

This paper provides a summary of the key findings of a study commissioned by JISC into timetabling and resource scheduling in higher education (HE) and further education (FE).

The study, undertaken by Oakleigh Consulting Ltd, offers a useful profile of current practice, challenges, use of technology, and innovation throughout the HE and FE sectors. It can be used as a 'menu' of approaches and possible use of policy, technology, process, and incentives to develop current practice.

How are institutions working and why?

The study identifies four model approaches to timetabling and resource scheduling commonly adopted throughout the sectors, and a number of 'drivers' influencing the development of these models at the institution level. These approaches are defined by the 'central' or 'distributed' (at the academic department level) management of:

- Requirements identification: identifying all requirements for teaching and learning activities
- Scheduling: identifying date and time of activities
- Location allocation: allocation of rooms and other resources to activities

Responsibility for these activities is most commonly arranged in four ways (A–D), as represented in Figure 1.

The approach adopted by any one institution is affected by a number of 'drivers' – internal or external factors that have influenced timetabling and resource scheduling over time. Such drivers include but are not limited to:

- Efficient use of resources, including acceptable utilisation of available locations for teaching and learning and use of teaching staff time
- Complexity of the curriculum, such as the extent of non-traditional provision

- Locus of control relating to the procurement and implementation of supporting technology, and ownership of process development
- Culture of the institution in relation to the prioritisation and accommodation of staff availability preferences, focus on student experience, and efficient utilisation of resources
- Student recruitment and retention, including the measurement of student attendance through the timetabling process and direction of appropriate support
- Physical layout of the institution, including the existence of distinct campus sites with discreet processes for management of the timetable
- Non-teaching activities, such as the priority of using available locations in the delivery of conferences, or ad hoc room bookings
- Enhancing the student experience through development of a 'student focused' timetable
- FE specific drivers, including the monitoring of attendance and reporting on student enrolment and retention as a requirement of funding models within this sector

It is possible to loosely associate these drivers with particular types of institution; however, the heterogeneous nature of the education and skills sector means that there will always be an exception to the rule.

About the research

The study has been informed by consultation with a number of bodies representing the higher and further education sectors, and suppliers of timetabling information systems.

A series of eight regional consultative workshops were then used as a forum to expand this umbrella perspective, attended by those working with timetabling and resource scheduling processes at the institution level. In total, 95 individuals participated in these workshops, representing 59 institutions from across the UK.

The administrative landscape: how does timetabling and resource scheduling link with other processes?

A dependency on accurate information relating to staff, students, locations and curriculum means that timetabling and resources scheduling processes are highly information intensive and can feel 'at the end of every other process'. In particular there is a dependency on the:

- Curriculum management process through which existing programmes of study and modules are modified or discontinued, and new offerings introduced
- Processes providing information relating to student association with programmes of study, modules and learning activities, including the application, enrolment, and progression processes
- Staff human resources process through which staff workload and module allocation may be managed
- Estates management process through which the existing pool of locations is extended, reduced and redeveloped

The study focused on the relationship between timetabling and the curriculum management process in particular. It was suggested by consultees that few institutions fully manage impact on timetabling and resource scheduling processes when considering changes to the curriculum and the way in which this is delivered. Consultees reported that likely resource implications are commonly considered during validation processes, such as the need for additional staff, and locations with specific resources, such as laboratories and portable equipment. However, the extent to which these decisions are made using management information derived through the timetable, and the involvement of timetabling staff in advising likely implications on the timetabling process, was identified as an area that could be developed.

To what extent are the processes supported by technology?

Comments from consultees suggest that almost all institutions make use of a timetabling information system either across the institution or at a distributed

level within certain academic departments. However, the extent to which the full functionality of the system is adopted varies greatly.

Whilst a number of workshop participants could identify specific functional issues with the timetabling system used at their institution, in the context of their work such as potential improvements to the user interface, many consultees reported that the current market offering is rich and extensive, with functionality of timetabling information systems often not fully implemented due to the need to invest significantly in major change programmes and system integration; or the dependence on extensive accurate information as a result of other processes.

Functionality to support the management of work placements at partner sites, and the existence of a single product enabling the management of timetabling and conference management, are two areas that have been identified as challenging to manage through use of existing off-the-shelf systems.

Timetabling and resource scheduling is hard: what are the most significant challenges?

The study has identified a range of issues impacting timetabling processes: these can be classified as relating to either policy, process, technology, or people. The most significant issues relating to each of these themes include:

- **Policy:** defining a 'good' timetable can be challenging for institutions due to a number of conflicting priorities that may arise; for example, accommodating teaching staff preferences regarding availability, while making most efficient use of locations, and producing a 'student-focused' timetable.
- **Process:** information required in order to plan and develop the timetable is dependent on many other processes. Information is often available immediately prior to the start of curriculum delivery – or following this – and may be inaccurate or subject to change. As a consequence of this, planning of the timetable and preparation of the timetabling system may need to proceed with inaccurate data. This issue is exasperated by the fact that timetabling requirements may change for a number of reasons relating to the curriculum, staff, estate and student number changes.

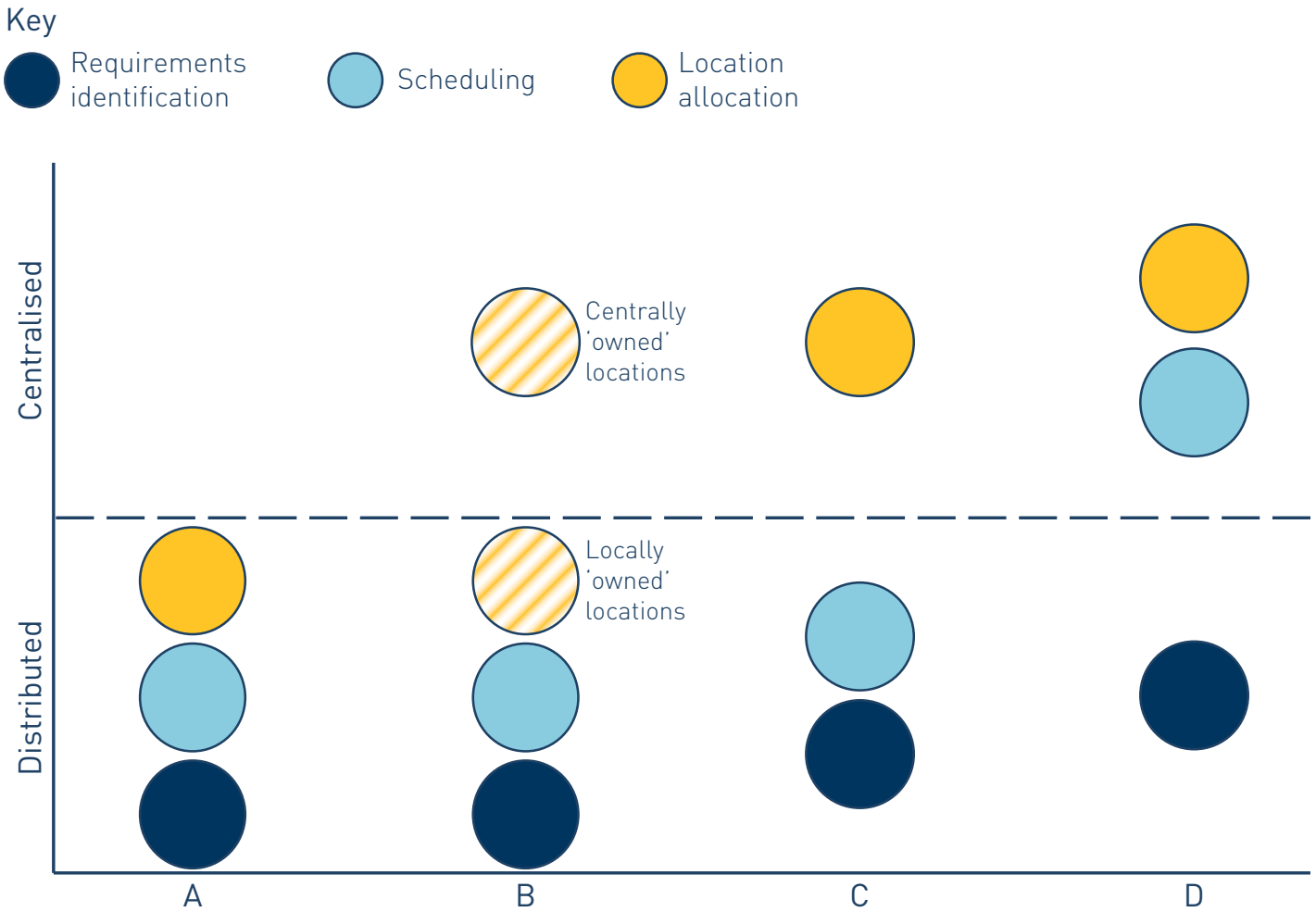


Fig 1: Four model approaches to timetabling and resource scheduling

- **Technology:** timetabling system functionality available through the open market is rich and extensive, however institutions may find it challenging to fully implement this functionality due to the potential need for major change activity, system integration and staff training.
- **People:** issues relating to people are primarily cultural and arise as a consequence of historical practice and the challenges of implementing changes to a process that has a significant impact on the practical working patterns of staff and students. Those charged with production of the timetable or implementation of change in this area may face significant opposition to changing historical patterns of working, which may prevent agreed timetabling priorities from being implemented.

The above is a highly synthesised summary of the common issues, and individual institutions are likely to experience a number of specific challenges.

A foundation for success: what are considered the building blocks of successful practice?

Consultees have commented on the importance of a number of 'building blocks' that are the foundation for successful management of timetabling and resource scheduling processes. These building blocks combine an appropriately rich use of the institution's timetabling information system functionality, with coordination of information and processes across the institution – and are not necessarily related to either a central or distributed approach to management of timetabling and resource scheduling. Building blocks relate to a range of factors, including:

- Existence and communication of appropriate policy influencing process design and managing stakeholder (specifically staff and student) expectations in relation to the timetable

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- The structure of the processes adopted and how these interface with other significant administrative processes operating at the institution; including consideration of the extent to which information outputs of processes significantly impacting timetabling can be made available at a point allowing accurate planning of the timetable. Use of timetable information and input from timetabling experts could also be incorporated into these processes
- Implementation and effective use of enabling technology, including identification of where existing functionality is not used and review of benefits associated with implementing this functionality, weighed against the need to change current practice and assign resources to achieving such changes
- Deployment of appropriately skilled people within, and to oversee the timetabling process, and networks to support their work; including establishment of a senior leader to 'champion' timetabling on an ongoing basis, and ensure that the impact on timetabling and resource scheduling processes is considered during the institution's strategic agenda-setting process

The extent to which individual institutions within both further and higher education consider their current practice against these suggestions is situation dependent, and the relative merit of developing practice in these

areas would need to be considered in the context of each institution's priorities and current circumstances.

The content of this briefing paper is drawn from a more extensive report containing additional information and further detail. The report also contains:

- Scenarios and process models describing timetabling and resource scheduling processes, variation throughout further and higher education, and examples of innovation
- A summary of links between timetabling and resource scheduling, curriculum design and delivery – including work-based learning

This briefing paper was written by Zeb Nash, Oakleigh Consulting, on behalf of JISC.

Alternative formats of this briefing paper can be found at:
www.jisc.ac.uk/publications

Further Information

JISC Study on Timetabling and Resource Scheduling
Final Report
www.jisc.ac.uk/timetablingandresourcescheduling

JISC e-Learning blog
<http://elearning.jiscinvolve.org>