrs a week availability). However, due to the distortions that are likely to apply to results from this approach, it is recommended that this data result be kept separated from the typical overall day data and used for internal purposes only.
4. Laboratories and Workshops have a lower frequency of use rate than lecture theatres or teaching areas due to the requirement to provide set-up and additional cleaning time for these areas.
5. Meeting rooms have been calculated as having a low frequency of use due to their use being largely associated with the daytime operation of a University. It is anticipated that evening use is minimal.

ANALYSIS OF SPACE UTILISATION DATA

Percentage of room use chart

Table 4.7 (right) is an example of a Percentage of Room Use Chart.

The data indicates the percentage of used spaces for lecture times across the audit week: percentage of rooms used is equivalent to the average Room Frequency for the selected spaces.

By examining the data in this form, a greater understanding of the trends in room usage can be grasped: this example indicates that late morning and early afternoon are popular, with a pronounced lunch break affect at 12.30pm.

This form of presenting audit data is particularly useful when analysing a large number of rooms.

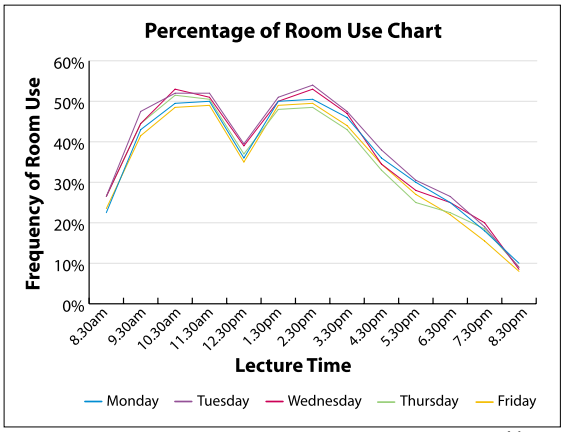

Table 4.7

CAPACITY BASED ANALYSIS

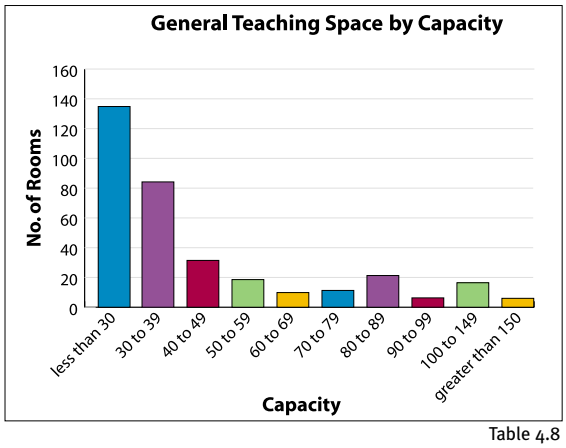

Table 4.8

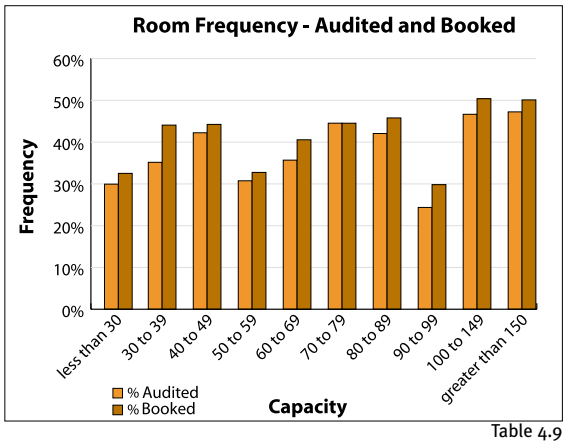

Table 4.9

Tables 4.8 and 4.9 (above) can be used to determine shortages, or surpluses in the provision of teaching spaces.

Table 4.8 is an example of a spread of classroom spaces across an institution, sorted by their capacities.

Table 4.9 provides an example of the frequency of room use, both physically audited and by booking, for the teaching spaces outlined in Table 4.8.

In looking at classrooms of a capacity less than 30 in Table 4.9, applying a standard of 75% frequency for general teaching spaces, it is clear that these spaces are both under booked and under used. As, according to Table 4.8, there are approximately 135 of these spaces in the university, further investigation into the reasons for low regularity of use should be undertaken.

Similar analysis using occupancy data can be used in conjunction with this method of Room Audit Data analysis.

PEAK OCCUPANCY ANALYSIS

An alternative to analysing room use on the basis of room occupancy is to examine the number of hours the space is used at or near full capacity.

The example shown in Table 4.10 would equate to an average room occupancy of 50% over the audited period. This is low compared to the recommended standard of 75%. However, Table 4.10 indicates that, while the overall occupancy is low, for 8 of the hours the room was occupied the room occupancy was above 90%.

Peak Occupancy analysis is another measure that can be useful when determining institution's need for teaching facilities of large capacities.

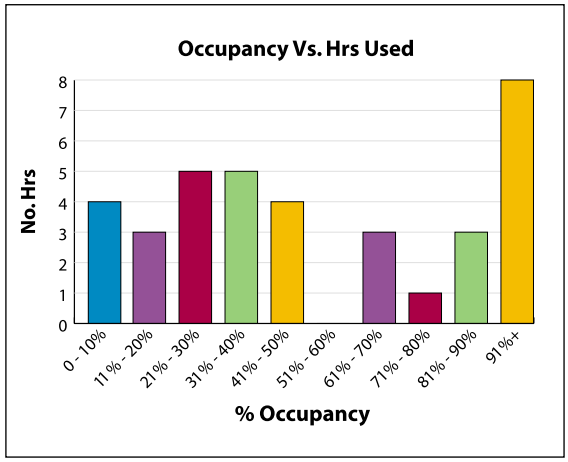

Table 4.10

FACTORS AFFECTING SPACE UTILISATION RATES

A room may be poorly utilised due to its physical attributes: its condition, an over-supply of similar facilities, insufficient capacity, too much capacity, wrong location, changing teaching methods causing obsolescence.

Aside from the physical nature of the space, other reasons for poor utilisation include:

Flexibility: Students are being offered a wider range of options within courses, and across disciplines. As students enrol in a greater number of subject combinations the difficulty of timetabling increases, and may lead to decreased utilisation.

Part-Time/Sessional Staff: Part-Time and Sessional Staff are not available to deliver programs at all times across the institution's operating hours. This reduces timetabling freedom and may lead to lower utilisation rates for teaching spaces.

Room Ownership: Granting control of rooms to groups within an institution reduces the accessibility of other groups to those rooms, and thus reduces the flexibility of timetabling.

Timetabling: Unavailability of a particular resource, such as specialised teaching staff or the student group themselves, may make optimal use of a physical facility impossible.

Teaching patterns: Particular teaching patterns that vary by institution may have an impact on overall utilisation. For example, practical placements in programs such as teaching and nursing may result in periods of low utilisation.

Departmental vs. Institutional Cost: If salary costs are paid from departmental funds, the department may timetable in order to minimise these costs. This may involve hiring part-time or sessional teaching staff. A timetable minimising cost to the department may not be the most cost effective timetable for the institution, as the cost of operating and maintaining the teaching facilities are often not included when determining a timetable.

Specialist Space: Some highly specialised facilities may not achieve high utilisation rates, but may be required in the successful delivery of an academic program. In these instances utilisation should be looked at in reference to the service provided by the space. This is particularly pertinent for spaces that may be in use when the room itself is vacant (e.g. an unattended research project).

5.0 SPACE PLANNING GUIDELINES BY SCHOOL/ DEPARTMENT/DISCIPLINE

SPACE PLANNING IS PREDICATED ON AN ACCURATE SPACE MANAGEMENT/INVENTORY SYSTEM & AN ACCURATE INDICATIVE SPACE MODEL

Indicative Space Model

The 'Indicative Space Model' is shown in Attachment 1.

USE OF THE INDICATIVE SPACE MODEL GRID AS A SPACE MANAGEMENT TOOL

The Grid can be used for projected space needs

Formulas can be added to the grid and set up as an Excel spreadsheet. Projected staff and student numbers can be entered into the spreadsheet and an indicative envelope of space will be calculated.

This is particularly useful when working out space for new academic schools, departments or disciplines.

The Grid as the basis of a computer model

The grid can be used as the basis of an Indicative Space Model and it can be written into a program that aggregates an indicative space calculation by IOU code. This can be achieved by downloading the university's DEETYA Student and Staff Load files from the STATPAC.

Use the outcome of the Indicative Space Model to compare with the actual allocation of space. This Model is a guide that can be used to ascertain who needs space and who has too much space. The model can be adjusted to square metre rates that are acceptable within your university.

Broad/Narrow fields of Education/ Discipline Groups – (Attachment 2)

This table is on pages 20 and 21 and is used to attach a Field of Education/Discipline code to a Space Indicator Group.

Note: For 2002 DEST have changed their Discipline Group categories to Fields of Education Codes.

These codes can be filtered from your university's STATPAC – student and staff load file to populate the Indicative Space Module for calculation of the Student/Staff – Indicative Space Envelope.

HOW THE MODEL IS FORMULATED

The model is based on the parameters of the DEET Higher Education Indicative Space Module, and takes into consideration the following principles:

- Different disciplines will require different amounts of space, for example Humanities compared to Sciences.
- Different types of staff will require different amounts of space, for example 'research only' compared to 'teaching only'.
- Students at different levels will require different amounts of space, for example a postgraduate compared to an undergraduate.

Taking the above points into consideration, the amount of space required is not solely reliant on the number of staff and students.

DEFINITION OF HEADINGS USED IN THE INDICATIVE SPACE MODEL

SIG (Space Indicator Groups)

This is the code given to a particular Field of Education/Discipline group that relates to the formula for the amount of space that is allocated to a particular discipline.

Staff Space (Teaching only, Research only, Teaching and Research and General)

This relates to square metres allocated per full time staff load (ie: fractional staff are combined to create the equivalent full-time load).

General Staff (No desk) is for persons who only require shared usage of a desk like storeman, drivers, part timers, etc.

Staff Ancillary Allowance

This is calculated on the basis of the sum of space required for all staff multiplied by the Ancillary allowance percentage. This space is to allow for storerooms, workshops (not teaching labs), photocopier rooms, tea rooms etc.

Student Space

Undergraduate = 4m² UFA/EFTSU (Effective full time student unit). Part- time students are pro rated to make up a whole EFTSU.

Higher Degree by Course work = 5m²/EFTSU depending on whether the discipline is allocated space under the model.

Higher Degree by Research = 7m² to 10m² UFA/EFTSU depending on whether the discipline is allocated space under the model.

Undergraduate space if central class timetabled space is used

SIG C presumes that centrally timetabled space is used and does not allocate teaching space in the model.

If other SIG groups use central timetabled space, a deduction of 2m² UFA/EFTSU should be taken from the total student space calculation to account for outside usage.

Use SIG C if teaching is done in centrally controlled computer laboratories, and likewise take off 2m² UFA/EFTSU from the total student space calculation. This would only apply to areas of heavy computer usage such as Mathematics, Statistics, Computer type studies where computers are an intensive part of the course.

Student Ancillary Allowance

This is calculated on the basis of the sum of space required for all students multiplied by the Ancillary allowance percentage. This space is to allow for storerooms, workshops, photocopier rooms, tea rooms etc.

Sample Reports

The following sample reports are provided for your information:

Sample Indicative Space report (Attachment 3)
Sample Indicative to Actual space report (Attachment 4)

Note: The Model has been set up on the basis of the DEETYA/AVCC Space Guidelines 1990 and has been adjusted over time to suit the changing needs within the University of Newcastle.

These Guidelines have a commonality with those from the New Zealand Ministry of Education and the New Zealand Vice Chancellors' Committee which allows the Model to be similarly used and adjusted.

INDICATIVE SPACE MODEL 'GRID'

ATTACHMENT 1

Indicative Space Model – Planning calculations

Based on the DEETYA Higher Education Space Indicators

Higher Education Space Indicators for Staff m² UFA/FTF									Higher Education Space Indicators for Students m² UFA/EFTSU			
Space Indicator Group	Teaching only	Research only		Teaching & Research		Other functions General**		Allowance Ancilliaries %	Under-graduate	Higher Degree by Course work	Higher Degree by Research	Allowance for Ancilliaries %
	Office	Office	Lab	Office	Lab	1	2					
A	14	0	16	14	16	12	6	10	4	5	10	60
B	14	7	16	14	16	12	6	10	4	5	7	40
C	14	14	0	14	0	12	6	10	0	0	7	20
D	14	14	0	14	0	12	6	10	4	5	7	40
E	14	0	16	14	16	12	6	10	4	5	10	30
F	14	0	16	14	16	12	6	10	4	5	10	50
G	14	14	0	14	0	12	6	20	0	0	0	0
H	14	0	16	14	16	12	6	10	0	5	10	30

** Other functions General 1 = Administrative staff

** Other functions General 2 = Outside staff who use a desk occasionally (Maintenance & Storeman)

Fields of Education /Discipline Codes as they relate to the Space Indicator Group are attached.

Note: The square metre rate placed against each position may be different from the Space Allocation by Position as outlined in Section 3 of the Guidelines

This grid is used to calculate an overall Indicative envelope of space for a School/Discipline or Department.

Use of the Grid as a Space Management Tool

Formulas can be added to the grid in an Excel spreadsheet to enable an Indicative space envelope to be calculated.
This is particularly useful when working out space for a new academic department or discipline.
Projected staff and student numbers can be entered into the spreadsheet and an Indicative envelope of space will be calculated.
The grid can be used as the basis of an Indicative Space Model and can be written into a program that aggregates an Indicative space calculation by IOU code. This can be achieved by downloading the university's DEST Student and Staff Load files from the STATPAC.
The Indicative outcomes can be measured against current space actuals.
This Model is a guide that can be used to see who needs space and who has too much space.
The model can be adjusted to square metre rates that are acceptable within your university.

FIELDS OF EDUCATION

ATTACHMENT 2

CODES TO BE TAKEN FROM THE DEETYA (DEST) STATPAC – STUDENT AND STAFF LOAD FILES

Note: This sheet is to be used in conjunction with the Indicative Space Model – Planning calculations to link the code to the Space Indicator Group

BROAD FIELDS OF EDUCATION (can ONLY be used for courses)		NARROW FIELDS OF EDUCATION		DISCIPLINE GROUP	SIG SPACE INDICATOR GROUP
01	Natural and Physical Sciences	0101	Mathematical Sciences	010101	H
		0103	Physics and Astronomy	010103	F
		0105	Chemical Sciences	010105	F
		0107	Earth Sciences	010107	F
		0109	Biological Sciences	010109	A
		0199	Other Natural and Physical Sciences	010199	E
02	Information Technology	0201	Computer Science	020201	E
		0203	Information Science	020203	E
		0299	Other Information Technology	020299	E
03	Engineering and Related Technologies	0301	Manufacturing Engineering and Technology	030301	E
		0303	Process and Resource Engineering	030303	E
		0305	Automotive Engineering and Technology	030305	E
		0307	Mechanical and Industrial Engineering and Technology	030307	E
		0309	Civil Engineering	030309	E
		0311	Geomatic Engineering	030311	E
		0313	Electrical and Electronic Engineering and Technology	030313	E
		0315	Aerospace Engineering and Technology	030315	E
		0317	Maritime Engineering and Technology	030317	E
		0399	Other Engineering and Related Technologies	030399	E
04	Architecture and Building	0401	Architecture and Urban Environment	040401	D
		0403	Building	040403	D
05	Agriculture, Environmental & Related Studies	0501	Agriculture	050501	A
		0503	Horticulture and Viticulture	050503	A
		0505	Forestry Studies	050505	A
		0507	Fisheries Studies	050507	A
		0509	Environmental Studies	050509	A
		0599	Other Agriculture, Environmental and Related Studies	050599	A
06	Health	0601	Medical Studies	060601	A
		0603	Nursing	060603	A
		0605	Pharmacy	060605	A
		0607	Dental Studies	060607	A
		0609	Optical Science	060609	A
		0611	Veterinary Science	060611	A

ATTACHMENT 2 (CONT)

		0613	Public Health	060613	A
		0615	Radiography	060615	A
		0617	Rehabilitation Therapies	060617	A
		0619	Complementary Therapies	060619	A
		0699	Other Health	060699	A
07	Education	0701	Teacher Education	070701	C
		0703	Curriculum and Education Studies	070703	C
		0799	Other Education	070799	C
08	Management and Commerce	0801	Accounting	080801	C
		0803	Business and Management	080803	C
		0805	Sales and Marketing	080805	C
		0807	Tourism	080807	C
		0809	Office Studies	080809	C
		0811	Banking, Finance and Related Fields	080811	C
		0899	Other Management and Commerce	080899	C
09	Society and Culture	0901	Political Science and Policy Studies	090901	C
		0903	Studies in Human Society	090903	C
		0905	Human Welfare Studies and Services	090905	C
		0907	Behavioural Science	090907	A
		0909	Law	090909	C
		0911	Justice and Law Enforcement	090911	C
		0913	Librarianship, Information Management and Curatorial Studies	090913	C
		0915	Language and Literature	090915	C
		0917	Philosophy and Religious Studies	090917	C
		0919	Economics and Econometrics	090919	C
		0921	Sport and Recreation	090921	C
		0999	Other Society and Culture	090999	C
10	Creative Arts	1001	Performing Arts	101001	D
		1003	Visual Arts and Crafts	101003	D
		1005	Graphic and Design Studies	101005	D
		1007	Communication and Media Studies	101007	C
		1099	Other Creative Arts	101099	D
11	Food, Hospitality and Personal Services	1101	Food and Hospitality	111101	E
		1103	Personal Services	111103	C
12	Mixed Field Programs				

The Broad Field of Education (BFOE) "12 Mixed Field Programs" appears in the classification to provide codes mainly for the Vocational Education and Training (VET) Sector. As no HECS bands have been provided that relate to this BFOE it is suggested that the University does not use any codes related to this BFOE.

SAMPLE REPORT – INDICATIVE SPACE MODEL CALCULATION

ATTACHMENT 3

Sample Indicative Space Report

Facilities Management (Space Management)
The University of Newcastle (3014)

UNISM — Based on: 2001 Data Set Year

Faculty: ENGINEERING

DEET Organisational Unit: 1135 – DEPARTMENT OF CHEMICAL ENGINEERING

Staff Numbers (1135) (FTE)

Disc. Group	Employment Type	Space Indicator Group		Teach Only	Research Only	Teach/ Research	Office Workers	Outdoor Workers	Misc.	Total
0701	Casual Staff	E		1.79	1.45	0.00	0.62	0.00	0.00	3.86
0701	Full time Staff	E		0.00	10.00	11.50	13.00	0.00	0.00	34.50
				1.79	11.45	11.50	13.62	0.00	0.00	38.36

Staff Indicative Space (1135)

Space Indicator Group	Teach Office	Research Office	Research Lab	Teach + Research Office	Teach + Research Lab	Office Workers	Outdoor Workers	Misc.	Ancillary	Total
E	25.06	0.00	183.20	161.00	184.00	163.44	0.00	0.00	71.67	788.37
	25.06	0.00	183.20	161.00	184.00	163.44	0.00	0.00	71.67	788.37

Student Numbers (1135) EFTSU

Disc. Group		Space Indicator Group		Post Graduate Research		Post Graduate Coursework		Other Than Higher Degree		Total
0103		F		0.13		0.00		4.63		4.75
0199		E		0.00		0.00		0.10		0.10
0303		E		30.50		0.00		73.86		104.36
0399		E		0.06		0.00		4.75		4.81
0509		A		0.00		0.22		0.00		0.22
0613		A		0.00		0.00		0.99		0.99
0809		C		0.00		0.00		2.88		2.88
				30.69		0.22		87.20		118.11

ATTACHMENT 3 (CONT)

Student Indicative Space (1135)

Space Indicator Group		Post Graduate Research		Post Graduate Coursework		Other Than Higher Degree		Ancillary	Computer Teaching	Total
A		0.00		1.10		3.97		3.04	0.00	8.11
C		0.00		0.00		0.00		0.00	0.00	0.00
E		305.62		0.00		314.82		186.13	0.00	806.58
F		1.25		0.00		18.50		9.88	0.00	29.63
	Total (sq m)	306.87		1.10		337.29		199.05	0.00	844.31

Summary of Indicative Space for IOU (1135)

Casual Staff		61.27								
Full time Staff		727.10								
All Staff		788.37		Student	844.31		Total Indicative Space Calculation:			1632.68

SAMPLE REPORT – INDICATIVE SPACE VERSUS ACTUAL SPACE

ATTACHMENT 4

SAMPLE Indicative Space Versus Actual Space
FACILITIES MANAGEMENT (Space Management)

The University of Newcastle (3014)

UNISM — Based on: 2001 Data Set Year

Faculty: ENGINEERING

DEET Organisational Unit:1135 – DEPARTMENT OF CHEMICAL ENGINEERING

Staff Numbers

	Teach Only	Research Only	Teach/ Research	Office Workers	Outdoor Workers	Miscellaneous	Total
	1.79	11.45	11.50	13.62	0.00	0.00	38.36

Student Numbers (EFTSU)

	Post Graduate Research		Post Graduate Coursework		Other Than Higher Degree		Total
	30.69		0.22		87.20		118.11

Student/Staff Ratios

	SSR1		SSR2				
	Teaching		All				
	4.76		2.37				

Indicative Space (m^2)					Actual Space (m^2)	
	Staff	Student	Total		Total Useable	
	788.37	844.31	1632.68		1540	

Actual - Indicative Difference: -92.68m^2

Percent of Indicative Space: -5.68%

Indicative Space / EFTSU: 13.82m^2

Actual Space / EFTSU: 13.04m^2

6.0 SPACE PLANNING SOFTWARE

University	Proprietary/ Specially Developed	Brand Name	Agents	University Contact	Phone	Email	Opinion (does it do the job well)	Able to be easily modified
University of South Australia	Proprietary	Aperture	FM Innovations	Phil Clatworthy	(08) 8302 1759	philip.clatworthy@unisa.edu.au	Yes	Yes
Macquarie	Proprietary	Insite Visual FM	Insite (Boston)	Nigel Gray	(02) 9850 7127	ngray@bgo.mq.edu.au	Yes	Yes for simple matters
Melbourne	Proprietary	Archibus	Facilities Assist	Martin Earp	(03) 8344 4625	earp@unimelb.edu.au	Yes	Yes
Griffith	Specially developed based on DEETYA Indicative Space Model	Uses Omnis Data Base/Being converted to Filemaker Pro		Sam Ragusa	(07) 3875 7149	s.ragusa@mailbox.gu.edu.au	Yes	Yes
Tasmania	Proprietary	Archibus	ICAD Consultants, Sydney	Joan Rodrigues	(03) 6226 2794	joan.rodrigues@utas.edu.au	Yes	Yes
Adelaide	Proprietary and Developed	DEETYA Indicative Space Model plus Spreadsheets		Andrew Trotter	(08) 8303 4247	andrew.trotter@adelaide.edu.au	Below Average	Yes
Newcastle	Specially developed based on DEETYA Indicative SpaceModel	UNSM Access Database	Developed In-house	Sandra Jones	(02) 4921 6665	Sandra.Jones@newcastle.edu.au	Yes	Yes
Edith Cowan	Proprietary	Archibus FM	PerthCad Centre	Darren McKee	(08) 9273 8490	d.mckee@ecu.edu.au	Yes	Yes for simple matters

7.0 GLOSSARY OF TERMS AND ABBREVIATIONS

AAPPA	Australasian Association of Higher Education Facilities Officers
DEETYA	Department of Education, Employment, Training and Youth Affairs (now DEST)
DEST	Department of Education, Science and Training
DESTPAC	Statistical Information Package from DEST
EFTSU	Equivalent Full-time Student Unit
FTE	Full-time Equivalent
FTF	Full-time Fractional
GFA	Gross Floor Area
HRS AVAILABLE	Teaching Hours Available to Deliver SCH
IOU	Institution Organisation Unit
OSPRO	Outside Studies Program
RF	Room Frequency
SCH	School Contact Hours
STATPAC	see DESTPAC
TBA	To Be Advised
TU	Theoretical Utilisation
UFA	Useable Floor Area

8.0 ACKNOWLEDGEMENTS

Each of the Sections of this document has been authored by people within the tertiary sector of Australasian Universities which are members of AAPPA.

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Denis Stephenson
Manager, Buildings and Grounds,
La Trobe University.
Editor.

9.0 FURTHER READING

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Wes McGregor (2000). 'Facilities Planning and the Business of Space.' (Butterworth – Heinemann).

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The web sites of the following organisations have publications on space planning:

- Council of Ontario Universities' (COU) Standing Committee on Space Standards and Reporting
- APPA: The Association of Higher Education Facilities Officers, www.appa.org
- Western Interstate Commission for Higher Education: WICHE
- SCUP: Society for College and University Planning, www.scup.org
- LAMA BES: Library Administration and Management Association, Building and Equipment Section.
- DEST, Education Services for Overseas Students (ESOS) www.detya.gov.au/esos/ specifies educational resources and facilities required for CRISCOS registered courses.
- National Center for Educational Statistics (NCES) USA, Working Group on Postsecondary Physical Facilities, Postsecondary Education Facilities Inventory and Classification Manual, http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=92165
- The Higher Education Estates Web Site, UK www.heestates.ac.uk