

IMPLEMENTING A MANAGEMENT INFORMATION SYSTEM FOR ENHANCED DATA MANAGEMENT AND INSTITUTIONAL EFFICIENCY – A CASE STUDY OF THE UNIVERSITY OF PRETORIA

*A. LOURENS & **H.J. MOUTON

*NORTH-WEST UNIVERSITY & **UNIVERSITY OF PRETORIA

Abstract

The integration of university performance data with the strategic goals of a university to enhance institutional efficiency is a complex process. This article aims to illustrate the importance of the alignment of performance data with decision-support needs linked to the strategic goals of a university by means of a case study from the University of Pretoria (UP). The enhancement of the capability for monitoring and evaluating faculty indicators and departmental performance against the strategic goals of the university is illustrated through the implementation of a new management information system (known as HEDA)¹. The focus of the article is to demonstrate the importance of integration and monitoring of the university's strategic plan for improvement in institutional efficiency. The alignment of UP's operational indicators with its Annual Performance Plan submissions required by the Department of Higher Education and Training is also outlined. The practical use and process followed for the adoption of the management information software at the university is discussed as well as the lessons learnt so far, in an attempt to monitor and integrate institutional planning at all levels.

Keywords: Decision-support, management information, institutional effectiveness, data management, strategic planning.

1. INTRODUCTION

The use of performance indicators and management information systems in higher education institutions (HEIs) as part of strategic planning is not new (Taylor, 2014: 7). However, the management of structured institutional data and data-based decision making require a change in the way decisions are taken at such institutions (McLaughlin, Howard, Cunningham, Blythe & Payne, 2004).

The value of data in support of decision making will improve when the data are strategically managed and made visible to key institutional stakeholders especially at faculty and departmental levels. The monitoring of performance

¹The Higher Education Data Analyser (HEDA) system is an integrated planning and reporting tool consisting of a set of modules, including academic planning, enrolment management, human resource planning, financial resource planning, annual performance plan monitoring and infrastructure resource planning. HEDA supports higher education institutions in South Africa by creating, housing, delivering, maintaining and retrieving data with the goal of enhancing institutional effectiveness and to provide integrated institutional planning and reporting tools.

within and among HEIs in South Africa has gained momentum in the last ten years due, in part, to increased reporting requirements by the Department of Higher Education and Training (DHET). However, the integration and alignment of university performance data with decision-support and strategic goals of the university is not a straightforward process. In this context, the practical implementation and importance of integration and monitoring of the University of Pretoria's (UP) Strategic Plan with decision-support needs linked to its strategic goals is outlined in this article. We believe that the solutions presented here should contribute to the advancement of institutional research within the higher education sector.

2. THE LINK BETWEEN DATA MANAGEMENT, INTEGRATED STRATEGIC PLANNING AND INSTITUTIONAL EFFECTIVENESS.

The measuring and monitoring of institutional performance is becoming increasingly important; the improvement in data quality is a key component of data management and the management information process. Yanosky (2009:12-13) defined data management as “the policies and practices by which higher education institutions effectively collect, protect, and use digital information assets to meet academic and business needs”. Institutions strive to create environments where strategic, relevant and usable information can be accessed when needed by key internal stakeholders.

Higher education institutions have benefited from a significant growth in information and communications technology, especially in terms of research and teaching and learning (Council on Higher Education, 2016). The explosion in the volume and variety of data that needs to be managed has changed the way in which management information is being used, reported on, monitored and evaluated within universities.

Although the higher education sector is collecting more data than ever before, the focus of the majority of institutions is mostly on reporting compliance and not necessarily on using data as an integrated planning tool or to improve institutional efficiency (Voorhees and Cooper, 2014:26). The institutional capacity to focus on data-driven decisions depends on the culture, availability of staff members and the financial resources of the university (Voorhees and Cooper, 2014:28). A culture of inquiry and evidence is needed to improve institutional effectiveness, but in many cases there is unease over trusting the evidence and the correctness of the data (Voorhees and Cooper, 2014:27).

The process of building a culture of evidence typically involves using data to understand where the problems are and designing strategies to remedy them, adopting the strategies and then evaluating the effectiveness of their implementation (Goomas, 2015). Hughes and White (2005:49) well summarised the value of information by stating that “[i]nformation becomes intelligence when the right person receives the right information and ultimately incorporates it into decision-making processes.”

Strategic planning in higher education has been widely reported in the literature (Hughes and White, 2005:42) and can be a resource-intensive undertaking given the complex nature of tertiary level institutions. Internal competition among departments, that may be more loyal to their discipline than to the university, still exists in the sector (Hughes and White, 2005:43). It is therefore important to understand that integrated planning in higher education is an explicit part of a university's strategic planning that links both strategic and operational plans. It enhances collaboration between support departments and academic faculties and brings together the capital and operational budgeting, enrolment management and human resource components (Sandmeyer, Dooris & Barlock, 2004:90). Atkinson (2002:2-3) describes the rationale behind integrated planning as follows: "With multiple revenue sources, multiple capital demands, and a changing student and faculty demographic, it is no longer desirable (if it ever was) to make one-off decisions or lavish attention on a selective subset of problems. We have to raise our decisions to a higher level." Atkinson (2002:2) also argues that the most difficult part of integrated planning is the integration of the strategic plan with budgeting. When budgeting is attempted without the discipline of a strategic plan, the loudest voices, mostly from positions of advantage, expect a privileged hearing (Atkinson, 2002:2). Integrated planning should allow planning to drive budgeting and not the other way around. Integrated planning also assists with unified data definitions as part of the data management process to ensure that all departments are using the same definitions for the performance indicators that are frequently used (Sandmeyer *et al.*, 2004:95-96).

Voorhees (2007:2) noted that 'actionable data' – data that are truly helpful – and not 'wallpaper data' – data that may be interesting to look at but do not address an institution's future – is key in the strategic planning process. Voorhees and Cooper (2014:30) assert also that most strategic plans in the higher education sector are lacking in five key areas: using actionable data, assigning responsibility to individuals, tying operational plans to strategic goals, embedding measurable goals that can lead to mid-year corrections, and most importantly, linking the entire planning process to the institution's budget. The integrated process will assist in measuring and monitoring institutional effectiveness.

In the South African context, integrated internal and external planning is critical given the DHET's demand for detailed enrolment planning and other reporting processes (DHET, 2014b). South African HEIs are highly dependent on student enrolment and most of the student admission processes should be developed in terms of enrolment-driven budgeting. It is also the view of the authors that integrated strategic planning cannot be implemented without proper data management and a management information system in order to monitor institutional effectiveness (Karim, 2011:460).

This article illustrates the importance of a management information system to improve data quality and management as well as operational efficiency, using the example of the recent adoption of such a system to monitor and evaluate the integrated strategic goals at various levels at the University of Pretoria. The approach used by the university provides practical guidelines on how HEIs can use a management information system for enhanced data management and institutional efficiency.

3. IMPLEMENTATION OF A NEW MANAGEMENT INFORMATION SYSTEM

The reporting, monitoring and evaluation of the strategic plan and integrated performance indicators have become critical and integral to a complex process in HEIs. In order for these establishments to adhere to the internal and external institutional reporting requirements, management information systems have assumed an important role to support decision-making. If systems and integrated reporting processes are not in place, statutory reporting will be challenged and may result in an institution receiving less funding from government.

The need exists for UP to have tools that enable comprehensive analysis of aspects of strategic planning with the focus to enhance its efforts to build a culture of integrated planning and to improve institutional effectiveness. Equally in support of informed decision-making and progress monitoring, there is a need to track performance against various key performance indicators and to provide a pre-delivered performance score card. UP has already acquired a comprehensive data warehouse and analytical tool, however, this facility does not provide for reporting and analyses that are consistent with the demands of the South African DHET Higher Education Management Information System (HEMIS), cohort analysis specifications/requirements, benchmarking exercises with peer institutions, programme and module viability analysis, and the modelling of enrolment planning.²

The responsibility for delivering the outputs listed above rests with a newly founded department at the university. The Department of Institutional Planning (DIP) at UP was established in 2013 to augment, among others, a data/evidence-driven culture at the university. The new department resulted in the amalgamation of hitherto standalone units, namely, the Quality Unit, the Unit for Academic Planning and the Bureau for Institutional Research and Planning (BIRAP). The university also established a Planning and Budget Committee in 2014 to ensure that resource allocation followed strategic/institutional priorities as well as a Vice-Principal for Institutional Planning. BIRAP is the unit responsible for presenting management information at a strategic level. For this purpose, it collects data, develops and maintains data models and dashboards, manages access security and

²UP has granted permission to make references to internal procedures and challenges to obtain information.

protects its data warehouse against loss or damage, creates user interfaces, develops integration and transformation programmes, and manages data downloads, data layers and programme structures.

The Department of Institutional Planning received a grant in 2015 from the Carnegie Corporation of New York to assist with data management for the improvement of institutional efficiency. The overall purpose of the funded project was to improve data/evidence-driven decision-making at the university and to enhance the capability for monitoring its performance against its strategic goals. Over the past few years, UP has strengthened its data systems in order to enhance organizational efficiency, but more importantly, to steer and monitor the realization of its strategic goals. While the university has enhanced its overall data architecture, the current system had several gaps and limitations, especially on the analyses that can be conducted. The consequence of the limitations was that certain analyses that are crucial for decision support and institutional performance assessment could not be performed. For example, the need exists for the university to have tools that enable a comprehensive analysis of various aspects of the student life cycle – including current status and historical trends relating to student admissions, registration and throughputs, cohort analyses, HEMIS reporting and the financial viability of academic offerings.

In order to address the limitations of the current system, the university acquired the Higher Education Data Analyser (HEDA) system, whose configuration and functionalities are aligned with the university's data needs and is already implemented by 17 universities (out of the 26 public universities) in South Africa – for example, the universities of Cape Town, Johannesburg and KwaZulu-Natal. The HEDA system also offers users the opportunity to develop goal-specific applications directed at addressing particular managerial needs. One such identified need was to develop in HEDA a specific dashboard for use by senior managers to access information on a university's academic performance dashboard. Equally, with HEDA, it is also possible to address a broad spectrum of information requirements by the development of multiple subject areas for use by managers. The HEDA system has all the functionalities required to hasten the institutionalization of a data-driven culture at the University of Pretoria.

The Carnegie funding assisted in accelerating the optimization and enhanced utilization of the HEDA system with the main objective to improve the DIP's efficiency in:

- collecting, organizing, maintaining, analysing and interpreting institutional and other data to support the university's management in its planning and decision-making processes;
- assessing the extent to which the university achieves its strategic goals;

- conducting special studies and research projects on important institutional priorities;
- preparing planning reports and statutory subsidy-related submissions to the Department of Higher Education and Training; and
- coordinating the university's Programme Qualification Mix (PQM) and programme alignment with the Higher Education Qualification Sub-Framework (HEQSF) and UP's academic mission.

4. ALIGNMENT OF DATA WITH DECISION-SUPPORT NEEDS

The Department of Institutional Planning held a needs-assessment planning session in August 2015 as part of the Carnegie-funded project. The occasion was attended by 12 staff members from executive management, faculty administration and staff from the DIP. The session was facilitated by IDSC.³

The main purpose of the meeting was to demonstrate the alignment of data with decision-support needs linked to the strategic goals and faculty performance indicators of UP using the HEDA system. The event did not focus on the details regarding the agreed-upon faculty performance indicators but on the enhancement of the capability for monitoring the university, faculty and departmental performance against its strategic goals.

The primary focus of the meeting in August therefore was on the end-user requirements in relation to monitoring and reporting of the university's key faculty performance indicators linked to its strategic goals. Issues addressed in the work session focused on how best to assist decision makers at senior level to address priority aspects of UP's strategic plan such as:

- aligning postgraduate and postdoctoral placements with research strength and supervisory capacity;
- improving research master's and doctoral throughput rates;
- improving staff: student ratios in areas of research strength and aligned to ranking objectives;
- implementing interventions in modules with high failure rates;
- balancing enrolment growth in undergraduate scarce skills areas with general-formative and postgraduate qualifications;
- setting annual enrolment targets to pursue realistic growth in line with the academic vision; and
- monitoring retention and throughput rates and adjusting growth targets.

³IDSC is a small South African software development company that, since 2003, has created a multi-faceted management information system for higher education institutions, under the name of the Higher Education Data Analyser (HEDA). A. Lourens is affiliated with IDSC as one of the directors.

It was agreed that the outcome of the session would be:

- *The compilation of end-user requirements and needs for performance score cards, reports and dashboards;*
- *Agreement on a mechanism to monitor and report on the strategic goals and key performance indicators at university, faculty and departmental levels; and*
- *The finalization of front-end/report layout in relation to faculty indicators.*

The proceedings of the August meeting were used to inform the DIP of the end-user requirements and to gain a better understanding of how best to support the university to achieve its strategic goals. Additional information was also requested from the members present by the completion of an evaluation questionnaire. The outcome of the work session provided input to the further roll-out of the HEDA system at the university.

The final results obtained from the academic performance scoreboard will be included in each dean's faculty plan together with an outline of initiatives to improve performance where needed.

5. MONITORING AND EVALUATION OF THE STRATEGIC PLAN

The University of Pretoria's approach to planning follows a 'nested' institutional model whereby the Strategic Plan (UP, 2025), which provides the roadmap and navigational markers for guiding the university to achieve the vision and strategic goals it has set for itself by 2025, is supported by a five-year implementation plan that identifies broad implementation strategies, and one-year implementation plans. The annual implementation plans are derived from a review of the previous year's performance and the extent to which the adoption strategies and priorities were effective. The one-year plans, therefore, provide the opportunity to review the achievement of targets and the implementation strategies. Thus, every year, the university's planning process prioritises the activities and initiatives to undertake, which activities are reshaped, and which current activities are discontinued. This process is supplemented through the creation of faculty plans. Each year a framework for the faculty plans is set to sharpen and speed up implementation, several priorities are identified, and the key priorities for the next year are set for deans to address and to ensure alignment and support for these key priorities. Evaluation of the faculty plans together with monitoring the progress towards achieving strategic goals are an essential part of the planning process at UP. Regular reviews of the university's performance against the targets set for the strategic goals are scheduled during each year and the information reports presented form the backbone of later discussions.

The main focus of the faculty plans therefore is the identification and implementation of key strategies and specific actions that are aligned with the priorities that have been identified, and setting of new targets in order to achieve institutional goals for the following year. It is expected that some strategies and actions will be a continuation of existing strategies for which there is evidence of positive results, while others will be new actions designed, in part, to complement existing strategies, speed up progress or remedial (corrective) actions where past targets have not been met.

A single set of core indicators per faculty is maintained and refreshed three times a year. However, during the work session in August, five reporting layout/front-end options for the faculty indicators were presented as possibilities and included the following:

- a portable document format (PDF) report;
- a cube or multi-dimensional report;
- a Web-based online interactive report;
- a dashboard of faculty indicators; and
- a faculty indicator progress monitoring report.

An example of each of the five layout options (containing demonstration data⁴) using UP's HEDA system is presented in Tables 1 to 5.

Table 1: Faculty indicator report in PDF format.

Report Parameters	
Faculty	All Faculties
Download Date	10 Aug 2015

Goal 1: To be a leading research University in Africa				
Indicator	2011	2012	2013	2014
01 - % C1 staff with Doctorate degrees as their highest qualification	47.45	44.98	44.57	45.64
02 - NRF-rated researchers as % of C1 staff	18.39	18.89	20.93	21.96
03 - No of NRF-rated researchers	303.00	331.00	370.00	393.00
04 - Accredited Publication journal units per C1 FTE staff	0.65	0.71	0.76	0.81
05 - Accredited Publication journal units per headcount of C1 staff	0.71	0.73	0.80	0.82
06 - No of accredited journal publication units in ISI journals	804.61	816.22	950.98	980.31
07 - % accredited ISI publication units to total publication journal units	68.29	64.06	67.33	66.89
08 - Total Master graduate output	1,340.89	1,392.10	1,476.56	1,618.82
09 - Total Doctoral graduate output	206.00	200.00	242.00	237.00

Goal 2: To strengthen the University international profile				
Indicator	2011	2012	2013	2014
10 - Number of international C1 staff	49.00	64.00	72.00	74.00
11 - Number of international PG students	1,784.00	1,958.00	2,108.00	2,253.00

⁴A sample data set was compiled that consisted of detailed data per faculty and department in order to develop and test the data model and drill-down functionality of HEDA. The data are for demonstration purposes and do not necessarily reflect the actual status. The Registrar gave permission for the data set to be used for publication purposes.

The PDF report, as the first option, provides a static layout with the key performance indicators in rows and the years as columns. This standardized report format can be used for internal benchmarking purposes and can be tabled as a formal report at executive meetings.

Option 2 is a multidimensional report providing more choices in terms of variables and other options to select from. A multidimensional report (or data model) is composed of logical cubes, measures, dimensions, hierarchies, levels, and attributes. Such a report is useful for providing information on large data sets in relatively small, user-friendly (or simplified) reporting formats. It is presented based on the end-user requirements. This report option is available from the Management Information (HEDA system) Web page of the university and can be accessed by staff members who have been granted permission to do so. An example is provided in Table 2 in which the identified performance indicator names are presented in rows and the data per year in the columns.

Table 2: Multidimensional faculty indicators report.

Year	2011	2012	2013	2014
Measures				
C1 staff with Doctorate degrees as their highest	47.45%	44.98%	44.60%	45.64%
NRF rated researchers as percentage of C1 staff	18.39%	18.89%	20.94%	21.96%
NRF Rated Researchers	303.00	331.00	370.00	393.00
Accredited Publication journal units per C1 FTE staff	0.65	0.71	0.76	0.81
Accredited Publication journal units per C1 staff	0.71	0.73	0.80	0.82
Accredited ISI Publications	804.61	816.22	950.98	980.31
Percentage accredited ISI publication units to total public	68.29%	64.06%	67.33%	66.89%
Graduates Masters	1 340.89	1 392.10	1 476.55	1 618.82
Graduates Doctoral	206.00	200.00	242.00	237.00
C1 Headcount International	49.00	64.00	72.00	74.00
Student Headcount PG International	1 784.00	1 958.00	2 108.00	2 253.00
C1 FTE	1 815.54	1 798.18	1 869.53	1 805.93
C1 Headcount	1 648.00	1 752.00	1 767.00	1 790.00
Average pass rate for undergraduate modules	79.20%	80.34%	80.19%	81.69%
Total UG contact FTE students per FTE teaching staff	15.90	16.14	16.46	17.32
Percentage Black C1 Staff	22.88%	23.92%	25.18%	26.20%
Percentage Black UG contact students to total UG contact staff	43.51%	45.18%	46.94%	48.31%
Percentage Black PG contact students to total PG contact staff	52.33%	53.29%	55.07%	55.44%
Accredited Publications	1178.2	1274.07	1412.5	1465.61
C1 Headcount Black	377	419	445	469

The interactive Web-based online report is the third option and provides the means to 'drill-down' or interrogate different levels such as departments within faculties; it also indicates trends over the years. This report can be read directly from the HEDA system by staff members who have been granted access. The number of years can be selected by the user. A view for a specific faculty or department can also be presented with this reporting format. Table 3 provides an example of the report for the first strategic goal and related nine objectives per faculty and department of the university. The report is available for all the strategic goals and can be extrapolated per faculty and department.

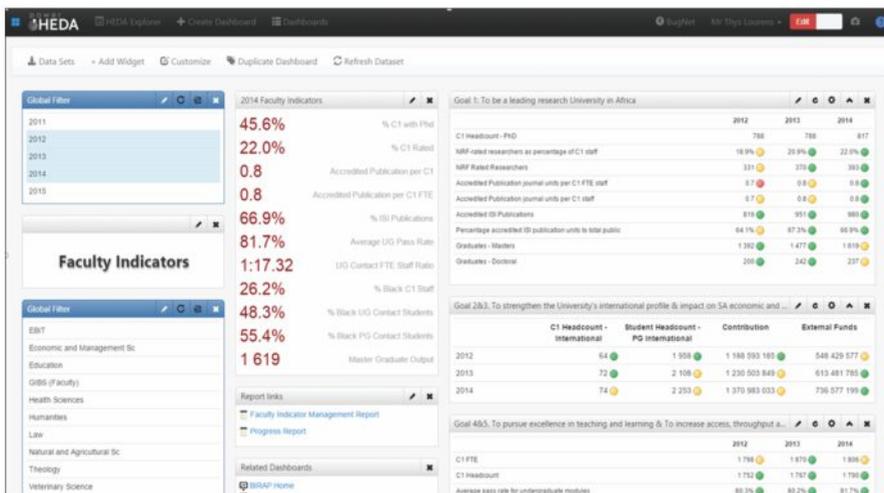
Table 3: Interactive faculty indicators report

Report Parameters		Faculty Indicators				
Faculty	All Faculties					
Department	All Departments					
Download Date	10 Aug 2015					
Faculty Indicator Definitions						
Goal 1: To be a leading research University in Africa						
Indicator ▶ Faculty ▶ Department	2011	2012	2013	2014	Trend	
01 - % C1 staff with Doctorate degrees as their highest qualification	47.45	44.98	44.57	45.64	■	■
00001 - Humanities	55.07	54.76	55.34	56.44	■	■
00002 - Natural and Agricultural Sc	74.04	71.00	72.48	74.92	■	■
00004 - Law	63.49	65.57	62.50	63.08	■	■
00005 - Theology	100.00	96.15	88.46	96.00	■	■
00007 - Economic and Management Sc	38.30	33.17	37.97	37.04	■	■
00008 - Veterinary Science	41.12	38.94	37.17	41.59	■	■
00009 - Education	75.00	67.05	68.18	71.25	■	■
00010 - Health Sciences	19.91	18.77	18.20	19.54	■	■
00012 - EBIT	53.88	52.89	50.62	51.23	■	■
00018 - GIBS (Faculty)	100.00	100.00	100.00	100.00	■	■
02 - NRF-rated researchers as % of C1 staff	18.39	18.89	20.93	21.96	■	■
03 - No of NRF-rated researchers	303.00	331.00	370.00	393.00	■	■
04 - Accredited Publication journal units per C1 FTE staff	0.65	0.71	0.76	0.81	■	■
05 - Accredited Publication journal units per headcount of C1 staff	0.71	0.73	0.80	0.82	■	■
06 - No of accredited journal publication units in ISI journals	804.61	816.22	950.98	980.31	■	■
07 - % accredited ISI publication units to total publication journal units	68.29	64.06	67.33	66.89	■	■
08 - Total Master graduate output	1,340.89	1,392.10	1,476.56	1,618.82	■	■
09 - Total Doctoral graduate output	206.00	200.00	242.00	237.00	■	■

Option 4 provides a dashboard of the faculty indicators. In management information systems, a dashboard is “a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance” (Chiang, 2011). It is often a single-page, real-time user interface, showing a graphical presentation of the current status (snapshot) and historical trends of

an organization's key performance indicators to enable instantaneous and informed decisions. Table 4 provides an example of a dashboard for UP in relation to the Strategic Plan and faculty indicators.

Table 4: Faculty indicators dashboard report



The five strategic goals and performance indicators in Table 4 are presented as a dashboard with filter options in terms of year and faculty. Different styles can be presented. The dashboard furthermore shows indicator colours (red, yellow or green) if key performance values are compared with set targets. The settings can be changed by the Department of Institutional Planning, depending on the needs of the end-users.

The Annual Performance Plan Monitor (APPM) module in the HEDA system was used to load the strategic goals and key performance indicators as well as the targets for the university. This layout option provides the user with the ability to take snapshots of the performance at various stages in order to compare and monitor progress towards the set targets. A trend is also provided across the selected period as well as the overall progress of each goal. Table 5 provides an example of the performance of the first strategic goal within quarterly time-frames.

Table 5: Annual performance plan monitor of faculty indicators.

		Faculty Indicator Progress Report					
Report Parameters							
Plan Name	Faculty Indicators						
Responsibility	APPM Administrator (All Responsibilities)						
Milestone	2014						
Hierarchy Levels	Level 1, Level 2, Level 3						
Snapshots	Current, 2014 - 2014 Q1, 2014 - 2014 Q2, 2014 - 2014 Q3						
Item Name	2014				Trend	Item Comments	
	2014 Q1	2014 Q2	2014 Q3	Current			
Faculty Indicators	Progress 33%	Progress 53%	Progress 70%	Progress 77%		-	
1 - To be a leading research University in Africa	34%	59%	75%	83%		-	
1.1 - % accredited ISI publication units to total publication journal units	0%	4%	0%	0%		-	
1.2 - % C1 staff with Doctorate degrees as their highest qualification	75%	75%	75%	75%		-	
1.3 - Accredited Publication journal units per C1 FTE staff	20%	60%	80%	100%		-	
1.4 - Accredited Publication journal units per headcount of C1 staff	0%	100%	100%	100%		-	
1.5 - No of accredited journal publication units in ISI journals	14%	59%	90%	100%		-	
1.6 - No of NRF-rated researchers	15%	45%	95%	100%		-	
1.7 - NRF-rated researchers as % of C1 staff	0%	7%	53%	93%		-	
1.8 - Total Doctoral graduate output	100%	100%	100%	100%		-	
1.9 - Total Master graduate output	82%	82%	82%	82%		-	
2 - To strengthen the University's international profile	13%	41%	56%	63%		-	

The DHET released regulations to all public HEIs in 2014; each establishment must produce a Strategic Plan with an update every five years, and submit an Annual Performance Plan with performance targets aligned with the corresponding Strategic Plan. UP must also identify a core set of indicators to monitor institutional performance and adopt a mid-year reporting system in order to submit a Mid-Year Performance report to the DHET. Finally, institutions must ensure alignment between the Strategic Plan, Annual Performance Plan, Annual Report, budget documents and the Mid-Year Performance report (DHET, 2014a).

The indicators report, as represented in Table 5 as part of the monitoring of the performance of the university, faculties and departments, can also be used to inform the DHET in relation to the reporting requirements.

7. LESSONS LEARNT

Development of a mechanism to monitor and evaluate the university's Strategic Plan: A practical case study at the University of Pretoria indicated the ease of monitoring the progress of faculty plans with the aim of improving the effectiveness of the institution.

Regular reviews of the university's performance against the targets set for the strategic goals are scheduled during each year and the information reports presented form the backbone of later discussions.

Improvement of data quality processes: The success of the system in practice will be measured by its implementation by end-users, especially deans of faculties and members of the university executive. The project assisted with the data quality processes through an enhanced data management application as well as an improved integrated data warehouse environment.

A number of key questions and responses were raised at the August meeting after the presentation of the various report layout options. These included the following:

- Should the targets and reports be finalized at departmental level?
 - o It was agreed that the targets and reports should be presented at departmental level.
- How do they make sure that the targets at departmental level add up to faculty targets and, finally, to the university targets?
 - o The HEDA APPM Module layout option (refer to Table 5) addresses this important aspect with built-in ability to achieve consolidated results.
- Could these reports automatically form part of faculty plans?
 - o It was agreed that the reports will be included in the faculty plans and so add significant value to the plans as well as saving time.
- How often should snapshots be taken in a given year?
 - o It was suggested that snapshots be taken in March, May and August but also quarterly. It was pointed out that at certain times of the year, such as the student registration period, updated information should be made available more regularly. It was therefore suggested that a differentiated approach be followed.
- Must reports be made available to management or will management extract reports directly from the HEDA system?
 - o The group agreed that the self-service route would be the best and that the managers would need training and prefer to extract the reports themselves.
- What is the preferred use of graphs?
 - o The current available options were acceptable to all and the option to export the information to Excel would also create the opportunity for users to create their own graphs.

It was unanimously agreed that all five layout options should be made available to the university. Very positive feedback was received in terms of the options available and the fact that the customised HEDA system will save time and assist management (especially deans of faculties) to monitor progress regularly in relation to their faculty indicators. One of the members of management commented that: “This is a great improvement, especially the different levels of analysis.”

At the same time the implementation of the new management information system necessitates, at a technical level, a critical evaluation of the following issues, which also contributed favourably to the level of enhanced, data-driven decision-making:

- Establishing within the university data standards and launching data verification programmes in the operational environments. One of the challenges is the 'integrity' and completeness of institutional data;
- Targeting support for awareness programmes to ensure that end-users are aware of the impact of the relevant information legislation and their information and data governance responsibilities;
- Instituting a stable tool to enable data to be accessed, validated, stored, protected, and processed such that its accessibility, reliability and timeliness is ensured to satisfy the requirements of the end-users;
- Continuous data migration, verification and table creation is possible that will significantly reduce time to completion of processes and time to present information; and
- The means to provide the users with the ability to control what they want to see. The options available in HEDA and the positive feedback received during the work session by users among senior management were encouraging. Future developers of the system should empower end-users to group graphs and tables together in the way they prefer them displayed.

8. CONCLUSION

South African universities are focusing increasingly on ways to monitor and evaluate their strategic planning progress, especially in view of the additional reporting required by the DHET. The advantage of adopting a system such as HEDA is that it provides the opportunity to incorporate further performance measures and continuously improve reporting layouts to meet end-user requirements. New developments can include coverage of such criteria as benchmarking, research outputs or student success evaluations.

This article has outlined the development of a mechanism to monitor and evaluate the Strategic Plan of the University of Pretoria. A practical case study is presented whereby the progress of faculty plans is being monitored and evaluated using the HEDA system with the aim of improving the



effectiveness of the institution. The success of the system in practice will be measured by its implementation by end-users, especially deans of faculties and members of the university executive. The project has already assisted with data quality processes through an enhanced data management application as well as an improved integrated data warehouse environment. A year since the first end-user work session, further dashboards on students, staff and cohort analysis have been successfully developed and employed. The ease with which proposals for continuous improvements can be accommodated ensure user-friendly Web reporting.

The process implemented at UP seems likely to benefit other universities that have similar challenges in relation to management information systems, the evaluation and monitoring of their strategic plans as well as the overall improvement in the quality of their performance data and institutional effectiveness.

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