

Information Technology - In Transformation: Organizational Structure Implications?

Noel Wilson¹

¹Independent Consultant, BALLYMENA, Northern Ireland, BT42 2BT, E28533@BTINTERNET.COM

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1. ABSTRACT

The pace of technological changes and associated changes to higher education are factors that may influence IT department's capability requirements, approaches to service and facilities provision and organizational structures. An IT department needs to be aligned to the institution's mission, vision and goals yet have the capability to proactively change in response to new technologies, new customer-centric requirements and to prevailing economic factors. Do we have the appropriate governance structures; the expertise and capacity we need; are there opportunities to divest some existing in-house interests and reinvest these resources in alternative sourcing models? These are some of the issues confronting higher education IT departments. Effectiveness of overall IT investment, whether in technologies or in human resources is of paramount importance to senior management and users. The paper outlines some implications associated with the types of changes referred to, seeking to identify how capability, framework alignments (e.g. ISO, ITIL[®]) and functional components may be achieved. It also touches upon the cultural implications associated with change and change management. The term Information Technology (IT) is used to incorporate Information Systems (IS) and related non-technology (e.g. human resource) aspects of the central IT department.

2. BACKGROUND

From the mid- to late 1960s many universities established computing departments as they were then known. Then, the purpose of these relatively new organizational units was principally to provide a computing service in terms of hardware, software and support provision to their research community. The development of the embryonic departments into what we now have as Information Technology (IT) departments has been a journey influenced by myriad changes. Organization structure should be designed to serve the purpose of the institution and specifically that of the particular department; in this case, the IT department. Critical factors influencing structure as well as the capacity and capability within the associated departmental team include, for example, vision and strategy. These dependencies (vision and strategy) are in effect time-dependent. Given the dynamics within the IT field, IT senior management working in conjunction with fellow senior managers and critical user (customer) representatives must periodically review their department's structure and revise it according to changes in the institution's vision and strategy that impinges upon the effectiveness of that organizational unit. An IT organization structure is not merely a chart that articulates positions, responsibilities and functions; it is the product of a design process entailing a systematic analysis of requirements and how best to oversee its obligations. Feeny and Willcocks (1998) refer to a resource-based perspective they consider necessary if an organization is to maintain competitive advantage. This research was conducted in the context of outsourcing of IT functions and will be referred to again later as the model focusses upon capability requirements and considerations of how best to address overall functional and service requirements.

Mahoney (2008) provides an interesting portfolio of statistics, based on Gartner research, giving a useful context for the "change factors" addressed in this paper. He reports that:

- Role changes within over 75% of IT organizations would happen by 2012,

- Two new IT-related IT organizational units would form from within existing units in at least 60% of organizations, one associated with change and architecture and one for sourcing,
- 37% of respondents anticipated the demise of traditional IT organizations by 2012.

These findings identify role changes, changes in functional focus and in structures, all of which are relevant within the tertiary sector. Many sector staff, especially in the UK, are acutely aware of role changes and the introduction of new units, or competencies, within their departments. Parallels can be drawn with work of Willcocks and Feeny (2006) when they state that successful outsourcing mandates internal capabilities including leadership, governance, relationship management, organized buying and contract facilitation. Competency in these capabilities are not part of the staple diet of a typical IT department's work force therefore, as indicated by Mahoney, role changes (and staff retraining) and restructuring as a possible means of introducing new organizational units (possibly procurement, incorporating contract management and supplier management) are likely. Introductory steps to implementing more formalised governance arrangements are also being evidenced. The uptake of sourcing options, hence the likely displacement of existing internal functions and the introduction of new skills would constitute the third "change factor". Whether demises have arisen is a separate matter, however changes are certainly a prevalent feature.

3. WHAT IT NEEDS SUPPORTED AND HOW?

Considering a resource-based approach, then it must be recognized that, today, a significant portion of a university's IT technology and service requirement is commercially available using enterprise grade solutions. Consider the role of products from commercial vendors for services such as messaging, desktop office suites, collaborative working, virtual learning environment, storage, "as a service" options (e.g. SaaS, PaaS, IaaS), the wide variety of administrative support solutions and service desk/call centre operations; we already avail of many solutions and accept their suitability as well as the commercial conditions under which they are provided. Vendors increasingly recognise the value of their offerings within the sector, hence the need to devise contracts sensitive to the peculiarities of it, whilst retaining their intellectual property and ensuring their financial viability.

Retention of core business-related skills and competencies are critical components for protection in any sourcing considerations. To devolve aspects of IT provision that directly contribute to the success of the organization including its competitive advantage is inappropriate. The routine establishing of contracted services of the type outlined indicates operational services that are already potential candidates for an outsourced arrangement. So what are the alternative sourcing options and what service components could be delivered through their use?

Educause reports that whilst alternative sourcing models are widely used nevertheless they are used narrowly; breadth in terms of range of solutions and depth in terms of extent of uptake of several solutions in any particular institution. Examples of adoption cited reflect the list referred to. SaaS, third party ERP project management, third party network design and third party operated call centres are the four most popular service areas selected (Goldstein, 2009). Interesting to note is that alternative sourcing options least favoured by senior IT managers are those associated with solutions where the institution needs to be more standardized in its business approach (Goldstein, 2009). A trend towards greater standardization and hence alignment of business IT requirements with commercially available enterprise grade solutions is likely to continue. It is unlikely that candidates for standardization will include any critical to the business' competitive advantage.

UCISA's biennial "Top Concerns" report (UCISA, 2011) incorporates a brief review of issues engaging senior IT managers in the UK, USA and Germany. Noted are:

- Funding IT was the top concern in Germany, USA and the UK
- German respondents (to their ZKI survey, the equivalent of "Top Concerns") rated staff development as second priority (the concern was not in the UCISA "top 10" list)
- Use of new technologies and cloud-based services featured in USA (4th) and in UK (=10th)
- Shared services (in the UK) do not feature in the "top 10" and only achieve tenth position in the "emerging concerns" list.

Whilst the UK 'funding IT' issue concerned inadequacy of funds, the USA situation was associated with reducing budgets and increasing revenue from technology-related activity. Despite the

continuance of financial challenges in the UK sector it is interesting to note that shared services as a cost-saving option is not viewed as a high priority strategic consideration in the provision of IT services. This said, one needs to acknowledge that the survey return may not necessarily represent the broader community practices. On the other hand, in the USA the interest in and uptake of cloud-based services is afoot. The German reference to staff development may be an indicator of changing skill sets and associated competency requirements within their sector. Whether there is an associated displacement of services based around traditional skills is not reported. Dealing with internal approaches to competency requirements is briefly addressed later.

Goldstein's work (2009) offers a much more comprehensive review of alternative sourcing models and their rates of adoption across the USA higher education sector. A point of particular note is that there was no statistical difference in the measure of the quality of IT service provision in terms of reliability and cost-effectiveness, based on current use of outsourcing whether in terms of the technologies or services outsourced. Another important finding was that those who consider alternative sourcing models as strategic are positioning their institutions to build competencies and capacity in areas that will facilitate engagements with external providers; in other words they are developing or strengthening what in effect is viewed as 'core' competencies and skills for retention.

4. SERVICE DELIVERY MODELS

How have institutional and government changes impacted upon IT departments, their workforce and their structures over the last half century? What skills and competency requirement changes have taken place? A shift in emphasis from structures established around organization models to ones based upon operating models has been a relatively recent focus (Bishop, 2012) of attention and referred to above. Early computing departments established their organizational structures to reflect technologies (operations, systems and program (usually administrative) units); today the situation is remarkably different. For example, Bichsel (2014), reporting on findings of an Educause Center for Analysis and Research (ECAR) survey titled "Today's Higher Education IT Workforce", states for example that the top skills requirements are "soft" skills, not technology-focused. Furthermore, legislative and business requirements are more relevant than in previous decades. Information technology is subservient to the needs of most organisations; generally speaking it is a business and business change enabler. Historically, computing was focussed on supporting research however its penetration into teaching and learning and administrative support soon developed and to the stage where IT is critical in an extremely competitive and economically retarded era. Can the continuance of in-house IT organisational units with their various organisational structures adequately meet present and future business needs? Can such an approach to providing human resources offer the skills complexities and dynamics necessary in today's changing world?

The language of organisation structure (chart) has been common parlance for decades, however to quote from Gartner research "*CIO's should not think in terms of an IT organization model, instead, CIO's should think in terms of an IT operating model. The reason is simple. An IT operating model defines IT service delivery ownership and responsibility. In this way the IT operating model is an accountability framework, not a service delivery model.*" The transformation to an operating model presents challenges for those supportive of organisational structures with their inherent technology-focussed job descriptions, however increased complexities in university business and IT, the wider economic climate (affordability), pace of change (technical skills), shrinking technology obsolescence intervals, IT consumerisation and changing status of IT at board level (business and social skills) necessitates a critical reappraisal of how best address an institution's portfolio of IT requirements. Relatively static organisational structures have been commonplace in the sector, expanding in numbers of personnel and elements comprising the structure as the organisation grew and its IT needs expanded. The extent to which existing personnel engaged in developing new technical skills, moved laterally within the structure to address increasing demands or when demands in their existing job diminished and became more involved in understanding business requirements has been rather variable. The situation is changing especially because it is being recognised that such an approach to IT expertise is unsustainable and can be a barrier to the IT department's ability to respond in a timely manner to its organisation's strategic requirements. At board and senior management levels it is well understood that the IT "value proposition" does not

rest comfortably with “baseline service provision” but with its capability to bring “value and agility” to the organisation. Educause’s recent ECAR Report on “Today’s Higher Education IT Workforce” highlights that “Soft skills are rated by chief information officers (CIOs), managers, and staff alike as being the most important skills for success.” and “Non-managerial staff are not engaging in (nor are they being encouraged to engage in) the activities they deem most important for their professional growth and development.” These major findings reinforce aspects of the above commentary, especially considering the extensiveness of availability and adoption of social computing resources. Do these resources require associated internal support personnel? Remember we are in the midst of “Generation Y” (those born since the early 1980s) persons holding managerial responsibilities and where “Generation Z” (those born in the early to mid-1990s) represents our student base; “a generation that has never known a life without superfast communication and unlimited access to media technologies, knowledge at their fingertips and the independence that technology gives them means they are able to work from any location” (Higginbottom, 2013).

Various sourcing models for IT provisioning are not new however their importance has been elevated as cost implications and the pressures to implement new enterprise wide systems increase. An economy incorporating sourcing options is not new; it is in growth. Hardware maintenance and use of commercial software as well as the use of consultancy in specialist, or niche, areas are familiar examples that have existed over a few decades. The advent of “*the cloud*” and of the “*as a service*” sector are two technology drivers for change in how IT is provided in support of the business. Whilst in most cases these drivers are commercially driven they need not be; higher education consortia or other “*member models*” can be constructed to deliver the same approach. Consideration of the sourcing options available may assist in establishing an appropriate operating model. For example, in the United States details on how a variety of sourcing options have been adopted appear in the Report on “Alternative Sourcing Strategies: Six Views” and in the paper “Alternative IT Sourcing Strategies: From the Campus to the Cloud”.

Lacity and Willcox in their study of sourcing options, as far back as 1998, noted based on the success criterion of “expected cost savings achieved”, that key factors included:

- Selective outsourcing was more successful than total out- or in-sourcing
- Joint decision making by senior executives and IT managers were more successful that if either party acted independent of the other
- Encouraging internal and external bids created more successes than inviting external bids only
- Short-term contracts were more successful than long-term and
- Detailed fee for service contracts were most successful.

Considering these findings and seeking to identify those skills necessary to provide in-house suggests a subtly changing portfolio of competencies is emerging. Strong technical knowledge and experience that is contemporary is the remit of successful commercial enterprises where they must hire and develop personnel with skills matched to current business sector needs. Such organizations, it is argued, have the agility to do so and have business models established that accommodate substantial investments in human resources. For the higher education sector the need to concentrate on core skills and competencies closely aligned to the business of the institution is an appropriate strategic approach for the IT department; concentrate on *core capabilities*. Experience in the business and how it operates, how various organizational units interoperate and a need to identify technical skills that are optimally provided as part of an in-house team are key human resource considerations. For example, effectiveness in establishing, monitoring and managing contracts and their suppliers is critical to success in any form of sourcing model where the supplier is not the in-house team. In situations where an in-house team has bid to provide a service at a stipulated cost and to an agreed service level then it is considered an externally sourced solution.

Today, sourcing of IT requirements has become a professional discipline; gone are the days when “all was in-house” and with few exceptions the “all is externally provided” has not become the norm. CIOs recognise the intellectual value associated with business knowledge and they appreciate that many facets of technology have matured into stable commercial offerings, especially through the range of “as a service” options now available. Why do we need to support student computing internally? Can we host our data storage in a commercial cloud? Do we really need an internal Help Desk function? These and many other questions arise and frequently are posed by senior management with the IT function invited to provide strategic responses. Complacency regarding the

need to keep under review trends and options is not an option for the IT function and its management team. NorMan has been referred to as a “member” type alternative sourcing option. The Joint Academic Network (JANET), the UK tertiary education sector’s wide-area network infrastructure provider has a service portfolio incorporating opportunities for central provision and management of video-conferencing, specialist training, software agreements, cloud-services associated with data storage and data sharing as well as frameworks for data centre provisioning. In the UK the range of opportunities for alternative sourcing is increasing as is the support for them as evidenced by these examples, some well-established, of national bodies’ provisioning.

5. IN-HOUSE HUMAN RESOURCE CONSIDERATIONS

As indicated, trends towards acquiring new skills and competencies are driven by technological and business change, economic factors as well as other influences. The discussion so far as reflected upon sourcing options and opportunities to avail of external providers. In-house developments are considered as important for a department’s success whether in terms of effectively developing and managing external suppliers or ensuring the appropriateness of core requirements. Organizational change can be structural as well as skill-based or indeed a hybrid of these elements.

The Skills Framework for the Information Age (SFIA[®]), published by the SFIA Foundation, a not-for-profit organization, is a competency framework to aid organizations in effective management of their (IT) human resources, identifying skill gaps, assisting with career development and the production of role analysis. Full detail on the Framework is beyond the scope of the paper, however the tool provides a foundation for consistent, unambiguous and clear definitions of IT-based skills using a 2-dimensional approach to represent a “range of skills” and associated “authority and responsibility” levels. Standardized definitions of information technology skills and levels populate the matrix which can be applied in creating job specifications, recruitment and the identification of skill requirements and levels commensurate with the requirements of the organization. SFIA refers to a “capability mix” and uses this concept to define IT professional capability based on a combination of professional and behavioural skills and knowledge. It uses definitions (or descriptions) of experience and qualifications to validate and support the capability concept. An illustration of SFIA’s output, based on work the author has been associated with¹ is given in Figure 1.

Heading	Description
Summary	A synopsis of the core skills relevant to the Profile
SFIA Core Skills	The main activities within the Profile; outlined as Skill and Task descriptions
Highest Task Level	Overview of the profile based on the highest SFIA level contained within it
Background Components	Key Prior Knowledge, Skills and Education requirements underpinning Core Skills
Work Activities	A comprehensive list, based on SFIA Levels and presented against each of the Core Skill areas, of assumed activities undertaken within the Profile
Knowledge/Skills	e.g. behavioural, technical and listed under ‘depth’ categories: aware, familiar, proficient, expert
Training Activities	Recommendation for (informal) training; technical and non-technical
PDA	Personal development activity (PDA) suggestions e.g. participating in professional body and writing papers etc.
Qualifications	Development areas using industry and professional body qualifications

Table 1: Example of SFIA^(C) Role Profile Headings

¹ As part of a project incorporating consultancy from the British Computer Society

This output represents a comprehensive Role Profile which can be tailored to omit sections that are considered of less importance, for example the qualifications section, as organizations may have their internal approach to this component of staff development. The work referred to was associated with profiling existing skills and competencies, producing a “heat map” illustrating key areas for competency development to address deficiencies, and establishing a base upon which to formally establish personal development plans (PDPs) for career development. The PDPs were used in a realignment process associated with the organization’s strategic plan for its IT department.

Based on the author’s experience in the use of SFIA[®] the creation of Role Profiles was a small component within the overall project. The ultimate output from the profiling stage resulted in a full and an abridged version with attention given to tuning content so that it aligned with the business environment, its language and needs. The abridged profile contained the summary, highest task level description, background and work activity elements and will act as input to a further project stage to provide Personal Development Plans (PDPs) as part of the organization’s staff development review process. Alignment of organizational culture with standardized SFIA output was important, for example in terms of the approach taken to formal and informal professional development activities; some instances of standardized language may be incompatible with how an organization describes its IT activities and given the pace of technological developments the current SFIA product may inadequately represent skills needed, for example in governance and information management. Successful role profile was viewed as a sensitive adjustment to the standardized output so as to create output compatible with the organization, its strategy and culture.

6. GOVERNANCE AND FRAMEWORKS

To conclude the issues discussed so far it is necessary to mention the role of IT governance, which may be described as a mechanism that facilitates “board level” executives with information and procedures to oversee the directing, monitoring and evaluation of IT as it is applied to their core business. The scope of IT governance coverage is extensive as illustrated by ISO38500, the international standard, which provides guidance on “assuring stakeholders that they can have confidence in the organization’s corporate governance of IT; informing/guiding Directors in governing the use of IT in their organization and a basis for objective evaluation of the governance effectiveness”. The standard is supported by a number of frameworks designed to deal with specific elements of the IT service. In particular, the Calder-Moir IT Governance Framework (2013) provides an umbrella approach for organizing IT governance into six stages representing end-to-end processes from strategy to service delivery. Within these stages reside existing tools, for example Cobit, ITIL, PRINCE2, PMBOK and “6 Sigma”. Implementation of a full governance regime apart from requiring leadership and an appropriate organizational culture, is likely to be a time consuming project. Eade (2011) offers a useful insight into how a governance framework was introduced within a UK university, adopting the JISC Toolkit (2008) to assist with scoping and implementing tasks. His work is set in a context where research by Willcocks and Feeny (2006) and Mahoney (2008) is evidenced.

How does IT governance interface with organizational structures, organizational models and sourcing options? An effective governance regime must have control over the delivery of IT services; delivery in turn is affected by the sources from which the facets of the service are acquired whether via internal human resources or via one of the many sourcing options that can be availed of. Capability to effectively establish, monitor and manage these sourcing options must reside within the department, perhaps with some elements supplied by the organization’s procurement or finance teams e.g. establishment of suitable contract terms and conditions.

7. CONCLUSIONS

Managing change in IT provisioning is a continual effort if its alignment with the mission and goals of an organization are to be achieved. With “cloud technologies” and “XaaS” availability spanning many facets of IT and the pressures witnessed by IT departments *to deliver*, the need for skills and competencies in new areas is essential. Use of SFIA[®] as a tool to help inform the remit of positions within an organisational structure where loose adherence to the ITIL[®] framework has been adopted is outlined. The relevance of this tool to the specific requirements of the sector is touched upon as

are alternative sourcing options; commercial and within-sector. Tomorrow's IT department is likely to be shaped around even greater demands to streamline existing services and the establishment of well-defined core skills, as well as providing partnership arrangements to deliver essential, but not *core*, facilities and services.

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9. AUTHOR'S BIOGRAPHY

Noel Wilson holds a Masters degree in Mathematics from the University of Ulster. He is a Chartered IT Professional and a Fellow of the British Computer Society. Until December 2013, when he decided to retire early from his 41-year career, he was employed by the University of Ulster as their Head of ICT Customer Services. His career, apart from an 11 month period as a biometrician, has been within tertiary education where he held various management positions associated with customer-facing aspects of IT service provision. In July 2005 the University awarded him a Distinguished Learning Support Fellowship for his contributions to IT and media service developments. His LinkedIn reference is:



<http://www.linkedin.com/pub/noel-wilson/15/476/91a>