Academic Timetabling: Space Sharing Strategies

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Implemented correctly, Automated Timetabling can provide many benefits to Academic Institutions [McCollum 2008, 2007a]. The ability to make better use of Institutional resource is a key area due to the need to deliver the best educational environment possible [McCollum2007b].

Imperial College is based in London, UK and specialises in Science, Technology, Engineering and Medicine. There are four faculties, Business, Engineering, Medicine and Natural Sciences, with the faculties of Engineering, and Natural Sciences having nine and four departments respectively. The total number of FTEs is approximately 15,000, of which approximately 8,500 are Under Graduates, 2,500 taught Post Graduates and 3,000 research-based Post Graduates.

Of the above, approximately 8,500 are home students, 2,000 are EU with the remainder being overseas students.

Within Imperial College London a recent decision to move towards automated timetabling was driven by the need to reduce capital spend and the ability to effectively utilise the College's estate. In order to minimize the need to build new or refurbish existing teaching space, and to maximize potential for revenue generation the ability to identify empty space and capitalize on opportunities for rental to external bodies was also considered advantageous. To meet these objectives, it was considered necessary to assess the possibility of centrally controlled and owned shared space. The aims of the project are:

(i) To ensure that timetabling and strategic modelling software is 'fit for purpose' for the next decade and beyond.

(ii) It was also considered that in order to effectively measure the ability to increase recruitment to existing courses and bring on-line new offers, the development and deployment of a strategic modelling environment needed to be assessed.

(iii) To improve student experience and reflect current 'real-time' timetables via web technologies, allowing students instant access to course and examination schedules and be informed of changes to timetable.

(iv) To reduce department overhead by locally engaging in support functions that could be more effectively resourced centrally.

Currently within Imperial College all space is 'owned' and scheduled by individual departments. This is detrimental to the College as it allows for little opportunity for collaborative courses, as departmental timescales are out of sync with each other. Additionally, the College has very poor utilisation rates, with a 'block booking' culture being prevalent. Departments have developed a very ad-hoc arrangement for sharing space, which is primarily done by directly contacting other departments and requesting usage.

Within the current project a methodology of centralising the collection of data has been developed, and a College-wide timescale adopted. The methodology employed was firstly to compile a complete set of building blocks that provide the foundation of the timetable i.e. Modules offered (compulsory, options), Delivery mechanism (lectures, seminars, tutorials), Staff members, Student groups, Room data, Cohort sizes and Constraints. Once the building blocks are in place, an attempt to auto-schedule events would be executed, excluding rooming.

(i) Staff and student clashes would be explored, and resolved.

(ii) Events would then be de-scheduled, with all constraints attached to individual events.

(iii) Large lecture space would be scheduled, and departmental zoning applied.

(iv) Specific space requests would then be processed, and any clashes resolved.

(v) Finally small teaching space and laboratories would then be allocated.

As an interim measure for the first year of the project, a decision at board level to allow departments to specify days and times of teaching events was taken. Post the September implementation, these time constraints are to be removed and events rescheduled. At this stage pre and post utilisation figures will be analysed, and used as a benchmark for distance travelled within the timetabling project. With the goal of sharing space, The College are looking to centrally allocate all teaching space, to model and reconfigure timetables in order to achieve maximum utilisation, and to produced an informed capital investment programme dependent on the results of potential models.

This talk will discuss the space strategies and show simulations on how their implementation has the ability to make better use of resource. An update will be given on the implementation and examples provided of best practice when implementing space sharing strategies as part of a decentralised timetabling system.

McCollum (2008), B. McCollum, A. Schaerf, B. Paechter, P. McMullan, R. Lewis, A. Parkes, L. Di Gaspero, R.Qu, E.K. Burke, Setting The Research Agenda in Automated Timetabling: The Second International Timetabling Competition,

McCollum (2007a), B. McCollum, A Perspective on Bridging the Gap between Theory and Practice in University Timetabling, Practice and Theory of Automated Timetabling VI, Springer LNCS Vol 3867, 2007, pp 3-23.

McCollum (2007b), B. McCollum, T. Roche, P. McMullan, Optimising Space Through Macro and Micro Planning and Scheduling, Presentation at SCUP–42 , Society of College and University Planners International Conference, July 7–11, 2007, Chicago.