The costs of engineering degrees

Report for: The Engineering and Technology Board and the Engineering Professors Council

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SUMMARY

1. This is the report of a short study for the Engineering and Technology Board and the Engineering Professors Council, to investigate the costs of teaching engineering in UK Higher Education Institutions (HEIs) and to provide a comparison with current levels of funding.

2. The study was commissioned because of concerns that current shortfalls in funding were leading to inadequate spend in key areas, and that engineering provision was at risk.

3. The study looked at costs, resources and the financial position of engineering departments and faculties in four institutions – each displaying different characteristics in terms of size, research focus, and mission. Information on a wide range of engineering disciplines and programmes was discussed during a one day visit to each institution.

Conclusions

4. Overall, we found that there is increasing pressure on resources. Departments have made great efforts to ameliorate the effects of this on the student experience.

5. The Transparent Approach to Costing for Teaching (TRAC (T)) shows deficits in HEFCE-fundable Teaching in all four institutions that we visited – these deficits are at a significant level in three of the institutions. There was some protection for provision through significant cross-subsidies from overseas students (and, for one institution, legacy income).

6. This position was not clearly shown in the management accounts of most of the institutions, as they generally did not show the full costs of the departments' activities, or the performance of publicly-funded Teaching separately from the other activities of teaching overseas students, and of Research. There is significant scope for improving the management accounting information which flows to department and faculty managers.

7. Most institutions were restructuring and rationalising engineering provision to meet market demand and to cope with cost pressures. Whilst this meant closing some modules, and occasionally a whole engineering discipline, it was generally done in parallel with shifting resources into other new discipline areas. There was a trend towards more desk-top and computer laboratory experiences, away from large practical hands-on equipment. We also saw recent rationalisation of estates; growth (of home and overseas student numbers); and more intensive use of resources (higher student:staff ratios, higher timetabled use of laboratories, extensions to equipment life).

8. However, there is a limit to how far such adjustments can be made, and there is now much more limited scope for further rationalisation or increased use of existing resources to cope with continuing inflationary and other cost rises. The pressure on resources is beginning to evidence itself in ways which will begin to be damaging: for example limiting staff time on continuing professional development and on programme development; preventing the timely

replacement and upgrading of equipment; increasing student:staff ratios to an extent that is beginning to impinge on the quality of the student experience.

9. This threat to sustainability, combined with flat forecasts of home student numbers, and forecasts of cost inflation rising faster than income, would not be addressed by the new variable fees. They could be addressed by increasing overseas student numbers – but this is a risky strategy. The market is uncertain and there are issues of balance in institutions which already have significant proportions of overseas students.

10. Overall then we would comment there are obvious signs of pressure within the departments and these will begin to damage sustainability and the student experience if they are not managed.

11. It is necessary for the future vitality, diversity and sustainability of engineering that costs and funding are brought into a better and more sustainable balance, and this may involve action on both costs and funding.

12. In terms of costs, we found that the institutions studied had generally taken significant action to rationalise and reduce the costs of their engineering provision. The scope for many institutions to do much more is limited.

13. In terms of funding, we found a shortfall of 15 - 41% over cost (representing the three more robust sets of data in our study). It will be important that the HEFCE 2008 review of the teaching cost weights for different subject areas recognises this and helps to address the current significant under-funding of this core discipline.

Summary of findings

14. There is considerable breadth of provision. Engineering programmes vary widely between different universities – discipline and specialities, qualifications of students at entry, part-time provision, sub-degree provision, masters courses, overseas students. The resources used also varied widely – in particular contact hours and student:staff ratios (SSRs) (although information on this could not be established robustly in the time available for this study).

15. Individual universities' experiences differ, but characteristics that were common to the majority of the case studies included:

- a major restructuring of engineering departments/faculties;
- changes in teaching and learning methods to reduce resource demands (for example, pastoral support, project group sizes);
- recent review of the technician workforce;
- reviews of the amount and type of research;
- for laboratory work a move from large analogue kit to bench-top kit;
- engineering forming part of a large faculty actively managing resources across a wide spectrum of engineering and other related disciplines (not a lone department);
- significant numbers of overseas students (10-40% of total provision);

- a recent significant increase in student numbers, higher than most other faculties – in most institutions for both home/EC and overseas students, although this depended on the individual engineering discipline.

16. This growth in students was not accompanied in any university by a proportional increase in the resources available for teaching. It led in all universities to an increase in the teaching hours for each member of staff. SSRs in all cases have worsened, often significantly. This has led to increased pressure on academic staff, and a reduction in their ability to do all of the student support, or research, or innovation that they believe is required.

17. This has had an impact on provision – one department had been shut in one of the institutions, some programme and discipline areas had been shut down. In response to the challenging circumstances, and to changes in student demand, the departments aimed to manage their provision in a flexible, innovative way. Rationalisation at the same time as growth, and within large faculties, meant that resources could, over time be redeployed into growth disciplines from declining disciplines. This was only possible because of the efforts and time of a dedicated body of academic staff. We gained the impression that the academics were innovative and supportive, and were proud of their provision.

18. The pressures on academic staff time have had some impact on students, although the institutions have tried to minimise this. It was seen to impact negatively by different institutions in different ways - restricting innovation; increasing the sizes of project groups; reducing Research activity that would inform teaching; presenting challenges for new lecturers as they tried to develop their teaching and research capabilities, whilst holding down an increasing student teaching workload. Equipment was considered to be functionally good (and a great effort has been put into maintaining dated equipment), but was gradually being rundown.

19. There was considerable concern at what these pressures will do to the student experience in the long term. Academic managers considered that these would affect the student experience in due course, as well as students' perception of the attractiveness of engineering as a career.

20. The universities themselves used a range of income and cost allocation methods to establish a financial position for the engineering faculty or department. These methods generally did not allocate all costs, included incentives, did not reflect the actual use of central services and estates, and did not identify Teaching separately from Research. These issues are addressed through annual TRAC, and, because of this, annual TRAC shows very different figures for the department, and is the only source of Teaching cost data, for most of the institutions we visited.

21. Institutions' management accounts and the annual TRAC figures for Teaching activities, show the following:

The financial position of the engineering faculties/departments (2005/06)

	Institution's management accounts covering all activities	Annual TRAC for Teaching only but including overseas students as well as HEFCE-fundable provision
Institution s	Surplus of £0.6m	Deficit of £(1.2)m
Institution t	Contribution of 44% to central services and estates	Not known
Institution u	Deficit of £(0.7)m before legacy income	Deficit of £(0.2)m
Institution w	Deficit of £(1.87)m	Deficit of £(0.1)m

22. The management accounting figures include Research as well as Teaching (they cannot be separated). The Teaching figures from annual TRAC shown in the above table cover all teaching provision in the institution and therefore include a subsidy (surplus) from overseas students. The deficits would be significantly worse if overseas student provision was not included (see para 24 below).

23. The increase in income from the full effect of the variable fees was not seen as something that would improve this financial position (it would be required to cover increased bursaries, staff pay, and centrally-managed capital spend). Home/EU student numbers are likely to be flat in the future (past growth in home and overseas student numbers, in all faculties, has helped departments to survive the funding shortfall from pay, and other inflation, rising higher than funding). There is the opportunity to increase international student provision, but all of the case study institutions were wary of unbalancing the student population. In addition, this market is uncertain and there is a danger of over-reliance on this source of funding.

24. TRAC (T) costs were also reviewed as part of the study. These costs exclude all Research activity, and also exclude any costs of overseas students provision. They reflect the costs of HEFCE-fundable students (excluding any non-subject related costs such as access, London weighting etc). The average annual cost per student is referred to under TRAC (T) as the Subject-FACTS, and is to be reported formally to the funding councils next year for use in informing their funding methods for teaching.

Average Subject-FACTS across the engineering cost centres in 2005/06

	Average annual subject-related cost of a HEFCE-fundable student FTE £
Institution s	7850
Institution t	6370 *
Institution u	7060
Institution w	8650

* this figure could not be verified and we consider it to be less robust than that of the other three institutions

25. These cost per student figures can be compared with the HEFCE standard unit of resource in 2005/06 of £6134. The table shows that institutional costs are between 4% and 41% higher. The table includes data from one institution (t) which, unlike the other institutions, we could not verify through annual TRAC. The other three institutions' costs (s, u, w) were between 15% and 41% higher than income. We understand from institutions that have benchmarked their results with figures from the rest of the sector that these three figures lie on or between the mean and the upper quartile of sector costs.

26. However, all of the figures reported above are historic figures, they have in part been dictated by the resources allocated to the department. They do not reflect the expenditure that needs to be incurred for long-term sustainable teaching. This is very difficult to quantify, but it is likely to increase the resource requirements, not reduce them. This would arise from:

- addressing some of the areas of greatest concern which are affecting the quality of the student experience (see para 18 above);
- reducing the dependence for home/EU provision on the cross-subsidy from overseas students (or in some other way recognising the potential losses that could arise from this high-risk market).

27. The main potential for further reduction in costs is the rationalisation of space requirements (in some institutions). However this in itself places cost demands on the overall institution from the need to refurbish and re-equip space, as well as finding alternative use.

28. The departments were forecasting a worsening position – generally as pay and other cost inflation will be rising faster than funding. It is, therefore, very unlikely that the existing deficits, the pressures on resources these were placing, and the long-term sustainability challenges, could be addressed within a funding envelope based on current levels.

1 INTRODUCTION

Terms of reference

1.1 This is a report on the teaching costs of engineering higher education. We were commissioned by the Engineering and Technology Board and the Engineering Professors' Council to carry out a short study of these costs in 2007.

1.2 The terms of reference were to:

- ascertain the costs of teaching engineering in UK HEIs;
- provide a comparison with current levels of funding.

Background and context

1.3 The project was commissioned in the knowledge that the sustainability of engineering (and science) is of great concern to universities, and to the Government. There is a need for hard evidence on costs, and issues surrounding the costs, to inform funding policy in this area.

1.4 The ETB and EPC were concerned that higher education engineering departments across the UK are suffering from severe financial constraints, which could be putting the future and the quality of many undergraduate and postgraduate teaching programmes under threat.

1.5 The primary focus of this project was to investigate how much it really costs to teach engineering undergraduates, and to teach them well.

1.6 One 'picture' on costs is provided through the national higher education costing costing system, the Transparent Approach to Costing (TRAC – see below). However, the TRAC data specifically for teaching (TRAC (T)) is not yet available outside institutions. In this review TRAC (T) information is compared with annual TRAC data (which has a broader base and is now considered to be robust). This is turn is compared with management accounting information used within the institutions.

1.7 It should be noted that one of the concerns of the ETB and EPC is that TRAC 'locks in' underfunding levels so, for example, if a department has been underspending on maintenance of equipment it is the existing level of funding for maintenance that is costed into TRAC not the level which might be required over a longer term.

The case studies

1.8 The programme of work was overseen by a project manager from the ETB, and a Steering Group composed of representatives of the ETB and EPC. The consultants' findings were discussed at three meetings of the Steering Group.

1.9 A short study was planned, consisting of four case studies. These were selected to cover different types of institution and a wide range of provision. They were not selected with any prior knowledge of their costs or surplus/deficit positions; however, departments that were in the middle of major structuring were generally not contacted. The institutions that volunteered were generally those that had an emerging interest in course and subject costing and wanted to learn from the study techniques.

1.10 The Steering Group initially wanted to study a much wider sample but this was not possible within budget constraints. Great care was therefore taken to ensure that the institutions represented the whole breadth of the higher education sector, were as far as possible typical, and provided a good indication of the financial position, and of trends, within the sector.

1.11 The case study institutions offered a wide range of engineering disciplines. In general, the discipline or group of disciplines that was costed was determined by the structure of the management information available. There was no attempt to calculate costs across all case study institutions for the same discipline, academic cost centre (as defined by the Higher Education Statistics Agency (HESA)) or programme. The results might then not have been representative of engineering as a whole, and it also would have posed significant challenges in extracting data sufficiently robustly from the totality of provision in a faculty. However, discussions around resource use tended to focus on one ‘not untypical’ discipline – mechanical engineering in most cases. This size of provision in this discipline was generally significant.

The study programme

1.12 The study was designed to be short in length, involving a one-day visit to each institution, and relying heavily on information and analysis being provided by the institution. An information proforma was designed by the consultants and completed by institutions. Appendix I provides a copy of this.

1.13 The consultants, accompanied by the project manager, then visited each institution, typically having discussions with the head of faculty, their resources manager, a head of a department or programme area, and the TRAC accountant.

1.14 Information was gathered on one department within a faculty, or for the faculty as a whole. The discussions were focussed on understanding the financial position of engineering teaching in one department (or faculty) and to describe this in a way that could inform policy. Information was gathered on:

- department activities, structure, strategy and disciplines
- size and nature of the taught provision
- institutional view of the department and its sustainability
- the costs and funding for a department, or the faculty, reported within the institution;
- methods used to manage provision within the funding envelope;
- TRAC costs, TRAC (T) costs, and funding.

1.15 Although considerable attention was paid to costs, an equal emphasis was placed on resources:

- how a typical programme, or provision across an academic discipline such as mechanical engineering, is organised and managed;
- how provision and activities have changed over recently years, or are likely to change;
- what resources are required to provide high-quality provision over a number a years – i.e. the sustainable costs of teaching.

1.16 All figures are actuals for the 2005/06 financial year. Differences between the provision and finances in this year and in previous and subsequent years were discussed. Three case study institutions had very good information readily available on annual TRAC at a faculty level. All case study institutions provided information on the faculty from their own management accounts, and had returned Subject-FACTS (TRAC(T)) pilot data to HEFCE.

1.17 This is only a small sample. However, each of the institutions had participated in the recent UK benchmarking exercise on TRAC (T). This showed that their Subject-FACTS figures for the whole of their engineering provision, when compared with sector averages (trimmed means), were typical of the sector. One figure lay below the sector mean (halfway between that and the lower quartile), one was the same as the sector mean, one was on the sector upper quartile, and the fourth lay between the mean and upper quartile for the sector. Again we would note that the lowest figure (below the sector mean) was not considered by us to be of similar quality (in cost accounting terms) to the other three figures.

1.18 Whilst this was a UK study, the four case study institutions were based in England, and therefore all references to funding relate to HEFCE's methods. A good explanation of HEFCE's funding methods in 2005/06 is available in the publication 'Funding higher education in England: how HEFCE allocates its funds'[1]

1.19 The term faculty is used in this report to indicate a management unit within which sit a number of academic departments.[2]

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[1] www.hefce.ac.uk under Publications, 'July 2005/34'.

Funding for 2007/08 is described in 'July 2007/20'.

[2] An institution may have only four or five academic faculties, but many more departments. Institutions use other terms for faculty and department, such as school.

2 MEASURING THE FINANCIAL POSITION OF ENGINEERING DEPARTMENTS

2.1 The study looked at three types of cost to assess the financial position of engineering departments:

- TRAC – data produced through the national costing system, and recently developed to obtain data specifically on teaching (TRAC (T)).
- Institutions' management accounts – the annual and monthly management accounts and resource allocation models that heads of departments, faculties (and institutions) use to plan and monitor expenditure
- Sustainable costs – the costs that are needed to maintain quality teaching provision in the long-term, based on realistic assumptions about market demand, resource requirements, and funding.

2.2 These are described below.

TRAC - the Transparent Approach to Costing

2.3 TRAC is a costing system that has been implemented by every higher education institution in the UK. It is used to provide information to institutions, to funding bodies and to Government that can inform funding policy and institutional strategy and management. Using comprehensive and quality assured methods, costs are allocated to academic departments and academic department costs are allocated between Teaching, Research and Other activities. The methods and definitions are provided in the TRAC Guidance on http://www.jcpsg.ac.uk/guidance/ In this report we refer to costs produced through this annual TRAC process as the **annual TRAC costs** of Teaching (and other activities). Paragraph 2.7 below clarifies the distinction between the annual TRAC costs of teaching and TRAC (T) (which only report some of the costs of teaching).

2.4 Student cost data was produced for a first pilot year in 2007 (2005/06 data) and will be produced for use by the funding bodies in spring 2008 (2006/07 data). For this, the annual TRAC costs of Teaching in each academic department (including an allocation of the costs of central service departments and estates) are analysed and the costs of provision not fundable by the HE funding councils (e.g. overseas students) are excluded.

2.5 The costs of funding council-fundable provision are further analysed into subject-related costs (those that vary by discipline, such as engineering, or humanities) and non-subject related costs (those that vary by student such as widening participation, type of course such as foundation degree, or type of institution such as London weighting). The subject-related costs in each academic department are allocated to HESA academic cost centres. These costs are then divided by the number of students allocated to each cost centre that are fundable by the funding council, to produce:

The average annual subject-related costs of teaching a full-time-equivalent funding council-fundable student in a HESA academic cost centre (called **Subject-FACTS)**

2.6 The methods for producing this are described in the TRAC for Teaching (TRAC (T)) Guidance on http://www.jcpsg.ac.uk/guidance/draft/ and in this report we refer to costs produced through this process as the **TRAC (T) costs**.

2.7 TRAC (T) costs therefore cover a smaller range of provision than the annual TRAC costs of Teaching (they exclude the costs of international students and short courses, and they exclude the costs of non-subject related factors). However, they are based on the annual TRAC costs of Teaching and use the same costing standards and principles).

2.8 Annual TRAC costs are produced by all institutions in the UK, and have been reported annually since 2000. In 2007, the first pilot year, TRAC (T) costs (Subject-FACTS) were produced by 85% of institutions in England, Scotland and Northern Ireland.

2.9 The use of annual TRAC and TRAC (T) information inside institutions varies widely. All institutions use the direct/indirect analysis within annual TRAC to produce indirect cost rates for Research (i.e. the overhead charges which will be applied for Full Economic Costing of research projects). Many institutions use annual TRAC for strategic planning – looking at the differing recovery from each type of activity and sponsor; and looking in particular at the surplus/deficit of each department calculated on a full economic cost basis. Some institutions are extending annual TRAC to course costing and are using TRAC (T) costs to benchmark externally. Many institutions are considering aligning their annual TRAC methods with their resource allocation models (in particular the way that central service department and estates costs are allocated to academic departments)

Institutions' management accounts

2.10 Institutions use a wide variety of techniques for managing their resources and costs.

2.11 Resource allocation models are an important technique used in resource management. These determine the budgeted expenditure levels up to which a department or faculty can spend; the income they need to generate; and incentives to influence action (e.g. for using equipment or space differently; for raising additional income). Budgets are generally allocated to a faculty, and it is up to the faculty to determine each of their department's allocations (they would generally follow the institutional model, once the faculty office costs and any local investment needs have been covered).

2.12 Described simply, two models predominate for institutional resource allocation:

- The income generated by each department is estimated, and is taxed or top-sliced (e.g. at 30%) to cover central service department costs and perhaps to provide a surplus to fund capital spend and other overarching institutional requirements. The remainder forms an expenditure budget for the department or their faculty. This model sometimes operates by the department working to a required contribution level (e.g. it should return 30% of its income to cover estates and central services). This model is often developed slightly further by attributing some central service charges directly to the department (so the required contribution level or tax is then lower). Typically, this involves space charging.

- Alternatively, a department is attributed all the costs and income that it has generated. It is then charged for its use of libraries, central services and estates. It will then be expected to make a surplus to fund institutional-directed capital spend and perhaps some institutional initiatives.

2.13 In the first model, in the most research-intensive institution we studied, research overhead income is allocated to departments as earned in their resource allocation model. It is not top-sliced, so there is little corresponding charge of the costs that are meant (by research sponsors at least) to be partially covered by that income.

2.14 In the second model, central service costs and estates charges are being driven down to departments. These figures are increasingly becoming more in alignment with those in annual TRAC. They will, however, always differ as they include incentives to reduce space, to generate income, to increase PGR numbers, and to improve overhead levels of recovery. The cost drivers used in resource allocation models that have much more limited attribution of costs (e.g. that just cover space charging) are unlikely to be those in annual TRAC, and the charges for central services and space are almost always much lower than the estates charges made through annual TRAC.

2.15 The estates and central service costs attributed to departments through their management accounts are therefore usually incomplete (not covering all those costs), are allocated using different cost drivers from those in annual TRAC, or are not allocated at all. (They are also based on forecast (budget) spend, rather than historic (actual) spend for the year in question.) This means costs in institutions' management accounts are lower than those in TRAC, and do not therefore show a comprehensive picture of the actual full economic cost of each department.

2.16 What management accounts focus on is the amount of cash available for the academic department managers to spend (their academic, technical and administrative staff, and non-pay expenditure such as travel, consumables, office supplies, equipment maintenance etc), and the costs they might be able to influence (e.g. space usage, facilities charges). These might account for only about 50-60% of the total costs of their activities.[3]

2.17 In fact, departments have autonomy over a smaller budget than this indicates, and sometimes are not a self-contained financial cost centre at all. In one institution, some departments form the location of subject expertise and administration, but the decisions on delivery (including its resourcing) are made by the faculty. Similarly, estates decisions are either historic, or are made at faculty, not department, level.

2.18 Even then, because so many of these costs are fixed (permanent staff costs are fixed in the short term, and often in the medium term), the head of

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[3] The table shown in paragraph 3.84 of this report shows that central services costs – which are not directly influenced by academic department managers – come to about 40% of the total costs of activities in the case study institutions. As well as central services costs, the full costs of estate is also not generally shown in academic department management accounts.

department's discretion over spend can be much smaller than this. Decisions on department restructuring, staff deployment on activities, the size and nature of technician workforce, the use of laboratories and workshops, are of course made by the faculty or department managers, but they are significant, and take several years to see through.

2.19 This means that the size of the budget that is really available in the short-term – for employing an extra technician, for travel, for time to attend conferences, for an equipment contract, for extra visiting lecturer hours – is often tiny in comparison to the total costs of Teaching. But these areas are often where academic managers have most problems – in finding what can be a relatively small budget to spend on a much-needed additional resource, for this year or next year.

Difference between TRAC and institutions' management accounts

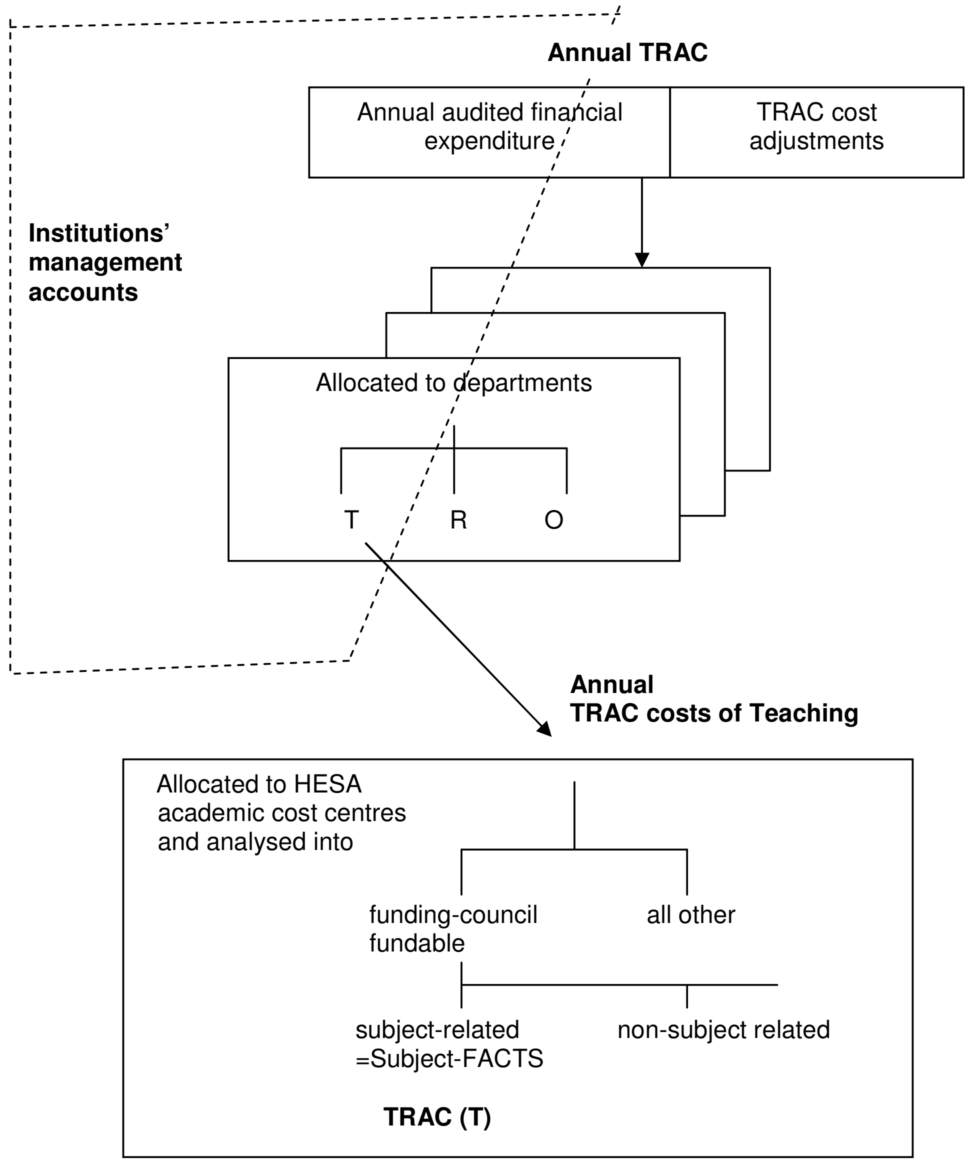
2.20 Both annual TRAC and TRAC (T) do not easily reflect this reality of day-to-day operating level resource decisions and constraints. TRAC works best as a tool to inform funding (were costs more or less than the funding provided?) or for strategic planning, to inform overall resource allocation decisions (which departments need to reduce their costs, where can net income be increased, which areas of teaching are not being allocated levels of resources comparable to other areas, or other institutions?) This is understood by some institutions – two in our study currently actively use TRAC for strategic planning at an institution level; and another is thinking of doing so. In contrast, academic managers in the fourth institution consider TRAC to be 'an external burden'.

2.21 However, because of this strategic focus, department or faculty managers do not use TRAC information for day-to-day decision-making or to inform (small) expenditure decisions.

2.22 This has influenced this study. In each institution we sought to understand the head of department's (and institution's) perception of their financial performance, and the headroom they had to address immediate, and potentially comparatively small, resource needs. This generally gave an operating or managerial view of the resource needs of a department – and the problems some departments have in meeting these. (Only one of the four institutions in this study included full economic costs as per TRAC in its monthly reporting to departments, although even then this did not include the Research/Teaching analysis.)

2.23 This can be very different from the financial information produced through TRAC, which is what the funding bodies will be using to inform national/institutional funding policies.

2.24 The key differences between costs in TRAC and most institutions' management accounts are illustrated in the figure below.



2.25 We use the terms management accounts in this report to refer to the monthly information provided to the department (year to date income generated and expenditure incurred, and forecast for the year). The levels of income and expenditure have been planned through the resource allocation model, as discussed earlier.

2.26 The differences between TRAC and management accounts can be summarised as:

a. Timing. TRAC is a retrospective calculation (although the costing methods can be used in forecast models). Management accounts are based on actual spend in academic departments but on budgeted spend and allocations (when charged) of central service and estates costs.

b. Different allocations of central services and estates costs. Management accounts do not generally include all the costs attributable to the activities being carried out in academic departments. TRAC generally gives a better reflection of the full economic costs of the departments' activities, and TRAC costs are therefore higher than those from the internal resource allocation models.

c. Different allocations of income. TRAC (T) for example specifically refers to the four price groups to which each subject is categorised in the funding councils' funding models: institutional allocation models may use these, or may use their own method of allocating the block grant for teaching/research.

   Variance can arise through timing and complexity alone - student numbers which helped to determine budget levels (and therefore spend) may be different from those being taught (and which determine the levels of teaching funding in the block grant); current levels of research activity will be different from the levels in 2001 which helped to determine the level of research funding; there are complex aspects of the teaching funding models which are significant[4], but cannot easily (or fairly) be replicated at a department level.

   Institutions will also need to invest in new areas of activity, by allocating income which was generated from old/current levels of activity. Often income (and expenditure) is allocated to a large faculty, which then has discretion as to how it is allocated to the departments within it.

d. Different methods of accounting for capital spend (e.g. equipment, estates refurbishment). Under TRAC an annualised cost of an asset – depreciation – is allocated to the department which is using those assets. In many institutions' management accounts the capital cash spend will be all that is shown (against a recurrent or additional capital budget). (Some institutions do show an adjustment at year-end to reflect the impact of capitalisation/depreciation in each department.)

e. Understanding the impact of Research. TRAC shows across the sector, and across all disciplines, that Research is in significant deficit. This is not obvious in institutions' management accounts. Therefore, heads of department do not know whether their teaching provision is under-funded or not.

2.27 Resource allocation models provide academic departments the freedom to make spend decisions in-year or in the forthcoming year. These decisions are limited by the fixed number of many of the costs, but can lead to changes in academic staffing, the employment of temporary staff or an extra technician or secretary, the whole range of non-pay costs (see paragraph 3.112) and equipment purchases. Information for managers to take decisions on spend is shown from the difference in income and expenditure in the resource allocation model during the planning process. It is therefore clear in the management accounts, but is not evident from TRAC data.

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[4] such as moderation, application of the tolerance band, the 0.05 FTE rule, the difference between actual and assumed PGT and PT fees, widening access, London premiums, capital and special initiative funding etc. These can influence HEFCE block grant funding for teaching by up to 10 - 20%.

2.28 The scope for this discretionary spend is dictated significantly by the 'discretionary income' allocated to a department. This is influenced by (b) to (e) above, as well as by complex and ever-changing policies on keeping surpluses. Policies differ on whether individual academics or departments are allowed to 'keep' (i.e. spend): money from under-spends on their annual budgets; additional income earned in the year over budget; all or some costs recovered from the recharging of overheads to research projects; income from spin-off companies, etc.

2.29 This ('discretionary') income or surplus significantly affects academics' behaviour (and spend) – e.g. as part of its financial strategy, one of the departments in this study is planning to increase their discretionary income by recruiting individuals with a strong record of research income generation. The department is allowed to keep all of the additional overhead income thus generated and use it to cover existing or new resources, at their discretion.

2.30 However, the real financial picture, reflecting the real impact on the institution, is that Research makes significant deficits if costs are allocated on a full cost basis. This is completely contrary to what this institution's management accounts are showing. Assuming Research activity is not marginal (which it is not in research-intensive institutions) – as activity increases, the deficit will increase, and the long-term financial position of the institution will decline.

2.31 There are of course strong reasons for increasing Research activity, as long as it is of sufficiently high quality, which outweigh full cost considerations for many institutions. However, the long-term detrimental impact this could be making to financial sustainability is now gradually being understood as a result of TRAC information .

2.32 The institution discussed in the last three paragraphs is now starting to change its resource allocation model and is introducing a charge 'for sustainability' on new fEC income on Research and higher (more realistic) space charging. This will align the costs reported in the management accounts closer to TRAC costs, and the overall financial position in the two reports will begin to give more similar messages.

2.33 Overall, therefore, the decisions in departments will always be influenced by their resource allocation models. Institutional resource allocation policies and methods, and good management information, are as important as external funding policies and allocations in helping an academic to manage within their institutional funding envelope. Unless there is transparency of income and (full) costs then it is difficult for academics to see to what extent their financial challenges are being caused by external funding levels, their portfolio of activity, the reasonableness of top-slicing or charges, or other reasons.

2.34 The focus of this study is on informing external funding requirements for teaching – but it is also highlighting the need for improved understanding of income and cost flows at a departmental level. TRAC is one of the tools that can help with this.

Sustainable costs

2.35 All four case studies felt their teaching was of very good or high quality (none had poor external quality assurance reviews and all had all relevant accreditation or stated that they were well on the way to this). However they expressed concern at the challenges they faced in maintaining this given their existing or forecast deficits.

2.36 Institutional management accounting costs and TRAC costs are historic costs. They are based on the previous years' reported expenditure for the institution. TRAC costs add two adjustments (to incorporate a cost of capital employed or return for financing and investment; and an adjustment to depreciation to ensure that the reported costs better reflect the real costs of the estate). However, they do not necessarily reflect the sustainable costs of teaching – the costs which should be spent to maintain quality or to enhance the student experience. This is particularly critical in a competitive market with students' expectations increasing (the new fee levels are empowering them in various ways).

2.37 These 'sustainable' costs of teaching are difficult to identify precisely or to quantify (they could be perceived as a 'wish list'). However, our discussions with academic managers in engineering departments found that each had particular resource needs that were not being adequately addressed. These included (and each institution was concerned about a different area in this list):

- Staff time available for teaching – e.g. in one institution project group sizes had had to increase (with the potential for 'passengers'); and there was a limit on the capacity to innovate because of the pressures on staff - "we have no personal or emotional energy to be innovative". In contrast, another institution made this a high priority: "it is costly – but we innovate or die" – at the expense of other resource needs;
- Staff time available for learning support – students are coming to university with significant needs in terms of both pastoral and academic support. Institutions are wanting to:- increase pastoral or tutorial support or reinforce the open-door policy; increase activities that would improve retention such as improving students' practical skills for laboratory work; improve feedback to students on assessed work and in general address areas aired in student evaluation questionnaires to ensure high quality teaching;
- Widening access – there are a range of activities aimed at increasing the number and types of students not well represented in the institution but these are "resource-hungry";
- Addressing staff workload concerns – the long working hours, the lack of time for adequate continuing professional development. One institution commented that 'you can't stretch staff forever'. They had a particular concern that it was much more difficult to start academic life then previously, with the expectation that new lecturers would do research, and take a teaching qualification, at the same time as taking on a significant teaching load. Another institution was concerned that the increase in teaching hours had meant a reduction in unfunded Research and scholarship – required to provide students with up-to-date teaching content;
- Replacing equipment. There was concern about ensuring the adequate replacement of equipment used for teaching in the future. There is an

issue with how attractive students will find old kit, however well maintained it is… "in time, our inability to replace enough equipment will impact";

- The level and quality of student support and facilities - to ensure that they remained attractive to students and their parents – both UK and international.

2.38 Increased spend on the above areas could, in some institutions, be offset to some extent by:

- Addressing space use (several case study institutions could still release some space);
- Rationalising the technician workforce (some case study institutions have rationalised their technician workforce, others have not).

2.39 Pedagogic changes affect resource levels, and some of the institutions we visited had undergone significant restructuring and portfolio reviews to try to address sustainability in the long-term. Actions included:

- Reviewing the amount of Research activity – and either significantly reducing it (in two institutions) - or (in another institution) positively taking steps to retain its quality and size. Sometimes the reduction was just a necessary result of having to increase academics' teaching hours to cope with the increase in student numbers and the static staff resource;
- Restructuring departments and faculties, to make more efficient and effective management units;
- Combining modules; discontinuing very small modules; the creation of a common core engineering programme; reviewing the number of one-to-one tutorials, the amount of coursework, the amount of assessment (and use of information technology - virtual learning environments, simulation, specialist software, etc);
- As well as costs, considering increases in international students (whilst retaining a balanced population), increases in fees, and actions to increase student applications.

2.40 All the case study institutions were concerned about their forecast financial positions. They expect to see increasing pressure on costs with, for example, salary increases higher than any funding increases. With such little room to manoeuvre at the moment, managers are very concerned about the future.

2.41 In some departments, significant Research portfolios can provide resource to Teaching. Unlike non-publicly-funded Teaching, this is not in the form of financial subsidy but is more indirect (and not quantifiable). It takes the form of often 'significant but uncosted' use of research equipment, Graduate Teaching Assistants (paid at a lower hourly rate than many permanent academics), Research Assistants supervising undergraduate research projects, UG and PGT projects being carried out in research laboratories, 'institution/own-funded Research informing Teaching'. This means that the real cost of Teaching is understated.

2.42 Sustainable strategies also need to recognise risks. Engineering departments have a high proportion (relative to many other disciplines) of international students. This can contribute high fee income and, in effect, subsidise home/EU provision, but there is increasing competition for these students, and their education and funding strategies of their home countries can change suddenly. TRAC allocates all the costs across students equally (according to use), it does not show the potential impact of a shortfall in overseas student numbers.

2.43 This will impact financially in at least two ways:

- most costs are fixed - . probably at least three-quarters are fixed in the short and medium term. If overseas students are 10-15% of the student population in a department, and this market does not continue, most of their costs are likely still to remain in the institution. This 10% of department cost will just all have to be allocated to public-fundable Teaching.
- where overseas students' fees are higher than cost – were this subsidy to be removed, deficits in those departments would significantly increase.

3 INSTITUTIONAL PROVISION

The institutions

3.1 Four institutions participated in the study. Their identity, through name or through traceable data, has been protected. Therefore the data is not presented in the same institutional order in any of the tables in this report.

3.2 The institutions illustrate the diversity in engineering provision in the sector. This is reflected in such areas as the MEng provision (one institution provided mainly MEng programmes, others none or almost none); their recruiting or selecting approaches to student entry; their activity in the widening participation agenda; or in Research.

3.3 They described themselves as one of

- Russell Group
- Research-led
- New university or post-92 university

3.4 The participating institutions are based in London, and in rural and metropolitan areas outside London. All institutions are in England, and therefore the funding reflects the funding models and levels of the Higher Education Funding Council for England (HEFCE).

3.5 The institutions varied in size from <10k students to 30k students.

3.6 The case studies demonstrate how engineering provision is being provided by a wide range of institutions across the sector.

The departments of engineering

3.7 Departments teaching engineering are often managed as part of a larger faculty. These are significant in size and in some institutions represent a quarter of the whole institution:

Size of engineering departments or faculties

Institution	Turnover £m	Number of taught students (FTEs)
F	£16m	1800
D	£10m	500
S	£23m	3600
U	£7m	800

Turnover and FTEs are unlikely all to be defined in the same way, but are useful to show the size and range of the faculties or departments for which costs and income were discussed in the case study institutions. The table shows figures for two faculties and two departments.

3.8 The turnover figures reported here include teaching international students as well as HEFCE-fundable; Research and Other activities; and some disciplines outside engineering - in one institution this amounted to half the activity in the faculty.

3.9 Similarly, the number of taught students includes international students and some students outside the engineering disciplines. In this same institution, the student numbers fundable by HEFCE reported only in engineering cost centres are 2/3rds of the total FTEs shown here.

3.10 In one institution all turnover and provision reported in this table related to one department, which was wholly engineering. However, it is very research active, Teaching was only half of that department's activity and HEFCE recurrent T income (including premiums etc) amounted for just under half the total teaching income for the department (the rest was overseas students). Therefore TRAC (T) data - Subject-FACTS - cover less than a quarter of the department's activity.

3.11 In three institutions the discussions generally focussed on a whole faculty (or school), of which various engineering disciplines formed the major part. Figures included in the table above for one post-92 institution covered 10% of the schools of the institution. In this school, engineering (mechanical, electrical) comprised about 50% of the provision. However, teaching accounted for 70% of engineering activity, and HEFCE-fundable was 65% of this. With subject-related costs just less than 90% of HEFCE-fundable costs, this meant that the engineering Subject-FACTS covered 40% of total costs in the department of engineering, and 20% of the total costs of the school.

3.12 Where engineering was part of a whole faculty, some non-engineering disciplines often came within that faculty e.g. computer science and applied maths. The faculties in which engineering sat covered other areas such as built environment (e.g. construction, surveying, architecture), maths, product design, computer sciences, applied sciences (e.g. biological and food science, forensic science). Many of these disciplines had common antecedents.

3.13 Costs for these other disciplines were pulled out separately in TRAC (T) – i.e. reported under non-engineering cost centres - but generally not in annual TRAC or in the management accounts).

3.14 This mixture of structures and disciplines means that costs (and income) had to be allocated – to HEFCE-fundable provision, and then to engineering cost centres – to identify the costs of engineering provision in itself, and only part of that provision is relevant to HEFCE's 'standard unit of resource' (and its four price bands). This is an important part of the TRAC (T) processes.

3.15 The engineering disciplines discussed in the study covered all the relevant HESA academic cost centres:

General engineering

Chemical engineering

Mineral, metallurgy and materials engineering

Civil engineering

Electrical, electronic and computer engineering

Mechanical, aero and production engineering

Although not all of these areas were offered by all institutions.

3.16 One institution offered 25 engineering programmes (HNCs to MScs) with titles covering the engineering fields of: civil, mechanical, architecture, mechatronics, quality, buildings, computer-aided design and manufacturing, environment, sustainable energy, quality management.

3.17 Similarly, there was a range of engineering disciplines which were provided outside the particular faculty studied here, the costs of which were not included. Sometimes the TRAC (T) costs (by HESA academic cost centre) and the institutional management information (by faculty) covered areas of engineering that were differently defined and aggregated. However, the significant part of the provision was the same.

3.18 Research activity varied significantly. Two institutions were graded 5/5* for Research in the last RAE. Another institution carried out little RAE-able research. Their Research has been squeezed out with increases in staff teaching hours. However they are planning to increase Research activity in the future – 'feeding back the wider world to student experience'. There is of course a cost (and deficit) associated with this decision.

3.19 A fourth institution has had significant financial pressures and has cut-back all 'non-contributing' research activity – "we are now very selective about the research contracts we take on". This has meant a drop in the research income for the faculty of £3m (nearly a third of the institution's research income) - very "bureaucratic albeit successful European research" is no longer being carried out, and the research programme now "is much more aligned with teaching and with local industry".

3.20 Other activity (academic activity that is not Research or Teaching) was comparatively small. Two institutions specifically stated that they were successful in knowledge transfer initiatives, but the activity in this area is small compared Research and Teaching. A common comment was that staff had no time to do short courses.

3.21 The case studies demonstrate how engineering is a much broader discipline than some other sciences (e.g. physics or chemistry) and covers a wide range of fields or disciplines. However, most of these are managed in one over-arching unit (a faculty) and therefore they still benefit from economies of scale from the use of space, technicians, administrative staff, management, common teaching programmes, shared modules, learning support (e.g. remedial maths) and so on.

3.22 This also allows more flexibility to respond to changes in demand and other challenges. There were a number of instances when faculties had dropped programmes, activities (such as research) or disciplines, and in one case a department. The size and breadth of a faculty is such that staff can be redeployed more easily, and provision changed, than in a self-standing small department.

3.23 For example, in one institution, student numbers in one discipline fell (chemical engineering) and at the same time rose in another discipline (computer science). One area became over-staffed, the other under-staffed. Any retirements in the faculty meant that computer science was given first choice on recruitment.

3.24 Of course balancing this type of change is always a challenge – it takes a long time, and there is always some fall-out. Flexibility can be constrained by the requirements for specialist expertise (particularly in research areas – one institution requires all staff to teach as part of their duties, but there is a disjoint between staff in research specialisms and the needs of the teaching programme). But it is extremely unlikely that engineering – a quarter of the size of some of the case study institutions – would ever be faced with the same threat of outright closure as some chemistry and physics departments have been.

3.25 Indeed the size of the departments has allowed some specialisms to continue which were not viable – when the demand for chemistry and chemical engineering declined one of the institutions specifically decided to take a long-term view and to subsidise those specialisms, as they were considered an important part of the portfolio, still able to provide high quality Research and with the potential to satisfy an increase in student demand in due course. The strategy paid off, and the student numbers in these areas are now up again.

3.26 Alternatively, in one institution civil engineering had to be shut because of insufficient student demand – but it was replaced by construction management which took more students in.

3.27 We noticed a number of characteristics that appeared in the majority of the case studies:

- Engineering often forms a significant part of institutions' teaching portfolios;
- It generally covered a wide breadth of disciplines (not managed as separate standalone units);
- Provision in some institutions has evolved - staff have been innovative, creating new and changing programmes. These are not static disciplines: "engineering programmes rest on their currency and relevance". However, there was a cost to developing a whole raft of technology-based courses, and not all institutions had managed to put the time into innovation.
- Many have undergone significant restructuring in the last 2-10 years.
- Academic managers are proud of their provision, believe it is of high quality, and have committed staff who are prepared to support this;
- They are facing continued financial challenges and staff teaching loads have increased. Most have experienced significant increases in student numbers over the past few years. They have conducted review of resource use (academic staff, technicians, equipment, space) and some changes in pedagogy, as a consequence of these factors.

Programmes

3.28 Although it was sometimes easier to describe a typical course in terms of its structure or resource requirements, the discussions generally covered the whole range of provision in a department. Most students were on BEng or BSc courses, but provision in some institutions also included foundation degrees, or they were planning new provision in this area. This was sometimes significant – in one institution HNCs/HNDs comprised nearly half of the engineering student numbers. These provided a major feeder to their engineering degree programmes.

3.29 There is significant diversity of provision. Standalone programmes were common, but most departments ran some common modules (e.g MSc students infilling to Year three modules; an engineering degree programme with a significant number of modules offered across three BEng (Hons) programmes). Some institutions offer Combined Honours (for example in business/engineering).

3.30 Many programmes had a sandwich year option, where students went into industry in their third year. (This study did not look at the costs of sandwich year-outs, and they are excluded from TRAC (T)).

3.31 Some institutions provided little or no MEng provision – one institution had a very small programme (only 20 students); another no longer offered it as they were not able to recruit sufficiently strongly. However, the majority of the provision was MEng type in one of the institutions studied.

3.32 There is little or no short course provision. One institution felt that there was potential to raise income in this area from the existing levels of resources – but that it would need an investment in staff time, particularly as they are starting from an almost zero position.

3.33 Most programmes that could be accredited (by the professional engineering institutions for Chartered Engineer or Incorporated Engineer qualifications) were accredited or well on the way to accreditation – engineering departments work with a large number of accrediting bodies because of the number of disciplines. However, external quality assurance has over the past few years become more joined-up and efficient.

3.34 It was not possible to assess without a more detailed study how the nature of the provision was different across the various programmes/modules and between the case studies. To inform the funding of most programmes this level of detail is not considered necessary – HEFCE fund all student FTEs in the HESA cost centres for engineering reported here at the same rate (subject only to premiums for long courses, foundation degrees, part-time students and widening participation – but the costs of these areas was not reviewed in this study, and we note that TRAC (T) specifically excludes them).

3.35 As noted above, most institutions have experienced changes in demand across programmes; and changes in disciplines. In one institution, student numbers on product design courses increased, perhaps at the expense of those on mechanical engineering programmes (but now the latter programmes are recruiting again). This same trend was echoed by another institution.

Students

3.36 We touched briefly on various characteristics of the student population in our discussions in engineering departments, in order to understand some of the differences, and how these might impact on resources and the style of provision. This is not meant to be an exhaustive list, or a comprehensive assessment of each area, but it does illustrate the breadth of cover of the four case study institutions (and therefore how their financial position does not illustrate the costs of teaching just one type of cohort).

Demand

3.37 There were several notable features of the student population in all four case studies.

3.38 The departments had a relatively high proportion of international students at undergraduate level (compared to most other disciplines)[5]: 10-15% in two of the institutions; and significantly higher (nearly 25% and nearly 40%) in the other two.

3.39 Departments had the ability to recruit more international students, but had serious concerns about the detrimental impact that this changed balance would have on the experience of home/EU students. "The concern would be language skills – the experience and quality for home students will be less if dominated by non-EU". This is because of the impact that students who are still fully getting to grips with spoken and written English have on, for example, laboratory classes, tutorial work and project experiences. It should be noted that many overseas students are academically very strong, often challenging and stretching the UK-based students. They bring an important international perspective to the university environment, particularly when engineering is such as global profession.

3.40 For the four institutions studied here, there are fluctuations in student demand from discipline to discipline, but recently overall recruitment has been healthy. Three have increased student numbers (both home and overseas) – the fourth reported flatter numbers.

3.41 One institution reported growth over the past 7-8 years of 40% in home students, and 90% in international students (international students were low compared to the rest of the students, but now make up 9% of the total student cohort).

3.42 Another institution had experienced variability across subjects, but the student numbers in the faculty as a whole had increased over the past few years. They were expecting a 'massive' increase in home students of 18% in 2007/08 (three times the national increase of 6%) due to very active recruitment initiatives. One discipline – construction engineering – had increased from 250 students 10 years ago to 450 now.

3.43 In a department of mechanical engineering in another institution, home/EU student numbers had increased by 20% over the last ten years, and overseas student numbers had increased by 44%. The full increase in students had not yet worked through all year groups in 2005/06.

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[5] Except business and management and a few other specific disciplines

3.44 The experiences of these three institutions contrasted with a fourth that has been experiencing flatter levels of recruitment overall. It has experienced a drop of 25% in home/EU entrants: "16 year olds don't see the relevance of engineering". This was experienced alongside a rise of 250% in overseas students (mainly PGT).

3.45 Home/EU numbers in institutions are now generally capped (unless institutions chose to go down the foundation degree route) and this provides a restriction on engineering departments' continued growth in this market. Some were pessimistic as to their chances in a shrinking home market with a forecast decline in the A-level student pool (particularly those with maths).

Entry requirements

3.46 Entry requirements ranged widely. One institution has now moved up to three As at A-levels (including maths) to counterbalance the low attainment in a B; one described their entry requirements as 18-20 points (now about 270 UCAS points) and one requests 240 UCAS points (3 'C's including maths) or a foundation year. These contrast with the fourth institution which recruits few students with A-levels; most arrive via further education colleges, with diplomas etc.

Access

3.47 This last institution was a recruiting university, and strong on access. "Access is an important part of our mission" and they were very active in schools. They had a heavy investment in access initiatives, both because of their commitment to widening participation but also because of their desire to move off clearing (which they felt was high risk and contributes to the high drop-out rate).

3.48 By way of contrast, another institution expressed itself as "good on widening participation although we don't consciously go out of our way to recruit in this area"; and a third institution had almost no widening participation student numbers.

Post-graduate taught provision

3.49 All institutions offered post-graduate provision, although this was small compared to some of the other faculties. (MEng programmes are defined as under-graduate.) In one institution 5% of taught numbers in mechanical engineering were post-graduate taught; whilst in two others 20% of engineering students were MSc. One institution had a few MSc students – whose non-project work significantly infilled into Year three modules.

Part-time provision

3.50 In two institutions part-time provision was very low (and those were on sandwich year-outs or were post-graduate taught students). In another, about 15% of home/EU students were part-time. In contrast, in the fourth institution, 40% of the students in the faculty were part-time – on one course 80% of students were part-time, mainly on day release programmes.

Source and destination

3.51 Institutions often recruited strongly from their local region. In one institution their students were either very local (within five miles), or they were international. In another, nearly half of their mechanical engineering home students were recruited locally. But this does depend on the discipline and type of course. In the third institution, almost all recruits to one programme were local, but other engineering programmes drew much more widely, from the whole country. By contrast, the fourth did not generally recruit locally at all (students were from the whole country, or other countries).

3.52 Most institutions felt that they had very good employment records for home/EU students. In one institution, half the students on a mechanical engineering course go into employment directly related to mechanical engineering. In two others most graduates go on into engineering employment – both had significant day release PT provision supported by local employers. The fourth institution tended to see a more disparate range of destinations, often outside engineering.

Attrition

3.53 Attrition was difficult to assess and define in a comparative way. One institution calculated their attrition at around 20% (excluding those who change programmes or repeat). Another commented that it was "awful at the end of year one", but it varies between mature students, part-time students in employment, post-graduate and full-time degree students. This institution provided a lot of opportunities to transfer (to the diploma) or to retake. A third institution had low attrition (but 15% of students re-sit their first year) – in part because they were now very aggressive at retaining students. As part of this they progress-chase much more. This increased focus stemmed from political pressure, rather than financial pressure.

The provision

3.54 In each institution we had a discussion with a programme leader or head of department about one or two programmes to obtain a view on the way it was taught, and how this had been affected by budgetary constraints. In the time available this was necessarily a high-level discussion – and we did not discuss some aspects such as the curricula.

3.55 Many features of engineering provision were found in all four case study institutions, however, there were differences in the way that the institutions approached these. We illustrate these below.

Changes in delivery

3.56 In one institution, an increase of 40% in student numbers over the past 8 years was accompanied by significant pay increases in staff and estates above funding level increases. This meant that no additional staff could be recruited – and led to an increase in SSRs from 16:1 to 20:1 (their definition, but measured in a comparable way over this time). This has meant that "a dedicated body of staff' are now working longer hours, and, over time, it has led to changes in delivery":

- a 'vast' increase in virtual learning environment delivery (on-line delivery combined with more traditional style delivery in a blending learning approach);
- increased use of dry-labs;
- the replacement of small group tutorials in Years 1 and 2 with example classes with bigger group sizes;
- fewer very small modules;
- increased use of sessional staff to teach new courses hence providing more flexibility;
- and (now) a look at the scope for less assessment.

3.57 But there is an urgent need in this institution (and elsewhere) to address one of the biggest areas of student complaint – personalised feedback on performance in assessment at a reasonable level within a reasonable timescale.

3.58 In another institution increases in student demand over the last four years (20% in two years alone) has meant an increase in teaching staff – but increased use of hourly paid staff as part of this to provide flexibility. Their common teaching programme across several degree subjects has helped them to cope and absorb the higher numbers. But this institution still felt that "every member of staff is pressurised" – their main gap (they had few A-level entrants) was an imperative need to address the "very poor quality of science training" pre-degree (including poor manual and experimental skills) and wanted to spend more time "getting students up to speed more quickly".

3.59 Another institution had had to increase project group sizes, reduce open-door access, and was very concerned about what it felt was an outdated style of teaching and learning on some of its programmes – but there was now little time available to staff for innovation.

Laboratory work

3.60 This was an important part of the courses. In two institutions, one week of contact time for a student (Year 1 and Year 2) typically included 6 lab-based hours.

3.61 The amount of practical work depended upon the course. In one institution Year One modules were timetabled for anything between 10% and 50% of their teaching contact time in the laboratories. But they had moved significantly away from analogue laboratory models to computer models (i.e. computer simulations of experiments). In this institution, financial constraints had led to them 'struggling' to maintain the same proportion of laboratory time – but they have specifically agreed that their strategy is to carry out the practical work that they have always provided, rather than 'retreating into a lecture-based mode'.

3.62 Laboratory work varied by programme – one institution emphasised to us how much their mechanical engineering remained a 'hands dirty' course.

Projects

3.63 Projects were also considered to be a very important part of the programmes. For a BEng, for example, in one institution, there was a 40 credit individual project in the final year (academics were timetabled half an hour a week per student to supervise this); their BSc had a 20 credit individual project. Project styles differed – in one institution the Year Three projects (generally 2 units, 40 credits) involved students working individually or in groups of three.

3.64 One institution maintained individual projects in Year Three partly to ensure the high numbers of overseas students (an electrical engineering programme had a cohort of less than 50% home/EU) would not adversely affect the home/EU student experience.

3.65 Although most institutions had not altered the way their projects were supported, financial constraints were adversely affecting one institution – 1/3rd of the students' time in year three is spent on a group project (the year 4 project for the MEng is an individual project) – but the group projects are now run with 4 students. This is considered by the institution to be one too many in the group, "allowing room for passengers". Although projects are always supervised by an academic, the day-to-day support is frequently provided by a Graduate Teaching Assistant, and the use of these has increased. This latter move is not considered, however, to have affected quality.

3.66 Financial constraints do not appear to have limited the choice or style of projects in this institution – for example, students are generally given practical projects, not computer-based projects which would be much cheaper.

Maths

3.67 All departments paid a special attention to improving maths skills. This reflects changes in the mathematics curricula in schools which have led to gaps in core subjects such as mechanics. Diluting the maths content in university programmes is not considered an option, if the quality of graduates, and of engineers in industry, is to be maintained. Widening participation students (without A level maths or its equivalent) need considerable extra support.

3.68 The techniques to provide mathematics support varied, and included, for example, in one institution 4-5 hours a week of timetabled sessions in Year 1, streamed to reflect ability but also engineering discipline; a university-wide maths drop-in centre; and a formalised part of the Year 1 personal tutor role. One institution commented that their "students' maths knowledge is not what we expect – or need".

3.69 In another institution "a very, very high proportion of the first year is spent in bringing students up to the level needed for chartered engineer". In Year 1, one out of the eight modules covers maths core skills, and for that module both students and staff will spend double the timetabled 'standard' time of four contact hours a week. In addition, the institution provides remedial maths support. The engineering departments' staff "put twice as much time into maths as the university requires".

3.70 A third institution expressed concern at the increase in the remedial maths support that they are having to provide - "the problem has intensified in the last five years". The engineering faculty is putting in a significant amount of work to developing innovative approaches to teaching maths in their own departments.

Contact hours

3.71 These vary from institution to institution and from course to course. In Years 2 and 3 project work makes it difficult to assess contact time (the time allocated for academic support may be very different in reality) and to compare between years.

3.72 In one institution, for Year 1 students, a common pattern was 18-20 hours a week contact time with staff for 30 weeks (including assessment). Another institution timetabled 18 hours for year one and year two students.

3.73 However part-time models varied from this – in another institution a very large day release programme was taught from 9am until 9pm one day a week (covering 6 units a year); full-time students on a similar programme (8 units a year) were expected to experience nearly 400 contact hours (a unit was scheduled with 4 hours a week, over 12 weeks, so 48 contact hours). This totals 16 hours of contact time per week (plus remedial maths).

3.74 Timetabled contact time had not been reduced as a result of financial pressures. One institution timetabled 589 contact hours for first year students on its MEng course (excluding examinations). This had been recently increased to include more time on remedial maths. This amounted to 20 hours of contact time with staff per week. Year two was timetabled with 531 hours. (Years three and four was formally timetabled with 262 – but this did not reflect the considerable project activity in those years which would require significantly more non-timetabled time from students.)

Group sizes

3.75 Again, these varied very widely.

3.76 There is increasing attention paid to module sizes – but institutions generally aim to keep the same range of options on offer: they increase module sizes by changing the curricula to combine modules, and only close down the very smallest modules.

3.77 In a MEng in one institution in Year 1 the class sizes ranged from 250 to 5 (those at the higher end were joint with business); in Year 2 the class size generally reflected the cohort (40 students); and in Year 3 there was a 40 credit project and other modules were generally with a group size of 20. Laboratory sessions were of course smaller.

3.78 Two institutions' timetabling of year one provision was as follows:

Group sizes for year one students

	Institution (i)		Institution (ii)	
Type of contact	% of timetabled hours	Group sizes	% of timetabled hours	Group sizes
Lectures	46%	160	50%	50-60
Laboratories	5%	4	30%	18 or 20-24 *
Study groups/ tutorials/ seminars	49%	16	20%	20-30
Project work	0%		0%	

* 18 in mechanical engineering, 20-24 in electrical engineering

3.79 The percentage of timetabled hours needs to be read with caution. For example, some study groups may take place in laboratories, computer work may take place across a variety of space.

3.80 Year 2 students in the first institution shown above had slightly smaller lecture groups due to attrition (140, rather than 160); and year 3 lecture groups were 100-140 depending on MSc infills. In year 3 there was a group project (4 students) and in Year 4 an individual project.

3.81 With the increase in student numbers, lecture groups, tutorial/seminar groups and often workshop/laboratory groups have increased in size. In this same institution tutorial group sizes have increased from 12 to 16 over the past few years.

Industry involvement

3.82 This was a key feature for all of the case studies. Although some institutions now have very few students sponsored by industry (apart from on foundation degree and part-time day release undergraduate degree programmes), there was considerable liaison in most institutions with industry involvement in foundation degrees, projects, sandwich year-out courses, KTP (knowledge transfer) activity, technical advisory panels, work placements, 3rd year sponsorship. Industry liaison in the most research intensive institution was achieved mainly through individual academics' research work.

3.83 It was not part of the scope of the study to establish from industry to what extent the programmes have kept pace with their requirements: the department managers believed that the provision produced good quality, fit for purpose graduates. And most institutions' graduates enjoyed good success in gaining employment in engineering or relevant professional fields.

Resources

3.84 An analysis of costs shows the following:

Type of expenditure in a department, based on TRAC costs

Type of expenditure	a	b	c
Academic staff	35%	35%	13%
Technical and administrative staff	8%	4%	11%
Depreciation or equipment		6%	3%
Non-staff costs in academic departments	7%	4%	4%
Central services	43%	29%	39%
Estates costs	6%	22%	30%
Total	100%	100%	100%

Where an analysis of the costs of Teaching only was available, this was used.
Otherwise the analysis shows the costs of all activity in the departments, including Research.

3.85 The figures in this table are not strictly comparable between institutions, as there are local accounting differences (e.g. sometimes depreciation is included in academic department spend, and sometimes in central services; and some departments have higher local services costs (accountants, libraries) than others). Nevertheless, it does show that at least 50% of the costs are centrally managed (central services, estates); and one of the largest items is central services (a third or more of total costs). Staff costs in some institutions are the largest item – this is reflected in student/staff ratios.

Staff

Staff time

3.86 We have noted above (para. 2.37) the pressures on staff time and some of the consequences of this on the provision. More directly, the teaching hours of staff have increased in some institutions. In one institution the normal teaching hours for an academic is 15 hours a week, but in engineering 18 is routine, and some staff work 22.

3.87 The academic time survey carried out for TRAC in one institution shows that academic staff work 47 hours a weeks on average. Compared to a 'standard' working week of say 37 hours, this means that staff are contributing 27% more hours. Academics would not say that their salaries reflect this – which would mean that, theoretically, staff costs of Teaching are understated by nearly 30%. The number of hours worked each week did not seem to have changed in recent years.

3.88 All institutions carry out this time survey for TRAC. This provides a critical piece of information for use in cost allocation – the percentage of time academic staff spend on Teaching, as opposed to Research or Other (income-generating) activities. Some academics are critical of the robustness of TRAC time surveys, but this is the main source of evidence available.

3.89 One research-intensive institution showed the following from their time allocation survey for a department of mechanical engineering (the figures were very similar for the faculty as a whole):

Results from an academic time survey

Category of time	Percentage time across a year for all academics	Percentages, with Support allocated to core activities
Teaching	25%	32%
Research	51%	65%
Other	2%	3%
Support	22%	-
	100%	100%

3.90 The second column of figures shows the allocation of Support time (scholarship/CPD, management, administration etc) across the other three 'core' activities. This resulted in an allocation of 32% of academic staff time to Teaching. Assuming the mix of staff was the same across activities (in practice, it would vary slightly) this then meant that 32% of academic staff costs was allocated to Teaching, and the rest to Research and Other.

3.91 Other less research-intensive institutions would not expect to show such a high proportion of time on Research. In a pre-92 institution, 82% of the total time of academics (including a relevant part of Support) had been allocated to Teaching[6]. This can be directly compared with the 32% shown in the research-intensive institution, above.

Pay increases

3.92 One case study institution had experienced a rise in staff pay of >10% in 2 years, and was expecting a 13% increase over the three years 2005/06-2008/09. With income rising 5-6% over this latter period, and without the ability to increase student numbers (through for example capping on home/EU numbers by HEFCE), the department was forecasting a shortfall of 7% in covering staff pay. It was not considered likely by the departments' managers that the new student fees would be able to remedy this at all, as the institution had a significant backlog in estates that it was important to address.

3.93 The challenges on covering staff pay increases were felt elsewhere. In one institution, an increase in fee income of £1.6m in the two years to 2007/08

[6] This institution initially showed a lower proportion of time allocated to Teaching. However this was understated as the academics had allocated too much time to institution-own-funded Research, rather than to scholarship. Scholarship, unlike Research, forms part of Support and is reallocated between Teaching and Research.

would all be absorbed by £1m bursaries and a 5.9% academic pay increase from the pay awards and agreement and pay modernisation.

3.94 Another institution noted that the 2005/06 figures (reported under Subject-FACTs in this report) did not include a 5% increase (on top of indexation and incremental drift) that was occurring as a result of the grade standardisation, job evaluation and pension reviews. 60% of the top-up fee income would be absorbed by this, and the other 40% by students' bursaries.

Student to staff ratios (SSRs)

3.95 SSRs are difficult to calculate on a comparable basis. For the purpose of this report we identified, where possible, total academic staff numbers (including visiting lecturers if material), the time they spent on Teaching (including a relevant part of Support time), and student FTEs (with post-graduate and part-time students weighted to reflect their different lengths of course). This could not reflect the length of the working week (i.e. the fact that staff generally work considerably longer hours than a 'standard' working week). It was often difficult to match staff to students (with service teaching, common modules etc) robustly enough.

3.96 However, the SSR calculations for three institutions was as follows:

Number of students compared to number of academic staff

		Research Intensive	post -92	post -92
No. of academics (FTEs)	A	36	56	88
Time on Teaching (and Support)	B	32%	82%	56%
Academic FTEs on Teaching alone	A*B = C	11.4	45.7	49.3
Student FTEs (weighted)	D	535	811	1818
Student:staff ratio taking into account all time	D/A	14.9 students per member of staff	14.5	20.7
Student:staff student ratio taking into account Teaching time alone	D/C	46.9 students per member of staff	17.8	37.1

3.97 There are many factors which make calculation and comparison of SSRs challenging and which make it difficult to understand the impact of the different SSR ratios on provision. For example we note that all institutions use staff in different ways and use different types of staff – other than permanent academic staff - in teaching. The SSRs calculated above will be affected by the use of retired staff, sessional staff, graduate teaching assistants, research assistants etc. SSRs could not be explored further in the timescale for this study.

3.98 Institutions had often done their own calculation – we noted above one institution's statement that their SSR had increased from 16:1 to 20:1 in the last eight years.

Technicians

3.99 The practical 'hands-on' nature of engineering means that there are costs for equipment maintenance, laboratory set-up and organisation and day-to-day support to students in laboratories. Health and safety issues are critical. All engineering faculties require access to technical workforces.

3.100 Technician numbers have decreased in all institutions. One institution reported that technician and secretarial staffing was now 'tight'. Another institution commented that the reduction had been appropriate with the way they had changed the nature of their courses – student numbers in technician-heavy areas had decreased, the use of bench-top kit had increased. In contrast with the decrease in technician numbers in the institution, the number of computer officers had increased. This was partly due to the increased use of Virtual Learning Environments (VLE), and the need for engineering students to learn advanced programming languages and industry-standard software packages, but also because of the rise in computer science provision which shared the computer suites in that faculty.

3.101 In one institution, as a consequence of the creation of the new faculty (from a number of existing departments) the whole labour workforce had been reorganised. The number of technicians had been reduced from 51.5 to 32.

3.102 In the fourth institution there had been "massive efficiencies" and they had lost one-third of their technician workforce over three-four years.

Equipment

3.103 Equipment now covers both engineering kit (machines, furnaces, engines, wind tunnels etc) and computer suites (with a range of specialist programmes). Precise equipment needs differ between subjects, and between programmes. Even in one discipline (e.g. electronics) fields such as telecommunications and computer network engineering would have very different equipment requirements from 'heavy' fields such as electrical engineering. Even in a particular discipline such as mechanical engineering, some departments will have equipment that others do not (e.g. a wind tunnel, or scanning electron microscope). Research-intensive institutions will have available a range of specialist research equipment.

3.104 We did not seek to identify a common or minimum set of equipment which one particular programme or discipline should have. However, the case study institutions did make some specific comments with regards to the standard of their current equipment.

3.105 One institution felt that it had a good level of standard industrial specification kit, and high-grade PCs. But they no longer had the big mechanical engineering kit – they now used much more bench-top kit.

3.106 This was echoed by another institution, that have also seen a move from engineering laboratories to computer laboratories. This has meant that a wider range of disciplines could use the resources, and they are now more intensively used. This institution described their engineering equipment as 'serviceable' – they keep up to date with technology in terms of their teaching, but the equipment is not modern and is not likely to be attractive to potential students.

3.107 A third institution had specifically moved year one provision towards a 'virtualisation route' (IT) away from 'real kit'. They balanced this with partnerships with industry to get access to real kit.

3.108 A fourth institution uses a significant amount of equipment that is over 20 years old – well-maintained but definitely not attractive to potential and current students.

Estates

3.109 The departments need classrooms (small group and large lecture rooms), engineering laboratories (with associated workshops) and computer suites. The laboratories need specialist built-in facilities such as pressurised gases and ventilation. In addition the full range of offices and support space is of course required. This means space can be low or high cost. In one institution 3% of the department's space was classified as 'basic' (offices, lowest cost), 32% was serviced, and 65% was highly serviced (excluding support and central timetabled space)

3.110 That institution also reported that their space capacity and quality was "fine, in fact we have more than enough floor space". This was echoed by another institution which reported that their space was fine, it had recently been increased (with the increase in student numbers) and some been refurbished.

3.111 In another institution the engineering faculty was created four years ago from several departments and brought onto one campus. The rationalisation of the technician workforce around the new faculty's provision lead to lower space requirements (for example, they now had two fluid/dynamic laboratories, instead of three, yet student numbers had increased). They commented that space was not an issue (they could "give some laboratory/workshop/dedicated space back") although its configuration meant that the space available for teaching was actually 10% too little, based on university norms.

3.112 The accommodation base in another institution had been reduced by at least 25% over four years. "Specialist space has been turned into generalist space…. project space has been absorbed into specialist laboratories, reducing the down-time necessary to set-up". However, this reduction in space has meant a more constrained access by students to laboratory resources ("back-to-back timetabling restricts access for assignments").

Non-staff costs

3.113 The non-pay budget is covering many costs of teaching including repair and maintenance of equipment for laboratory classes, investment in new equipment for laboratory classes, the cost of paying casual staff for demonstrating lab classes, cost of maintenance of infrastructure such as ventilation for laboratories, costs of running undergraduate projects, costs of annual licences for software packages such as MATLAB which engineering undergraduates are expected to be conversant with as industry standard, costs of maintaining and upgrading computer suites (including software) which are required for teaching undergraduate classes). Normal consumables, travel and subsistence, office supplies are all covered from the non-staff cost budget.

3.114 Most of these items have a direct impact on the student experience. Concern was expressed at how long these current levels of spend could be maintained.

Central services

3.115 This (significant) area of cost covers library, general education expenditure, and central services such as the Vice-Chancellor's office and secretariat, marketing, international office, finance, registry, human resources, etc. Individual departments have very little say in the level of costs incurred by these functions, and therefore in the level of costs charged or allocated to their departments. However, under TRAC their type and level of activity (numbers of students and staff, volume of activity, etc) strongly influence the proportion of these costs that are allocated to them.

3.116 There is no information as to whether the central service costs allocated to the engineering departments under TRAC reflect 'adequate' levels of provision, nor whether they are efficient not. This was not part of our brief. However, TRAC aims to ensure that the allocation is 'fair and reasonable'; and pressures on university finances help to encourage efficient levels of spend, and good levels of service.

4 FINANCIAL POSITION

Institutional perception

4.1 Department and faculty managers expressed their perception of their financial position, based on their institution's management accounts, in the following ways. They believed this to be similar to the perception held of them by senior academic managers in the institution.

Current financial position of departments and faculties from the institutions' management accounts

institution	Financial position (2005/06)
(a)	The department is £(0.7)m in deficit and is 'completely non-viable'. It only reaches financial breakeven by the drawn-down of funds from a legacy.
(b)	The faculty's financial position was shown as: • £(0.2)m operating deficit; • turning into a breakeven position after capital cash spend had been replaced with deferred capital grant income and depreciation; • and then shown as a £0.6m surplus once £1m 'unspent personal earnings' had been included – this related to income from overheads recovered from sponsors that are allocated directly to academic members of staff. Many of the costs used to calculate those overheads have not been attributed to the department so it is 'discretionary income' and the department is free to spend this income as it wishes.
(c)	An 'unacceptable' deficit of £(1.87)m
(d)	The faculty is currently considered to be a 'high performing faculty': their contribution of 44% was the highest of all four faculties in the institution.

4.2 These are important statements, as they are the view of the departments, and of the institution. It is these figures that lead to public statements by senior academics about the level of funding for their department – both positive and negative. However, we would express caution at reading too much into all of them for the purposes of this review:

- They generally do not show the full costs of activities;
- They are based on historical costs, and do not show pressures and gaps in resources;

- They do not show the effort that academic managers have made in maximising their surpluses, or minimising their deficits.

Full costs

4.3 In Chapter 2 we explained how these costs (in management accounts) cover Research as well as Teaching activities and involve a wide variety of costing and allocation methods. For example, the results for institution (b) in the Table above is shown after a 30% tax which has been made by the centre; but also includes half of its earned research overhead income which has been allocated to the department after a 50% top slice. This led to the managers' stating that "we are only fine because we don't spend this research overhead income (of £1m) which we could".

4.4 Of course the costs to which the research overhead income relates are already being incurred. These are not all recognised in the management accounts (central services costs are not allocated to the department, the top-slice is unlikely to cover the full total of these). It is likely that the overhead income which is coming back to the member of staff as discretionary funds should in fact be being used by the department to pay its full infrastructure costs. The department would not then show a surplus, it would show closer to a breakeven or small deficit position.

4.5 One institution (institution c) does, however, provide TRAC information as part of their management accounts, and for that reason the two figures reported in this table, and those below for TRAC, are very close (differences will always arise because one shows forecast figures, and the other actual). These show a significant deficit.

Historical not sustainable costs

4.6 The management accounts, as with TRAC, only report historical costs. They do not show the increasing pressure on staff time, and the fact that resource requirements not being adequately addressed. These were listed in para 2.39 above. These were real concerns that were starting to threaten the student experience. However, it is not possible to quantify these in the timescale of this project.

Management action

4.7 The statements of financial position do not show the effort that the department managers had made to achieve an acceptable outturn (or as close to an acceptable outturn as they can make). We described these in Chapter 2 above. They have managed by:

- Increasing student numbers;
- Increasing the proportion of international students and/or their fees;
- Changing their portfolio of activity (in particular, on research);
- Restructuring (departments);
- Rationalisation (technical workforce, space, equipment, modules/core programme);

- Increasing SSRs. This has meant changes in delivery and pedagogy and an increasing list of sustainability concerns (group sizes, innovation, open door policy, etc).

4.8 We commented above how institutions had undergone significant cost saving measures (particularly keeping academic staff numbers stable during a period of significant student number increases). As one institution commented: "students are no worse off – the pressure has all been on the staff". The same institution had undertaken significant curricula changes to manage these financial challenges – they felt areas still remaining for review (how assessment was done, how many items of coursework) had the potential to threaten their educational standards.

<u>Forecast</u>

4.9 All the case study institutions expected cost levels to rise higher than income. Some were actively planning to take more of the measures we listed above to retain or improve their financial position in the future. None saw top-up fees replacing the increasing deficits that most of them were otherwise forecasting.

4.10 One department has an operating deficit of £(0.7)m and was facing significant problems as a result. Although there will be rises in income from students' fees and from Research overhead recovery (as part of the change to 'Full Economic Costing' by research councils), these are likely to be absorbed by increases in spend on bursaries, staff pay, and estates. Their policy for the future is more one of income generation rather than cost reduction. They have recently recruited some good research staff, who they plan will be the high research earners of the future (bringing in research overheads that are, in their current resource allocation model, allocated almost in their entirety to the department). They will explore opportunities to increase post-graduate taught student numbers. They may try to increase overseas student numbers (but are mindful of the home/overseas balance). Their fear is that they will be driven to reduce home/EU numbers. They will take some maths teaching into the department (from the maths department) thus increasing their share of the HEFCE funding. On the cost side, their main strategy is to lose some space and thus reduce their space charge.

4.11 Another institution had an overall surplus position in 2005/06, and now expects to "breakeven if lucky" in 2006/07. They expect the higher income from home students to be put towards the institution's capital programme, and there is no expectation that the faculty will see any net increase in income.

4.12 The institution with the highest deficit of the four (£(1.87)m) in 2005/06 had been turned into a breakeven situation by 2006/07, and the faculty head aims to turn this into a small surplus within two years. This will have been achieved through space and staff cuts, innovation ("we innovate or die"), reductions in research activity ("our SSR will rise above 21.1:1"), and an increase in overseas students ("our undergraduate provision would not exist were it not for our overseas postgraduate provision").

4.13 The institution that is currently perceived to be a high contributor to institutional central service functions and estates, is now expected to become a low contributor, as space charging is about to be introduced. They are one of the largest users of space on the campus, and although they are likely to give up some space as a result, this will not resolve this. A new Vice-Chancellor may well have a different perception of their (currently 'good') performance.

TRAC financial position

4.14 TRAC could be expected to show a worst financial situation than the management accounts, because full costs are then included. We saw this clearly in two institutions (referenced b and d in the Table shown in para. 4.1) where the management accounts showed with a surplus or a 'good' level of contribution. (The first institution (a) showed a significant deficit; the third (c) used TRAC information.)

4.15 TRAC provides an analysis that helps to understand this. As explained in Chapter 2, Annual TRAC is analysed between Teaching and Research and Other. Teaching is then analysed between HEFCE-fundable and other provision. HEFCE-fundable provision is then analysed between subject-related and non-subject related. The result – Subject-FACTS – then represents a 'clean' cost of Teaching. At each stage the understanding of surplus and deficits grows. This can be shown in a diagram.

Department costs	Result
Management accounts (assumed for this example to include a top-slice for some central costs)	Assumed (for this example) to be at **Breakeven**
Plus all relevant central service and estates costs = Annual TRAC	Deficit
Annual TRAC analysed between: • Teaching • Research • Other	 Breakeven Deficit Either
Teaching analysed between: • HEFCE-fundable • International student provision	 **Deficit** Surplus
HEFCE-fundable analysed between • Subject-related (Subject-FACTS) • Non-subject related	 **Deficit** Breakeven [7]

[7] A breakeven position for non-subject related activity is built into the TRAC model. These costs are not currently calculated robustly.

4.16 The TRAC results for the engineering faculties/departments in 2005/06 are shown below. These figures are from annual TRAC (not TRAC (T) which we cover next).

Annual TRAC results

Institution	Total TRAC surplus/(deficit) for the faculty or department	TRAC surplus/(deficit) for Teaching	Teaching: deficit as % income
M	£(1.9)m	£(0.1)m	2%
N	Not known	Not known	Not known
O	Not known	£(0.2)m	4%
P	£(2.9)m	£(1.2)m	13%

The methods used by institutions to allocate income from the block grant to faculties and departments in institutional management accounts generally mirror, as closely as possible, HEFCE's funding method i.e. money is distributed between departments/faculties in proportion to the student numbers bringing in HEFCE money in each price band. As commented in para. 2.12, most institutions top- slice this money before it is distributed, although there are other models.

4.17 The annual TRAC surplus/deficit shown in the first column of figures covers all activities. The figure for Teaching in the second column excludes the costs and income of Research and Other activities. In one post-92 institution the Teaching costs account for nearly 70% of total costs; in a research-led institution 50%; in the most research active institution they covered a quarter of the total costs in the department.

4.18 Where the full annual TRAC data was available, it was obvious that the deficit is only partly due to Teaching – a significant part arises from Research activity. This aligns with national TRAC data (all institutions/all disciplines) which shows that Research deficits are much higher than any deficit on Teaching.

4.19 Similarly, the national TRAC data shows that the financial position on publicly-funded Teaching (mainly funding council-fundable) is much worse than that on non-publicly funded Teaching (mainly international students provision) which shows a surplus.

4.20 However, the annual TRAC Teaching costs, above, still cover all Teaching provision – funding council-fundable (publicly-funded Teaching); international students and short courses (non-publicly funded Teaching); and non-subject related costs (e.g. of widening participation students and long courses). In one institution TRAC (T) costs were only half the total costs of Teaching in the department – in the other institutions they were a considerably higher proportion. In effect, international students subsidise HEFCE-fundable provision. In one institution the deficit shown above for Teaching of £(0.2)m becomes £(0.7)m once the overseas fee income, and costs, are excluded.

TRAC (T) costs

4.21 The TRAC (T) costs are based on the annual TRAC figures for Teaching, but exclude any provision that is not HEFCE-fundable (such as the costs of international students) and also exclude costs arising from non-subject related factors such as access students. The purpose is to arrive at a 'clean' cost of teaching that is directly comparable to the unit of resource that drives a significant part of HEFCE's funding model.

4.22 The data provided to this study was broadly the same as that provided for the sector benchmarking exercise (May 2007), although it had been reviewed and improved on in a few cases. This is still, however, first pilot year data, and should not be considered as robust. One institution noted that as they do not collect time allocation data robustly at the level of department their Subject-FACTS figures will never be robust.

4.23 However, as part of this study, the average costs of a publicly-funded student across the whole faculty were calculated under annual TRAC (above), and compared to the Subject-FACTs figures. Differences were investigated and explained. This provided some reassurance that the Subject-FACTS figures are likely to provide a fair and reasonable indication of the cost levels in engineering. This could however be done for only three of the four institutions (we were not provided with annual TRAC information for one institution, so could not check the reasonableness of the Subject-FACT data they gave us).

4.24 TRAC (T) average cost per student FTE in each engineering cost centre for 2005/06 (Subject-FACTS) were provided by each institution and were as follows:

2005/06 Subject-FACTS

Institution HESA academic cost centre £ per student	w	x	y	z
14 earth marine and environmental sciences				12150
16 general engineering		5840		5860
17 chemical engineering	7800	9900		7180
18 mineral, metallurgy & materials engineering				12520
19 civil engineering	7890	5620		7880
20 electrical, electronic and computer engineering	7870	9300	7060	7650
21 mechanical, aero & production engineering	7840	4370		8630
Weighted average	7850	6370 (1)	7060 (2)	8650 (3)

The average has been weighted by the number of FTE students in the cost centres shown (it is not the average for a faculty as a whole – so the costs are not exactly those shown in the institutional management accounts and the annual TRAC costs for the faculties providing engineering).

This average reflects the costs of a FTE. The additional costs of long courses have been (broadly) excluded.

All numbers have been rounded.

The figures are those provided by the institution. These costs are not all exactly the same as the first pilot figures returned to HEFCE in the April 2007 TRAC (T) benchmarking exercise. They use equivalent methods, but further robustness has been included in some cases.

Notes:

1. The figures provided by this institution could not be validated or checked through a review of annual TRAC, which we did for the other three institutions.

2. Whilst this institution returned all their engineering costs under cost centre 20, in fact their provision covered a wider range of disciplines than this.

3. The figures for this institution are known to be 'abnormal' in some areas of provision – the lowest figure is suspect, with not all costs adequately allocated; and the highest figures are due to (a) very low student numbers, and, (b) in another cost centre, a department that has undergone a lot of change which has caused significant fluctuations in its staff/student ratios. In this institution the TRAC time allocation survey method means that the figures at individual cost centre level cannot be regarded as robust.

4.25 All the students reported under these cost centres are allocated to price band B in HEFCE's Teaching Funding Model. Their costs – Subject-FACTS - can be directly compared with HEFCE's standard unit of resource in 2005/06 for Price B of £6,134.[8]

4.26 This shows a deficit over funding in all four institutions, as shown on the table overleaf. These deficits were significant in the three institutions where it was possible to confirm the reasonableness of the data through annual TRAC.

4.27 The financial position shown here by Subject-FACTS is worse than that shown for all of Teaching in annual TRAC (shown in the right hand column in the table under para. 4.16). As we explained earlier, annual TRAC Teaching figures covers both HEFCE-fundable and international student provision – the latter would make surpluses and would mask the deficit on the HEFCE-fundable provision.

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[8] We note that HEFCE made available additional funding over three years from 2007/08 to support very high cost and vulnerable science subjects – vulnerable because of relatively low demand. The subjects being supported are chemistry, physics, chemical engineering and mineral, metallurgy and materials engineering.

The standard unit of resource excludes capital allocations. Capital costs are included in the Subject-FACTS figures.

Deficit on HEFCE funding

Weighted average cost as % of standard unit of resource	Institution s	Institution t	Institution u	Institution w
Costs are in excess of funding by	28%	4%	15%	41%

Institution t was not able in the time available to provide robust information at the level of department for annual TRAC, and it was therefore not possible to confirm the reasonableness of their Subject-FACTS and the deficit calculated here.

4.28 These deficits are not surprising, given the deficits reported for T in annual TRAC, and the overall financial position for the departments reported internally. These deficits are not sustainable in the long term – possible actions include cross-subsidy from high numbers of international students; further work on cost reduction; and acknowledgement in HEFCE's review of the price band cost weights.

Appendix I Information proforma