

Tool to Benchmark the Size of the Estate

User Guide

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1	Introduction to the Benchmarking Tool	1
2	Model layout	2
3	How to use the model	3
4	Comparison of Benchmarking predictions over time	11
5	Troubleshooting	12
6	System requirements	14

1 Introduction to the Benchmarking Tool

The Benchmarking Tool is a spreadsheet-based tool, which allows users to compare the size of their actual non-residential estate with predictions of its space use, which are based on assumptions set within the tool.

The Benchmarking Tool derives a predicted size of an HEI's estate from its profile of explanatory factors ("drivers"), such as income, student-body demographics and location.

There are two different estimation bases for the predictions. Each prediction method considers the relationship, between the drivers and actual space use, that prevails on average across (a sub-sample of) the sector.

The first set of predictions is based on the average relationship across all HEIs in the sector. Therefore it does not reflect the best or most efficient use of space.

The second type of prediction is based on the average relationship across the quartile of HEIs which were found in the first prediction to be the most efficient in their space use. This relationship reflects broadly the best or most efficient use of space.

It is important to note that the output of the Benchmarking Tool should be interpreted as an important input into a wider reflection by an institution on the appropriate size of its estate and not as a normative space guide. There may be very valid reasons why the estate of a particular HEI deviates from the size that the benchmarking model predicts.

The Benchmarking Tool's primary focus is on the net internal area of the entire non-residential estate of an HEI. There is some further exploration of sub-categories of space (by type of use).

To facilitate the use of the Benchmarking Tool, the 2011 releases of EMS and HESA data, and a number of other parameters, are provided as default settings but users are free to override these default settings with their own data.

Users can easily modify many of the inputs to generate predictions based on actual or planned scenarios of space use.

The spreadsheet for the Benchmarking Tool is password-protected to protect the confidentiality of the EMS data contained within it. Please contact Bernard Dromgoole (b.dromgoole@hefce.ac.uk) to request the password, which is, in general, restricted to staff of Estates Management departments within HEIs.

2 Model layout

The Benchmarking Tool is a spreadsheet, with the main inputs and outputs being presented in a single worksheet. There are other worksheets in the model, though most of these are for underlying inputs and historical summaries of the results in the main worksheet.

The worksheets are as follows:

- Introduction – the opening page of the model, giving brief notes on its use
- Benchmarking – the main worksheet for users of the model
- HEI Data – HEI-specific data that underlie some inputs into the Benchmarking worksheet
- Predictions Across Editions – a worksheet containing an embedded spreadsheet that reproduces the predictions from previous years' Benchmarking worksheets

The Benchmarking worksheet contains the model's main functions, and almost all the information relevant to users of the model.

The HEI Data contain data supporting the Benchmarking worksheet. Users do not need to examine or change any elements of the HEI Data worksheet.

Cells in the Benchmarking worksheet are shaded with colour coding for ease of identification:

▪ Individual HEI inputs (light green)
▪ EMS/HESA/other data (pale blue) [with EMS codes in right margin]
▪ Outputs from the model (lavender)
▪ Inputs derived from SAM (orange) ¹

¹SAM (Space Assessment Model) is a spreadsheet-based tool that allows HEIs to build up their profile of academic space needs from the bottom up, based on the type of space and demands on that space. The tool itself forms part of the AUDE Toolkit for a Sustainable Estate, available here: http://www.aude.ac.uk/info-centre/aude_toolkit_forsustainableestate

3 How to use the model

The model makes use of data already used within the sector, and adheres to EMS/HESA definitions for much of its calculations.²

The model allows you to quickly populate its cells with whatever data has been recorded for HEIs.

However, you can also use it to run calculations for different data, such as more recent data or hypothetical situations, by entering data into the green input cells.

You can adjust many of the inputs into the calculation to make the calculations for whatever parameters best represent your actual or hypothetical estate.

The steps listed below describe how to use the Benchmarking worksheet to calculate estate-wide costs. To help you navigate around the model, each step is accompanied by a picture of the relevant section of the Benchmarking worksheet.

For the model to function fully, you must enter values into all the green cells.

The Benchmarking worksheet makes predictions for the total non-residential estate and also by sub-category of space.

² A useful point of reference is the file listing EMS variables' definitions, the latest version of which can be found on the Estate Management Statistics website at <http://www.opdems.ac.uk/downloads.asp>.

Space Sub-Categories

All space categories in the model are in terms of non-residential net internal area, and are directly related to EMS definitions. The precise space definitions and EMS variables are set out in the table below.

Table 1: Space categories and EMS variables used in the model	
Space category (non-residential, net internal area)	EMS variable(s)
Total	D12C13 (Total non-residential)
General Purpose Teaching Space	D12C3 (Teaching – core) <i>less</i> D14A (Specialist teaching area)
Specialist Teaching Space	D14A (Specialist teaching area)
Teaching Office Space	D12C2 (Teaching – offices)
Research Space	D12C7 (Research – total) [equal to D12C5 (Research – offices) <i>plus</i> D12C6 (Research – core)]
Learning Centre Space	D12C10c (Support – learning centre space)
Other Support Space	D12C10 (Support – total) <i>less</i> D12C10c (Support – learning centre space)

Note: EMS definitions are from 2009 EMS report. The labelling of the variables has not changed since the 2006 EMS report, but is slightly different in previous EMS reports.

Step 1 – Estate Data Inputs

This step sets up the whole model for use with a particular HEI. It is possible to use the model without completing this step, but it will involve making cell entries one at a time. This step speeds up the process by making use of data already submitted by the HEI to EMS.

Step 1 - ESTATE DATA INPUTS	
Select an HEI:	(Not Identified) <input type="button" value="v"/>
To copy the EMS values from the blue cells into the green input cells, click the button 'USE EMS'. Users may choose instead to enter other values in the green input cells.	<input type="button" value="USE EMS"/>
To clear the green input cells, click the button 'CLEAR INPUTS'.	<input type="button" value="CLEAR INPUTS"/>
To clear the orange input cells, click the button 'CLEAR SAM'.	<input type="button" value="CLEAR SAM"/>

At the top of the worksheet is a drop-down menu that allows you to select which HEI you want to load the EMS values for.

- Once you have specified an HEI, data for that HEI from the EMS institutional report (referring to the previous academic year) will appear in the pale blue cells.

There are three buttons at the top of the Benchmarking worksheet which automate some of the input processes throughout the entire worksheet. This automation reduces the amount of information a user needs to fill in. These values can be over-ridden with a user's own values; users may wish to use the automation, then amend just one or two values manually.

- You can automatically use EMS values as the inputs to the model by clicking the 'USE EMS' button.
- You can clear all inputs to the model (green cells) by clicking the 'CLEAR INPUTS' button.
- You can clear SAM inputs to the model (orange cells) by clicking the 'CLEAR SAM' button.

Step 2 – Estate Description

This section asks you to describe the size of the estate, and to assign values to some of the inputs identified as the drivers of space use. You must fill in all the green input cells describing the estate of the HEI of interest.

Step 2 - ESTATE DESCRIPTION			
<i>NOTE 1: All areas are net internal areas.</i>			
	UNITS	INPUT	EMS VALUES
ESTATE			
What is the area of your non-residential estate?	Sq. M.	<input type="text"/>	(Not Identified)
What is the area of your core teaching space?	Sq. M.	<input type="text"/>	(Not Identified)
What is the area of your teaching office space?	Sq. M.	<input type="text"/>	(Not Identified)
What is the area of your research space?	Sq. M.	<input type="text"/>	(Not Identified)
What is the area of your library space?	Sq. M.	<input type="text"/>	(Not Identified)
What is the area of your other support space?	Sq. M.	<input type="text"/>	(Not Identified)
What is the bottom-up prediction of the area of total teaching space?	Sq. M.	<input type="text"/>	
What is the bottom-up prediction of the area of library space?	Sq. M.	<input type="text"/>	
What is the bottom-up prediction of the area of teaching office space?	Sq. M.	<input type="text"/>	
What is the bottom-up prediction of the area of research office space?	Sq. M.	<input type="text"/>	
What is the bottom-up prediction of the area of research area space?	Sq. M.	<input type="text"/>	
How many sites do you have?	Number	<input type="text"/>	(Not Identified)
What is the population density of your local authority district?	000 persons/hectare	<input type="text"/>	(Not Identified)
<i>NOTE 2: The Data Reference section below lists population density in all UK Local Authority Districts.</i>			
FINANCE			
What is your annual teaching income?	£ millions	<input type="text"/>	(Not Identified)
What is your annual research income?	£ millions	<input type="text"/>	(Not Identified)
What is your annual income from other sources?	£ millions	<input type="text"/>	(Not Identified)
STUDENT BODY			
What percentage of your students are:			
Franchised students?	%	<input type="text"/>	(Not Identified)
Studying subjects in price group B?	%	<input type="text"/>	(Not Identified)
What is the share of student FTEs in your total student headcount?	%	<input type="text"/>	(Not Identified)
SPACE MANAGEMENT			
Do you use Space Charging?	0 = No, 1 = Yes	<input type="text"/>	(Not Identified)
What percentage of your core teaching space is subject to Central Timetabling?	%	<input type="text"/>	(Not Identified)

Most of these drivers' values are recorded in EMS, with the corresponding variable codes presented in the margin (not shown in this guide) to the right of the main cells of the model. Further data on student body demographics come from HESA, and there is also a measure of population density from 2001 census data³.

³ At the end of the Benchmarking worksheet, a list labelled "Data Reference" fully lists the population

- You need to fill in four sub-sections (most of which are recorded in EMS for the entire estate) regarding the following: estate size and location, HEI income, student body demographics, and use of space management tools.
- HEI data may be missing for some variables. In this case, the blue cells will read 'Missing'. You must enter numeric values in all the green input cells.

Step 3 – Comparison of Actual Estate Size with Model Predictions

Once all inputs have been entered, the 'Comparison' section summarises the size of the HEI's estate and predictions based on estimated regression models of the drivers in the HEI sector. There are individual regression models for each sub-category of space, reflecting that each driving factor may have a different influence on each space sub-category.

Step 3 - COMPARISON OF ACTUAL ESTATE SIZE WITH MODEL PREDICTIONS					
ESTATE SIZES (all in Sq. M.)	ACTUAL	PREDICTED SPACE (SAM):	PREDICTED SPACE 1:	PREDICTED SPACE 2:	PREDICTED SPACE 3:
SAMPLE OF HEIs (USED TO ESTIMATE PREDICTIVE MODELS)			ALL	ALL	TOP 25%
USE OF SPACE MANAGEMENT TOOLS			CURRENT	ALL	ALL
NOTE 3: 'Current' implies Space Charging, Central Timetabling are the input values (H77, H79) 'All' implies Space Charging = 1 and Central Timetabling = 100%.					
TOTAL NON-RESIDENTIAL	Undefined		Undefined	Undefined	Undefined
CORE TEACHING	Undefined	Undefined	Undefined	Undefined	Undefined
TEACHING OFFICES	Undefined	Undefined	Undefined	Undefined	Undefined
RESEARCH	Undefined	Undefined	Undefined	Undefined	Undefined
LIBRARY	Undefined	Undefined	Undefined	Undefined	Undefined
NOTE 4: Predicted value constrained to be greater than or equal to zero.					
OTHER SUPPORT	Undefined		Undefined	Undefined	Undefined

It is important to note that the regression models underlying the Benchmarking Tool allow explicitly for space charging and central timetabling to have an effect on the size of the total non-residential estate and a number of sub-space categories, such as teaching (in the case of central timetabling) and teaching research and support (in the case of space charging).

The Benchmarking Tool generates four space predictions. The first is based on a bottom-up approach, and the remaining three are based on EMS and

density data (from the 2001 Census) that is used as an input by the benchmarking tool. Users may use this list as a point of reference, but do not have to change any of these data.

HESA data. Two of these latter three are based on the sector-wide relationship between the size of the estate and a range of space drivers while the third is based on the relationship between the size of the estate and the drivers observed among the HEIs which are the most space efficient.⁴ The details of each prediction are provided below:

- Predicted Space (SAM): The predicted size of a certain space category of an HEI based on the bottom-up predictions from SAM (Space Assessment Models);
- Predicted Space 1: The predicted size of a certain space category of an HEI based on
 - a) the sector-wide relationship between size and drivers of size, and
 - b) the HEI's current use of the space management tools;
- Predicted Space 2: The predicted size of a certain space category of an HEI based on
 - a) the sector-wide relationship between size and drivers of size of the same space category, and
 - b) the assumption that the two space management tools are fully utilised, namely that a space charge is in place and that 100% of the teaching space is centrally timetabled;
- Predicted Space 3: The predicted size of a certain space category of an HEI based on
 - a) the relationship between size and drivers of size of the same space category among the most space efficient HEIs, and
 - b) the assumption that the two space management tools are fully utilised, namely that a space charge is in place and that 100% of the teaching space is centrally timetabled.

⁴ The relationship between the size of the estate and the drivers of the most space efficient HEIs is the relationship among the quartile of HEIs which were found to use the least space relative to the drivers using the sector-wide average relationship.

Step 4 – Costs Implications of Excess Space

Step 4 - COST IMPLICATIONS OF EXCESS SPACE

NOTE 5: This section uses the estimates of the ANNUALISED COST OF A FIT-FOR-PURPOSE ESTATE from the AUDE Model of Estate Costs (Calculations 1 and 2 from cells F185 and F215 in the Space Cost worksheet). The definitions are given in the Model of Estate Costs (MEC) itself and in the User Guide accompanying it. Be careful to make the estimates based on the same HEI across the two models.

For the whole of the HEI estate, excluding Essential Backlog Maintenance:

Calculation 1 - ANNUALISED COST OF A FIT-FOR-PURPOSE ESTATE	£/ Sq. M.	<input type="text"/>
Calculation 2 - (Calculation 1) plus OPPORTUNITY COST OF CAPITAL	£/ Sq. M.	<input type="text"/>

This section uses the estimates of Calculations 1 and 2 from the Space Cost worksheet in the AUDE Model of Estate Costs (MEC). You will need to enter the values of these cells manually, counting the entire net internal non-residential area for all tenures of space use together. The calculations, in the hypotheses which follow, assume that an HEI maintains its existing distribution of space across tenure types.

For each hypothesis, this change in cost is expressed in two forms: the Annualised Cost of a Fit-for-Purpose Estate and the same *plus* the Opportunity Cost of Capital. The spreadsheet defines the interpretation of each form of output in Notes 6 and 7.

Hypothesis 1:

Actual Total Non-Residential Space is reduced in total by an amount specified by the user.

Actual Total Non-Residential Space is reduced in percentage terms by: %

The HEI annual costs would increase as follows (negative values denote savings):

Calculation 1 - ANNUALISED COST OF A FIT-FOR-PURPOSE ESTATE £ millions

NOTE 6: If the HEI reduced space but received no revenue from selling or letting the excess space, it would benefit to this amount annually through lower estate cost.

Calculation 2 - (Calculation 1) plus OPPORTUNITY COST OF CAPITAL £ millions

NOTE 7: If the HEI reduced space and either let or sold the excess space, it would benefit by this much annually through lower estate cost and higher rental or interest income.

Hypothesis 1 shows, using the sector-wide relationship between size and drivers of size, the annual flow of money the HEI could save were it to reduce space by a percentage specified by the user.

Hypothesis 2:

Actual Total Non-Residential Space changes towards the value predicted by the model, assuming the HEI uses all available space management tools.

The gap between actual and predicted space is reduced in percentage terms by: %

The HEI annual costs would increase as follows (negative values denote savings):

Calculation 1 - ANNUALISED COST OF A FIT-FOR-PURPOSE ESTATE (SEE NOTE 6)	£ millions	<input type="text" value="Undefined"/>
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Calculation 2 - (Calculation 1) plus OPPORTUNITY COST OF CAPITAL (SEE NOTE 7)	£ millions	<input type="text" value="Undefined"/>
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Hypothesis 2 shows, using the sector-wide relationship between size and drivers of size, the predicted annual flow of money the HEI could save were it to close the gap, between actual space and predicted space assuming full use of space management techniques (space charging and central timetabling), by a percentage specified by the user.

Hypothesis 3:

Actual Total Non-Residential Space changes towards the value predicted by the model, assuming the HEI uses all available space management tools, plus the HEI performs as well as the average for the top 25% of HEIs.

The gap between actual and predicted space is reduced in percentage terms by: %

The HEI annual costs would increase as follows (negative values denote savings):

Calculation 1 - ANNUALISED COST OF A FIT-FOR-PURPOSE ESTATE (SEE NOTE 6)	£ millions	<input type="text" value="Undefined"/>
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Calculation 2 - (Calculation 1) plus OPPORTUNITY COST OF CAPITAL (SEE NOTE 7)	£ millions	<input type="text" value="Undefined"/>
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Hypothesis 3 shows, using the space-efficient relationship between size and drivers of size, the predicted annual flow of money the HEI could save were it to close the gap, between actual space and predicted space assuming full use of space management techniques (space charging and central timetabling), by a percentage specified by the user, and assuming that the HEI performs as well as the average for the top 25% of HEIs.

4 Comparison of Benchmarking predictions over time

Users can compare the Benchmarking Tool predictions of the total non-residential area for each HEI across time. The Benchmarking Tool contains embedded within it a second spreadsheet that reproduces the predictions from previous years' Benchmarking worksheets.

There are no inputs to be entered in the comparison file, though it does allow the user to use the AutoFilter command in Excel on the data.

"The All Predictions worksheet presents a summary of the predictions for each of the years in which the Benchmarking worksheet has been used.

For each year of data, we include two worksheets, labelled Predictions and Data. ""Data"" worksheets are reproductions of the HEI Data worksheets from the SMG (Benchmarking) model. ""Predictions"" worksheets use the HEI data to calculate the predicted total non-residential area, and also the absolute difference between predicted and actual total non-residential areas."

5 Troubleshooting

Some error messages or other difficulties may be encountered when working with the spreadsheet. We have identified a few such issues and these are discussed below. You are recommended to follow these troubleshooting steps before seeking further help. You may contact Pietro Patrignani of London Economics with additional support questions at ppatrignani@londecon.co.uk. Pietro would also be interested in any errors you believe the spreadsheet contains, or further suggestions for improving the user-friendliness of the model.

Opening the Model

The spreadsheet for the Benchmarking Tool is password-protected to protect the confidentiality of the EMS data contained within it. Please contact Bernard Dromgoole (b.dromgoole@hefce.ac.uk) to request the password, which is, in general, restricted to staff of Estates Management departments within HEIs.

This model uses macros to perform some functions. If your security settings in Excel are set to a high level, you may not be able to open the model.

You may encounter an error message, due to macros being disabled automatically by Excel.

In Excel 2007, a security bar will appear between the ribbon and the formula bar with the message “**Security Warning** Macros have been disabled.” Accompanied by a button labelled ‘Options...’. Click this button, select “Enable this content” in the subsequent dialog box and click ‘OK’. This may occur every time you open the file, and cannot be circumvented without compromising the general security of your PC when opening Excel files.

In previous versions of Excel, open Microsoft Excel and click on ‘Tools’, ‘Macro’, ‘Security’. This presents a choice of three security levels, ‘High’, ‘Medium’ and ‘Low’. Select ‘Medium’ and then click ‘OK’.

On opening the spreadsheet after this, you may encounter a message asking whether you wish to ‘Disable Macros’ or ‘Enable Macros’. Select ‘Enable Macros’.

Closing the Model

You may be asked to save the embedded file (Comparison of Benchmarking Predictions Across Time.xls) as well as the SMG model when you exit the program. If you have made changes that you wish to keep (such as a customised filtering) in the embedded file, you should choose to save changes to both files.

Output Cells

The problem you are most likely to face is that an output cell reads 'Undefined' rather than giving an output. This will occur if you do not enter all the required input details.

You should check you have filled in all necessary input cells correctly. You should also check you have selected the relevant HEI in the Benchmarking worksheet.

Printing Spreadsheet

The spreadsheet is set up to print legibly onto A3. If you wish to change the print settings to suit A4, you may adjust the settings as follows:

Go to 'Page Layout', 'Size' and select A4. Then go to 'View', 'Page Break Preview' and then drag the page breaks with the mouse to suit your needs.

6 System requirements

The spreadsheet runs in versions of Windows since Windows 98, except for Windows XP Home. It will not run on Macintoshes. We have not tested it on any other operating systems. It should run in all versions of Office from Office 2000 onwards.