A resource management tool for implementing strategic direction in an academic department

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ABSTRACT

This paper reports on a load balancing system for an academic department, which can be used as an implementation mechanism for strategic planning. In essence, it consists of weighting each activity within the department and performing workload allocation based on this transparent scheme. The experience to date has been very positive, in terms of achieving strategic change *and* staff contentment.

1. INTRODUCTION

Leading and managing a university engineering department in the 3rd Millennium can be a challenging experience. Developing a new department from a green field site, while possibly a little daunting, can offer a number of interesting possibilities. In addition to deciding on a strategic direction for the department, the department must operate within the constraints of the university resourcing policy and operate within the wider context of the national and international educational, research and economic environment. While some theoretically inclined academics might relish this as a constrained optimisation problem, the pragmatists among us might realise that the mere formulation of the problem would lead to a certain insight that might provoke a potential solution.

A perusal of the published literature reveals a paucity of published work dealing with the resource allocation problem for an academic department, though it is understood that such schemes exist (at least informally) in Oxford University and the National University of Ireland, Dublin. A number of works deal with the issue of achieving quality, either in teaching (Jauch & Orwig, 1997, Mullin & Wilson, 1998) or in research (Butler, 2003), but both issues are dealt with independently, without observing the conflicting requirements of the same resources. Some treatment is given of general performance issues in relation to academic department administration, for example in Jackson (2000), and there is, of course, a significant amount of literature examining the wider issue of university-wide management, as in Rhoades (2001), for example, but little on the management of strategy and resources for individual academic departments. An interesting article by Jackson (2000) presents 14 case studies from UK institutions examining how heads of department manage performance, but this mostly relates to performance of individuals within departments, rather than departmental-wide balancing.

The subject matter of this paper is a report on formulation of the strategy/resource balancing problem for a relatively young electronic engineering department, with solutions determined empirically. The system has operated for 3 years and serves to attain the following objectives:

- Implementation of the chosen strategic direction for the department,
- Motivate staff
- Provide a transparent and fair workload allocation mechanism, and
- Address the teaching/research balance

One of the default mechanisms for allocation of teaching and administrative workload in academic departments is a simple judgement by the head. While this has certain flexibility and can consider many different types of worthwhile activities that staff engage themselves in, it does have the following drawbacks:

- It may be difficult for the head to be aware of all the activities that staff are involved in and the extent to which that involvement goes,
- There is little transparency in the system, with staff anxiously awaiting, for example, the teaching allocation at the start of each new academic year, and
- Staff are not clear on what activities are important to the department or how different activities trade off against each other.

The above issues can lead to poor staff motivation, the perceived need for staff to lobby the head to ensure that their contributions are recognised and no mechanism to push the department along any strategic direction. In addition, the head is placed in a somewhat invidious position of making judgement calls based on possibly incomplete information.

Other possibilities include an even distribution of teaching and administrative load, with the level of research activity left up to the individual volition of individual staff. While this may seem to be ultimately equitable, there is no mechanism to enthuse individuals or staff to work towards a common goal.

The basis for the methodology documented in this paper is first to establish a strategic direction for the department. Possible strategic directions could include:

- Provide the highest quality educational experience for students,
- Become the biggest department nationally in terms of undergraduate student numbers,
- Build a reputation for excellence in research,
- Etc.

A transparent 'reward' mechanism must then be put in place in order that staff are motivated to follow this strategic direction. The simple (and perhaps obvious !) solution is to put a system in place, where different activities are weighted in relation to the overall strategic goal and an attempt is made to strike a balance between the *weighted* sum of activities for all individual staff, including the head ! However, while this is simple in concept, determining the weightings is not quite so straightforward.

2. ACTIVITIES AND WEIGHTINGS

Activities can be broadly broken down into:

- Teaching activities, such as lectures, tutorials, labs., project supervision, etc.
- Research activities, such as publication, student supervision, funding applications, etc.
- Management/administrative tasks, such as dept. head, research officer, teaching officer, etc.

2.1 Teaching Activities

As a first step, teaching is taken as a benchmark and an attempt to establish a maximum teaching load in the absence of any management/administrative responsibilities or research activities. For teaching, a benchmark is provided by the current practice of the Institutes of Technology in Ireland (focussing on teaching, rather than research), where the 'normal' teaching load consists of 14 contact hours per week. In the EE Dept., this would equate to approximately 3 modules per semester, assuming no administrative or management tasks. This is calculated on the basis that an average technical module has approximately 4 to 4.5 contact hours per 12-week semester, as per Table 1.:

	Mainly Lecture	**Lecture/Lab.**	**Lab./Assignment**

	(e.g. Mathematics)	(e.g. Electronics)	(e.g. Design)
Lectures	36	24	10
Tutorials	12	12	3
Laboratory	-	18	60
Assignment	-	6	-
Private study	32	20	7

Table 1: Contact hours for different teaching methodologies

Note that the *distribution* of contact hours may differ significantly between modules which are predominantly lecture based or laboratory based. In the NUI Maynooth modular system, a module is defined to have 80 hours of *student* workload, rather then relating only to contact hours. There are also implications for different teaching methodologies in terms of correction/assessment workload e.g. homeworks, labs., assignment. However, on balance, it would seem that the total workload is relatively similar across different methodologies. This is important, since any merit system should not provide any bias towards any particular methodology, rather then the methodology should be completely dependent on the nature of the module subject matter.

The base weighting for a teaching module is set as 10. This means that an academic staff member engaged in teaching only would achieve a total of approximately 60 points. Other weighting were decided as follows:

Activity	New course	Course new to teacher	New staff member	Final Year Project
Points	10	5	5	1.5

Table 2: Weightings for teaching components

2.2 Research Activities

The research activities were enumerated as follows:

Activity	Journal paper	Conference paper	Research student	Funding proposal	Staff as PhD student
Points	2-7	1-2	3	2	10x3 + 5x1

Table 3: Weightings for research components

Journal papers are rated by each author, depending on the journal impact, with some moderation by the Head of Department. The conference paper allocation is simpler:

- 2 points for a conference paper submitted on the basis of the full paper
- 1 point for a conference paper submitted on the basis of the abstract only

Each research student supervised is weighted as 3 points, irrespective of whether a masters or PhD student. Funding proposals attract 2 points, but only when the proposal contains a request for student support, which effectively puts a threshold on the scale of the proposal. Academic staff undertaking a PhD are awarded 10 points for the first 3 years and 5 points for the fourth, with no subsequent contribution.

In comparison to an exclusive teaching load, an exclusive research load might be exemplified by:

4 journal papers (16), 8 conference papers (12), 6 research students (18), 4 grant proposals (8). It is also likely that such a person would be involved in Final Year Project supervision at the level of approximately 4 projects (6).

The general thinking behind these weightings follows the desire to establish a research reputation for the Department through scholarly output and to ensure that aspects that drive this output, such as the presence of research students and the submission of funding proposals, are adequately valued. In addition, consideration must be given to academic staff undertaking a PhD, since they will not (in general) be applying for funding nor supervising research students. The achievement of research funding is not explicitly weighted, since it is seen as a contributor to (a) research output and (b) research student numbers, both of which are weighted, and is not seen as having any value in itself.

One final issue relates to how collaborative research output is regarded. Research points are awarded per staff member, regardless of whether the qualifying work was done in collaboration with others. In the extreme, if a significant number of academic staff were involved in the same publication, funding proposal or supervision of a research student, a disproportionate number of points may accrue to that *activity*. However, it is important that 'internal' collaboration is not discouraged, there being the clear benefit of nurturing junior staff and getting them on the 'research ladder'. However, external collaboration is regarded as significantly more beneficial, so a compromise was achieved using the following weighting::

One 'internal' author	100%
Two or more 'internal' authors	150%

Table 4: Weightings for internal collaboration

Therefore, if a staff member authors a paper (rated at, say, 4) either individually or with other authors outside the Dept., the rating for that individual is 4. However, if that person authored a similar paper with 2 other internal authors, the *paper* would attract a score of 6 (4 x 150%), but this number would then be distributed between the internal authors, according their own agreed contribution.

2.3 Management/Administration Activities

The management and administrative responsibilities are enumerated as in Table 5.

Other administrative posts, which the Department identifies as important, are:

- PRO/Publicity Officer
- Student Recruitment Officer
- Industrial Work Experience (IWE) Officer

Activity	Dept. Head	Dean of Faculty	Secretary of Faculty	Research Officer	Teaching Officer
Points	30	3	3	10	6

Activity	IWE Officer (academic)	Library Liaison	Year Tutors (1,2,3,4)	EE Prog. Manager	DEFT Prog. Manager
Points	3	2	4	5	10

Activity	Foundations Prog. Manager	DEFT/VLE System Developer	EE FY Proj. Administrator
Points	5	10	5

Table 5: Weightings for Management/Administrative Components

The Department is currently fortunate in that these functions are currently carried by the administrative staff of the dept. It is worth stating that our Department currently finds itself in a *very* competitive market for undergraduate students and therefore places great emphasis on the recruitment and publicity functions. In addition, the post of IWE Officer is also carried by the administrator, with support from the Academic IWE Officer. Again, placing third year students under the IWE programme is currently challenging, given the relative youth of the dept. and the current unfavourable economic circumstances. The other management/administrative posts can be briefly described as follows:

Dept. Head: responsible for resourcing in Dept., maintenance of academic standards and quality, academic leadership in teaching and research and representation of the Dept. on various University committees.

Dean of Faculty: A non-executive Dean of a single department faculty. Faculty deals primarily with academic matters and the Deanship involves representation of the Faculty on a number of University committees and outside bodies.

Secretary of Faculty: Minutes Faculty meetings and deals with all correspondence relating to the Faculty.

Research Officer: Represents the Dept./Faculty on the University Research Committee and is a champion for research in the Dept., responsible for organising research seminars and workshops on research related activities, such as postgraduate supervision and funding proposals.

Teaching Officer: Represents the Dept./Faculty on the University Teaching Committee and champions teaching excellence in the Dept., responsible for organising workshops on teaching and assessment methodologies, etc.
IWE Officer (academic): Academic support for main Dept. IWE Officer.
Library Liaison: Represents the Dept./Faculty on the University Library Committee and co-ordinates all library needs, book budgets, etc.
Year Tutors: Facilitate student/staff liaison for each year of the undergraduate programme(s) via meeting with student representative committees, oversees student attendances and potential problems and performs induction for each programme year.
EE Prog. Manager: Chairs Programme Board and Examination Boards, co-ordinates any programme changes and suggestions and liases with outside accrediting bodies.
DEFT Prog. Manager: Manages the **D**egree **E**xtension **F**or **T**echnicians Programme, including advertising, recruitment, liaison with external students, etc.
Foundations Prog. Manager: Manages the Department's contribution to the Engineering Foundation Programme and the International Foundation Programme as well as liasing with students on these programmes.
DEFT/VLE System Developer: Oversees the development and maintenance of the **V**irtual **L**earning **E**nvironment for the delivery of the DEFT programme remotely via the Internet. Provides training and liaison with academic staff regarding content and technical features.
EE FY Proj. Administrator: Solicits project titles from staff and students, performs project allocation, provides induction/training on project aspects and organises assessment components, such as presentations, report submission and displays.

3. CONSTRAINTS AND PRIORITIES

The workload allocation mechanism must operate within the constraints of the University system. In particular, the total staff resource is exclusively dependent on a University allocation which, in general, is related to student numbers, rather then workload i.e. though a given number of modules need to be delivered independently of student numbers, the staff allocation mechanism is broadly based on the staff/student ratio for each dept. There is, of course, extra overhead directly related to student numbers in terms of assignment/exam. correction and response to queries, but lecture/lab. preparation and delivery are largely insensitive to student numbers, within certain bounds. Some small flexibility in teaching commitment is possibly available by reducing the number of optional subjects available in a programme, or removing particular programme streams, but this must be carefully considered within the broader context of programme quality, particularly with regard to any outside accreditation. Therefore, a department's teaching commitment is a relatively inflexible quantity. On the other extreme, there are few hard constraints (from the University) on the research side, where it is largely left up to the volition of individual academic staff to engage with research. However, research output plays a significant part in assessment for promotion, which is considered on a university-wide basis in NUI Maynooth. Finally, some flexibility exists regarding the creation of management functions relating to various activities, as determined by departmental priorities and strategy. For the EE Dept. at NUI Maynooth, the following considerations (mainly due to the external environment) apply:

1. Within Ireland, and the Dublin region in particular, there is considerable competition for engineering students,
2. Electronic engineering is not currently in favour with school leavers in Ireland (due, in part at least, to Ireland's economic situation),
3. NUI Maynooth is not one of the biggest and best known universities in Ireland,
4. The existence (and pedigree) of electronic engineering at NUI Maynooth is relatively unknown,
5. There is a relatively new interest by overseas (particularly Asian) students in coming to Ireland to study science or engineering, and
6. The availability of research funding in Ireland has improved considerably over the past 5 years.

Issues 1-4 are largely responsible for the creation of the posts of PRO/Publicity Officer and Student Recruitment Officer. In addition, the DEFT programme (and the associated positions of DEFT Prog. Manager and DEFT/VLE System Developer), which offers years 3 and 4 of the undergraduate programme in EE to qualified technicians working in industry, was created with 1 and 2 in mind, and in response to a national need. The post of Foundations Prog. Manager deals directly with 1, 2 and 5 and to facilitate non-traditional entry routes, such as disadvantaged students or early school leavers

returning to learning. In addition, it is vitally important that our graduates and students are well perceived by both industry and the general population (i.e. prospective students and those that influence them) so it is important that a quality programme and good student support mechanisms are put in place. This largely accounts for the creation of the following posts: Teaching Officer, IWE Officer, IWE Officer (academic), Year Tutors, Foundations Prog. Manager and EE Prog. Manager and to a slightly lesser degree in relation to the posts of EE FY Proj. Administrator and DEFT Prog. Manager. Further student support is also provided by the overseeing role of Dept. Head and a 1st Year student mentoring system, in which all EE staff play an active part, is also run by the University.

Given the set of constraints and pressures both within the NUI Maynooth system and externally, it is clear that most flexibility exists with regard to research activity. Research activity can, of course, be instrumental in establishing the reputation of a department and a university and can therefore help to address issues 3 and 4 above, taking advantage of 6.

4. ESTABLISHING AND IMPLEMENTING STRATEGIC DIRECTION

Clearly, it is important to establish strategic goals if strategic planning is to take place. For the EE Dept. at NUI Maynooth, this takes place annually in a two-day off-campus
Session in June. Here, strategy is reviewed in relation to current challenges and constraints and priorities are set. The mechanism for implementing the chosen strategy is via the creation/deletion of various management/administrative posts and the adjustment of weights for the various teaching, management and research activities. This is done by the Department staff as a body, leading to unanimous agreement and transparency in the scheme adopted.

If, for example, a department wishes to prioritise research output with the objective of the department achieving an international reputation for research (as a strategic goal), then research output items are heavily weighted. In reality, however, there will be a subset of staff who will be motivated to take up this challenge and others who may not. The weighting system still allows this dichotomy and, indeed, it is important that there are people willing to engage predominantly with teaching so that those who are willing/able to make an impact on research have the opportunity to do so. The implementation plan uses the following procedure:

1. Staff submit scores for various activities in the last year (May to April)
2. Scores are totalled for each staff member
3. Strategy is reviewed against the background of environment/constraints
4. New weightings and/or new posts are created/removed, as appropriate
5. The workload allocation for the forthcoming year is agreed

In assigning new workload, a projection of a similar research output for the forthcoming year is made for each staff member, with any deficit/surplus for each person being made up of management/teaching duties. Therefore, staff must be proactive in research in order to secure a reduction in management/teaching duties.

One other issue is ensuring quality in each of the assigned activities. Clearly, since the output of the research activities is reasonably straightforward to measure (numbers of papers, students, etc and citations, etc), it is not quite so easy to measure quality in teaching and administration/management. However, the following approach gives some assistance:

- Student assessment forms, external examiner comments help to ensure quality of teaching, and
- Annual reports on activities in managerial/administrative roles are presented at the strategy meeting.

5. CONCLUSIONS

The approach to strategic management of an academic department presented in this paper may seem very clinical and enumerate. However, there has been broad acceptance and, indeed, the scheme was conceived by the staff body, as a group and refined over the past three years. As well as establishing

strategic direction, it provides a transparent view of activities which the department values highly and removes any subjectivity from the assignment of workload by the Head. There is still some discretion of the Head employed, since not all the numbers balance out exactly equally and there may be further constraints on expertise and abilities that need to be observed. In the main, this has been a straightforward task, with the utmost co-operation from all staff and plenty of volunteers for the management/administrative tasks. It should be pointed out that the 'system' does not detail every minute activity and all staff engage in various activities which are not enumerated, though they may be considered subsequently at the next strategy meeting for inclusion. Interestingly, the mean point count per staff member for 2003/2004 (using the 2002/2003 research projection) is 70, with a variance of about 2 points. The focus of this workload allocation mechanism is on academic staff, but other staff contribute to its refinement and may impinge on the allocation in a direct way by assuming some of the posts.

The general focus of the scheme is on relative values of points per staff member, though a deficit/surplus of points over the benchmark (70) may give a hint as to whether the Department is being under/over-ambitious (respectively) in terms of aspirations, relative to resources (particularly staff numbers). It may also relate directly to the disparity between workload determinants (number of modules) and resource provision mechanism (student numbers).

Clearly, the scheme described here is not for every academic department. Our Department has some unique characteristics, not least of which is the fact that it was non-existent before 2000, allowing *carte blanche* in relation to the creation of new management and administrative mechanisms. It may not suit non-engineering faculties and there are a number of other, both formal and informal, workload allocation strategies which are employed in the university sector. However, we feel that the scheme reported here has succeeded (to date at least!) in providing an equitable workload allocation mechanism which can be used to implement strategic plans.

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