Chapter 1: Linking Systems to Strategy and the Organization

Overview

This chapter presents a very simple framework, the Information Systems Strategy Triangle, which links business strategy with organizational strategy and information strategy. The chapter describes this model, and builds on several other popular strategy models and organizational models. The goal of this chapter is to make sure every student has a basic understanding of both strategy and organizations. For students familiar with business strategy and organizational behavior, this chapter is a review of key points from those two fields.

Discussion Opener: Why should general managers have a broad understanding of information systems? How can that knowledge be helpful in their careers?

Key Points in Chapter

The **Information Systems Strategy Triangle** links business strategy with organizational strategy and information strategy. The triangle is used to suggest that all three points must be in balance in any organization to have optimal efficiency and effectiveness. An imbalance can lead to organizational tension or possibly a crisis. A company is out of “alignment” when its business strategy is not supported by the IS. There are several implications from this model. First, business strategy drives organizational and information strategy. Second, organizational strategy must complement business strategy. Third, information strategy must complement business strategy. Fourth, organizational and information strategy should complement each other. Finally, if a change is made to one corner of the triangle, it is necessary to evaluate the other two corners to ensure balance is maintained. That means that if the business strategy is changed (i.e. such as becoming a "bricks and clicks" company), then the manager must also consider a redesign of both the organization (i.e. do we have people that can be successful in this new strategy) and the information systems (i.e. do we have the capability to process inquiries taken off of the Web).

Strategy is defined and is tied to the **mission** of the organization. Examples of mission statements are provided in the text (Figure 1.2), along with a discussion of how Dell has creatively adjusted its business strategy to meet the rapidly changing computer industry.

There are several ways to describe **business strategy**. This chapter summarizes two well-accepted models: the Porter generic strategies framework and the D'Aveni **hypercompetition** model. Current examples are offered to illustrate the models.

The Porter generic strategies framework (Differentiation, Cost Leadership, Focus) has spawned many variants. A **cost leadership** focus means that the company maintains above average performance by selling products that are comparable in quality (i.e. the customer perceives relative value), but at a lower price in the marketplace. **Differentiation** strategy involves uniqueness of the product in the marketplace in some appreciable qualitative dimension. A **focused** strategy directs products to meet the specific needs of a particular segment of the market, either based on cost focus or differentiation focus. **Hypercompetition** models, and the dynamic framework, focus on flexibility and rapid change in response to the volatility in the marketplace. Competitive advantage

is a moving target; companies must be ready to adjust quickly to changes in the marketplace. In this environment, agility becomes the competitive advantage. Chapter 2 discusses strategic use of information resources, building on these and other models.

"Social Business Lens: Building a Social Business Strategy" – Variations on the Social Business Strategy include **collaboration** (bringing people together to share ideas, information, and expertise), **engagement** (increase perceived attachment through increased interaction), and **innovation** (development of new ideas). Example: National Instruments (ni.com) has created a 'branded community' to collect and disseminate new ideas.

The chapter also summarizes several frameworks for describing **organizational strategy**. Included are the business diamond and the managerial levers framework. The **business diamond** links four key inter-related components of the organization's plan: information/control, people, structure, and tasks (Figure 1.5). The **managerial levers model** is somewhat more comprehensive, linking organizational structure variables, control variables, and cultural variables. Decision makers can manipulate the managerial levers to effect change within the organization. Chapters 3, 4, and 5 discuss the managerial levers in greater detail and apply the organizational strategy frameworks to assessing the impact of IS.

The **IS strategy** provides the plan for information services, and supports the business strategy through needs fulfillment. Figure 1.8 provides a basic framework showing the four components of the information system, the hardware, software, networking and data, and the key managerial concerns for each: what, who, and where.

Discussion Question: How can we recognize a misalignment between business strategy and IS strategy? Do you have any examples from internships or work experiences?

Illustrative Answers to Discussion Questions

This is a summary chapter of the key models for the information systems strategy triangle, so discussion questions were provided to get students focused on and thinking about using these models. Below are some sample answers, but expect creative answers from your students that are not represented here. We encourage you to post some of your best answers to the online community webpage and share them with other instructors.

1. Why is it important for business strategy to drive organizational strategy and IS strategy? What might happen if business strategy was not the driver?

Ans: The primary point in this chapter is that in any well-run organization, the business strategy drives the rest of the operational strategy, and information systems are no different. The business strategy defines the goals and objectives based on the organizational capabilities and structure. Information systems are intended to enable and facilitate successful realization of the goals and objectives. Technology for its own sake is not usually a good investment. However, typically, managers seem to think that changing or upgrading an information system (or even a component of an information system) will only positively impact a business. This is commonly referred to as the "Technological Imperative." Quite the opposite, in fact, is true. By making changes in

organizational strategy or IT strategy first, the triangle is "out of balance" and there will be consequences in the affected areas. For example, building a virtual organization, but not changing the business strategy to something like "ensuring our people are productive and have the widest possible work place opportunities" can lead to significant disconnects between workers, their managers, and their customers. And, worse, without supplying the virtual worker with the appropriate information system (a computer at home, a laptop, etc.) will lead to a decrease in productivity by the virtual worker, and a major disruption of business operations. Therefore, allowing IS strategy to drive business strategy could easily lead to poor implementations with disappointing outcomes (i.e. wasted resources).

2. Suppose managers in an organization decided to hand out tablets (iPad) to all salespeople without making any other formal changes in organizational strategy or business strategy. What might be the outcome? What unintended consequences might occur?

Ans: Salespeople might not use them, without training and modifications to their jobs. They may be accustomed to a manual, paper system and resist moving to the tablet devices. They might not appreciate the added benefits of the mobility, choosing familiar business processes instead. If they do use the devices, there will eventually be strain on the rest of the organization if it doesn't adapt to this new technology. For example, messaging might become ineffective if salespeople use e-mail on their tablets and voice mail. Where is the primary place or method to contact them? When someone is urgently needed, it is a hindrance to have multiple places to check. Likewise, if the tablets are used for order entry, but the order process is not changed to accommodate the tablets, there will be problems. Lack of integration could lead to unnecessary delays and frustrated customers. Support systems must also be redesigned. It does a salesperson little good to have to bring a tablet device into the office for repairs, especially if this involves a substantial geographical distance. Many troubleshooting activities can be performed by the salespeople, but only if they have been trained and feel confident. Support processes will have to adapt to the mobility of the technology, or the company can expect to have agents further resist. Employees are adept at creating their own “workarounds,” particularly when they do not support a mandatory change.

3. Consider a traditional manufacturing company that wanted to build a social business strategy. What might be a reasonable business strategy, and how would organizational and IS strategy need to change? How would this differ for a restaurant chain? A consumer-products company? A non-profit?

Ans: A reasonable business strategy might be to provide what the customer wants when the customer wants it. The idea is to use the Web as a mechanism to connect to customers, to take their orders, to provide services when the customer wants them, and to link with suppliers and partners. To do that, the organization would have to be actively engaged and responsive, and would have to include elements of empowerment and authority for the employees tasked with monitoring the social network. It would not work to have a centralized decision making authority if the organization wants to be responsive because it would take too long to get appropriate information and communicate decisions back to the field. The manufacturing process might be organized around build-to-order rather than on market analysis and product histories, but then there would need to be a series of organizational processes and people that would be in place to make sure the manufacturing company is able to actually build the products when they are ordered. The IS

strategy to support this business strategy would be one of rethinking the use of the Web as a tool for delivering information to customers, suppliers and employees. One direct value of social networks is the involvement of customers in the design and operation of the product. It is imperative that the company listen to the customer. In all of the instances listed, organizations could use social networking technologies to advertise, set up discussion groups, monitor discussions on social networking sites, use visualization tools to promote products and services, etc. The business strategy would need to adapt to listening to the customer, rather than "if we build it, they will come." A restaurant chain could provide incentives for customers to join the social network (e.g. coupons, special orders, preferred seating, etc.). Service industries are often more agile than manufacturing firms, so implementing changes identified by customers could be nearly instantaneous. Consumer-products companies would be expected to respond to customer notifications rapidly. Customers who take the time to provide personal opinions are usually in the two extremes: either very happy with their experience or very unhappy. The latter group will impatiently demand action, or they will be likely to broadcast their negative views to a wide audience. Sensitivity in the company's reply will be critical. A non-profit would be open to learning new ways to attract contributions and volunteers. The level of creativity from a social network could far exceed the capabilities of staff members. Responding to comments can create momentum and greater interest. View social networking as enhanced word-of-mouth, and don't underestimate the impact of the media.

4. This chapter describes key components of an IS strategy. Describe the IS strategy of a consulting firm using the matrix framework.

Ans: The matrix framework is a very simple structure for decomposing the confusing IS architecture of an organization. For a consulting firm, some of the components would look like this:

Element	**What**	**Who**	**Where**
Hardware	Tablets and servers to store information, along with necessary back up devices	Consultants have their own tablets, managed by the centralized IS dept, which also "owns" the servers	Tablets are mobile, traveling with consultants. Servers are fixed at corporate offices.
Software	Office suite, collaboration tools	Consultants have the software on their tablets, but software is managed centrally by the IS group	All software resides on the mobile devices but is backed up on servers. Some corporate applications might only be on the servers.
Networking	Internet, hard wired connections from office, dial up and/or high bandwidth lines from remote (home and client) locations (e.g. secure VPN)	ISP service is obtained from AT&T or AOL or other provider who has international access numbers for dialing in. Company has own IS group provide the necessary servers to be	Global access is needed. Nodes are not managed by the consulting company, but by the ISP they contract with.

		connected to the Internet	
Data	Engagement data such as details of the work done for clients, client data with info about who the client is, previous engagements done for them, etc., and personnel data so consultants can be identified and assigned to projects (billable work hours)	All data is "owned" by the company, but is made available to any consultant on an as-needed basis	Data reside on the servers, but are "replicated" to the tablets as needed. Information is not considered part of the company until it is on the servers, therefore information only residing on the tablets would not be recognized until uploaded to the servers.

5. What does this tip from Fast Company mean: "The job of the CIO is to provide organizational and strategic flexibility"?

Ans: The job of the CIO does not just narrowly involve information systems (IS) or solely focus on developing IS strategy. Rather the CIO must work with top level executives and functional supervisors to ensure that the IS strategy is aligned with the business and organizational strategy. A particular challenge for the CIO is to ensure that the IS architecture and infrastructure can support the business and organizational strategy. In making long-term decisions about IS architecture, the CIO must attempt to promote flexibility in the future with scalable architecture that meets the organization's present and future needs. Being responsive to the needs of the business will create a mutual benefit for all stakeholders.

Further Discussion Questions:

1. How can managers determine an imbalance between the three strategies in the Information Systems Strategy Triangle? How might corrections be made before the imbalance leads to a catastrophic failure?

2. a. Imagine that you purchase an expensive home appliance. The first time you use the device, sparks literally fly, and the device shuts down automatically. You read on the box that the company engages in social networking using a dedicated site. Would you use the social networking site to share your concerns? Why/why not? What do you expect to happen in this instance?
b. Now imagine that you are the corporate representative assigned to respond to the customer feedback provided in part a. What is the appropriate way to engage this irate customer? ("Ignore it; hope it goes away"?)

3. Many companies have created corporate Facebook pages/groups. From your experience, why are those pages often poorly utilized? How might a company motivate customers to interact with it using social networking technologies? How would the organizational and IS strategies need to change to increase the effectiveness of this social business strategy?

Case Study 1-1: *Lego*

1. How did the information systems and the organization design changes implemented by Knudstorp align with the changes in business strategy?

Ans: Knudstorp determined that the way to save the company was to focus on productivity and profits. The organizational strategy included incentives for employees, encouraging them to develop profitable new product ideas. From the modeler approach, the IS strategy followed the same pattern. The infrastructure was streamlined and the systems supported a more responsive product ordering/operations/shipping business process. The entire company adapted to the new goals and objectives, focusing on key performance indicators of creating products that were well-received by customers.

2. Which of the generic strategies does Lego appear to be using on this case? Provide support for your choice.

Ans: Lego appears to be following a differentiated focused strategy. These are toys designed for creative play. They are high quality, and not the cheapest products on the market. However, they are designed to appeal to a variety of customers – themes to capture movie followers (e.g. Star Wars), video games, and creative artists. Each product line can be targeted toward a particular group.

3. Are changes implemented by Knudstorp an indication of hypercompetition? Defend your position.

Ans: This would be a hypercompetition strategy since the market continues to change rapidly, and Lego must keep pace with the market. Also, the company is attempting to dynamically adapt to the rapid pace of change. Entering into new markets with innovative product offerings is one way to stay ahead of the competition.

4. What advice would you give Knudstorp to keep Lego competitive, growing, and relevant?

Ans: Student responses will vary. Answers should be creative and reflect deep, critical thinking. In general, Lego should remain financially viable through cost cutting practices, automation using IT, and innovative product designs based on sound marketing studies and focus groups. Remove products from inventory if they are not selling well, or if they are not resulting in financial profits. Higher margin products should be added to the portfolio to help secure the company's future.

Case Study 1-2: Google

1. How is Google's mission statement related to its business strategy?

Ans: Google's primary goal is to organize the world's information and make it universally accessible and useful (mission statement). Google continues to take risks and expand into new

markets to further its reach into the information world. It takes advantage of new avenues to expand its market share by making information freely available on its Intranet, and by willing to take risks by investing in speculative and strange projects if they see a large potential payoff.

2. How does Google's information systems strategy support its business strategy?

Ans: Through openness and innovation. It permits users to download their own software, maintains official and unofficial blogs, and buys and makes software to suit the needs of the business. IT encourages innovation by allowing employees to spend 20% of their time on a project of their own choosing. This "flexible" IT structure supports the innovation and creativity that its business strategy espouses.

3. How does Google's organizational strategy support its business strategy?

Ans: Google has a culture of innovation and creativity. However, it still provides a level of structure when making decisions. Specifically, Google's mission statement relates to its business strategy by making data on all ongoing projects and systems available to all of its employees through its corporate Intranet. Any employee can see what is transpiring in other areas and can lend a hand through Google's "free day" policy and other open work-environment strategies.

4. Which of Porter's three generic strategies does Google appear to be using based upon this case? Provide a rationale for your response.

Ans: Differentiation, though one may argue that cost leadership is also utilized with its very reasonable ad costs. However, through the use of its innovative processes and unique business model, Google has differentiated itself from its competitors by keeping a clean and simple interface (which most of the other search engines have emulated), and by continuing to invest in its employees to provide innovation on a large scale.

5. Analyze Google's strategy and the type of market disruption it has created using a dynamic environment perspective.

Ans: In some form or another Google has almost utilized D'Aveni's entire framework. Specifically, it has gained superior stakeholder satisfaction through offering a superior product to its customers and adding new products that provide value to its customers (AdSense, etc.). It is continually seeking out new knowledge through its innovative management styles and by its willingness to invest in risky projects that have a high-return potential. Google positions for speed and surprise by constantly innovating by setting limitations on how long it will take to make changes to its products and services. Through this innovative approach, it is able to stay on the cutting edge of technology and lead this market of the IT world. Through its new products and services (AdSense, GoogleApps, etc.) and its low cost marketing, it shifts the rules of competition by finding new and better ways to serve its customers.

Supplemental Cases:

Google Inc. by Edelman, B., and Eisenmann, T.R., Harvard Business School. 9-910-036, 21 pages, 2011 (setting: US)

This case study provides a glimpse of Google's history and is a good compliment to the mini-case provided in the chapter. The authors discuss the strategic focus and competition with Yahoo! and Microsoft. Students will be required to recommend a course of action for the company going forward.

Airbnb (A) by Edelman, B., and Luca, M., Harvard Business School. 9-912-019, 7 pages, 2012 (setting: US)

Airbnb is an online apartment rental site. This case study explores the online reputation service developed to address trust issues in the apartment rental business. Students will investigate the tradeoff between complexity/simplicity and amount of information necessary.

Introducing Expert Systems at The Corporation by Liebowitz J., Idea Publishing Group. IT5555, 8 pages (setting: US)

This case study highlights the concept the "management" of the technology is usually the limiting factor causing the demise of a project rather than the "technology" itself. This real case study involves creating an awareness of a new technology within the company and trying to start a much-needed project using this technology.

Risks and Rewards at Frontier Communications: Improving Customer Service Using Client/Server Technology by Mathieson, K. and T. Toland , Idea Publishing Group. IT5561, 11 pages (setting: US)

The case shows how a firm can improve a critical business function with new technology. In addition, the case shows that a firm can use new technology to build mission-critical information systems and examines the risks and benefits of restructuring.

Business Reeingineering at a Large Government Agency by McGarry, N.and T. Beckman, Idea Publishing Group. IT5562, 25 pages (setting: US)

This case describes the difficulties and successes encountered in a reengineering effort. A team of consultants undertook reengineering the delivery of compensation and benefits at a large quasi-governmental agency. Benefits included six programs which accounted for time-intensive processes such as "cafeteria plan," options enrollment period where information is dispersed to assist employees in plan selection, and retirement accounts.

End-User computing at BRECI: The Ordeals of a One-Person IS Department by Moffitt, K. Idea Publishing Group. IT5563, 11 pages (setting: US)

The intention of the case study is to show an unsuccessful attempt at the introduction and use of information technology in a small business, leading to the finding that the application and understanding of technology is lacking in many small businesses that could benefit greatly from its use.

Implementing a Wide-Area Network at a Naval Air Station: A Stakeholder Analysis Hocevar, S.P., B.A. Frew, and V.C. Bayer. Idea Publishing Group. IT5568, 13 pages (setting: US)

This case study illustrates the use of a non-traditional approach to determine the requirements for the Naval Air Systems Team Wide-Area Network (NAVWAN). It is considered to be non-traditional because the case data enable the use of Stakeholder Analysis and SWOT (strengths, weaknesses, opportunities, threats) assessments to determine the requirements instead of asking functional proponents about function and data requirements.

Reengineering the Selling Process in a Showroom by Crnkovic, J., N. Janicijevic, and G. Petkovic, Idea Publishing Group. IT5630, 14 pages (setting: Yugoslavia)

The case study describes a process of successful re-engineering of a small Yugoslavian showroom wholesale company ("Wissol") during the period of economy in transition. An established organizational solution was not supported by adequate IS support. It opens possibilities for designing an IS prototype and for planning future steps in IT and IRM.

Enterprise Wide Strategic Information Systems Planning for Shanghai Bell Corporation by Long, Y., F. Fui-hoon Nah, and Zhanbei Shu. Idea Publishing Group. IT5581, 16 pages (setting: China)

This case examines Shanghai Bell Corporation, Limited, a leading telecommunications enterprise located in Shanghai, China, and its initiative to develop its new generation Information Technology/Information Systems (IT/IS) plan. The issues covered include alignment of IT strategy with evolving business needs, application of a methodology to develop the enterprise-wide strategic IT/IS plan, and the evaluation of strategic planning project success.

Sun Microsystems, Inc: Web Services Strategy by Eisenmann, T. R., Suarez, F. F. Harvard Business School Publishing. 2005 (20 pages)

Microsoft and IBM have excluded Sun Microsystems from the board of the Web Services Interoperability Organization (WS-I), an industry consortium that will shape the evolution of Web services standards. Sun managers must decide whether to join WS-I as a contributing member--a less influential role that lacks the veto and agenda-setting powers of a board position. Sun has recruited leading IT vendors--including several WS-I board members--to create technologies that compete with proposed standards jointly developed by Microsoft and IBM.

Volkswagen of America: Managing IT Priorities by Austin, R. D., Ritchie, W. & Garrett, G. Harvard Business School Publishing. 2005 (19 pages)

Describes the efforts of Volkswagen of America, the U.S. subsidiary of Volkswagen AG, to arrive at a process for setting IT funding priorities so that they align with business priorities and the company's overall strategy.

Kemps LLC: Introducing Time-Driven ABC by Robert S Kaplan. Harvard Business School Publishing; 08/03/2005 (10 pages)

Managers use the information to enhance process efficiencies, negotiate new terms with customers, and attempt to win new business. The company now faces some crucial decisions about how to forge new relationships with key customers.

Readings/Articles from Chapter 1:

Learning to Compete: IT's Next Transformation from EMC
http://www.emc.com/microsites/cio/articles/learning-to-compete/pwf.htm

This white paper covers the changing relationship between IT and business. Rapid implementation, efficiency, and reliability are the clear expectations. There is competition for IT solutions not present in years past. Alignment with the business users' needs is critical to attracting internal clients. These changes lead to operational changes as well.

Andrew McAfee and Erik Brynjolfsson, "Investing in the IT that makes a competitive difference," Harvard Business Review, July 2008.

This article provides practical advice for managers to create a sustainable competitive advantage through a strategic use of technology. The three key points are: deploy an enterprise technology that is integrated, innovate by improving work processes, and propagate those successes throughout the company. It is important to continue these endeavors to stay ahead of the competition.

Brad Wyckoff and David Thompson, "Unlocking the Value of IT" Harvard Business Review. May 25, 2010. www.hbr.org

Organizations must become information-centric (predictive) rather than system-centric (historical). In order to facilitate competitive advantage, data must be pushed out to the decision makers throughout the organization. This article exposes the gap that exists between what companies say about the value of this critical asset and what they are actually doing with their data.

Shayndi Raice, "Is Facebook Ready for the Big Time?" Wall Street Journal January 14-15, 2012, B1.

The article features an interview with Mark Zuckerberg, Chief Executive of Facebook, and Sheryl Sandberg, former Google Inc. executive. They discuss the initial public offering for the social networking company and the original purpose behind the product.

Warren McFarland & Richard Nolan, "Information Technology and the Board of Directors" Harvard Business Review. 83(3): 2005.

Most boards remain largely in the dark when it comes to IT spending and strategy, despite the fact that corporate information assets can account for more than 50% of capital spending. This article spells out the conditions under which boards need to change their level of involvement in IT decisions, explaining how members can recognize their firms' IT risks.

Tarun Khanna, Krishna G Palepu & Sinha, Jayant "Strategies That Fit Emerging Markets" Harvard Business Review. 83(2): 2005.

If Western companies don't come up with good strategies for engaging with emerging markets, they are unlikely to remain competitive. The best way to do this, the authors have found, is by using the five contexts framework. The five contexts are a country's political and social systems, its degree of openness, its product markets, its labor markets, and its capital markets.

Robert S. Kaplan and David P. Norton, "Having troubles with your strategy? Then map it." Harvard Business Review. 78(5): 167-176. 2000 Sep/Oct.

A workforce needs clear and detailed information to execute a business strategy successfully. Until now, there have not been many tools that can communicate both an organization's strategy and the processes and systems needed to implement that strategy. But Kaplan and Norton, the creators of the balanced scorecard, have adapted that seminal tool to create strategy maps.

Books:

R.D. Austin, R.L. Nolan, and S. O'Donnell, *The Adventures of an IT Leader*. MA: Harvard Business School Press, 2009.

N.G. Carr, *Does IT Matter? Information Technology and the Corrosion of Competitive Advantage* MA: Harvard Business School Press, 2002.

R. D'Aveni, *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. New York: Free Press, 1994.

P. Evans and T. Wurster, *Blown to Bits.* Boston, MA: Harvard Business School Press, 2000.

B. Girard, *The Google Way*. San Francisco, CA: No Starch Press, Inc., 2009.

F. Hogue, V. Sambamurthy, R. Zmud, T. Trainer, and C.Wilson, *Winning the 3-Legged Race*. Upper Saddle River, NJ: Prentice Hall, 2005.

M. Porter, *Competitive Advantage*. New York: Free Press, 1985.

M. Porter, *Competitive Strategies*. New York: Free Press, 1998.

Websites:

www.bp.com
BP is a global petrochemical company. The website includes a tab featuring the innovative uses of technology, from seismic imaging to biofuels. Links also update the cleanup from the Gulf of Mexico oil spill that occurred in April 2010.

Ritz-Carlton Gold Standards: http://corporate.ritzcarlton.com/en/About/GoldStandards.htm
The website describes the values and philosophy for the premier hotel chain.

www.cisco.com The Cisco website is an excellent source of additional information on the importance of linking business, organizational and IT strategy. Look at the annual report letter from the CEO, and at the numerous cultural and organizational references Cisco describes as part of their various programs and opportunities.

www.brint.com This @Brint website is a good general starting place for articles and other web links related to the management and use of IT in business. This page contains many links to other portals on more specific topics such as e-business strategies, organizational strategies, business strategies, and IT management.

www.cio.comCIO and CIO.com are published by CXO Media Inc. to meet the needs of CIOs (Chief Information Officers) and other information executives. CIO is read by more than 140,000 CIOs and senior executives who oversee annual IT budgets in excess of $175 million. CIO.com serves over 12 million pages annually.

www.google.com
Founded in 1998, the statement from the website is, "Google's mission is to organize the world's information and make it universally accessible and useful." Visitors can learn a detailed history of the company, from the original search engine to the IPO in 2004 and, more recently, the launch of Google+. This website is a valuable companion to the case study.

Integrated Systems: Management Approaches To Acquiring Them In Australian Universities

Prepared by Dave Oliver and Celia Romm

Introduction

In 1997 Central Queensland University (CQU) was faced with a number of issues. The existing student record system had been designed on a model that had a single campus, recognized two semesters, was not Year 2000 compliant and used an inappropriate database structure. A decision by the University to operate over four terms rendered the existing system inoperable. There were no commercial systems in the market that would solve this problem in the required time frame. An in-house project was initiated to amend the existing system to allow for four terms, make it Year 2000 compliant, change the database platform, and cleanse the data. The structure and processes used by this system were largely undocumented and posed a potential risk to the University. It was recognized that considerable resources would be required to address these issues and that the potential returns would be minimal.

The Vice-President (Administration) called all interested parties to a meeting to review the student system on August 7, 1998. That meeting identified a number of outstanding issues in relation to the system. It was also recognized that many of the problems stemmed from the outdated and often redundant processes that are associated with the system. This issue along with a proposed review of IT provision and services was referred to the monthly meetings of the University's Senior Management Group. The group met on two occasions to address the matter. Following further discussions with the Associate Deans of Teaching and Learning it was agreed that while a University-wide review of IT was important the greater need was to improve the University's administrative processes. The Director Information Technology Division (ITD) was then asked to develop an appropriate Request for Proposals (RFP).

The RFP was developed as a result of a series of meetings and discussions among ITD, the administrative functional areas, the Associate Deans of Teaching and Learning and key faculty-based users. The RFP had a primary focus on Student Administration but also addressed the University's long-standing requirement for integrated systems and in addition requested proposals for Financials and Human Resource systems. The RFP was released on December 7, 1998 and sent to the three potential providers of Student Systems in Australia. These providers were PeopleSoft Australia, Deakin Software Services and Technology One.
(Central Queensland University Integrated Systems Project Final Report May 1999)

Institutional progress

In the 1970s Australian Colleges of Advanced Education (CAE) emerged as an alternative to universities, offering a selection of courses in education, nursing, arts and business that were not generally offered by universities, or that were parallel to university curricula but with a more practical emphasis. The professional education market, the requirements of credentialing in fields like education, as well as the upsurge of interest in continuing education made CAE's a popular alternative to universities.

CQU entered the higher education sector as Queensland Institute of Technology (QIT) Capricornia in 1967 and student enrollment was primarily confined to the local area of about 60,000 people. The campus was located at Rockhampton, situated between the university cities of Brisbane 650 kilometers to the south and Townsville a similar distance to the north (see Figure 1). Many students could not afford the cost of residing away from home in Brisbane or Townsville, while the emerging student group of life-long learners (such as workers, parents with childcare responsibilities, older people) could not afford to live outside Central Queensland either (Cryle 1992). In addition there was a perceived need to provide an educational service to the rich mining area of Central Queensland, specifically to provide technical training in the engineering and science disciplines that were important for the development of the mining industry.

QIT at Rockhampton became the Capricornia Institute of Advanced Education (CIAE) in June 1971, initially offering degrees in Applied Science, Business, Engineering and Education, and later in Arts and Health Science. The geographical context of regional Queensland with its massive size and small population made distance education an appropriate response to community needs for higher education. CIAE was the first Australian provider of an external Bachelor of Applied Science in Physics and Chemistry in 1974 (Cryle 1992). In the following year Biology and Mathematics were offered externally, as was the Graduate Diploma of Management. By 1983 external enrolments exceeded internal full-time and part-time enrolments, becoming a major source of revenue (Cryle 1992). Most external students at this time were between the ages of 30 and 39.

To increase student enrolment in the mid 1980s and in recognition of changing demands, CQU decided to provide on site education in the main population centers of the region (initially Mackay and Gladstone). To some extent this decision was based on demonstrated interest from the towns themselves. They pushed for the establishment of campuses based on study centers for distance education students. Initially branch campuses were set up at Mackay and Gladstone where students could study the first year of a degree, and then move to the Rockhampton campus to finish the course. In practice some students transferred to other universities after their first year.

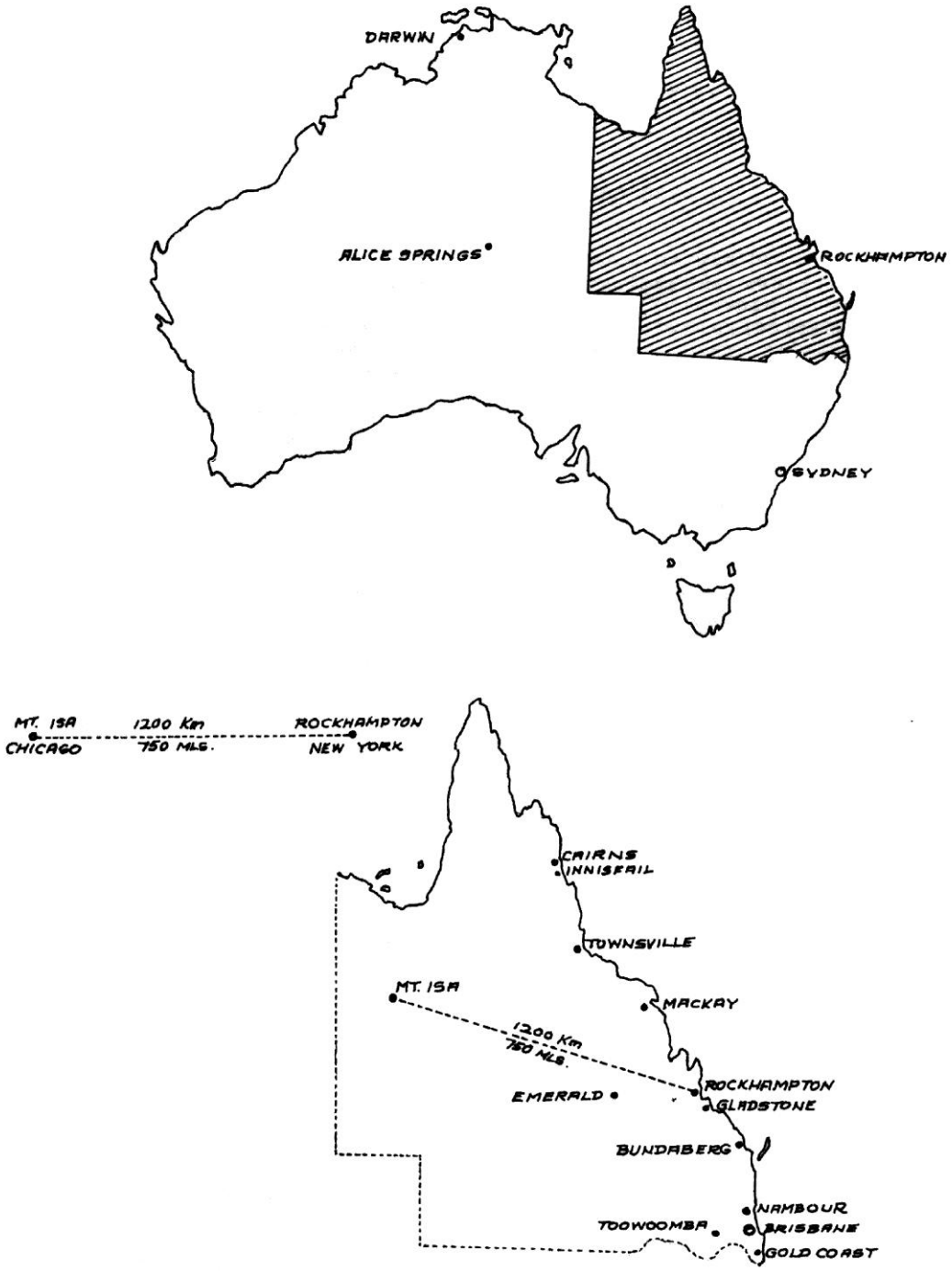

Figure 1

In part to arrest this process of attrition, in part to exploit the tertiary market that was being inflated by rising unemployment, in part to mark the university as a truly regional institution, the second and third years of some degrees were introduced on the other campuses. Also more campuses at Bundaberg and Emerald (350km to the south and west respectively) were opened. This resulted in a network of campuses serving a large geographical area of some 616,121 square kilometers. These new campuses were strongly supported by the local communities who

contributed funds and/or land that could be developed. Hence Central Queensland University no longer has a main campus with four branch campuses, but rather has five campuses of equal status, where students can now study a complete degree, from a growing choice of courses.

A more recent expansion has established sites in Sydney (1994), Melbourne (1996), Brisbane (1998) and Fiji (1998) through a commercial association with Campus Management Services (CMS). These campuses represent an extension of the institutional network, as do a number of overseas centers, mainly in South East Asia. These overseas centers are essentially partnership arrangements with other educational providers, but extend the networked university concept both interstate and overseas.

Collaborative Initiative

As a public agency CQU along with other universities (only two of Australia's 37 universities are private organizations) is subject to government scrutiny. This means that universities must provide various statistics to the central government to enable a degree of public monitoring. The gathering of statistics is a type of information request to which universities would like to be able to respond expeditiously through the use of IT. The fact that many student record systems were developed during the 1970s using 3rd generation software technology meant that for many universities it was a struggle to keep pace with changing requirements for information from the government. A characteristic of IT systems of this era (i.e. the 1970s) is that they are relatively inflexible and do not lend themselves easily to changed requirements. Difficulties in meeting information requests from the government lead universities to consider a cooperative approach to IT systems development.

The **Core Australian Specification for Management and Administrative Computing** (CASMAC) steering committee was formed in 1989 by the Australian Vice-Chancellors' Committee (AVCC0) and the council of Australia's university presidents. The AVCC is the peak organization representing Australian universities nationally and internationally and seeks to advance higher education through voluntary, cooperative and coordinated action.

CASMAC is intended to meet the following **four objectives:**

Objective 1:

- Specify and maintain the core functional requirements necessary to support the business and management functions of Australian universities.

Objective 2:

- Encourage and provide the basis for cost effective collaborative development and acquisition of adaptable and integrated core administrative computing applications which will:

1. Meet Australian universities' core operational and information requirements;
2. Provide the means of complying with statutory responsibilities and managerial obligations in a timely manner; and
3. Facilitate the effective deployment of university resources.

Objective 3:

- Maximize the ability to respond to external reporting requirements, particularly those of the government, in a cost effective and timely manner.

Objective 4:

- Allow for the flexible adoption and/or exploitation of new and evolving technology and facilitate the implementation of innovative approaches for management and administrative systems.

The national Core Australian Specification for Management and Administrative Computing defines the core functional requirements of the management and administrative needs of Australian universities for:

- Student Systems
- Human Resources
- Finance Systems
- Physical Resources
- Research and Consultancy
- Executive Reporting

(AVCC 1997)

CASMAC is based on a similar project initiated in 1988 by the University Grants Committee (UGC) in the United Kingdom that became known as the Management and Administrative Computing (MAC) initiative. These projects were undertaken because of the difficulties being experienced by universities in maintaining and redeveloping administrative systems in order to satisfy increasing demands for information from the government. As the demands for information came from the government the same demands were placed on all universities. Both CASMAC and the UK MAC initiative were based on the premise that there was a high degree of commonality in the core functionality needed to support the administrative and management functions of universities. The AVCC believed that there were benefits to be obtained by specifying these requirements and sharing the development and ongoing costs of the resulting systems.

The Steering Committee was successful in its bid to the central government for funds to undertake a feasibility study to determine if a similar approach to MAC could be applicable in Australia. As a result of the feasibility study, it was agreed to proceed with the preparation of CASMAC. Between April 1991 and July 1991 a small technical specification team together with consultants from Price Waterhouse used the MAC blueprint as a base for this development. From December 1991 to May 1992 progressive revisions were made to the specifications. CASMAC specifications use the structured system specification techniques of data flow diagrams, data model diagrams and a data dictionary. It has been suggested that the specification may cover 80% of each university's functional requirements but this is obviously a very rough assessment of something that cannot really be quantified.

While the term 'CASMAC' technically refers to only the core specification it is often used to include those dimensions of the project that emerged subsequently.

In July 1992 a Request for Information (RFI) was issued to potential suppliers of systems that would meet the requirements specified in CASMAC. This RFI required suppliers to indicate how they might deliver CASMAC-compliant applications to universities and to address a range of specified issues. Nineteen responses were received. A Request for Tender (RFT) was issued to the top five potential suppliers after evaluation of the RFI. The responses received were evaluated against the following criteria: CASMAC compliance, cost, company/consortium profile, technology platform, time frame and delivery schedule, control/ownership/support and adaptability and customization capability.

Between January 1993 and March 1993 universities were invited and encouraged to commit to a collaborative group project based on one of the suppliers responding to the RFT. Such a commitment would involve:

- Agreement to meet a share of the total cost of achieving the CASMAC objective through a joint venture with that supplier;
- Representation on the Management Committee established to oversee the project;
- Commitment to the provision of resources in the form of staff time and expertise for systems development, testing and implementation; and
- No commitment for an institution to take any of the applications with timing of implementation at the discretion of the institutions.

(AVCC 1996)

In April 1993, based on the responses to this invitation, the Steering Committee recommended to the AVCC that an agreement be signed with two selected suppliers, Oracle and Coulson Heron Associates (CHA), and that Management Committees for each project be established, reporting to the CASMAC Steering Committee.

During the following weeks, 19 universities committed to forming a consortium based on the CHA proposal using the PowerHouse fourth generation development language. This consortium was subsequently called UniPower.

The UniPower consortium has been the first to announce details of the system it is developing. On July 27, 1993 it signed a $10.5 million deal with British software house Coulson, Heron and Associates (CHA) and Canadian-US software house Cognos to begin development of the system based on the software developed by CHA in the UK. The $10.5 million software cost will be spread over the 19 universities with contributions being determined by the relative size of each. (The contribution of CQU was $185,683).
(CASMAC Bulletin #1, 1994)

Of these 19 universities, 16 were already using Cognos (Powerhouse) products.

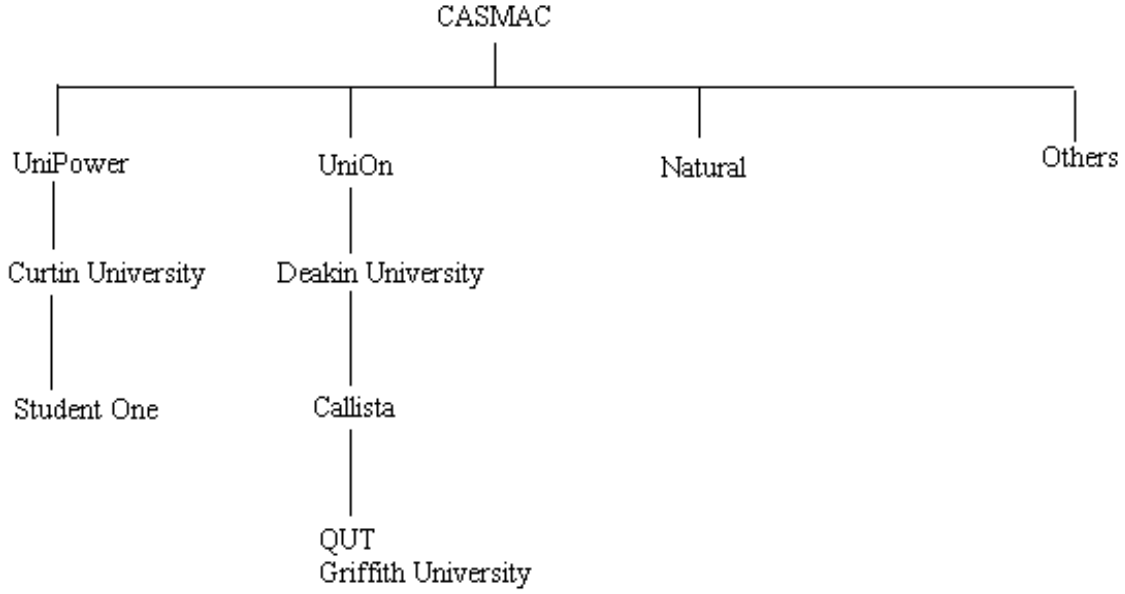

Figure 2. System Development From CASMAC

For UCQ[1] the decision to join the Powerhouse family was easier as there was already a strong Powerhouse presence with the existing Student Record application being written in the Powerhouse 4GL language.
(CASMAC Bulletin #1, 1994)

In the same period 11 other universities committed to forming a consortium that would use the Oracle relational database management system. This consortium was subsequently called the UniOn Group. Significantly, both successful bidders were also successful in the UK bidding process and, therefore, had already developed a set of systems that could be used as the basis for the Australian systems.

Later in 1993, three of the remaining universities agreed on a Memorandum of Understanding for the joint development, acquisition and exchange of CASMAC compliant software based on the Natural fourth generation language. These institutions are known as the Natural Group. The four other universities either determined to develop their own software in-house or to acquire software from other vendors.

For many IT investment decisions in universities, the question is not 'should we invest' but 'where and how to invest'. It is often not a choice of whether to develop, upgrade, or replace a system, but which system will efficiently deliver the required benefits, and how should it be obtained and installed. For such a system, which could be termed an operational or competitive necessity, 'return on investment' is not usually a very relevant measure. Where the system is fundamental to running the organization and delivering services, there may be no choice but to invest. In many cases, and especially in the public sector, it is difficult to quantify all of the costs

[1] CQU (Central Queensland University) was formerly named UCQ (University of Central Queensland).

and benefits (Stacey 1993). This may cause some universities to neglect the cost-benefit analysis of proposed IT projects. Some of these will be operational or competitive necessities, which will not give you any competitive advantage, but will keep you in the game and thus are necessary for survival.

Many university administrative IT projects would fall into this category. In attempting to address the need for such systems, most universities have collaborated in the CASMAC initiative. Collaborative development has been proposed as a way to share the costs of developing standardized IT systems for areas such as finance, human resources, student administration and management information.

The objectives for CASMAC include cost-effective collaborative development and acquisition of administrative systems to meet the operational and information requirements of the universities, and especially to enable a standardized response to the universities' statutory requirements and external reporting responsibilities to government.

The collaborative focus of CASMAC was therefore intended to provide a framework for institutional development, towards which universities could migrate in the knowledge that systems obtained from other universities, or possibly developed in conjunction with other universities, would have minimum integration problems.

In addition, this separation of the project from individual universities seems to have led to a distancing from, and lack of ownership by, university line management, even though the development process involved considerable consultation, and software development teams usually included application specialists from within the universities. The interviewers often heard both university IT managers and senior administrators say they were not focused on the administrative systems of the institution because they were 'waiting for CASMAC'. It did not have senior management attention, although some did express concern about how long it was taking to get UniOn or UniPower systems in place. These delays meant that 'interim systems' were sometimes being developed or purchased by some universities to meet the immediate needs of the institution.

Competition between universities has grown since CASMAC began in 1991, and this is leading to increasing strategic differentiation. Perhaps this changing strategic focus within universities has contributed to the lack of attention to and 'ownership' of the CASMAC initiative by individual universities.
(Vitale et al 1997)

CASMAC would not have been instigated but for the general acknowledgment that university administrative systems were struggling to keep pace with the information demands from the government (recall this initiative started in 1989). The central government allocated $2.7 million to the UniPower consortium in 1993. This project eventually ran into problems and no useful systems were developed. Legal proceedings were instigated by the consortium in 1997 to seek compensation for this failed investment.

CQU Information Systems

CQU decided that their Finance and HR systems would need replacing before a solution would become available from UniPower. Consequently interim stand-alone systems for Finance and HR were purchased and installed in 1991 and 1993 respectively.

In 1989 difficulties apparent in information systems support had lead to the CASMAC project. Now, Y2K was looming with its own immovable agenda, and the student system was more or less the same as it had been a decade earlier when moves to affect a replacement system had been instigated. In 1987 the multi-campus concept was newly emerging; in 1997 it was a dominant reality. The organizational context at CQU was considerably different from ten years earlier when moves to replace the student records systems were first activated. Despite the remediation that had taken place to comply with Y2K, the underlying structure of the systems was regarded as inappropriate for the support systems that should be provided.

A number of factors contributed to the overall level of dissatisfaction with current systems that was sufficient to generate a serious search for replacement systems that culminated in an RFP. In summary these were:

- Changing reporting requirements for government;
- New management requirements for information because of a changing institutional profile, including full fee paying overseas students;
- Commercially operated campuses for international students;
- An increase in research activity and
- An awareness of newer and superior IT appearing in the market.

As the student system was the most critical the RFP was sent only to software suppliers of student systems. The CQU RFP did not explicitly express CASMAC compliance as a general requirement but rather stated:

> Complies with Federal and State legislation. Also enables the University to satisfy the reporting requirements of government bodies such as DETYA, ATO, and ABS and other external bodies.
> (CQU Request For Proposal December 7, 1998)

The intention the University had of introducing more efficient administrative processes based on the new system is evident in:

> Facilitates Business Process Re-engineering, including Work Flow automation as a design concept across all modules.
> (CQU Request For Proposal December 7, 1998)

The limitations of existing systems and hopes for the future are reflected in:

> Rapid changes in the higher education environment make it imperative that any administrative computing systems put into place do not constrain future courses of action.
> (CQU Request For Proposal December 7, 1998)

ERP Adoption

Two of the three potential providers, Deakin Software Services and Technology One are Australian software houses offering systems that had originated from the CASMAC project (see Figure 2). The third was PeopleSoft, an American company with an international presence in the Enterprise Resource Planning (ERP) system market. Their ERP product is primarily recognized as having a strong HRM capability, however they market a University Student system that has achieved significant market penetration in the USA, and has been adapted for the Australian and New Zealand requirements.

Following a process that evaluated the responses from these providers, PeopleSoft Australia was selected as the preferred software supplier for CQU on March 12, 1999. Eleven Australian universities are reported as having signed contracts to adopt PeopleSoft systems (The Australian April 26 2000). The Deputy Vice Chancellor of CQU comments:

> The following outlines the focus of the project and the drivers that have necessitated this initiative.
>
> Integrated Systems Project – A Necessary Undertaking The Integrated Systems Project (ISP) was undertaken as a response to increasing pressures on the University and its staff. CQU is now compelled to address issues such as the following:
>
> * The current Student System is unable to support core University functions (such as the management of student information) and must be replaced as a priority.
>
> * Staff have experienced significant change recently and in many cases, the University is doing more with less. New systems are required to reduce the administrative workload and allow staff to consolidate recent change and focus on value adding activities.
>
> * Existing financial systems are not integrated with other core university functions and are not providing information required to empower staff to make informed decisions.
>
> * CQU's HR system does not support an employee self-help facility. Further, the HR system is not integrated with the Student and Finance systems and personnel planning is therefore hindered.
>
> Integrated Systems Project – A Key to CQU's Future CQU has undertaken significant change in recent times and like all organizations, will continue to do so. While the Integrated Systems Project will result in further change, this project is a necessary investment to support our employees and better position the University for the future.
> (Hancock 1999)

Even if a full cost benefit analysis of the impact of installing new IT systems has not been performed, possibly because of the complexity of the calculation, there seems to be an implicit assumption that savings will be realized. These savings are not achieved directly through the IT

budget, but by replacing ageing costly-to-maintain systems with newer systems requiring less maintenance expenditure from revised business processes.

Many of the savings that are part of the pay-off of new systems arise because their imminent arrival disciplines us to review the processes and transactions through which the organization conducts its internal and external business. (These are reviews we should be conducting in any case.) We must conform our processes to the systems we are purchasing, and not the other way around.
(Chipman, 1999a).

Some of the major benefits that are anticipated from the Integrated Systems Project include:

* Reducing the administrative effort associated with existing tasks. Automating many low value-adding tasks will reduce staff workloads. This will enable staff to better focus on value adding initiatives including professional development, research, increased student support and enhanced teaching activities. This will subsequently result in numerous benefits ranging from improved employee job satisfaction to increased student retention.

* The reduction in time spent on operational duties will enable staff to focus on activities that support CQU's strategic direction, such as enhancing the products that differentiate CQU within the higher education sector. This will ensure that the University delivers a higher quality product and is better equipped to flourish in an increasingly competitive market. This is expected to increase CQU's reputation and allow it to more efficiently respond to market pressures. The extent to which these benefits improve CQU's market position will be reflected in enhanced employee job security.

* An increased focus on maximizing CQU's competitive advantages (such as our Distance Learning capabilities) is expected to lead to an increase in revenue. As the University reinvests these funds in value added activities, our improved financial position could ultimately be reflected in increased funding for the Faculties and improved employee conditions.

* Delivering "self-help" for students allows staff to change focus from undertaking a directing role to providing guidance and consultation. Further, greater access to student academic progress and course information will lead to improved quality of student counseling. Benefits such as these will help to reduce student attrition rates.

* Enhanced management information and a student-friendly web interface will better enable CQU to attract and retain students.

* Improved financial management (such as timely and accurate budgetary information, course costing and revenue details, etc.) will enable the University to invest its financial resources so as to achieve the greatest return.

* Providing employees with an HR self-help facility will allow them to track and maintain their personal details more independently. Reducing the administrative workload on HR staff and enhancing the quality of information relating to personnel, will enable the University to track,

understand and deploy its staff in the most effective way. This should improve job satisfaction and staff productivity.
Hancock G (1999)

The introduction of the new integrated IT systems creates the opportunity to introduce new business processes that are more efficient than their predecessors. Projects like the PeopleSoft project at CQU are not simply IT projects designed to produce better information for managers and government, but also are instruments of business change and institutional reorganization and restructuring. In this sense the current PeopleSoft project has a different emphasis and rationale from the earlier CASMAC project.

Questions for Discussion

1. What are the advantages and disadvantages of collaborative IT projects in a particular industry?
2. What are the implications of this account to theories of strategic information systems development for competitive advantage?
3. What appeared to be the determining factor in the decision regarding which consortium to join?
4. How do you account for the comparative success of the PeopleSoft product in Australia? What impact did the collaborative CASMAC project on have on individual IT managers in universities?
5. Do you view the CASMAC project as a positive or a negative experience for Australian universities?
6. What alternative outcomes may have emerged had the CASMAC initiative not occurred?
7. Do you think the basis for making a decision to invest in IT systems is different for public and private organizations? Is there evidence suggesting the application of more formal investment decision making in the commercial sector? Do you agree that the necessity to invest in an IT project can be assessed in the absence of financial criteria?
8. What criteria would you apply to the selection process at CQU when it needed to choose between the respective products from PeopleSoft, Deakin Software Services and Technology One?
9. How would you define the role of an IT department when all of the significant administrative systems operated by the organization are packaged software products?

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