The Need for a Strategic Foundation for Digital Learning and Knowledge Management Solutions

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Abstract: This paper elaborates on the importance of a strategic foundation when digital learning or knowledge management (KM) solutions are planned and developed. It looks at some key issues of e-Learning and knowledge management (KM) through discussing the various stages (technologies) and potential benefits of e-Learning; the state of the e-Learning industry; the concept and hierarchy (components) of KM; digital divide; and the implications of KM on e-Learning. It emphasizes the importance of a strategic approach to introducing e-Learning and KM through reviewing some of the potential causes of failure and proposing a framework for developing a strategic foundation for e-Learning and KM.

Keywords: Digital Learning, Knowledge Management, e-Learning, Strategic Foundation, Digital Divide

1. Introduction

Educators and educational technologists (e.g. Baynton 2001, Rosenberg 2001, Higgins 2002, Burns et al 2001, and Dobbs 2000) argue that learning practices are on the verge of a major change. Today, the knowledge and skills that we acquire are in danger of becoming increasingly obsolete, which in turn requires us to learn on an ongoing basis. Most traditional approaches (to learning) seem to be no longer adequate in responding to the new challenges with regards to the need for increased efficiency (and effectiveness) in developing, acquiring or disseminating knowledge. The solution (in most cases) seems to have been provided through the application of Information and Communications Technology (ICT).

Over the past few years rapid advancements in ICT have contributed towards a staggering growth in global computer networking and the emergence of a globally connected world. The Internet has evolved from being a network for researchers and academics into a platform that has enabled new businesses to find alternative ways in which to offer their products and services. We have witnessed a paradigm shift in the ways in which the transfer and management of knowledge is handled. The Internet and Web-based technologies have both had a profound effect on the way(s) in which educational and training institutions now operate - in that it has made it possible for many innovative educators/trainers (within ICT enabled nations) to think of new ways in which to use the Internet in order to provide Web-based knowledge management and training opportunities.

There appears to be significant optimism amongst technologists and strategic planners for knowledge management. They view global networking and Web-based solutions as catalysts for addressing today's challenges of knowledge management and digital learning. This has become evident with an increasing number of tertiary educational institutions and industry based training organisations attempting to offer a wide variety of Web-based (online) learning solutions. These institutions have adopted a variety of strategies - some have considered Web-assisted solutions as a supplement to face-to-face communication between students and educators/trainers, whilst others have used Web-based learning through the Internet as the sole medium for delivery.

A review of e-Learning and KM cases (e.g. various cases in online learning in the Training Magazine, Asgarkhani 2003, Kiser 2001, Montanden 2002 and Rossett 2002) suggests that most tertiary educational institutions and professional training organizations (within ICT enabled and globally networked countries) acknowledge (to some extent) the strategic importance of using technology-based education and learning through Web-based applications. They seem to view e-Learning as being a fundamental and positive shift in the academic and professional knowledge management world. Yet there is also a danger. If we focus too much on the technology aspect of e-Learning and less on broader issues and/or strategies, we are unlikely to be able to deliver futuristic solutions of a high quality. On the whole, some electronically delivered programs/courses appear to have been developed and implemented in a somewhat reactive manner, and in isolation - more specifically, without much thought being given as to strategic implications; global developments; cultural issues; digital divide and the complexity of today's knowledge management systems. As a result, some of

these solutions have proved incapable of meeting the expectations of their potential markets (students/trainees). Considering the significance of knowledge management and ongoing learning in today's environment, the development of knowledge management systems and electronic learning solutions needs to be based upon a strategic foundation.

2. The evolution of digital or electronic learning

2.1 e-Learning - The concept

e-Learning has been defined in many different ways. The historical background of e-Learning can be observed over three decades of development in ICT based education (and training).

Various technologies (including ICT) that have been introduced throughout the past few decades (in order to facilitate learning) include:

- Film
- Advanced TV technologies and video tapes
- Mainframe computer based "teaching machines"
- Early microcomputers as a basis for Computer Based Training (CBT)
- Touch screens and interactive videodisks based on "InfoWindows" hardware technology
- Power PCs, CDs and VCDs
- Global networking advancements and web-based solutions

Overall, universities in the US and the army appear to have played a pioneering role in the application of technology and developments which has eventually led to digital delivery of learning solutions.

Today, the e-Learning industry is diverse. Numerous universities have developed profit orientated e-universities offering courses and degree programs.

It should be noted that the e-Learning industry also includes organizations that support the establishment of learning infrastructures and networks for higher education institutions and corporations – such as course management and delivery tools from Blackboard and WebCT that allow customers to create learning programs directly on the Web without investing in their own tools or infrastructure.

In this paper, digital learning (or e-Learning) refers to the use of Web-based technologies (and applications) in order to deliver a broad range of learning solutions - whereby learning materials can be accessed from the web or intranet via a computer and educators/trainers can communicate with each other using e-mail, chat or discussion forums. e-Learning can be used as the main method of delivery of education/training or as a combined approach with face-to-face classroom-based teaching.

Some of the key characteristics of e-Learning solutions (Rosenberg 2001) can include:

- Relying on computer networking technologies – so as to make it capable of instant updating, storage/retrieval, distribution and sharing of instruction or information.
- Delivering to the learner via a computer that is connected to standard Internet technologies. However, there is much debate over the interpretation of the term "computer" and what it actually refers to.
- Focussing on the broadest view of learning. That is to say, it considers learning solutions that go beyond the traditional paradigms of training. E-Learning moves beyond training to include the delivery of information and tools that improve performance and competitiveness within the job market.

2.2 Change of attitudes in the transfer and management of knowledge

Training Magazine's 1999 statistics (Industry Report 1999) demonstrate that companies are shifting some of their training investments away from on-site classrooms. There appears to be growing evidence that in the future, changes to business, society, general attitudes towards learning and the application of technology will limit the effectiveness of traditional learning/training. Providing effective futuristic learning solutions requires a shift in attitudes and perceptions – including:

- Focussing on outcomes – Learning solutions need to make a positive impact on learners' performance and work-readiness.
- Providing flexible access (anytime/anywhere) – Knowledge solutions must meet the diverse needs of learners concerning time frames and locations.
- Placing emphasis on online rather than paper-based delivery

- Shifting the focus from physical facilities to networked facilities – Networked solutions for knowledge delivery (Internet or Intranet) play a significant role in information sharing, communications, and flexible access to learning material from any location in real time.
- Facilitating real time rather than cyclic learning – Today, the pace of change is extraordinary and the cycle time concerning knowledge is short. There is a need for improved learning efficiency and pace.

It has to be emphasised once more, that there is an enduring and important role for traditional classroom instruction (Asgarkhani 2003). Those who believe technology will eventually replace highly skilled teachers within classrooms of highly motivated learners are as misguided as those who consider the Internet as a phenomenon that can be overlooked as its impact will diminish over time.

2.3 Potential benefits and drawbacks of e-Learning

There has been much debate over the potential benefits and drawbacks where web-assisted learning is concerned (Asgarkhani 2003, Rosenberg 2001, Kruse 2002b, Kruse 2002c, Sitze 2001 and Burns et al 2001). Some of the more obvious advantages and disadvantages are outlined in Table 1.

Table 1: Benefits and Drawbacks of e-Learning

Potential Benefits (Solution Provider)	Potential Benefits (Learner)	Potential Drawbacks (Solution Provider)	Potential Drawbacks (Learner)
Reduced overall costs Reduced learning time Consistent delivery of materials Expert knowledge can be communicated and captured with effective e-Learning and knowledge management systems Proof of completion and certification	On-demand availability Self-pacing Interactivity Availability of newly updated material in a timely fashion	The need for up-front investment Technology complexities and design Educators' workload The need for selecting appropriate content and effective instructional design Cultural acceptance	The need for access to technology The need for printed workbooks or reference material Reduced social and cultural interaction

2.4 Digital learning and KM - General trends

Over the past few years, there has been much debate over the effectiveness of e-Learning. Many people (e.g. Rosenberg 2001) consider technology-based learning disappointing at its best - as they argue that its impact has been relatively minimal. Others (Kiser 2001, Dobbs 2000, and Kruse 2002a) argue that the benefits of e-Learning outweigh its drawbacks.

The perceived importance of digital learning has motivated some governments to develop national guidelines and strategies for introducing e-Learning solutions (e.g. New Zealand e-Learning Advisory Group 2002).

Recently, there has been much debate with regards to the state of the e-Learning industry (e.g. Dobbs 2000, Industry Report 1999, Kaeter 2000, and Kiser 2001). Overall, e-Learning appears to be taking root in organisations of all sizes - even though there are often different views concerning the ways in which e-Learning can benefit individuals or organisations.

The International Data Corporation (IDC) and Online Learning Magazine (OLM) recently examined the general attitudes towards e-Learning - as expressed by a group of OLM readers about training within organisations (Kiser 2001). According to this research, those people who have been responsible for the implementation of e-Learning solutions seem to be pleased with the results (80% of the respondents used some form of e-Learning and there were indications that this percentage will increase - as more than 40 percent of the respondents whose employers had not yet adopted e-Learning were apparently planning to do so within the next two years). Research by the IDC has shown convenience as being one of the most important reasons for employees for using e-Learning.

Furthermore, recent studies of learners' attitudes towards e-Learning within tertiary educational institutions (e.g. Burns et al 2001, Asgarkhani 2003) indicated that there is an increasing demand for web-assisted courses. A recent pilot study of trends and attitudes within the CPIT in Christchurch, New Zealand (Asgarkhani 2003) suggested that in general,

there is an increasing interest in the application of e-Learning (despite the fact that most of their learning still happens in the classroom). Even though the results of this study are not considered as being final, it appears that the demand for quality web-assisted courses with multifaceted person-to-person interaction will increase rapidly in the near future.

3. Knowledge management – An overview

3.1 3.1 The Concept of Knowledge Management

Within the information society, the world of knowledge management and learning seems to be focussed on two concepts: Knowledge Management (henceforth abbreviated as KM) and Digital (Electronic) Learning.

KM is not easy to define. However, it can be viewed as a methodology for the acquisition, retention, storage, distribution and use of knowledge. Rosenberg (Rosenberg 2001) describes KM as a tool for supporting the creation, archiving, and sharing of valued information, expertise, and insight within and across communities of people and organizations with similar interests and needs. Today, numerous KM systems are facilitated by web-based solutions and technologies. However, it should be noted that KM is as much about people, working relationships, and communication. KM is best represented as a cross-disciplinary domain (Putzhuber 2003) which can relate to a wide range of disciplines and technologies – some of which can include:

- Cognitive Science
- Artificial Intelligence and Expert Systems and knowledge based management systems (KBMS)
- Groupware
- Library and Information Science
- Technical Writing
- Document Management
- Semantic Networks
- Relational and Object-Oriented Databases
- Simulation
- Management of Information
- Management of People

3.2 A definition for knowledge

There often seems to be confusion with reference to the terms *information* and *knowledge* – which obscures the fact that while it can be extremely easy and quick to transfer information from one place to another, it is often very difficult and slow to transfer knowledge from one person to another. In attempting to understand *knowledge* it would be beneficial to consider that the human mind often deals with two kinds of knowledge: the *rational* and the *intuitive*. The way in which we view knowledge today has been significantly transformed – largely due to the extended accessibility of *know-how* through advanced ICT solutions.

Knowledge is more than what someone knows. It's also what the organization knows-gathered from internal and external sources throughout years and decades. Knowledge can be:

- Explicit – can be easily described and specific enough to be documented and applied in educating/training.
- Tacit - harder to record and difficult to document or teach to others (heuristics often embedded in people's experiences and life's work). This is often the most elusive and most valuable type of knowledge.

Different types of knowledge require different approaches to KM. Each presents unique challenges and opportunities.

3.3 The hierarchy of knowledge management

Rosenberg's (Rosenberg 2001) review of some KM systems/solutions and a review of other studies (Hsieh et al 2003, Zyngier 2003, and Asgarkhani 2003a) indicate that KM can be divided into three layers:

- **Layer 1: Document management** – The earliest form of KM has been the use of technology in order to retrieve and access documentation. Today, it is common for organizations to provide access to documents, reports, and forms online.
- **Layer 2: Information creation, sharing, and management** - This is where people contribute information to the system, creating new content and growing the knowledge base. That is to say, users are encouraged to read documents, fill forms, and submit forms online. This would allow for the information to be continually updated
- **Layer 3: Organization or enterprise intelligence** – The ultimate in KM is the development of a robust and interactive KM system so as to accurately represent the organizational "know-how."

As KM solutions are introduced, it is inevitable that we observe changes in the ways in which people learn and work together.

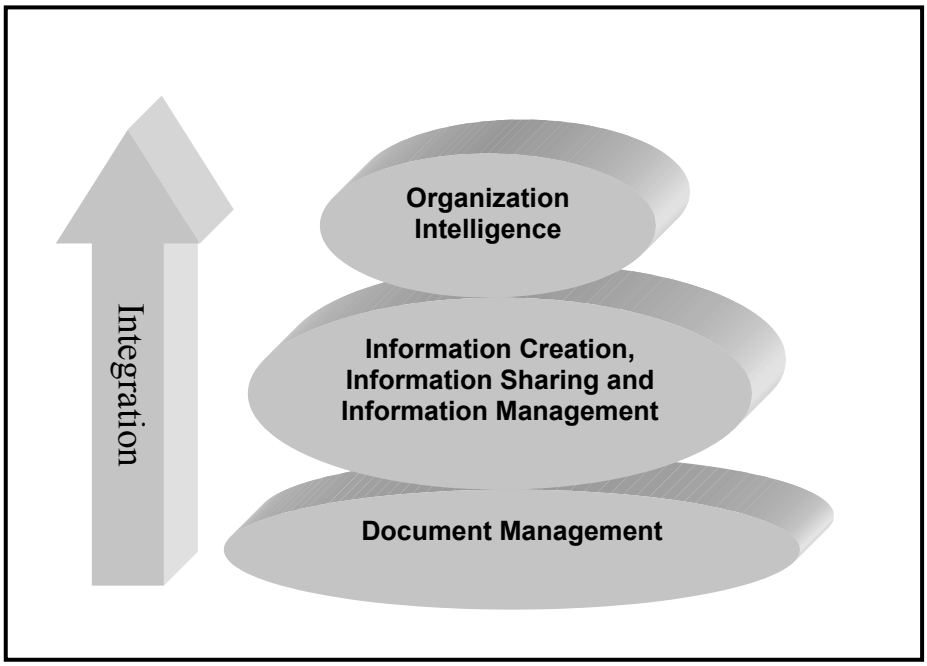

Figure 1: The Knowledge Management Hierarchy

4. Common characteristics of e-Learning and knowledge management

Web-assisted course management tools are often viewed as KM tools (Asgarkhani 2003). However, the concept of KM is different from e-Learning. Even though e-Learning could potentially be a cornerstone of KM, there is little evidence that e-Learning organizations have identified the need for and mastered the theory and practice of KM.

e-Learning and KM seem to focus on different goals (Putzhuber 2003, Asgarkhani 2003a). E-Learning systems appear to help learners in expanding their knowledge through providing structured learning content and intercommunication facilities to specific topics. In contrast, most KM systems provide knowledge by using content management systems with search and sort facilities.

Common characteristics of e-Learning and KM can include:

- Both e-Learning and KM systems provide knowledge in different forms to the users.
- The system architecture (client-server-architecture with high complexity in the server-part) is almost the same for both systems.
- Both e-Learning and KM need to provide communication and cooperation facilities.
- Personalization (role-based or person oriented) plays an important role in both e-Learning and KM.
- Both approaches need to consider access regulation (group or person specific).

Today, there is an increasing interest to bridge the gap (differences) that currently exists between e-Learning and KM.

The potential implications of KM for e-Learning can be significant. For instance, rather than relying on instruction, we can use well structured information (as well as productivity enhancing tools) to help people learn and improve their performance. We can differentiate between skills that must be performed automatically from information that can be accessed or referenced when needed. We may not have to teach people the steps in for example a sales process; we may only have to teach people where to find the steps.

It is fair to say that developing strategies for e-Learning cannot be carried out in isolation. Any strategic framework for introducing digital learning needs to address KM alongside that of developing e-Learning solutions (see section 6).

5. Digital divide and e-Learning

Today, access to information and communication technologies (ICTs) is critical for economic and social development. Developing effective digital learning and KM solutions depend on the state of the ICT industry and electronic readiness (e-readiness) where it concerns countries, organizations, societies and so on (e.g. Information Society Index 2001, OECD Workshop 2000, META Group 2000 and Asgarkhani 2002b).

Overall, differences in diffusion and use of ICTs and electronic networks can lead to:

- Divides between countries
- Social divides within countries
- Divides within countries related to income, education, age, family type, and location
- Business divides related to sector, region, and firm size

There has been much debate over the implications of digital divide on e-Learning and KM. In November 2001, the global communications company Marconi (Marconi 2001) called on government and private stakeholders in South Africa to accelerate the introduction of e-Learning centres in remote, rural and disadvantaged areas - suggesting that economic and educational benefits would have an immediate and measurable impact on poverty in South Africa. Higgins (Higgins 2002) views e- learning as a tool that can play a significant role in bridging the digital divide in the APEC region. However, the digital divide can also be considered as a barrier to successful rollout of e-Learning and KM solutions.

Some of the causes of digital divide that can also limit successful implementation of e-Learning and KM solutions can include:

- Lack of telecommunications and network infrastructure
- Limited PC access
- Lack of financial resources for developing an infrastructure
- Lack of ICT literacy
- Limited Internet access
- Cultural resistance
- High access costs to global networks and the Internet
- High cost of business investment
- Strategic business impediments – applicability; the need to reorganise; the need for skills, security and privacy considerations

6. The need for a strategic foundation

6.1 Assessing the effectiveness/success

While the impact of e-Learning within the academic and the professional world can be widespread, it is essential to monitor and assess the success/effectiveness of e-Learning projects.

e-Learning success can be measured with reference to either financial indicators or academic achievements. Some of the parameters that can be taken into consideration when measuring the success and effectiveness of e-Learning include:

- financial indicators such as return on investment (ROI), increased revenue, cost savings and total cost of ownership
- learners' achievements including comparison with other learning tools.
- functionality and best practice
- scalability and support resources

6.2 Potential causes of problems

While there are many case studies and success stories (with regards to e-Learning and KM), there are equally examples and cases where e-Learning and KM solutions have proved inadequate (e.g. Rosenberg 2001).

Typical causes of failure (Rosenberg 2001, Sun 2003, Asgarkhani 2003a and Galloway et al 2002) can include:

- lack of familiarity with proper applications and requirements of digital learning
- underestimating the resources and expertise that are required
- overestimating what can be accomplished through digital learning
- lack of understanding of the functionality and the tools that are available
- overlooking the potential problems of self-learning
- overemphasizing technological aspects of digital learning
- inappropriate content planning and design
- authenticity of the solutions (programs) that are being offered

- lack of standards for digital learning solutions
- different requirements by different learners – "one size does not fit all"
- lack of support
- learners' resistance to adopt digital learning culture
- lack of creativity in order to motivate online self-learners

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6.4 The need for strategic thinking

As we can observe (e.g. see sections 6.2 and 6.3), even though technology is a major component of e-Learning and KM, improving technology and infrastructure is not sufficient to produce outcomes of a high quality – as the components and relationships within today's information society are complex. The development and delivery of quality e-Learning and KM solutions needs to be viewed as a holistic process, whereby a strategic foundation is developed in order to optimize the application of technology by giving consideration to many aspects of the digital delivery of knowledge such as digital divide, culture, social trends and so on. The process for strategic development of digital learning and KM must also consider critical success factors that have been widely discussed over the past few years (Kruse 2002d, Gallagher et al 2002, Hsieh 2003, Rosenberg 2001, and Rossett 2002) – which can include:

- establishing a culture of support for ongoing learning
- ensuring support from management
- deploying a nurturing business model
- sustaining the change throughout the organisation

Today, it is essential that we view learning needs in a much broader context – one that includes:

- learning as the growth of the intellectual capital of corporations and societies
- learning as enabling higher individual and organisational performance

A strategy that is developed for e-Learning and KM needs to be examined, pilot tested and put in practice at a rate that technology develops and the Internet grows.

Any strategic framework for introducing e-Learning and KM solutions needs to be concerned with the overall direction of digital learning and KM whilst providing a foundation for tactical and operational issues. A review of some of the most widely used frameworks for

strategy development (Robson 1997, Asgarkhani 2002a, Boar 2001, Heath 2003, and Rossett 2002) suggests that it (the process) should consist of at least three specific components/phases: *Analysis*, *Choice* and *Implementation*.

The total strategic process for e-Learning/KM is anything but linear. Integrating all the components of the strategic process is cyclic – often circling back to itself. The key elements of this cycle (as outlined in Figure 2) are:

- *Strategic Analysis* – involves establishing an understanding of the current situation, including: aspects of the environment; current technology infrastructure; available resources; expectations; broad objectives; and power bases.
- *Strategic Choice* – involves the formulation of the strategy itself through understanding various options, evaluating options and making a decision on a suitable strategy.
- *Strategy Implementation* – involves tactical issues such as resource assessment and planning, identifying human resources and systems, contents, determining organizational structure and so forth.

The first two stages of the strategy cycle outlined in Figure 2 should ideally result in the formulation of a strategy plan. The strategy plan can often be formulated as a hierarchy that clearly outlines the various stages (components) of the strategy process for e-Learning or KM – Figure 3.

The components of the strategy plan often include (but may not be limited to):

- **Mission** - What are we planning to do with e-Learning and KM solutions?
- **Goal(s)** – What are we trying to achieve?
- **Strategies -** What alternative pathways are available to us – in order to achieve agreed upon goals?
- **Policies -** How should we be guiding our moves within a selected pathway in order to achieve goals?
- **Decisions -** What alternative options for moves should be considered?
- **Action -** This is the way we will implement our decision for introducing e-Learning and/or KM solutions.

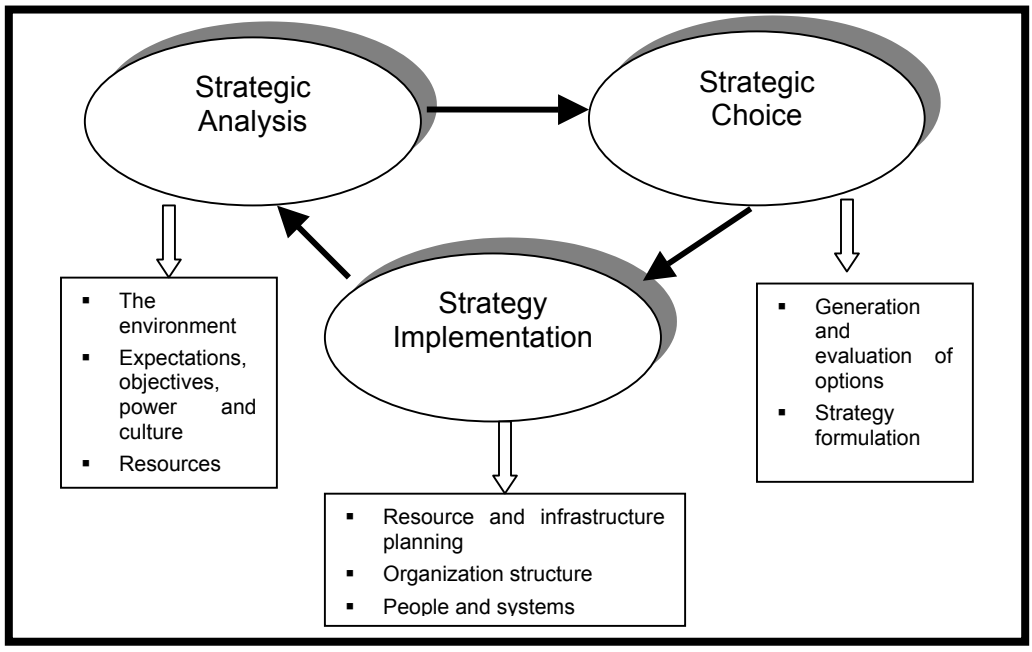

Figure 2: The cycle of strategy development and implementation for e-Learning and knowledge management

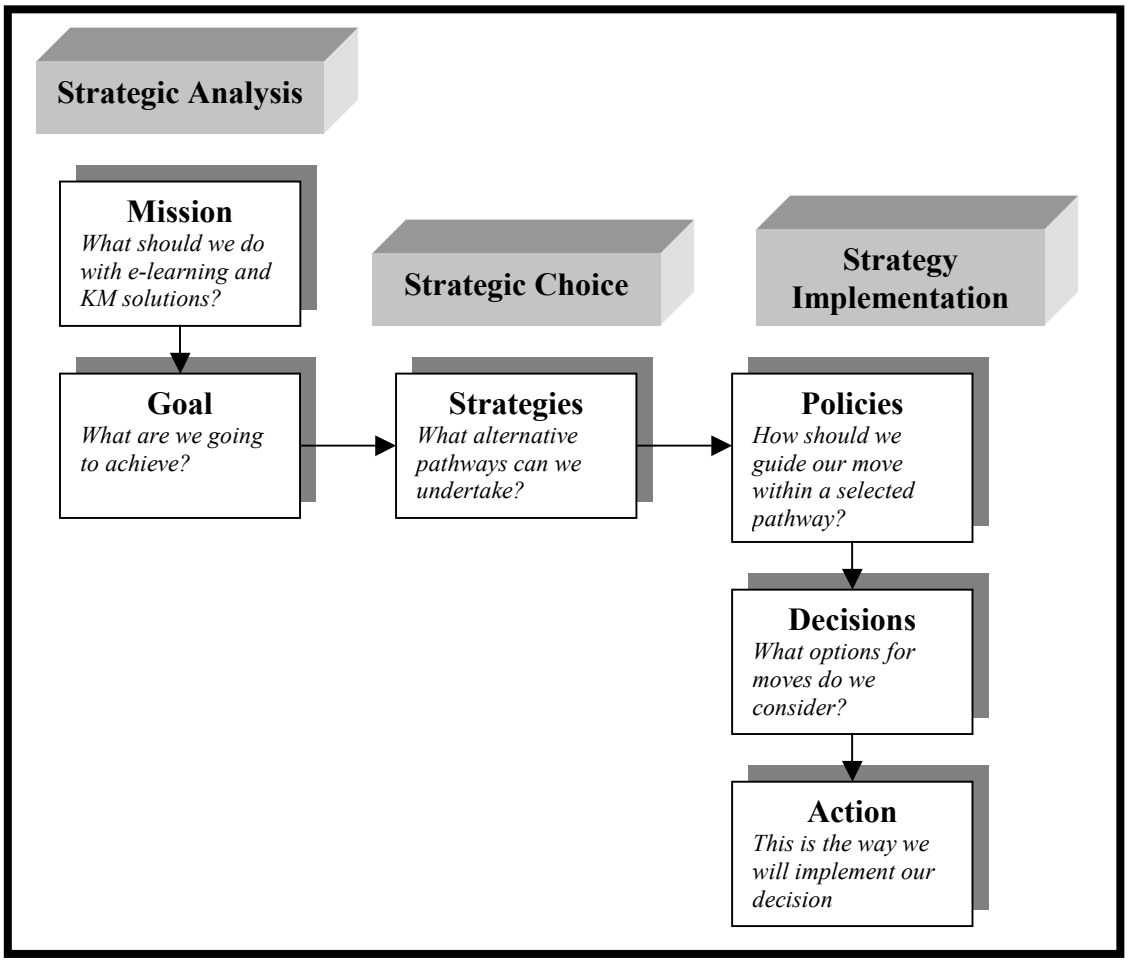

Figure 3: The hierarchy of strategy development for e-Learning and KM

Alternatively, the strategy cycle can help in establishing a foundation for successful development and delivery of web-assisted learning and KM – as displayed in Figure 4. As you can observe, Figure 4 depicts the critical components for successful e-Learning, including:

- Reviewing/reinventing the position of e-Learning – e.g. determining if Web-assisted solutions are to be introduced as a supplement to face-to-face communication between students and educators/trainers, or whether Web-based learning through the Internet is to be the sole medium for delivery.
- Compiling a sound business case for delivering on-line learning and KM solutions – more specifically, linking e-Learning goals with business goals
- Fostering an environment that balances learner and business needs in order to guarantee management support
- Allowing for an effective change management approach
- Establishing an information vision and architecture that would form the basis of the infrastructure (technological capabilities) needed in order to deliver and manage e-Learning and supporting KM solutions. This would require involvement from ICT technologists in order to develop an understanding of baseline technologies.
- Taking into consideration alternative approaches to e-Learning (and KM) and the ways in which e-Learning can be co-ordinated with other learning methods – including the enduring and important role for traditional classroom instruction.

There are a number of key questions that can be considered in order to facilitate the strategy development (as outlined in Figures 1, 2 and 3). These can include:

- What are our reasons for pursuing digital learning and KM?
- Are we aware of our limitations and the challenges ahead of us?
- What is our clear vision for digital KM and/or digital learning?
- What are the priorities that we have considered?

- What types of e-Learning or KM are we ready for?
- What specific KM solutions/strategies suit our choice of digital learning?
- Do we have a methodology for selecting, planning and managing e-Learning and/or KM projects?
- Did we consider a thorough plan for managing change?
- What are the tools and metrics that we have thought of in order to be able to measure progress/success?
- What would be a model (methodology) for managing relationships with other institutions when considering potential strategic partnerships?
- How would our e-Learning and KM model improve the overall process of learning and KM?

To conclude, strategy development and implementation is an ongoing process. A strategy plan is considered to be a living document. It needs to be:

- redefined and adjusted as the environment and requirements change or new technological options become available, and
- examined on an ongoing basis against the mission and vision of your institution (a solution provider or a learners' institution)

To ignore the iterative nature of any strategy would eventually compromise the quality of the outcome.

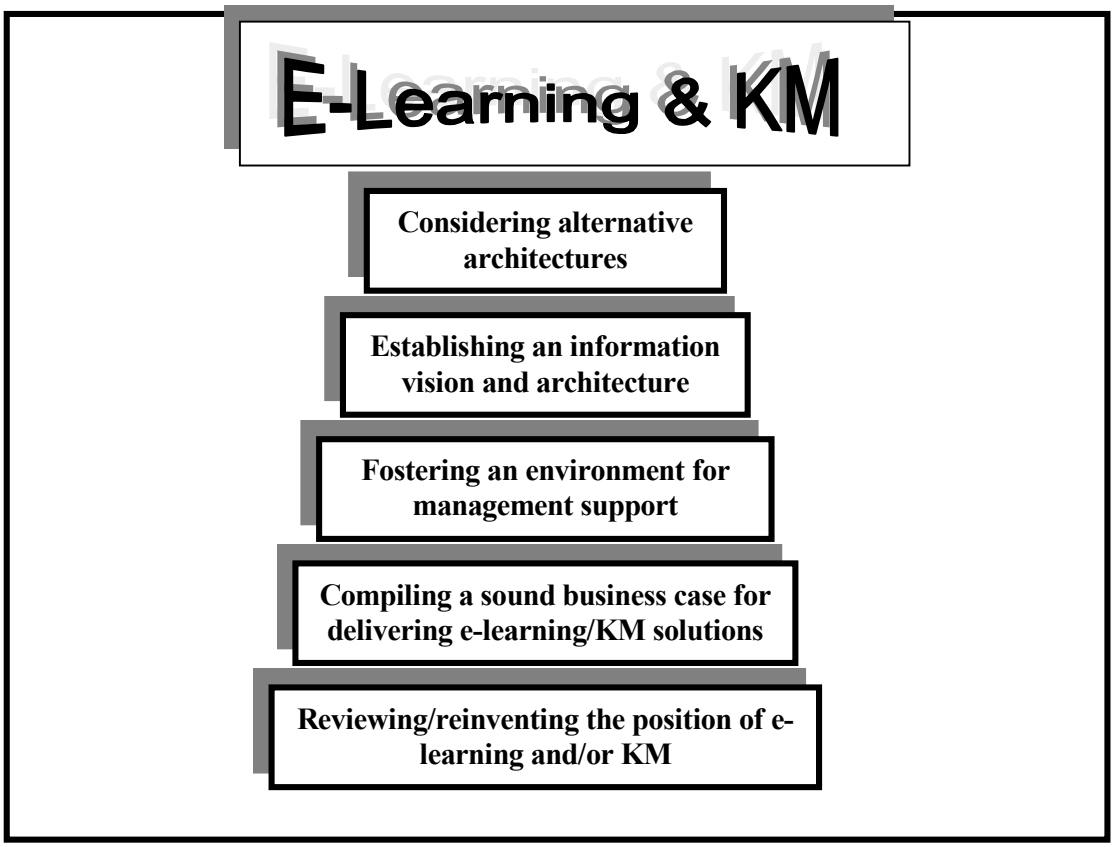

Figure 4: A strategic foundation for e-Learning and KM

7. Summary and conclusions

Educators and educational technologists evidently believe that we are witnessing a major shift in attitudes towards learning and knowledge management. The ICT and web-based solutions have fundamentally altered the technological, social and economic landscape so as to make it possible for quantum leaps to be made in the application of technology for learning and KM.

Overall (see section 2.4), it appears that there is an increasing interest in the application of e-Learning within organisations. However the potential benefits of e-Learning (see section 2.3) and KM can only materialize when the solutions are introduced as part of a well-planned and properly supported education/training environment.

Technical innovation on its own is not enough to drive the e-Learning and the KM

development process (as discussed in sections 6.2, 6.3 and 6.4). More specifically, access to the right technology for delivering learning and KM solutions is essential but insufficient. Successful Internet-enabled (or Web-enabled) learning needs to be reliant on the development of a strategy that optimises the application of technology through giving consideration to learning attitudes in potential markets (e.g. tertiary educational market and corporate training market); organisational culture; organisational business strategies and so on. Furthermore, an effective e-Learning/KM strategy must give consideration to critical success factors such as establishing a culture of support for ongoing learning; ensuring support from management; deploying a nurturing business model; and sustaining the change throughout the organisation.

The strategic process for e-Learning/KM is cyclic (as discussed in Section 6.4 – Figure 2). The key elements of this cycle are strategic analysis; strategic choice; and strategy implementation. The strategy process outlined in Figure 2 results in:

- Compiling a strategy plan that is formulated as a hierarchy of mission, goal(s), strategies, policies, decisions and actions (Figure 3).
- Developing a strategic foundation that depicts the critical components for successful e-Learning (Figure 4).

Overall, the introduction of e-Learning and KM solutions needs to be a holistic process – one that addresses fundamental issues in a strategic fashion, taking into consideration:

- Securing management support – through aligning e-Learning and KM goals with business strategies
- Defining an information vision and architecture
- Developing terms of reference and methodologies for project development and management
- Putting together strategic, tactical and operational plans (including a change management plan) for the implementation of the information vision and architecture and the development and delivery of e-Learning and KM solutions.

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