

UNDERSTANDING STAKEHOLDER EXPECTATIONS IN HIGHER EDUCATION

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Abstract

Higher education invests heavily in information technology and information systems, with variable outcomes. Organisations in other sectors, such as engineering, the defence industry, public administration and business, have developed and adopted good practice for the choice, development and operation of software-based systems that are only sometimes understood in higher education.

In order to assess the extent to which good practice might assist higher education, the four tertiary institutions in the Western Cape of South Africa were approached and a representative range of academic, administrative, technical and managerial respondents agreed to contribute to the study. Interviews were organised in two parts: the first an open conversation about their involvement with systems, and the second a structured examination of systems-related events that they considered significant. By inspection of those events, bipolar scales were developed by which respondents were able to characterise events (for example as ‘challenging’ or ‘easy’, or as ‘functional’ or ‘dysfunctional’). Respondents rated events on those scales. Repertory Grid analysis was applied so as to investigate which scales correlated with event success. 30 scales (out of 170) proved to be adequately correlated with success, and by principal component analysis they were combined to form ten ‘success scale’ groups, indicating ten areas where the deployment of good practice might be expected to lead to more effective use of improved information systems. A new Reference Model is developed that has a role to play in resolving the transitions between the domains of the Information Management Body of Knowledge (IMBOK).

Keywords

Higher education; Information systems; Stakeholder expectations; Reference model; IMBOK

1 Introduction

Over time, information technology and information systems (IT&IS) have become increasingly important in education, and the adoption of IT&IS naturally leads to changes in the way that people work (Cramer, 2006; Elton, 2003; Oliver, 2002; Singh, 2008; Thang et al., 2010), sometimes disruptively (Christensen et al., 2013; Pappano, 2012). However, large educational institutions such as universities are often resistant to change and only sometimes pro-active in dealing with change. Higher education continues to invest heavily in information technology and information systems, but with variable outcomes and often no real benefits for any of the involved people. Just one example is the national investment in research information management in South Africa, which over ten years has cost a great deal of money but is not yet benefitting researchers (RIMS, 2012) because of the changes that it brings to research administration.

Managing change requires strategic management, and a key component of formulating effective strategies is stakeholder analysis (Freeman, 2010; Johnson and Scholes, 1987; Ward and Peppard, 2002). This paper reports on a study that set out to understand stakeholder expectations of IT&IS in higher education. A previous study that was grounded on a two-day meeting of experts (Bytheway and Bladergroen, 2013) established that there was little extant work that had achieved an adequate breadth in addressing this problem; most other work that could be found had been predicated on specific information technologies (such as white boards in schools, or learning management systems in universities) but none could be found that reviewed expectations across a range of stakeholders, in higher education. To examine only what students think, or what educators think, or what managers think is not enough. There has to be a balanced view of the competing interests of all stakeholders.

1.1 Data collection

The study followed an exploratory, abductive approach, engaging with 38 respondents in the four universities within the Western Cape, a province of South Africa. Respondents were first invited to describe their experiences with IT&IS in an open conversation; then structured data was gathered about specific IT&IS-related events and the characteristics of those events that shape their expectations. The variety of roles represented in the sample included: *academics, technical specialists, students, researchers, project managers, managers, and business partners.*

1.2 Data analysis

The collected data was analysed in two stages, the second of which is the focus of this paper. The first stage transcribed the spoken content of the conversations (almost 100,000 words in total) and coded the text as qualitative data (in the style of Strauss and Corbin, 1998; Charmaz, 2014). This led to a range of ‘categories’ (the issues evident in the narrative), of which the *outcome* of an involvement with IT&IS proved to be of most interest across all respondents. See Figure 1:, which shows the five categories (out of 113) that occurred more than 100 times.

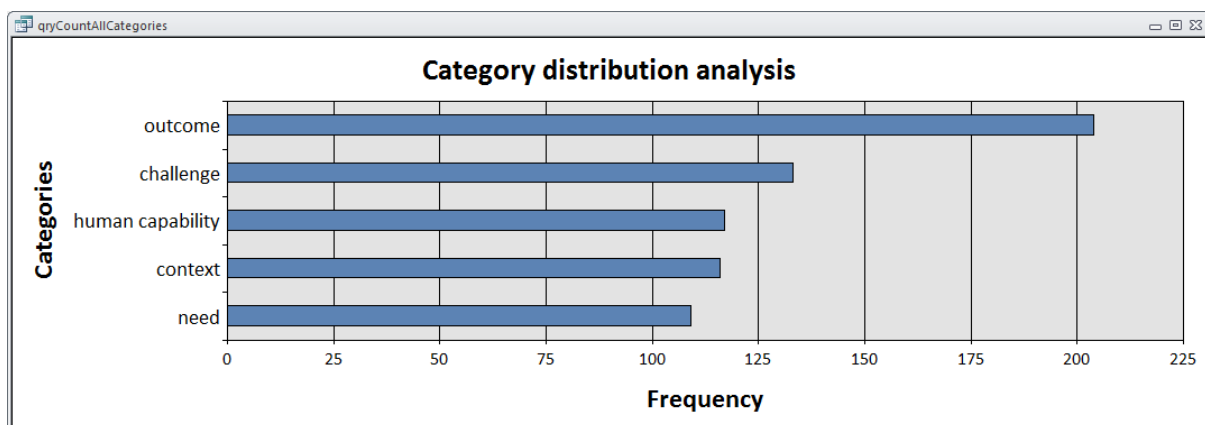


Figure 1: Most frequently occurring categories from the first phase of the study

It can be seen that other issues of concern, apart from *outcome*, included the *challenges* that respondents faced, their *capability* to deal with things, the constraints and demands of the *context* that they were working in, and their *needs*. These results are reported in detail elsewhere (Bytheway, 2016), for the present purpose they simply provide a foundation for the second phase of the analysis that is reported here.

2 Objectives

This paper now sets out to address questions based on the results of the first phase of the study:

- 1 What kinds of *systems* and *events* were respondents concerned with?
- 2 How do they *characterise* the different kinds of events, and their *outcomes*?
- 3 How can IT&IS be better managed given the *context*, so as to meet *challenges*, acknowledge *capabilities*, and yet still fulfil *needs*?

3 Method of working

First, respondents identified specific information systems or information technologies that they worked with. They were then asked to identify events relating to their use of IT&IS that they considered important or indicative. From inspection of these events, scales of assessment were developed which were reviewed for their applicability and then used to rate the events:

- Having a list of *systems* that were significant, a minimum of eight and a maximum of 16 related *events* were sought. Respondents were asked to grade the *success* of both the systems and the events; this was done intuitively, according to the respondent's own perceptions of success.
- Then, up to 16 *scales* were derived that distinguished events from each other, by comparison of the events in triplets (one against two) using the triadic method associated with Repertory Grid (RepGrid) analysis (Kelly, 1970, 1955). These scales were then named with appropriate terms, indicating the nature of the scale and its extremes. Some scales indicated 'good' or 'bad' (for example '**Access**: Secure ~ Insecure'), some did not (for example '**Academic**: Academic ~ Non-academic').
- Because a scale originated from inspection of just three events, they were then all tested for *applicability* to all the events in the set, using a scale from *slightly* applicable ('1') to *highly* applicable ('5'). Respondents were invited to skip instances where there was no applicability.
- For those scales with an applicability of 3 or more, respondents were then asked to *rate the event* between '1' (generally the 'good' end, where the scale indicated good or bad) and '5' (generally the 'bad' end).

An example of the final ratings for one respondent is shown in Figure 2:. Nine events are seen in the columns, and seven scales in the rows; the 'left' and 'right' ends of the scales are named appropriately, with the 'good' end of the scale at the left and the 'bad' end at the right. This procedure took time (an hour or more) but all respondents that started the structured data collection completed it; there were some cases where it was not appropriate because of the respondent's role, or because respondents were unwilling to give the necessary time. In total, the data from 31 responses delivered 312 events, 228 scales, 2242 applicabilities and 1132 ratings.

This data about events, scales, applicabilities and ratings was collected in Microsoft Excel, and then ported into a Microsoft Access database for RepGrid analysis by means of SQL queries and Pivot Chart analysis. The use of the RepGrid in information systems related research has a long history (Whyte et al., 1997; Whyte and Bytheway, 1996) and has been discussed in great detail in a paper by Tan and Hunter, in which it is explained that the method supports both quantitative and qualitative research, and also idiographic and nomothetic research (Tan and Hunter, 2002):

		Event:	unpack the box	students broke printer	data captured not usable	specifying super silent computer to a spec	handover	build android app with libraries	dealing with custom software	Web deployment in Zim - web education	Imaging across PC types
Scale	'Left' characteristic										'Right' Characteristic
challenge	unchallenging		5		3		3	5	5	5	challenging
engineering	constructive		1	3	5		4	4	4	5	destructive
progress	regressive		1	1	5			4	5		progressive
satisfaction	satisfied	5	1		1	5		4	4	2	not satisfied
success	usable	1	4	1	1	1	5	3	3	3	not usable
technicality	technical		1	1	1		2	1	1	1	non technical
time	short		5	5	3		3	4	5	5	intensive

Figure 2: Example of events, rated on the derived scales

The RepGrid technique, for IS, entails a set of procedures for uncovering the personal constructs individuals use to structure and interpret events relating to the development, implementation, use, and management of IT in organizations. The meaning individuals ascribe to an event is anchored in its antecedents and consequents. (Tan and Hunter, 2002, p. 2)

The reader is referred to Tan and Hunter for further discussion about the use of RepGrid. In this research, Kelly's 'elements' are the events that respondents reported, Kelly's 'constructs' are the scales that were derived from the discovered qualities and characteristics, and Kelly's 'links' are the instances where bi-polar scales were considered to apply to an event, and were used to rate the events. The RepGrid data was analysed using the OpenRepGrid library within the RStudio statistical analysis package¹, which produced – for each respondent – a Repertory Grid, a Principal Component analysis and a Pearson Correlation Analysis.

4 The analysis

4.1 The kinds of systems and events

More than 80 cases of information systems were introduced in the discussions with respondents. It was interesting that, despite the discussion being directed to *information systems*, respondents actually chose to talk more about *situations* that concerned them, each related to information systems they were involved with. So, the term 'cases' was adopted so as to not exclude what was, to them, important evidence. Examples included administrative processes, core operational systems, data and information services, infrastructure, technical experiences, methods of working, innovation and a range of strategic initiatives.

Administrative processes were in some cases not at all directly connected to information systems as such. For researchers, it was important to deal with the acquisition and assignment of resources, as was the negotiation of employment contracts. Financial reporting systems for researchers lacked the facilities that they require – institutional book-keeping systems do not have the required facilities and do not provide timeous data when it is needed.

¹ <https://www.rstudio.com/>

Core operational systems were as might be expected: student application processing, student information systems, timetabling, learning management, student assessment and marks administration all featured strongly. Services provided in-house such as printing services, email, and library facilities led to a range of stories ranging from total success to abject frustration. Institutional web sites were mentioned, but did not predominate. Research shows a growing interest in BigData, IT&IS that will effectively manage the high volumes of research data now produced in sectors such as genome research and cosmology.

Google searching, Google Drive and Google Scholar featured prominently among academic and administrative staff. YouTube is taken as a legitimate resource for supplementary learning by students and by some staff. Open bibliography management services like Mendeley are widely adopted and used, despite the efforts of some institutions to develop their own, or to make specific recommendations. Help desk services are seen as important. There was at least one (possibly apocryphal) story of a research unit in one institution that had completely divorced itself from the standard services, and had made a total commitment to using Google Drive and Google Docs as its chosen infrastructure.

Infrastructure and technical stories revolved around Internet, network engineering, database design, maintenance, upgrading and documentation; also web development tools such as Android studio, Eclipse, Textpad, Java, Net Beans, and LaTeX. It is clear that the new tools for web- and cloud-based systems are still immature, they change quickly, and much effort is needed to make them work well.

The instances of difficulty included institutional infrastructure, financial reporting, application processing, and hardware purchasing – especially the problems in acquiring specialist equipment and software for research. The instances of success were more numerous than those of difficulty and included the personal use of office suite software, publicly available services such as WhatsApp, Google Drive and GitHub, as well as core systems such as timetabling, library services, learning management and learning innovation. Success in one perspective might be a failure in another: in the case of one marks administration system that the project manager reported as a great success (because it forced the imposition of the academic rules) the same was reported as a distinct failure by an academic, because it prevented him administering his marks in the way that he wanted.

This survey of systems was expected to generate a simple list of what traditionally would be seen as systems, but it generated something quite different: a portfolio of ‘situations’ that articulate and make real what respondents consider to be the important issues in working with IT&IS. It does not matter if they chose to talk about the delight in making web development tools work properly for the first time, that was what they considered to be important and rewarding. It does not matter if they rant and rave about poor email services and the inadequacies of the people in the IT function, that was what has really affected their personal productivity in trying to accomplish their academic, administrative or management work with information technology and systems. This cautions us that successful investments in information technology and systems rely on much more than just the qualities of the technical work. What is needed is something bigger: clear sight of what an institution is trying to achieve in its different realms of activity, and putting in place policies and procedures that will join the technology and systems opportunities to the educational need. Or, conversely, stimulating new educational opportunities from new technology capability. Further insight can be gained by a more careful inspection of the detail of respondents’ experiences. This is

now done, at the level of the events that respondents considered significant within their experiences.

4.2 Events analysis

Several (211) events and 274 assessments were identified, each of them an example of what might happen when working with IT&IS in higher education. The words used in naming and describing the events were chosen by respondents and so the events were reviewed in order that like-events could be gathered into groups for further analysis. Such an aggregation of the detailed data also provides for the calculation of cardinal data (averages and standard deviations, for example) from the detailed ordinal data that is in the source tables. This is done here by means of frequency analysis and by mapping the results to the Information Management Body of Knowledge domains defined by Bytheway (2004), in order to see the extent of evidence along the chain of activity that delivers not just software and systems, but the benefits that serve the strategic intentions of an institution.

4.2.1 Aggregation of events into groups

First, the aggregation of events into groups was undertaken subjectively, but it was guided by the natural separation of university work into five areas: *Academic (teaching and learning)*, *Academic (research)*, *Administrative, Management and Systems development*.

In the context of this study the first four main event groups are indisputable: these are the principal areas within which people work in higher education. However, there was a preponderance of events concerning systems-related activities and therefore the fifth top-level group, 'Systems development', was added.

4.2.2 Mapping to the Information Management Body of Knowledge

The IMBOK originates from a stream of research that started in 2002 (Bytheway, 2003) and has been tested and validated in a range of contexts (Bytheway, 2014, 2013, 2011, 2004, 2016). It identifies five domains of management: information technology, information systems, business processes, business benefits, and business strategy. It also identifies the four transitions between them, making a total of nine domains of interest. To those nine we can add the domain of management activity that is directed at the control of these nine domains.

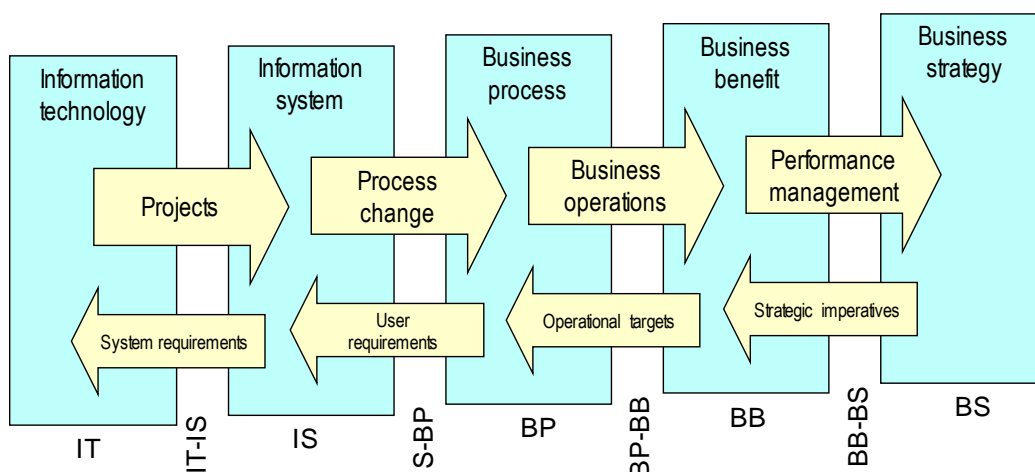


Figure 3: The Information Management Body of Knowledge

All 211 events were reviewed individually, and attributed to one or other of these ten domains. The cross-tabulation of the data (Table 1) shows the mapping of the event group frequencies to these ten domains².

	IT	IT-IS	IS	IS-BP	BP	BP-BB	BB	BB-BS	BS	MAN	Totals
Event group											
SYSTEM	22	72	25	39	12	1	2			14	187
ACADEMIC	3		1	1	6		1			4	16
ADMINISTRATION				4	16		1		1	4	26
RESEARCH	1	1	2	1	11					1	17
MANAGEMENT		1		3	3		1	2	7	11	28
Totals	26	74	28	48	48	1	5	2	8	34	274

Table 1 Mapping events to the IMBOK

The IMBOK adds to our understanding because it highlights the events that stand at the interfaces of technology (IT), systems (IS), processes (BP), benefits (BB) and strategy (BS). The transitions from IT to IS (74) and from IS to BP (48) together account for almost exactly 50% of all the non-managerial events (excluding the rightmost column, ‘MAN’), and well over 44% of the total (including ‘MAN’). This is highly significant, and makes clear that it is the exchange of value between the information systems project and its ‘supply’ side and ‘demand’ side that is the major concern of respondents. One might have anticipated this, but to have real evidence at hand helps to direct this enquiry in the most useful direction.

This mapping reveals another issue that is more troublesome – despite the high level of concern about the formulation of strategy revealed earlier in the study there is very little in the events data showing *linkage* between basic operations and strategy: BP-BB (1), BB (5) and BB-BS (2) in the table above. Even strategy itself – BS (5) – is not well represented at the level of the reported systems *events*. Hence, we find that the benefits of systems in business processes are not evident in narratives such as these. In these circumstances, strategic success from IT&IS will be extremely difficult to achieve, and stakeholders clearly articulated strategic ambitions will not be realised.

4.3 Characterising events and outcomes

170 scales emerged from the triadic analysis and were subjected to a similar process of grouping and review. Figure 4 below shows a sample, with the scale name and end-descriptors chosen by the respondent, and notes from the researcher.

Many scales were clearly associated with ‘goodness’ and ‘badness’ of the events, and some not, as indicated in Figure 4. above. Those scales associated with good and bad outcomes were mapped against the intuitive success of the events as indicated by respondents. This gives an overview of the correlation of the scale ratings with event success (and ultimately with system success) and a good correlation would indicate the possibility that improved performance *on these scales* will lead to better *event outcomes*, and therefore better *systems outcomes*.

² The reader will notice that in the table there are now two categories of management – one in the columns and one in the rows. This is because the interpretation of ‘management’ in the IMBOK concerns the management of technical work; in the event groups, ‘management’ concerns general institutional management activities.

		Hardly a continuous scale, but interesting to recognise the differences.
Decisiveness	Decisive : Indecisive	This is a scale that the respondent attributed to external authorities that took decisions without proper assessment of the consequences, and (more specifically) in the sense that users can be indecisive. Ratings were middling, I am not convinced that
Delivery	Easy : Difficult	Very similar to the idea of the cost of rollout being variable, the ease with which systems and upgrades can be implemented is variable and significant, and leads to additional costs that might be avoidable.
Delivery	Delivered : Not delivered	Not everything that is expected or intended is delivered. Although this scale emerged from the triadic analysis, it was not deployed.
Dependency	Dependant : Independent	In a research management role, the dependency of the project on funding and the rate of expenditure is important. This respondent

Figure 4: Illustrative scales, end point descriptors and notes

The scatter graph (Figure 5) includes all those scales that were specifically concerned with ‘good’ and ‘bad’ measures and that had more than two ratings. It indicates visually that there is a positive correlation: high success is quite consistently reported where the ratings are high; low success is reported where the ratings are low.

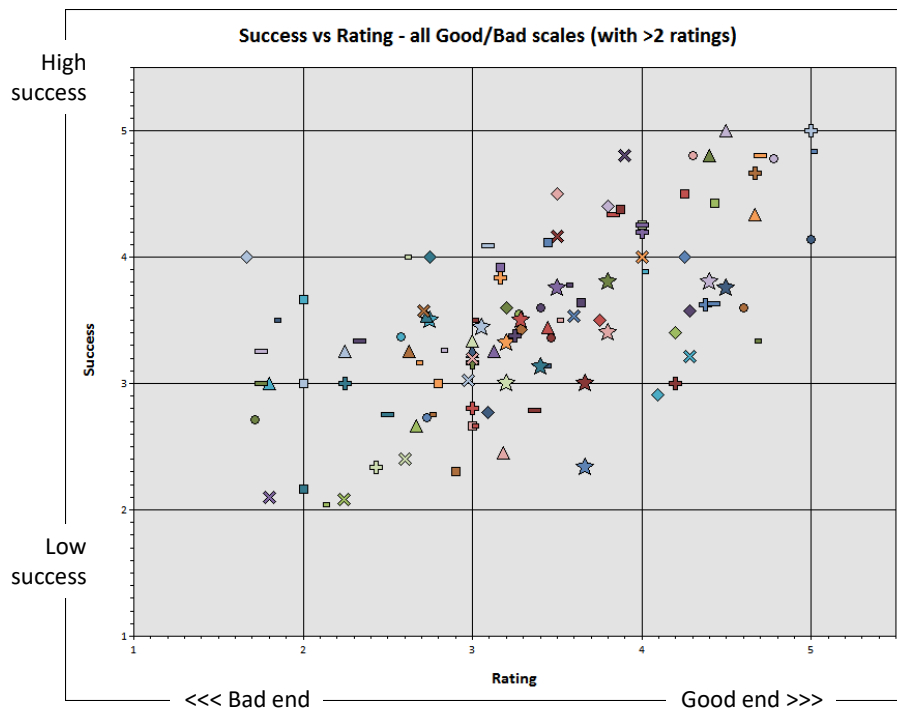


Figure 5: Rating and success for only those scales that indicate ‘good’ or ‘bad’

This is a useful result that shows a clear correlation between success and ratings, where the scales measure something that has a sense of ‘good’ and ‘bad’. But there is more potential in the data: as well as this simple mapping there is the possibility to undertake statistical analysis, and this is done in the section following.

4.3.1 Aggregation of scales into groups

The data collection delivered details of 211 events and 274 instances of event assessment, and the analysis developed 170 scales. The Repertory Grid approach invokes statistical methods to establish patterns of association between variables and the correlations between

them – here there is a special interest in the correlation of *scale ratings* with *event success*. The data was loaded into RStudio³ and subjected to Principal Component Analysis (PCA) and Pearson Correlation Analysis. Space precludes a detailed report of the statistical analysis, but the process identified those scales that correlate with success and grouped them. These results were combined into the ten success-related groups in Table 2.

4.3.2 The resulting success-related groups

Group	Notes
Capability	The capability to do something relates to the familiarity that one has with the technology at hand, the quality of the inputs to a task, and subjective feelings that a task is going to be difficult or easy.
Input	All processes require input, that can be seen as the product of other processes, or that might be sourced from outside the organisation.
Output	In the same way, processes deliver output that is passed on to further dependent processes, or that are passed to the outside world, beyond the scope of the organisation.
Management action	Actions of management that have impact, such as deciding insourcing and outsourcing, applying different levels of control, and engaging properly as management with those undertaking the work.
Means	The means to achieve a task is concerned with the enabling resources such as management approval, the co-operation of colleagues, and having access to the right tools and techniques.
Need	The measurement of need is concerned with the criticality of a system – the extent to which it will contribute to the work of individuals developing or using systems
Outcome	An outcome is not the same as an output – it is something more important that makes a direct contribution to the strategic ambitions of an organisation; something changes for the better.
Process	The collection of activities that takes input, adds value to it, and delivers it (transformed) to another process elsewhere.
Product	The material input and output, to and from processes, that ultimately delivers the systems or services that are required by the institution.
Service transaction	The focus of management performance analysis, based on timing, value delivered, engagement and the need to achieve ‘progress’.

Table 2 The ten scale groups correlating with success

This is an important result: it provides the first sight of a set of scales of measurement that have been found to correlate with success in the development and use of systems in higher education.

4.4 Managing better with a reference model

In a situation where different stakeholders with different expectations have to work together, it is necessary to communicate reliably. A *reference model* is useful as an ontological basis for working together within a shared domain⁴. The analysis of events and scales here led to a candidate reference model (that is, one with empirical origins but not yet fully tested).

The model accommodates the ten scale groups that have been found to correlate with success, and it therefore provides a framework with which to manage the things that will lead to an increased chance of success. It begins with the idea that a transaction is the result of *need* and *capability*, determining the *processes* that are necessary (on the one hand) and possible (on the other). Processes exchange *products* that comprise their *input* (again, on the one hand) and their *output* (on the other). The enactment of an exchange can be seen as a *service transaction* that is monitored and adjusted by *management* according to the available *means*

³ The statistical package used to generate the analyses here was RStudio (Version 0.98.1103) with the OpenRepGrid Library (Version 0.1.9).

⁴ One example is the OASIS Reference model for open standards. There are many others, and one of the first was the Open Systems Interconnect reference model, sometimes known as the ‘seven-layer model’.

and the desired strategic *outcomes*. As presented here, the model uses the conventions of entity-relationship modelling but of course there are other ways to see these models, beyond the scope of this short paper.

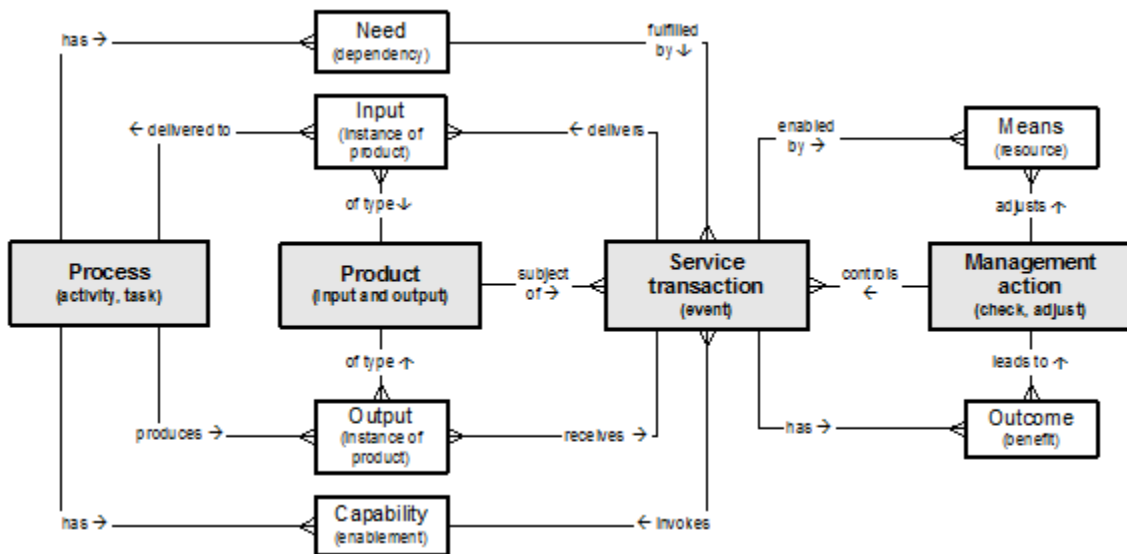


Figure 6: The reference model

4.5 Managing expectations

The model shows that if we need to understand performance and deliver to expectations, then we must start with the service transactions and examine all of the instances where resources are consumed as the ‘means’ of getting the job done. If, on the other hand, we just need to know what has been consumed in the fulfilment of a complete process, then by tracking the inputs and outputs, the related service transactions, and the means that those service transactions absorbed, then we will have the answer. If we wish to know the sum of all the benefits delivered by a process, then we can track the parallel route through all of the needs, the service transactions that fulfilled them, and the outcomes of the service transactions. Finally, if we need to undertake a cost benefit analysis, then the combination of both these summations as a difference will show the full cost and the full benefit. This is how the expectations of different stakeholders can be managed.

4.6 Some illustrative evidence

In closing, and in order to relate the reference model to the reality that we work with in higher education, consider some examples from the open discussions that demonstrate the ideas that we have at hand.

A student talked about the Learning Management System as a *means* to support the sharing of *products* in a way that reduced costs and delivered value – a useful *outcome*:

Well, it's a means as well where lecturers can communicate with not just my faculty but everybody that is doing chemistry at my level. So, all the slides, all the lecture notes are put on there - you don't have to print it out because it's there on the machine, they communicate past papers and ... just valuable information. [Mature first year student (health), University B, 2014/09/01]

Students are enabled to be informed about their intended learning without queuing at the student book shop, without paying for printing and without having to travel a distance or find out exactly when the shop is open.

Elsewhere, the interdependency between managerial transactions (where decisions are taken) and the operational consequences can be seen:

I was on the tender committee. What normally happens is it becomes a price battle. That's where I think we missed the plot, where we didn't look to build business relationships ... in terms of maintaining different laptops from the support perspective, maintaining this maintaining that, it's just horrible. The impact on support is just unbelievable. [Technology manager, University C, 2015/08/11]

This reveals the undesirable outcomes that can arise when things go wrong, and makes clear the need to understand the desired *outcomes* and adjust the way that things are done at the level of *products* and *processes*.

Talking about an outreach project, one project manager pointed out that institutional and external factors led to constant adjustment of plans and designs:

You have to have a clear understanding of the technology, to make adjustments about what are the implications in terms of the institution, so that you can create [the right conditions] and what are the implications of implementing this novel app, and then in terms of understanding what is happening in the outside space. [Project manager, University B, 2015/05/04]

These are issues for *management* to attend to. Understanding the external space is a matter of strategic analysis and strategy formulation – the stuff of the highest levels of management; adjusting the technology accordingly is a matter of operational fine-tuning.

The availability of a reference model is one way to begin building an understanding that will make a real difference. When that understanding concerns stakeholders, and what they expect from IT&IS investments, then there is every reason to expect real benefits that really meet needs.

5 Conclusion

5.1 The research questions re-visited

At the start, three questions were asked:

1 What kinds of systems and events were respondents concerned with?

Respondents mostly talked about the *events* in their working lives that demonstrated the advantages and disadvantages of information systems (Section 4.1). Table 1 reveals that the kinds of events were mostly concerned with technology, systems, and business change. Although all respondents had views about the outcomes that they hoped for (from their involvement with technology and systems) there was very little evidence about the delivery of real benefits.

2 How do they characterise the different kinds of events, and their outcomes?

As might be expected, respondents characterise events in many different ways, and have a focus on different stages in the creation of value from IT&IS investments (Section 4.2). It was found that only some of the characteristics reliably correlate with successful outcomes, and based upon statistical analysis they were organised into a new reference model that shows how they relate to each other (Section 4.3, Figure 6).

3 How can IT&IS be better managed given the context, so as to meet challenges, acknowledge capabilities, and yet still fulfil needs?

Here work remains to be done. The reference model has a sound provenance but it is yet to be deployed so as to test its utility. Sadly, the Higher Education sector in South Africa has been seriously distracted by student protest and damage to university property, and whilst it had been intended to present this work to senior education management nationally at about this time, this is simply not a *good* time to suggest quiet reflection and strategic planning. One hopes that the *right* time will certainly come.

5.2 Contribution

This work addressed a problem concerning the variable outcomes of IT&IS investments in Higher Education in South Africa, and the mixed expectations of stakeholders. It shows how a broadly-based examination of qualitative and quantitative evidence leads to a simple conclusion: stakeholders' expectations can be viewed in relation to the *services* that they deliver or receive; those services can be characterised according to their inputs, outputs and outcomes, and the needs and capabilities of those involved. Statistical analysis revealed the concerns that are most closely related to perceptions of successful outcomes, and led to a new reference model that can now be tested. In the course of the analysis, an extant framework (the IMBOK) served well in indicating a general failure in Higher Education to actively manage the identification and delivery of benefits to stakeholders.

5.3 Limitations and future work

This work is limited in that it is based on only *four* institutions in South Africa and it was only possible to *sample* the many different roles that prevail in those (and other) institutions. Nevertheless, the new reference model provides an opportunity for institutional management to reflect on their strategic thinking and take steps to measure and assess the extent to which their institutions are delivering what is expected.

5.4 A final comment on the IMBOK and the possibility of future work

The IMBOK has a 15-year history. It highlights four critical interfaces in the delivery of value from IT&IS investments: when technology is engineered into systems, when systems are installed into businesses, when benefits are delivered from improved business performance, and when strategic intentions are fulfilled. It is at these four interfaces where many of the problems of information management can be found (Bytheway, 2014). It was at a late stage in the project that it was realised that the new Reference Model provides the discipline that is needed when moving between the knowledge domains of the IMBOK. Consider the transition from information systems to business processes:

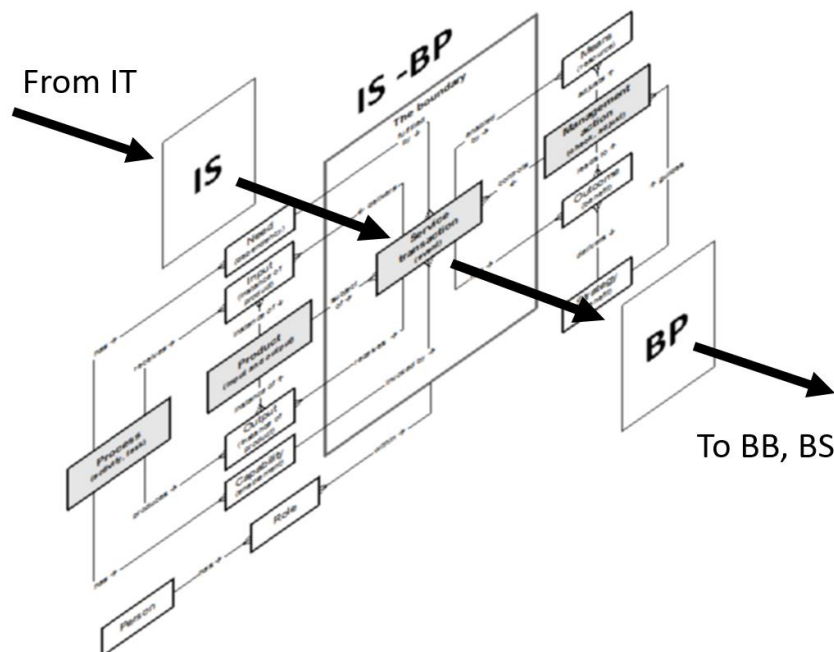


Figure 7: The Reference Model at the IS-BP junction

The IMBOK framework was a major deliverable from a UWC research project, working in partnership with the Cape Technikon (UWC, 2003). It was introduced during the analysis (Section 4.2.2) to examine the spread of data that had been gathered, with a useful outcome. Figure 7: shows how the Reference Model can be seen to sit in the important, but sometimes very difficult space, wherein information systems are being implemented in business processes. It could equally well contribute at the other junctions (IT-IS, BP-BB and BB-BS) and it is here where further work will build on what is reported here.

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