The management information requirements of heads of university departments: a critical success factors approach

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Abstract. This paper examines the problems of developing management information systems in universities, with particular attention to the information needs of Heads of Departments. The context of university work is explored and needs are uncovered using the critical success factors methodology. In using CSF it was found that senior managers intuitively understand and accept their use and that the methodology can take account of the unique characteristics of university management. Further advantages of the method are that all information is considered, whether or not it is easy to collect, and the critical success factors point to priorities for development. The conclusions include suggestions for future research, hypotheses on critical success factors and information needs of Heads of departments and recommendations on information acquisition, analysis and dissemination.

1. Background

The research reported here formed part of the activities of a steering group, set up by the Vice-Chancellor of the University of Sheffield, to examine how more effective management information systems could be developed in the University. Part of the work of the Group was to explore the needs of Heads of Departments whose traditional role as academic leaders is changing towards a greater acceptance of managerial responsibilities, consequent upon a greater market orientation in the higher education system of the U.K. The aim of this pilot study was to explore the potential of the Critical Success Factors methodology for assessing information requirements. Other aspects of university management information systems are dealt with only to provide a context for the study.

2. Objectives

The objectives of the project were:

(1) to define the management information requirements of Heads of academic departments in areas critical to the achievement of organizational goals;
(2) to explore the relationship between factors critical to the successful achievement of organizational goals and information needs, and to develop priorities in management information provision.

2.1. Management information systems

The determination of information requirements is a key element in developing the strategy for management information systems in any organization, and all the more necessary when that organization (like most universities in the U.K.) lacks any tradition of systematically developed management information systems. Davis [7] differentiates between two levels of information requirements definition:

1. The organizational informational requirements to define an overall information system plan.
2. The detailed requirements for each data-base including the requirements for each application” ([7] p. 4).
This paper is exclusively concerned with the former. Many of the issues that face universities in seeking to implement management information systems are reflected in the literature on management information systems planning. For example, Bowman *et al.* [4] suggest that effective MIS planning involves four difficult processes:

1. Strategic MIS planning - the alignment of the MIS plan with overall strategies and objective of the organization.
2. Organizational information requirements analysis - design of an information architecture for the organization as a framework within which systems are to be developed.
3. Resource allocation.
4. Methodology selection - selection of one or more planning methodologies for performing the above three processes.

A similar pattern would need to be adopted by any university in identifying its management information aims. The essentially non-technological character of information planning is discussed by Adriaans and Hoogakker [1], who demonstrate that at the strategic level, information analysis should focus on top management goals and critical success factors.

2.2. Management information needs

The literature of MIS offers few examples of work on the information needs of Heads of university departments - or, even more generally, of university administrators or executives. A common way of considering information need is through a model of information use which reflects the hierarchical structure of the organization. Davis and Olson [8] suggest a model of information use, derived from Anthony *et al.*'s [2] categories of management planning and control, in which it is suggested that operational control requires internal, well-defined, detailed, current, and highly accurate information, whereas strategic planning requires external, less well-defined, forward-looking, less current, less accurate information.

The question, however, is: how can models of management behaviour be applied to universities? Some useful guidance is presented by Beckman [3] who examines university culture in relation to "two dimensions of choice in principles of social organizations" (see Fig. 1). The heteronomy/autonomy axis concerns the external relationships of social units closely integrated with, or independent of, the environment. The open/closed axis concerns its internal organization - "liberal" or "authoritarian". Beckman extracts four organizational paradigms to which ideals and values cluster.

"The Temple", the university standing above the ignorant masses providing the guidance of true dogma.
"The Oasis", the ideal free academy of thinkers.
"The Factory", the efficient, planned and disciplined unit generating qualified labour and technically useful knowledge.
"The Bazaar", the rich and flexible market place for knowledge, competence, profitable information for whoever cares to ask (and pay).

The "Temple" can perhaps be best understood in historical terms, now undone by social mobility, the "Oasis" as an ideal for which academics are believed to yearn, and the "Factory" and "Bazaar" as the direction in which government policy, in many countries, is pointing.
Proponents of heteronomous ideals stress the value of usefulness, of social expediency over values of academic freedom, and of the efficient adaptation to environmental needs. Palmer and Sage [18] suggest that the future of universities will depend on their ability to adapt rapidly to changes in their environment. In the U.K. there is pressure for change in universities from Government (through the Higher Education Funding Councils and their predecessors) which is forcing them towards the “Factory” or “Bazaar” ideals. A response to this pressure clearly supports the importance of information on environmental/external factors noted previously.

Palmer and Sage identify a number of management characteristics that are truly unique to the university. For example, headship in the university is exercised from a perspective of persuasion, consultation and guidance in the formulation and acceptance of philosophy and procedures. This leads them to suggest that management information support in universities must necessarily be concerned with subjective, intuitive feeling and this must be integrated with the more readily quantifiable and objective.

2.3. Management information systems in universities
Examples of attention to management information within the university environment are largely confined to the United States. For example, Freeman and Simpson [10] describe the development of a unified evaluation, budgeting and planning system at Michigan State University, which concentrates mainly on the collection of internal data to enable budgetary allocations to be made in a more efficient manner. Little attention is paid to the specific needs of individual managers and the collection of external information is confined to comparative data from similar institutions. Planning is seen as a short-term phenomenon and the lack of information provided by the system for longer term planning is resolved by dropping this requirement from the programme. The problems of inadequate information provision are emphasised by the failure to control budget growth at a time when clear environmental signals, dictating the need for budget reduction, were available.

The potential dangers of developing management information systems by focusing on the problems with existing systems are ignored by Lewandowski [14], who reports on the development of an Information Center for Chicago State, Governors State and Northeastern Illinois Universities. The motivation for the development of an Information Center came from dissatisfaction within the current systems, shown in the backlog of requests by users for enhancements to the existing systems and for reports the system could not provide. The proposed solution was technologically based, providing the widest possible assortment of user-friendly software and hardware with access to university data. Little is said in the paper about the information content of university data, or of the management issues determining users’ needs.

There is also an absence of consideration of information requirements in Penrod and Dolen’s account of the development of Information Resource Management at California State University. This report concentrates on personnel, on reporting structures and on technological infrastructures. The responsibility for meeting information requirements is clearly defined: “Users ... have responsibility for meeting their information needs” ([19], p. 21).

Another example of a technology-inspired development is provided by Lundy and Davis reviewing the development of a planning and institutional research system at Grambling State University. The university, recognising: 

“that the quality of planning could not consistently rise above the quality of information on which it was based... took some necessary steps to improve the planning technology [our emphasis] at the institution” (Lundy and Davis [15]).

Not surprisingly, therefore, the proposed solutions focused on the technological capabilities of the system: (1) its ability to interact with existing databases; and (2) its ability to provide projections and one-off reports.

Success in developing the system was to be ensured by the careful preparation of a design
document and (perhaps optimistically) the employment of an external consultant. The design document recommends that implementation should be based on five principles: user motivation; availability of early results; simplicity; flexibility, and data purification. No consideration was given at this early stage to information requirements. The information the system provides was based on a Management by Objectives plan and was designed to give managers a constant flow of information on the status of their operations.

These three approaches have a number of things in common:

1. Managers’ information requirements are not thought about at a sufficiently early stage in the development process. Information needs are satisfied through the byproducts of transactions processing activities or as an avalanche of performance indicators. Horton’s conclusions [12] that responsibility for information accessibility, availability, etc. is left with the user in these instances is justified.
2. Little attention is paid to information that is not internal, quantitative or objective. Mintzberg’s findings on managers’ information behaviour [17] are not taken into account. External and “soft” information needs are ignored.
3. Most solutions concentrate on the technology. Current technology with its ability to provide “end-user” computing is (in some instances) seen as the solution. The possibility that the information provision and content are at fault is not admitted.

3. The critical success factors (CSF) approach

In an attempt to overcome the shortcomings of approaches to management information systems, Rockart [21] developed the CSF approach on the earlier work of Daniel who stated that a company’s information system should be selective, focusing on success factors. He suggested that, in most industries, three to six factors determine success and that, "... these key jobs must be done exceedingly well for a company to be successful" (Daniel, [4], 111). Thus, both authors suggest that there are a few key areas which must go right for the business to flourish. They are areas of activity that should receive careful attention from management and on which information should be made available. Critical Success Factors support the attainment of organizational goals - they are the areas in which good performance is necessary to achieve those goals.

Rockart notes that there are significant benefits in taking the necessary time to think through the critical success factors for general managers in organizations:

–The identification of CSFs allows a clear definition of the amount of information that must be collected by the organization and limits the costly collection of data.
–Their use moves the organization away from building its reporting and information system primarily around data that are easy to collect. Rather, it focuses attention on those data that might otherwise not be collected but are significant for the success of the particular management level involved.
–The identification of critical success factors below ‘top’ executive level can also fulfill a number of important functions from a managerial point of view.
–They can provide a means of pragmatic and action oriented communication amongst executives to enhance shared understanding of the company and its environment.
–They improve management control by helping to ensure that more significant factors will receive careful and continual management scrutiny and force managers to develop good measures for those factors.

Boynton and Zmud [5] suggest that the strengths of critical success factors method lie in two key areas: (1) The CSF method generates user acceptance at the senior managerial level. Senior executives seem to intuitively understand the thrust of CSF method. Friend [11], reviewing the growth of Executive Information Systems, supports this point. (2) The CSF method favours a top
down planning process - initially focusing a participant’s attention on a core set of essential issues, refining them in a manner that allows an evolving design to be continuously examined for validity and completeness.

They caution, however, that CSFs do not seem appropriate for developing detailed information requirements for all managers within the organization. Rather, they should be used to conceptually capture a manager’s key concerns and provide initial descriptions of information measures. They suggest that the further removed managers are from senior positions within the organization, and the less involved they are with strategic and tactical planning, the more difficulty they have in identifying CSFs.

If the proof of the pudding is in its eating, then the attractiveness of CSF as a methodology for determining overall organizational information requirements is indicated by a number of reports of its use in real-life information systems development, for example: Mainelli and Miller [16] at British Rail; Adriaans and Hoogakker [1] in determining the extent an information system is contributing to the achievement of corporate objectives; and Vogel and Wetherbe [22] who use CSF alongside elements of Business Systems Processing (developed at IBM) and End/Means Analysis (Bowman et al., [4]). In these and other studies the main strengths of critical success factors are shown to be:

1. Acceptance - senior managers intuitively understand and accept their use.
2. Scope - consideration of information regardless of whether it is easy to collect or not.
3. Prioritisation - the critical success factors and the resulting information needs point to priorities for development.

4. Methodology

In this application of CSF, Heads of Departments were selected (from the 63 available), taking the following factors into account: the need to limit the total number of interviews to 20 because of time constraints; research selectivity rating (a national rating of all university departments carried out by the Universities Funding Council); undergraduate/postgraduate mix.

Four groups of departments were drawn up (with the sample and the number of departments satisfying the criteria show in parentheses):

- Group W: Research rating 1, 2 or 3, more than 80% undergraduate. (5 from 15),
- Group X: Research rating 4 or 5, more than 80% undergraduate. (4 from 11),
- Group Y: Research rating 1, 2 or 3, less than 80% undergraduate. (6 from 23),
- Group Z: Research rating 4 or 5, less than 80% undergraduate. (5 from 12).

where 80% is the average proportion of undergraduates in departments at the University of Sheffield and 3.23 is the average research selectivity rating of Departments in the University on a scale from 1 (worst) to 5 (best).

The slight over-representation of departments from group W is to allow for the inclusion of one department from the small number (three) that were postgraduate only. Departments from each group were chosen in consultation with members of the Steering Group. Interviews were carried out following a schedule consisting of open-ended questions covering: (1) the identification of departmental goals; (2) the determination of factors critical to the successful achievement of those goals; (3) the information required to manage those factors.

The interview structure was based on the recommendations made by Rockart [21]. More complex methodologies such as those suggested by Vogel and Wetherbe [22] involving analysis of sub-systems were rejected because of lack of appropriateness to the objectives of the study and the time limits involved.

Few problems were encountered in arranging interviews, despite what were obviously very full diaries, although in the end it was only possible to carry out seventeen of the proposed sample
of twenty interviews, distributed over the groups as follows: Group W, three departments; Group X, four; Group Y, five; Group Z, four departments. Slightly under-representing departments in Group W. Interviews lasted on average 90 minutes and in some instances respondents provided documents outlining departmental activities and strategic objectives, which were very useful.

5. Results

The information collected revealed a recognisable and cohesive range of issues; however, individual answers differed in style and detail. The data analysis, therefore, is largely qualitative. An initial survey of the results identified a few major themes in each section and these were gradually refined into more detailed subject categories under which results were aggregated. For respondent’s goals this was a relatively simple process; however, the task became progressively more complex through the determination of CSF and information needs. The critical success factors were grouped under a number of headings that approximated to activity areas. These were eventually refined into a number of "key functions" reproduced below. The CSF were collected and classified in more detail under these functions.

The categorisation of information needs proved more problematic. The simplest way of structuring the data was to collect them under a number of headings of subject of information need - students, staff, competition, etc. With one or two changes to highlight items of interest this is the format adopted.

(1) Reported goals are analysed in the context of Beckman’s analysis [3] on University ideals to see what pressures are exerted on CSF and information needs by the University’s culture.

(2) Critical success factors and information needs and interview groups are explored to probe potential relationships between department characteristics and information needs.

The fact that this paper reports a pilot study, rather than a full investigation, must be reiterated at this point. A full census of information needs in the organization is necessary to give proper guidance for information systems design. As a pilot study, it must be recognised that the sample of users is not statistically representative, but an attempt to gather a diversity of views.

5.1. Departmental goals

Respondents generally had no difficulty in identifying and articulating goals that conformed to a general understanding of the term. There were, however, some variations in the specificity and scope of goals. A minority of respondents, for instance, saw goal outcomes in subjective terms such as excellence but, on the whole, more objectively understood terms were favoured. Beyond being rooted in a roughly similar reality, the coherence of responses was probably helped by the University’s recent strategic planning exercise.

The goals formulated by respondents show a number of common concerns which are shown as "typical" goals in Table 1. The totals refer to the number of respondents whose goal statements have been interpreted as falling under that typical goal. The high ranking of goals A & B can be explained by the circumstances within which universities in the U.K. now function. In 1989 the Universities Funding Council reported on the results of a Research Selectivity Exercise, the aim of which was to
assess all university departments in all disciplines on a scale of 1 to 5 (1, low; 5, high). A further such exercise was carried out in 1992 and, as a result, research resources will be differentially allocated to universities on the basis of their overall research evaluation. Universities are expected to apply the same principles in the allocation of departmental budgets and it is not surprising, therefore, that Heads of departments at Sheffield should be so concerned with this issue.

The emphasis upon teaching quality can also be seen as a response to national action to ensure the maintenance of quality in the face of a significant reduction in the allocation of national resources to higher education, together with a massive planned increase in student numbers. Various processes have been set in train to ensure quality, such as more formal student evaluation of courses, staff appraisal, formal monitoring through Faculties, and a national assessment of teaching quality by the Higher Education Funding Council from 1993 onwards. Again, these pressures might be expected to raise the salience of this issue in the minds of Heads of departments.

5.2. Critical Success Factors
Having identified their departmental goals, the interviewees were then asked to identify factors critical to the successful achievement of those goals. Most respondents showed little difficulty in identifying such CSF, supporting the general conclusion from the literature that they are readily understood by senior managers. The results are presented by highlighting their relationship to the goal types discussed in the previous section. A summary of this information appears in Table 2. The first nine CSF have been grouped as related to “external” factors and some are related to the research activity of Departments, although they appear in the list as a result of being cited in relation to some other goal. Indeed, what the cross-tabulation reveals is a close association in the minds of Heads of the link between research and teaching.

<table>
<thead>
<tr>
<th>Critical Success Factor</th>
<th>Organization goals*</th>
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<tr>
<td></td>
<td>A</td>
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<tr>
<td>Reputuation of Department</td>
<td>6</td>
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<tr>
<td>External relationships</td>
<td>4</td>
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<tr>
<td>Funding for research</td>
<td>4</td>
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<tr>
<td>Support for students</td>
<td>4</td>
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<td>Research base diversification</td>
<td>4</td>
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<tr>
<td>Response to external needs</td>
<td>1</td>
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<tr>
<td>Policy of external bodies</td>
<td>2</td>
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<tr>
<td>Attraction of funding</td>
<td>2</td>
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<tr>
<td>Relations with NHS</td>
<td>2</td>
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<tr>
<td>Teaching and research expertise</td>
<td>3</td>
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<tr>
<td>Resource management</td>
<td>4</td>
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<tr>
<td>Student recruitment</td>
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<tr>
<td>Response to internal needs</td>
<td>2</td>
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<tr>
<td>Course design</td>
<td>3</td>
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<tr>
<td>Teaching resources</td>
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<tr>
<td>Protection of teaching/research time</td>
<td>1</td>
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<tr>
<td>Maintenance of clinical practice</td>
<td>1</td>
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<tr>
<td>Students (NHS)</td>
<td>1</td>
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<tr>
<td>New technology exploitation</td>
<td>1</td>
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<td>Academic recruitment</td>
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Note: *The goals are those set out in Table 1

5.3. Management information needs
The information needs discussed in the interviews were aggregated into the information types shown in Table 3. In using information, interviewees were attempting to deal with two important questions: "Are we doing the right thing?" and "Are we doing things right?" Answers to these two
fundamental questions seem to be found in two corresponding broad categories of information; information about competitors and information about clients.

The use of the word "client" is adopted from the terminology of Kotler and Levy [13] who contend that an organization’s client base includes not only those who consume its output, but also those who control it, those who have a direct interest in it and finally those who have an indirect interest in it. On this understanding, the potential client base of a university department is very wide.

6. The results analysed

6.1. Departmental goals

Respondents identified goals concerned with their two main activities. Only those goals concerned with improving external relationships, widening access and attracting high-quality students contain no immediate reference to teaching or research. Some of the goals, particularly those using ill-defined concepts such as "excellence", are open to interpretation; whether "excellence" refers to the output of research or to the actual process of research; what excellence means in real terms, and so on. Some of the responses are of interest because they are indicative of the tensions in University ideals outlined by Beckman [3].

Heteronomy vs. autonomy: examples of heteronomous orientation are not difficult to see: "to improve the department’s research rating" underlines the department’s subordinate relationship to externally generated performance measures. Commitment to heteronomous ideals is exemplified by goals such as: "to develop department’s relationship with the commercial and industrial sectors and review activities in the light of this", whilst a more autonomous approach is suggested by statements such as: "To participate in the development of activities, national and international ...", and " ... to advance the boundaries of the discipline". When considering teaching there was a tendency to look both ways, emphasising both the autonomous values of the discipline and the heteronomous values embodied in "employment skills".

Open vs. closed: Palmer and Sage [18] and Epstein [9] presuppose a tendency towards values of openness - flexibility, collegiality, lack of hierarchy - within academic departments. These seem to be present in responses such as: "the defence of individual scholarship and research", and "to maximise the potential of teachers and researchers both individually and as a team, allowing them full space to explore areas of common and individual interest". These characteristics are indicative of some important issues in the application of traditional models of management activity to University "managers". Management presupposes certain values. Strategic planning seeks to fit the organization into the demands of the outside world. Management control is suggestive of a closed hierarchical style. The resistance to these values implied by the persistence of autonomous and open cultural values suggest that caution should be exercised in the application of traditional models of management activity to management information systems development in a university.

6.2. Critical Success Factors and interview group

The results of this section of the analysis are summarised in Table 4. The critical success factors are grouped under a number of headings that can best be described as key functions to which they naturally attach. The four interview groups were those defined earlier: W, Research rating 3 and below; above 80% undergraduate; X, Research rating 4 and above; above 80% undergraduate; Y, Research rating 3 and below; below 80% undergraduate; and Z, Research rating 4 and above; below 80% undergraduate. The following points may be drawn out from the data; External relationships: the proportion of respondents identifying CSF in this category is lower for Group W than for the other groups. "Reputation of the Department" (Public relations) was cited across all groups.
Research and funding: CSF in this category are critical to most respondents although it is interesting that the two CSF concerned with attracting funds are located in Group Z. In both instances, the department concerned seemed to adopt aggressive approaches to obtaining research funds. Internal management: despite a superficially similar pattern to “External Relationships”, the underlying CSFs are a rather disparate group with few being cited more than once by interviewees from the same group. Three heads of medical departments all cited “management of resources” as a CSF - perhaps their minds were more focussed upon this issue as a result of the pressures of NHS reform and the reform of University funding of departments.

Student management: Critical Success Factors associated with students are concentrated in Groups W and Z. Departments in these two groups by and large chose student-oriented teaching goals. Group X department Heads identified goals related to teaching which were not student centred. Three of the four respondents in group W placed particular emphasis on the value of overseas students to their post-graduate courses and research.

Summary: four influences appear to be at work in dictating the choice of Critical Success Factor:

(1) The social, economic and political environment; which produce pressure on university departments to develop closer links with external bodies.
(2) Structural relationships: close reciprocal relationships with external bodies require maintenance. This applies particularly to departments in the medical school, because of their links to the National Health Service.
(3) Departmental culture: most notably through the expression of departmental goals expressing the values of ‘autonomy’ noted by Beckman [3].
(4) Postgraduate students: the needs of postgraduate students seem to influence factor choice. The relative instability of the demand and supply of this group of students appears to make their needs on the whole more critical than undergraduates.

6.3. Information needs and interview group

The results of the analysis of statements of information need by the members of the different response groups are shown in Table 5. Perhaps the most notable finding (although perhaps not unexpected in departments with high research ratings and higher proportions of postgraduate students) is that respondents from Group Z voiced more information needs than other groups and noted information needs of virtually every type. Perhaps they have a greater awareness of their information needs, because of their greater research orientation, but this factor is contradicted by the fact that respondents from group X (also with high research ratings) had the lowest incidence of stated information needs. Perhaps the size of the departments and the undergraduate orientation of those in group X may offer an explanation.

6.4. External and internal information need

In choosing Critical Success Factors respondents tended to identify factors that are either external to the Department or at the interface of the department and its environment. This impression is reinforced by an examination of aggregated information types.
Table 6 gives a ranked list of information types mapped against information source, and shows that the majority of sources are located outside of the department. Even if one considers staff information, one must be aware that this is not what one would normally term personnel information - information about performance, salary, absence etc. - instead it is information about staff needs and how to meet them. In this sense, one can perhaps consider "staff" as a client group of the department who have certain needs or wants that the university can satisfy - with space and resources for research for example. In return the University has certain needs - teaching expertise, the benefit good research brings to the institution - that these people can bring. Thus, it may be helpful to think of staff as an "external" group in trying to conceptualise the type of information needed about them.

Why are "useful" information needs largely external? By seeking factors that are critical to the successful achievement of goals, one concentrates on the strategic development of departments and, as Rhyne puts it: "Planning has the fundamental objective of achieving a 'match' or 'fit' or 'alignment' between the external environment and the internal capabilities of the organization" ([20] p. 320)

This focuses Critical Success Factors at the interface with the environment. The characteristics of university management identified earlier - informal, non-hierarchical etc. - mean that internal information needs may be thought of as informal and ad hoc and not necessarily seen as important. Finally, university departments are, in a broad sense, service organizations; their main activities take place at the interface with the environment, and this is where Success Factors are placed.

To conclude: as the environment in which the University operates becomes more complex and more uncertain, it is axiomatic that not just more, but better information about it will be needed.

7. Conclusions and Recommendations

Some general points that have emerged from the previous summary of results are worthy of comment as they point towards possible recommendations that will emerge from the project. The goals identified by respondents seem to confirm many of the points made in references in the literature search about the significant characteristics in university management. Many of the values identified by Palmer and Sage [18], Epstein [9] and described as 'open' by Beckman [3] in his model of University ideals are present in the goals identified by respondents. It is worth repeating that these contrast with the closed, hierarchical values embodied in models of management activity; values that are implicit in the underlying philosophy of traditional perceptions of management information strategies.

Many of the respondents identified goals that showed varying degrees of bias to heteronomous values. This is not surprising given the pressure exerted by current legislation and government policy in this direction. In addition, many of the departments had close institutional links with organizations and people external to them; the medical departments’ relationship with the NHS is one example, although more typical are the close links developed by many departments with outside bodies in their research activities.

Given these factors, the durability of autonomous values in Heads’ identified goals is interesting. This would suggest that departmental culture plays an important part in how the respondents view and plan their activities. It has been suggested earlier that strategic planning has the fundamental aim of achieving an alignment between the external environment and the internal capabilities of the organization (Rhyne, [20]). Enduring academic values that seek independence
from the environment are in opposition to this and are, again, indicative of potential problems in the uniform application of traditional models of management activity to the University.

The majority of the critical success factors identified by respondents are located at the departments’ interface with the environment. By seeking to identify those factors that are critical to the successful achievement of goals, the resulting factors will be those critical to department’s strategic plans or development. Four influences were suggested in respondents’ choice of CSF:

1. The economic and political environment.
2. Institutional relationships with outside bodies.
3. Departmental culture. Its impact on CSF is difficult to exactly define, but Beckman’s model has been used to suggest how it may influence respondents’ choices of goals. This influence will presumably affect respondents’ choice of critical success factor.
4. The relative importance of postgraduate students. Dependence on postgraduates as a source of funds is seen as more critical than dependence on undergraduates.

The critical success factors that have been identified in this study are shown in Table 7. Most respondents have identified requirements for information generated externally. To some extent, this is unsurprising as one would expect needs for detailed, internally generated information to be located at lower levels in the department. The emphasis on external information sources needs to be considered in the context of the critical success factors they are supporting. CSF can be categorised as tending towards one of two types-monitoring current performance or adapting the department to a perceived new environment. The general trend within critical success factors was towards the latter category.

### 7.1. Recommendations

A number of recommendations can be made on the basis of this investigation.

(1) Further research is necessary in a number of areas:
   (a) The evidence of this research is that Heads of departments rely heavily on networks of personal contacts, the nature of which seems to be closely related to the prevailing culture of the University. This aspect of information gathering might be explored further, to discover how extensive are those networks, and to what extent the information gathered is conveyed to others in the gatherer’s own department.
   (b) The investigation of what is critical for success in any organization is a worthy subject of study in its own right; however, there are good practical reasons for so doing in the University context. The evidence of this work suggests that a more extensive examination of CSF and the related information needs will: (i) provide the University with a better idea of the information it needs to support its wider goals; (ii) improve communication between departments and the centre - particularly about the overall direction of University policy; and (iii) improve the implementation and support given to University policy making.

(2) A University’s management information strategy must recognise the importance of information management. In particular, a number of policy recommendations can be made:
   (a) There is a need to improve information flow around the University: some of the information needs identified could be partially met from present resources in the University. Improving information flow may encourage better use of available information and reduce the possibility of friction between the centre and departments.
Better management information will not necessarily improve decision making. The values and skills of people using information must be taken into account. Training and education can help improve existing information use and assist in the management of change.

3. A number of priority areas have emerged for information collection and dissemination. The most important are:

**Competitor intelligence**: the systematic scanning of publications and brochures is recommended. Better use can also be made of the information and knowledge available within the University on the activities of competitors.

**Research funding**: the evidence here is that respondents rely heavily on personal contacts and knowledge of the "marketplace". Clearly, however, there are differences in expertise in attracting research funds, and efforts may initially be most profitably concentrated in widening that expertise. The study suggests that where information is collected and disseminated centrally, more thought needs to be given about its relevance to departmental research activity.

**Potential student needs**: information about potential students who may be attracted to Sheffield, largely but not exclusively from sixth forms; their needs, aspirations and general capabilities. Where new types of courses are being considered, such information is needed for marketing purposes. Few respondents attached importance to the specific needs of minority groups.

**Students**: first, student management information, to enable the progress of students to be monitored more closely; secondly, student feedback to provide information about current student needs.

**Research activity**: if the collection and dissemination of information about research activity outside the University is to be undertaken centrally on a programmed basis, then importance must be attached to the quality, timeliness and relevance of information collected. However, these same issues apply if information is collected locally and emphasise the importance of the recommendations on information management made earlier.

**Employment (teaching) needs**: information about the needs of the organizations and the sectors into which graduates are recruited. This also includes information about those skills and capabilities graduates themselves feel they need.

**Measures of performance**: some (relatively) objective measures, such as the UFC research ratings, are already widely circulated. Respondents identified other measures but these were more informal and general concerned with the opinions of peers and gathered through personal contacts. This suggests that objective measures of academic performance are seen as important but crude, with weight being attached to more subjective measures of performance.

**Staff needs**: this type of information has been accorded low priority because this appears to be a need that can be best met internally. One of the conclusions of the study has been that Heads of Departments should be considered as facilitators rather than managers in the traditional sense; assistance in this role will be provided by following the recommendations for improved information dissemination around the University and for providing opportunities for training and development.

It is recommended that a university that is exploring the potential of management information systems should concentrate its initial efforts in these areas.

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**References**


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