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FOREWORD

This book is a collection of papers presented at the National Research and Development Conference of the Institute of Computer Scientists and Information Technologists, held on 26 & 27 September, at the Interaction Conference Centre, University of Natal, Durban. The Conference was organised by the Department of Computer Science and Information Systems of The University of Natal, Pietermaritzburg.

The papers contained herein range from serious technical research to work-in-progress reports of current research to industry and commercial practice and experience. It has been a difficult task maintaining an adequate and representative spread of interests and a high standard of scholarship at the same time. Nevertheless, the conference boasts a wide range of high quality papers. The program committee decided not only to accept papers that are publishable in their present form, but also papers which reflect this potential in order to encourage young researchers and to involve practitioners from commerce and industry.

The organisers would like to thank IBM South Africa for their generous sponsorship and all the members of the organising and program committees, and the referees for making the conference a success. The organisers are indebted to the Computer Society of South Africa (Natal Chapter) for promoting the conference among its members and also to the staff and management of the Interaction Conference Centre for their contribution to the success of the conference.

On behalf of the Organising Committee
Vevek Ram
Editor and Program Chair
Pietermaritzburg, September 1996

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The IS Workers, They are A-Changin'

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Abstract

As changes in Information Technology and organisations move into the sophisticated areas of client/server computing and open, integrated architectures, the IS professional needs to develop an increasing range of skills and abilities to produce the required systems. By synthesising the results of local research and identifying important issues from international research, the author argues that both academia and industry must react together to create a spirit of lifelong learning in IS staff. Universities offering IS degrees must look at common frameworks and IS management must put more resources into the education and training of IS professionals. Only by strongly encouraging a move to lifelong learning will companies have adequate people skills to develop tomorrow's highly complex systems.

Introduction

Come gather round people wherever you roam
And admit that the waters around you have grown
And accept it that soon, you'll be drenched to the bone
If your time to you is worth saving
Then you better start swimming or you'll sink like a stone
For the times they are a-changin'.

Bob Dylan, 1964

Bob Dylan confused, mystified and excited those of us who heard him first time around in the '60s. His music was very different from the blues, from rock 'n roll and even from folk music. Dylan decided from the first to build on the old blues of Woody Guthrie, but to develop something of his own called protest blues. Maybe the young, naive Dylan knew more about the future than we did. Whatever the reasons, we all knew that his hit song about a changing world was important. What we didn't know was that the changes would continue and would happen at a faster pace.

Over the last decade, Wetherbe and colleagues at the University of Minnesota have identified the top IS issues according to IS managers. The important IS issues have started to integrate and a recent study describes issues like architecture, integrated systems and networks as being vital to company growth. (Brancheau, Janz & Wetherbe, 1995) Staff development is also mentioned as a key issue as these are the people who will be making the other issues happen.

Assuming that the discipline and practice of Information Systems comprises the three pillars of information technology, organisations and people, it is not difficult to see that there are significant and revolutionary changes happening in business in these three areas.

Organisations are becoming global and are focusing more on core competencies. Business processes are being redesigned to handle services and products more efficiently. Middle management are being retrenched in order to "flatten" organisations and reduce operating costs. Non-core activities are being outsourced to expert service providers.

Information Technology (IT) is developing at ever increasing rates. Many organisations now identify their computer environment as network-centric and the systems which run on them as strategically important to their ongoing business survival. New hardware and software announcements from suppliers arrive daily making future planning and direction-setting a complex and bewildering exercise.

People needs and people management in IS no longer match the old paradigms. Apart from a strong move to "quality of life" and contracting/consulting work modes (Handy,1995), relatively junior staff are now empowered to make significant decisions in a distributed environment and they tend to work in multi-functional, project teams instead of the traditional functional hierarchies. Indeed, Handy argues for a new world where many people work from home and offer their services as contractors. The move to outsourcing IS services and teleworking certainly lend themselves to this trend. The IS service industry has grown remarkably in recent years. According to the Datamation 100 Survey, IS services have shown the largest growth world-wide in market share compared to any other areas in the IS industry (Brousell,1993,p23). The move to create more entrepreneurs in the IS industry is not very well researched. In a study by Smith, Boakes and Murray (1994), a university degree curriculum was developed for an IS graduate who would follow an entrepreneurial career. In this research 43 entrepreneurial skills were identified from the literature. IS entrepreneurs were asked to consider the importance of these skills. Some skill areas like communication, leadership, problem solving, change management and risk assessment were identified as requiring more emphasis whereas skills like positive thinking, creativity, ethics, business planning, scenario planning, venture evaluation and entrepreneurship theory required new courseware to be developed.

Developing Information Systems (IS) in the above sophisticated business environment is a highly complex process. Apart from the organisational and people changes mentioned above, new information technologies like desktop computing, object orientation, client/server computing and interconnecting LANs/WANs are becoming commonplace.

These issues are far removed from the "old world" of COBOL programmers working on large mainframes writing functional batch systems. However, it is argued that, apart from trying to recruit new IS staff with these new technical skills, very little is being done to change attitudes of IS staff or to identify new career ladders or to adopt new approaches to education and training. In fact, the author argues that a vain attempt is being made to develop new systems using new technologies using old management methods which must be doomed to failure.

There is evidence that some universities have identified these current requirements and have modified and enhanced curricula to ensure new graduates can make this transition (Smith,1994). Indeed, the relatively new IS'95 curriculum, a combined effort by key IS players from the ACM, ICIS, DPMA and IAIM organisations, identifies the skills , knowledge and competencies required for an IS graduate over a typical three or four year degree. These skills are very similar to those identified in a local South African study (Young, Sabor and Smith,1994). Interestingly, the IS Managers in this study identified three areas of competence - business skills, interpersonal skills and information technology skills with interpersonal skills being the most important for IS professionals. When these derived skills were presented to heads of Information Systems departments, and these academics were asked what skills were taught currently and what skills would likely be taught in 5 years time, there were many omissions. Firstly, there was a great deal of disparity amongst the current IS degree content offered at South African universities. Certainly it was difficult to detect a core syllabus or a common focus. The focus seemed to be on the technical skills with a lack of emphasis on the people and business skills. The common 4-year curriculum derived from this research provided a very exciting mix of the skill areas as shown in Table 1. The majority of the subjects are taught each year - starting with introductory concepts in the first year, leading to sophisticated practice and research in the fourth year. As each of the 42 skill/knowledge areas is taught in more detail and complexity over the four years, so the students learn to integrate the different subjects into a cohesive learning experience.

Table 1 - A 4-Year Skills Framework

Skill	Year 1	Year 2	Year 3	Year 4
Written Communication	X	X	X	X
Spoken Communication		X	X	X
Selling an Idea/Concept		X	X	X
Creativity	X	X	X	X
Dealing with Cultural Differences	X	X	X	X
Group Dynamics		X	X	X
Motivation	X	X	X	X
Leadership		X	X	X
Negotiation Skills		X	X	X
Change Management		X	X	X
Strategic Thinking		X	X	X
Problem Management	X	X	X	X
Business Relevance of IT	X	X	X	X
Business Analysis	X	X	X	X
Entrepreneurial Skills		X	X	X
Business Management	X	X	X	X
General Management	X	X	X	X
Marketing	X	X	X	
Finance Principles	X	X	X	X
Ability to Relearn		X	X	X
Package Assessment		X	X	X
JAD	X	X	X	X
Executive Information Systems	X	X	X	X
Group DSS	X	X	X	X
DSS	X	X	X	X
Project Management		X	X	X
Systems Analysis	X	X	X	X
Systems Design	X	X	X	X
Multi-media	X	X	X	X
PC Skills	X	X	X	X
Graphical User Interface	X	X	X	X
RAD			X	X
Data Management	X	X	X	X
Database Management	X	X	X	X
Programming	X	X	X	X
Systems Theory	X	X	X	X
Client/Server		X	X	X
Multiplatform Skills		X	X	X
Object Orientation		X	X	X
Telecommunications Networks	X	X	X	X
BPR and Design			X	X
Systems Architecture	X	X	X	X

The problem is not whether universities and technikons can supply IS graduates with the right skills and knowledge. Provided these academics monitor the local and international research into curricula

changes and developments, most will attempt to stay with current trends although the reaction time may be somewhat slow and curricula between universities may continue to differ because of differentiation between university faculty. However, it is vital that IS academics maintain links with each other. Bishop (1996), in a study of manpower and training in IS and computer science training, only identified nine IS departments employing 72 academics. These departments produced a mere 600 graduates in 1994. With so few staff and graduates, it is important to keep close ties between IS departments in universities. Another problem seems to be with the IS professionals themselves and IS management currently employed in the larger organisations who cannot, or will not, identify the impact of the changes happening around them and who seem reluctant to put plans in place to address these problems

The Lifetime Learning Paradigm

Handy (1995) identifies a different career structure emerging in Europe where professionals work harder and longer without the tenured jobs and regular hours expected in the last generation. He argues for a "portfolio of jobs" where work is paid not by the hour but by the product or service provided. Much of this work is provided by teleworkers who do not have to commute to the office to provide the service required. This new world of work requires a professional to understand how new organisations work, how new technology affects the organisations and how employees in these organisations can be made more effective and efficient. Understanding these new factors cannot be done through old experiences but must be continually updated with trade literature and research findings.

It has often been unfairly said (but not proven), that IS professionals read very little. And what they do read tends to be articles in the popular press and the job advertisements! Whilst the IS industry is a continually changing one, perhaps all an IS professional has time for is to deliver the systems required using the tools and the technology of the current employer.

The author argues strongly for a change in this thinking. All IS staff should be strongly encouraged to develop a philosophy of life-long learning in areas of general skills and specific technical skills - to develop and broaden as well as being skilled for specific, current technologies. The benefits to this approach have been clearly seen by the author in the IS graduates during their early career years.

The Organisation's Response

In a study by Judronich (1994), systems analysts in large organisations were asked to identify new technology skills they considered were important to their future roles in the IS industry. They were then asked to identify the levels of these skills they currently had and how these skills might change over the following three years. The general consensus was that they were hopelessly underskilled for the new information technologies that were already available in the market-place. Moreover, they did not see a move by their organisations to provide wholesale reskilling funding in the future. This concern was supported by the IS Training Managers who, despite a clear understanding of these changes in the market-place, did not anticipate any significant changes in their training budgets. This approach will do little to retain good staff and will provide a poor foundation to progress towards new technologies.

The IS Professional's Response

Many IS professionals seem to be taking the easy way out and are looking to become either SAP specialists or similarly highly-focused specialists. Whilst this approach is highly lucrative in the short term, it is easy to see that this could lead to a narrow skill set and a negation of many of the author's arguments. The knee-jerk reaction from universities who would focus on skills, for example, like SAP, Microsoft products and Netware would also lead to a long-term narrowing of the three skill sets.

Research into motivation by Couger and Smith (1994) has shown that the industry consists of people with the highest growth need of any professional groupings. The expressed need to continually achieve and grow in the job can only be satisfied by ongoing job enrichment through the acquisition of new knowledge and skills in technical, inter-personal and business areas

Conclusion

It time to start swimming. All stakeholders - academics, IS managers and IS professionals will have to change. In an industry as small as the IS industry in South Africa, I do not believe we can reinvent wheels. Academics who teach IS must start to work closer together to ensure at least a core body-of-knowledge is standardised. We must follow our colleagues in America who have started to get their act together. We must help each other to develop in similar directions.

IS Managers must realise that staff development does not merely consist of the odd skills course every year. Career planning and development must be focused on both present and future technologies and staff must be provided with considerably more opportunities to study further and to develop in broader areas of business skills, people skills and technology skills. Through extending their own company libraries and increased use of university facilities, staff must be encouraged to read more journals, books, Internet ezines and business magazines and to attend ongoing academic and commercial seminars and courses. Time must be set aside to ensure learning is an important business activity not a lunchtime browse. Staff must be encouraged to present their research and knowledge in sessions where open discussions can be held in friendly surroundings. The move to lifelong learning must be viewed as an inevitability for all IS professionals.

Bob Dylan is now in his mid-50s. Although he has modified his style dramatically over the years, his early protest song has considerable relevance to IS professionals and managers. As he says, if we don't start swimming (presumably in the right direction), then we will sink like a stone. Let's rather swim.

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