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Information Resources Management Association, USA

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Annals of Cases on Information Technology

2002/Volume 4

Table of Contents

Preface viii

DataNaut Incorporated: Growing Pains of a Small Company 1
on the Verge of an Internet Revolution
Nancy Shaw, George Mason University, USA
Joan O'Reilly Fix, Citibank N.A., USA

Military Applications of Natural Language Processing and Software 12
James A. Rodger, Indiana University of Pennsylvania, USA
Tamara V. Trank, Naval Health Research Center, USA
Parag C. Pendharkar, Pennsylvania State University at Harrisburg, USA

IT-Based Decision Tools for Item Processing Operations 29
Management in Retail Banking
Charles J. Malmborg, Rensselaer Polytechnic Institute, USA

The Dilemma of Dairy Farm Group Between Redesigning of 39
Business Processes and Rebuilding of Management Information Systems
Eugenia M.W. Ng, Hong Kong Institute of Education, Hong Kong
Ali F. Farhoomand, University of Hong Kong, Hong Kong
Probir Banerjee, City University of Hong Kong, Hong Kong

Developing a Hypertext Guide Program for Teaching the Simple Tasks 58
of Maintaining and Troubleshooting Educational Equipment
Kamel Hussein Rahouma, Minia University, Egypt
Peter Zinterhof, University of Salzburg, Austria

IS Strategy at NZmilk 73
Paul Cragg, University of Canterbury, New Zealand
Bob McQueen, University of Waikato, New Zealand

Implementing Information Technology to Effectively Utilize 84
Enterprise Information Resources
Yousif Mustafa, Central Missouri State University, USA
Clara Maingi, Central Missouri State University, USA

Implementation of Information Technology in a Job Shop 103
Manufacturing Company–A Focus on ManuSoft
Purnendu Mandal, Marshall University, USA

Shared Workspace for Collaborative Engineering 119
Dirk Trossen, Nokia Research Center, USA
Andre Schuppen, Aachen University of Technology, Germany
Michael Wallbaum, Aachen University of Technology, Germany

IT in Improvement of Public Administration 131
Jerzy Kisielnicki, Warsaw University, Poland

The Foreign Banks' Influence in Information Technology Adoption 141
in the Chinese Banking System
Michelle W.L. Fong, Victoria University, Australia

Adopting the Process View: A Case Study of Modeling Change in 162
the Not-For-Profit Sector
Antony Bryant, Leeds Metropolitan University, UK
Veena Syan, Forzani Group, Canada

Developing Interorganizational Trust in Business-to-Business 184
E-Commerce Participation —Case Studies in the Automotive Industry
Pauline Ratnasingam, University of Vermont, USA

Analyzing the Evolution of End User Information Technology Performance: 195
A Longitudinal Study of a County Budget Office
John Sacco, George Mason University, USA
Darrene Hackler, George Mason University, USA

Adopting IT: Food Program Sponsor Discovers It's No Picnic 209
John M. Anderson, University of North Carolina Wilmington, USA
William H. Gwinn, University of North Carolina Wilmington, USA

Everyone's Watching: The Remarkable Public Reorganization of the 225
Nevada Department of Motor Vehicles
William L. Kuechler, University of Nevada-Reno, USA
Dana Edberg, University of Nevada-Reno, USA

IT Help Desk Implementation: The Case of an International Airline 241
Steve Clarke, University of Luton, UK
Arthur Greaves, London Borough of Hillingdon, UK

Application of Tree-Based Solutions: A Case Study with INEEL 260
David Paper, Utah State University, USA
Kenneth B. Tingey, Utah State University, USA

Recognizing Runaway IS Projects When They Occur: The Bank Consortium Case ... 272
Joan Ellen Cheney Mann, Old Dominion University, USA

Long Term Evolution of a Conceptual Schema at a Life Insurance Company 280
Lex Wedemeijer, ABP, The Netherlands

Incentives and Knowledge Mismatch: The Deemed Failure of a BPR Project 297
in a Large Banking Organization
Parthasarathi Banerjee, National Institute of Science,
Technology and Development Studies, India

Risks in Partnerships Involving Information Systems Development: 316
Lessons from a British National Health Service Hospital Trust
G. Harindranath, Royal Holloway College, University of London, UK
John A.A. Sillince, Royal Holloway College, University of London, UK

A Case on Communications Management 328
Susanne Robra-Bissantz, Universitat Erlangen-Nurnberg, Germany

A Case Study of One IT Regional Library Consortium: VALE – 345
Virtual Academic Library Environment
Virginia A. Taylor, William Paterson University, USA
Caroline M. Coughlin, Consultant, USA

Prudential Chamberlain Stiehl: The Evolution of an IT Architechture 360
for a Residential Real Estate Firm, 1996-2001
Andy Borchers, Kettering University, USA
Robert Mills, Prudential Chamberlain Stiehl Realtors, USA

Seaboard Stock Exchange's Emerging E-Commerce Initiative 376
Linda V. Knight and Theresa A. Steinbach, DePaul University, USA
Diane M. Graf, Northern Illinois University, USA

Added-Value Benefits of Application of Internet Technologies 390
to Subject Delivery
Stephen Burgess, Victoria University, Australia
Paul Darbyshire, Victoria University, Australia

Enterprise Information Portal Implementation: Knowledge Sharing 410
Efforts of a Pharmaceutical Company
Alison Manning, Washington State University, USA
Suprateek Sarker, Washington State University, USA

Design and Implementation of a Wide Area Network: Technological 427
and Managerial Issues
Rohit Rampal, Portland State University, USA

An Experience of Software Process Improvement Applied to Education: 440
The Personal Work Planning Technique
D. Antonio de Amescua Seco, Carlos III University of Madrid, Spain
Javier Garcia Guzman, Carlos III University of Madrid, Spain
Maria-Isabel Sanchez-Segura, Carlos III University of Madrid, Spain
Paloma Martinez Fernandez, Universidad Politecnica of Madrid, Spain
Juan Lloreas Morillo,

SEIU Local 36 Benefits Office: The Y2K Crisis and Its Aftermath 456
Ira Yermish, St. Joseph's University, USA

Credit Card System for Subsidized Nourishment of University Students 468
Kresimir Fertalj, Damir Kalpic, Vedran Mornar & Slavko Krajcar
University of Zagreb, Croatia

Designing a First-Iteration Data Warehouse for a Financial Application 487
Service Provider
Nenad Jukic. Loyola University of Chicago, USA
Tania Neild, InfoGrate Incorporated, USA

Reengineering the Selling Process in a Showroom 499
Jakov Crnkovic, University at Albany, State University of New York, USA
Nebojsa Janicijevic. University at Belgrade, Yugoslavia
Goran Petkovic, University at Belgrade, Yugoslavia

Leveraging IT and a Business Network by a Small Medical Practice 513
Simpson Poon, Charles Sturt University, Australia
Daniel May, Monash University, Australia

Systems Design Issues in Planning and Implementation: Lessons 526
Learned and Strategies for Management
Mahesh S. Raisinghani, University of Dallas, USA

Index 535

Preface

The decade of the 1990s brought Web-enabled technologies and their most popular application, e-commerce. Many predicted that the technologies of e-commerce would revolutionize the way organizations conduct their businesses and manage their resources. E-commerce is still strong and vibrant in assisting organizations of all sizes and types, but now during the first decade of the 21st century, many organizations are trying to learn from the pitfalls and successes of these new technologies and their applications in modern organizations. Like any other information technologies of the past, Web-enabled technologies of e-commerce will greatly benefit from the lessons that can be learned from its previous applications and management. The case studies included in this publication focus on many issues including e-commerce related issues facing modern information technologies and their challenges for management. This book consists of 36 case studies authored by more than 60 scholars and practicing managers from all over the world. The following paragraphs provide summaries of cases included in this publication.

DataNaut Incorporated: Growing Pains of a Small Company on the Verge of an Internet Revolution, by Nancy Shaw, George Mason University (USA) and Joan O'Reilly Fix, Citibank N.A. (USA)

This case discusses a small, locally run company that faces several strategic decisions at the end of 1999, marketing its new high-tech products, securing sufficient venture capital financing and creating a profit-sharing plan for current and future employees. The case describes challenges that this company had to deal with the new Internet revolution banging at its front door. This case combines new technology development, HR decisions, marketing and finance, which makes it a true cross-disciplinary case describing challenges of small businesses and Internet.

Military Applications of Natural Language Processing and Software, by James A. Rodger, Indiana University of Pennsylvania (USA), Tamara V. Trank, Naval Health Research Center (USA), and Parag C. Pendharkar, Pennsylvania State University at Harrisburg (USA)

This case describes a preliminary feasibility study aboard U.S. Navy ships utilizing voice interactive technology to improve medical readiness. A focus group was surveyed about reporting methods in health and environmental surveillance inspections to develop criteria for designing a lightweight, wearable computing device with voice interactive capability. The case study describes the process of planning, analysis, design and implementation of an integrated voice interactive device (VID) for the Navy. The case reports challenges that need to be considered to enhance health protection and improve medical readiness by applying voice interactive technology to environmental and clinical surveillance activities aboard U.S. Navy ships.

IT-Based Decision Tools for Item Processing Operations Management in Retail Banking, by Charles J. Malmborg, Rensselaer Polytechnic Institute (USA)

This case reports IT challenges facing Merit Bank, a multi-line financial services company with

$75 billion in assets and approximately 1,000 retail branches distributed across 20 geographic divisions in 16 states. Merit's aggressive acquisition and consolidation strategy in its retail and commercial banking divisions has significantly increased check processing volumes and motivated major investments in automated imaging technology and branch operations reporting systems. The case describes re-focusing of IT resources to improve item processing operations in retail banking. Branch operations and item processing software tools are integrated to develop courier scheduling tools minimizing uncollected checks at branch offices. Automated encoding systems are adapted for just-in-time processing to maximize cost savings in check clearing operations.

The Dilemma of Dairy Farm Group Between Redesigning of Businesses Processes and Rebuilding of Management Information Systems, by Eugenia M.W. Ng, Hong Kong Institute of Education (Hong Kong), Ali F. Farhoomand, University of Hong Kong (Hong Kong), and Probir Banerjee, City University of Hong Kong (Hong Kong)

This case reports the IT challenges of the Dairy Farm Group (DFG) of Companies , as a leading food and drugstore retailer in the Asia-Pacific Region. DFG and its associates operated supermarkets, hypermarkets, convenience stores and drugstores in nine territories and had sales of US$6.9 billion in 1997. However, the profit margin of DFG was low compared to its competitors in Hong Kong and China and other retailers in Europe and the U.S. Consequently, a new chief executive officer was hired in June that year. The case study describes a preliminary investigation report of the existing DFG information systems and the recommended changes by two independent consulting firms, that were brought in to conduct the investigation and to determine how DFG can better utilize their IT resources to improve their profitability picture and to enhance their strategic positions

Developing a Hypertext Guide Program for Teaching the Simple Tasks of Maintaining and Troubleshooting Educational Equipment, by Kamel Hussein Rahouma, Minia University (Egypt) and Peter Zinterhof, University of Salzburg (Austria)

This case reports challenges facing educational technology programs at Minia University, Egypt, and hypertext technology was utilized to remedy the shortcomings assessing the effectiveness of the educational programs delivered. The case study describes the process of designing, implementing and applying a hypertext GUIDE program for teaching the educational technologists that graduated from the Department of Educational Technology and ways that improvements can be made to the existing education technology programs.

IS Strategy at NZmilk, by Paul Cragg, University of Canterbury (New Zealand) and Bob McQueen, University of Waikato (New Zealand)

This case describes the current situation of the NZmilk, a small, fresh milk supplier that is contemplating using IS to a greater extent to become more competitive due to the changes in the deregulation of the industry, and how supermarkets and home delivery contractors could purchase milk from wherever they chose, rather than a required local manufacturer. This had opened up both competition and expansion opportunities within the industry. The case reports the process of developing a new IS strategy in assisting NZmilk to become more competitive and to improve its strategic posture.

Implementing Information Technology to Effectively Utilize Enterprise Information Resources, by Yousif Mustafa, Central Missouri State University (USA) and Clara Maingi, Central Missouri State University (USA)

This is a typical case of implementing information technology in order to assist an enterprise to effectively utilize their production information resources. The enterprise, a world class leader in the pharmaceutical industry, currently keeps a huge number of technical research reports on shared network media. The case reports that the best solution to the problem is to create an information system which will keep track of these reports, provide a concise synopsis of each report, enable the researchers to search using keywords and give a direct link to locate that report via a friendly web-based user-interface.

Implementation of Information Technology in a Job Shop Manufacturing Company–A focus on ManuSoft, by Purnendu Mandal, Marshall University (USA)

This case describes A.B.C. Engineering, a Melbourne-based job shop manufacturing company that attempted a major improvement in the information technology area by implementing and enhancing the capability of an MIS software package called 'ManuSoft.' The case reports the challenges of the implementation of ManuSoft, as a generic MIS package, and enhancement of its effectiveness to the management with the development of object-oriented interfacing programs.

Shared Workspace for Collaborative Engineering, by Dirk Trossen, Nokia Research Center Boston (USA), André Schüppen , Aachen University of Technology (Germany), and Michael Wallbaum, Aachen University of Technology (Germany)

This case deals with the difficult task of developing collaborative engineering due to the variety of proprietary data and tools to be integrated in a shared workspace in the field of chemical engineering research. The case study describes the design process for a collaborative engineering workspace at the University of Technology, Aachen, Germany, under development within a research project considering distributed chemical engineering as an example. Current solutions and challenges as well as future work are outlined, including the lessons learned from the study.

IT in Improvement of Public Administration, by Jerzy Kisielnicki, Warsaw University (Poland)

The case study describes the process of implementation of IT for the improvement of public administration in Bialystok (Poland) . The city of Bialystok has 280,000 inhabitants. The new management system has been based on new IT solutions, including an extranet network and integrated data base. The result of implementation of the new IT was a reduction of the decision-making time by an average of 30% and the reduction of the routine affairs handling time by the average of 25%.

The Foreign Banks' Influence in Information Technology Adoption in the Chinese Banking System, by Michelle W.L. Fong, Victoria University (Australia)

This case study examines the foreign banking sector's potential in transferring technology to the domestic banks in the People's Republic of China. Although the rationale of the Chinese government's admission of foreign banks into its domestic banking industry was to attract foreign capital and banking expertise, the case reports the difficulties involved in foreign banks'

transfer and how potential information technology transfer can be fully utilized as a secondary benefit.

Adopting the Process View: A Case Study of Modeling Change in the Not-For-Profit Sector, by Antony Bryant, Leeds Metropolitan University (UK) andVeena Syan, Forzani Group (Canada)

This case study focuses on the operation of an adoption agency in the UK, illustrating the issues involved in a small, not-for-profit organization seeking to respond to the pressures to streamline and automate its routines and procedures. It illustrates the limitations of inadequately planned IT-centered initiatives, and how such strategies can be redeemed by process-oriented methods– specifically those derived from a combined BPR and soft systems approach. It also exemplifies the critical importance of organizational issues and the constraints they impose on effective implementation of IT.

Developing Interorganizational Trust in Business-to-Business E-Commerce Participation By Pauline Ratnasingam, University of Vermont (USA)

This case reports the interorganizational systems such as EDI that have been the main form of business-to-business e-commerce participation in the automotive industry for the last two decades. The case study describes efforts to clarify and refocus information management and operational procedures in an organization concerned with placement of children for adoption in the UK, following the introduction of a database system. The case illustrates the use of process modeling in the context of an information-intensive organization in the not-for-profit sector.

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Analyzing the Evolution of End User Information Technology Performance: A Longitudinal Study of a County Budget Office, by John Sacco, George Mason University (USA) and Darrene Hackler, George Mason University (USA)

This study reports the evolution of the personal computer's utilization in public sectors and how the budget office of a large county government designed and implemented end user information technology (IT) from personal computers (PCs) and local area networks (LANs) to an intranet and Web pages over a 15-year period. The study evaluates end user information technology performance and comments on organizational, technical and social issues that accompany information technology implementation and how public organizations can deal with them.

Adopting IT: Food Program Sponsor Discovers It's No Picnic, by John M. Anderson, University of North Carolina Wilmington (USA) and.... William H. Gwinn, University of North Carolina Wilmington (USA)

This case reports on how traditionally small companies are often reluctant to try innovative approaches to information management because of the cost of the hardware and software, the potential disruption of processes already dependent on overstressed resources and the lack of in-house expertise. This case looks at the experience with information technology (IT) implementation of one small nonprofit company that provides administrative services for child care providers. The case discusses the difficulties encountered by Quality Care, Inc. in implementing information technology.

Everyone's Watching: The Remarkable Public Reorganization of the Nevada Dept. of Motor Vehicles, by William L. Kuechler, University of Nevada-Reno (USA) and Dana Edberg, University of Nevada-Reno (USA)

This case reports the situation at the Nevada Department of Motor Vehicles and Public Safety that launched the "Genesis" project in 1999 for planning, organizational restructuring and system development, and to the accompaniment of great publicity, the project fell dramatically short of expectations. This case provides the background necessary to understand the origins and shortcomings of the system, then focuses on the turn-around effort that took the system to a point of successful operation within a year of its going into production.

IT Help Desk Implementation: The Case of an International Airline, by Steve Clarke, University of Luton (UK) and Arthur Greaves, London Borough of Hillingdon (UK)

This case study concerns IT help desk management within an international airline. The core of what is described relates to attempts at implementing help desk procedures in practice, and illustrates the problems of treating these both as predominantly technology systems and predominantly human systems. The case discusses the failure attempts and an alternative approach that was proposed based on the application of methods drawn from an understanding of critical social theory. The practical problems and theoretical issues are discussed, and a theoretically informed framework is applied retrospectively to the case.

Application of Tree-Based Solutions: A Case Study with INEEL, by David Paper, Utah State University (USA) and Kenneth B. Tingey, Utah State University (USA)

This case describes a tree-based solution at the Idaho National Engineering and Environmental Laboratory (INEEL) for rapid development of a computerized system to meet complex, yet exacting compliance requirements for thousands of employees. The case discusses advantages and disadvantages of this project and the implementation issues/challenges, and overall effects of the project on other components of the information systems, working environments and implications of management at INEEL with respect to all aspects of enterprise systems development.

Recognizing Runaway Projects When They Occur: The Bank Consortium Case, by Joan Ellen Cheney Mann, Old Dominion University (USA)

This case reports the situation at KPMG, its challenge of dealing with 35% of their largest clients currently having a runaway project and how in 1991 the number increased to 60%. The traditional definition of a runaway project is any project that grossly exceeds budget and time targets but yet has failed to produce an acceptable deliverable. Given that each runaway project is a dysfunctional use of organizational resources, it is important for practitioners to be able to identify them early and react appropriately. This case discusses many issues related to the dilemma of runaway and provides remedies to deal with complex runaway projects.

Long-Term Evolution of a Conceptual Schema At a Life Insurance Company, by Lex Wedemeijer, APB, (The Netherlands)

This case discusses how enterprises need data resources that are stable and at the same time flexible to support current and new ways of doing business. However, there is a lack of understanding how flexibility of a conceptual schema design is demonstrated in its evolution over time. This case study outlines the evolution of a highly integrated conceptual schema in its business environment. The case reports that a real conceptual schema is the result of 'objective' design practices as well as the product of negotiation and compromise with the user community, and discusses drivers such as not only 'accepted' causes like new legislation, but also error correction, changing user perceptions and elimination of derived data.

Incentives and Knowledge Mismatch: The Deemed Failure of a BPR Project in a Large Banking Organization, by Parthasarathi Banerjee, National Institute of Science, Technology and Development Studies (India)

This case reports the situation at a large public bank in an economy now under transition to liberalization, and how the organization attempted reengineering its structure and business processes to deal with the sharpening. The case describes a process reengineering project at this organization and issues/challenges that organization had to face regarding IT strategy, structure, technology, process and personnel involved in planning and implementating this project. This discusses that integration of disparate processes on an information technology platform can be proved with mixed success.

Risks in Partnerships Involving Information Systems Development: Lessons from a British National Health Service Hospital Trust, by G. Harindranath, Royal Holloway College, University of London (UK) and John A.A. Sillince, Royal Holloway College, University of London (UK)

This case describes a US$ 30 million project to establish a new form of rapid healthcare service delivery within the context of a highly politicized National Health Service Hospital (NHS) Trust in the United Kingdom (UK). This project involved large-scale redesign of long-established healthcare procedures and the development of sophisticated new information systems (ISs) through a unique partnership between the public sector (the UK's NHS) and a number of private-sector companies (a software developer, a facilities manager, a hardware vendor and a builder). The case study concentrates on, what is often, one of the more important determinants of the success or failure of such partnerships involved in information systems development, i.e. 'risk'.

A Case on Communication Management, by Susanne Robra-Bissantz, Universitat of Erlangen-Nuremberg (Germany)
This case reports the situation at the Bissantz & Company GmbH, a small software producing company that is enjoying a rapid growth and is in need of a strategic concept for communication activities with external partners. The case study describes the application of a concept for communication management in the Bissantz & Company GmbH and challenges of achiveing communication goals and strategies for all communication forms in the organisation. This case reports many proposals for the contents of messages and media selection, especially in the field of external business communication.

A Case Study of One IT Regional Library Consortium: VALE – Virtual Academic Library Environment, by Virginia Taylor, William Paterson University (USA) and Caroline M. Coughlin, Consultant (USA)

This case discuss that in modern years, historic models of library management are being tested and modified in the digital age due to several interrelated factors. First, the importance of place or a home library space changes as electronic opportunities for dispersal of library collections increase with IT innovations and availability. Second, the high cost of IT has made library managers more sensitive to issues of cost in general while the ability of IT systems to provide easy access to managerial data, data previously difficult to capture, has allowed library managers to begin to differentiate costs for services based on use. This case reports the findings of an IT role, implications on regional library information delivery and challenges of a virtual library environment in the digital information transmission age.

Prudential Chamberlain Stiehl: The Evolution of an IT Architechture for a Residential Real Estate Firm, 1996-2001, by Andy Borchers.Kettering University (USA) and Robert Mills, Prudential Chamberlain Stiehl Realtors (USA)

This case describes the evolution of an IT architecture for Prudential Chamberlain Stiehl Realtors (PCSR), a 14-office, 250-sales-agent real estate firm located in Southeast Michigan. Initially, the CIO of the firm concentrated on providing basic connectivity to sales agents and a simple World Wide Web presence. Although this was accepted by users and moved the firm forward technically, management questioned the value of this technology. In the next phase of development, PCSR worked to build a "rich" set of applications that enhance the firm's relationships with clients and agents.

Seaboard Stock Exchange's Emerging E-Commerce Initiative, by Linda V. Knight, DePaul University (USA), Theresa Steinbach, DePaul University (USA) and Diane M. Graf, Northern Illinois University (USA)

This case describes the situation at the Seaboard Stock Exchange, one of the top stock exchanges in the United States, and how its relative position in the world is threatening and slipping due to the e-commerce and entrance of new competitors into Seaboard's market. The case study describes how this traditional organization is now at the verge of coming back, through the use of its new integrated Internet-based technologies strategies and some of the organizational struggles they had to deal with in order to adopt this technology based on new strategies. This case also discusses the system development methodologies and the impact of standards and controls in an emerging technology environment.

Added Value Benefits of Application of Internet Technologies to Subject Delivery, by Stephen Burgess, Victoria University (Australia) and Paul Darbyshire, Victoria University (Australia)

This case examines a range of subjects taught in the School of Information Systems at Victoria University, Australia. Each subject uses Internet technologies for different 'added-value' benefits. Subject coordinators comment upon the use of the Internet technologies for both academic and administrative aspects. The case study explores the similarities between businesses

using Internet technologies to "add value" to their products and services, and the reasons academics use Internet technologies to assist in traditional classroom delivery. This case examines benefits derived by faculty and students when using the Internet to supplement four different subjects at Victoria University, Australia.

Enterprise Information Portal Implementation: Knowledge Sharing Efforts of a Pharmaceutical Company, by Alison Manning, Washington State University (USA) and Suprateek Sarker, Washington State University (USA)

This case study provides a detailed account of the formation of a knowledge management (KM) division within a multinational pharmaceutical company, and the subsequent undertaking of the first major KM project, which involved the implementation of a portal software technology. Specific issues discussed include rationale for replacing the existing intranet with portal technology, selection of the portal, justification for this selection, challenges in organizing and linking documents, as well as the social and behavioral factors influencing the implementation. A number of dilemmas and tradeoffs are presented with respect to each of the issues.

Design and Implementation of a Wide Area Network: Technological and Managerial Issues, By Rohit Rampal, Portland State University (USA)

This case deals with the experience of a school district with about 2700 students in five schools, and the Board of Education that overseas those schools and the bus garage. The buildings that house these seven entities are spread over four towns and distance between locations is more than ten miles. The case discusses the issues of design and implementation of a wide area network and the problems faced by the school district that made the WAN a necessity are enumerated. The choice of hardware and software is explained within the context of the needs of the school district and how the choice of technology can greatly impact the utilization and management of WAN in organizations.

An Experience of Software Process Improvement Applied to Education: The Personal Work Planning Technique, by D. Antonio de Amescua Seco, Javier Garcia Guzman, Maria-Isabel Sanchez-Segura, Carlos III University of Madrid (Spain), Paloma Martinez Fernandez, Universidad Politecnica of Madrid (Spain) and Juan Llorens Morillo, Carlos III University of Madrid (Spain)

This case describes the use of the Personal Work Planning (PWP) technique as a time management tool for student projects in a software engineering course at Carlos III University in Madrid. The case reports the methodology used to implement activities associated with the PSP technique in an academic institution. In addition, the case discusses ways that the institution has determined the level of student satisfaction after using this technique, and how many students have realized the usefulness of PWP for their assignments.

SEIU Local 36 Benefits Office: The Y2K Crisis and Its Aftermath, by Ira Yermish, St. Joseph's University (USA)

This case describes how a service organization approached the Y2K compliance issue and how a complex decision-making process led to near operational disaster. The case reports how

software vendor relations can be complicated by vendor viability and technological innovations. This case also explores the issues of IT management and the role that outsourcing for software and support plays in its operational life, and the character of management and problems caused by vendor-client relationships.

Credit Card System for Subsidized Nourishment of University Students, by Vedran Mornar, Kresimir Fertalj, Damir Kalpic, & Slavko Krajcar (University of Zagreb (Croatia)

This case describes the situation in the Croatian Ministry of Science and Technology and its major role in providing funds for higher education. There are four universities, each consisting of a number of relatively independent and dislocated faculties and academies. The case reports the process and challenges of computerizing the system of subsidized nourishment of the university students. The initial plan was to establish a simple credit card system but faced with political and technical infrastructure difficulties, the system had to develop a heterogeneous distributed database scheme as a proprietary replication mechanism, capable to exchange high volumes of data over a slow network or over dial-up networking.

Designing a First-Iteration Data Warehouse for a Financial Application Service Provider, by Nenad Jukic, Loyala University of Chicago (USA) and Tania Neild, InfoGate, Incorporated (USA)

This case describes the efforts behind designing a first iteration of an evolutionary, iterative enterprise-wide data warehouse for AIIA Corp., a financial application service provider. The case reports the importance of a well-defined mission, effective requirement collection, detailed logical definitions, and an efficient methodology for source systems and infrastructure development, during a data-warehousing project. The case discusses issues and challenges dealing with this data-warehousing project at AIIA Corp.

Reengineering the Selling Process in a Showroom, by Jakov Crnkovic, State University of New York at Albany (USA), Nebojsa Janicijevic. University at Belgrad (Yugoslavia), and Goran Petkovic, University at Belgrade (Yugoslavia)

This case describes the reengineering efforts of a small Yugoslavian showroom wholesaler. Following an initial period of success, the company subsequently became unable to deliver the promised level of quality and service. A team of consultants was engaged who recommended business-process reengineering in order help improve performance. The strategy they devised for the company involved replacing functional specialists with case managers. While the strategy was successfully implemented, it was not followed by appropriate changes in information technology, thus limiting the effectiveness of the entire process.

Leveraging IT and a Business Network by a Small Medical Practice, by Simpson Poon, Charles Sturt University (Australia) and Daniel May, Monash University (Australia)

This case describes that although many medical information technologies require significant financial investment and are often out of reach of small medical practices, it is possible through careful alignment of IT and customer strategy, together with a network of strategic alliances to

exploit IT effectively. This case reports on how a small medical practice managed to leverage skills, expertise and opportunities in the professional and knowledge-based industry and to improve its strategic posture with IT through the strategic alliance to enhance its competitive advantage without heavy up-front financial investment. The case also discusses the pros and cons of strategic alliances and potential issues related to building trust, consolidating relationships among members and risk management of such alliances on an ongoing basis.

Systems Design Issues in Planning and Implementation: Lessons Learned and Strategies for Management, by Mahesh S. Raisinghani, University of Dallas (USA)

This case describes a Schedule Graph (SG) System that was designed to automate the sales schedule process that had previously been a paper and pencil process in a telecommunication company. The system was designed and implemented in a matter of months to reduce cost and deliver an application that was long overdue. The project had been proposed for years, but funding issues had routinely delayed initiation. The case discusses the process of planning and implementation of this integrated software designed, where after to a lengthy delay, the systems was released with numerous software, hardware and network problems, with significant negative impacts on the customer community, the information systems department and other stakeholders.

We hope that cases included in this publication will be instrumental in better understanding the issues, trends and challenges of information technology utilization and management in modern organizations. In addition, practices and lessons described in the above cases, in terms of both success and pitfalls related to various applications and technologies of IT, should teach/assist information technology students, researchers and practicing managers in devising more effective management strategies and programs to achieve greater utilization and management of IT applications and resources.

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October 1, 2001

DataNaut Incorporated: Growing Pains of a Small Company on the Verge of an Internet Revolution

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This case was written for the 8th annual Kogod School of Business Case Competition at American University. It discusses a small, locally run company that faced several strategic decisions at the end of 1999: marketing its new high-tech products, securing sufficient venture capital financing, and creating a profit-sharing plan for current and future employees. The case involves an actual corporation (although some of the employee names have been changed) and the issues that confronted the management team at the end of 1999. The case includes a complete description of the company's products, a glossary of terms, a list of Web sites summarizing existing radio market research, detailed operating expenses and pro-forma financial statements (numbers have been altered for confidentiality). This case combines new technology development, HR decisions, marketing and finance, which makes it a true cross-disciplinary case that can be used in several different courses.

EXECUTIVE SUMMARY

At the end of 1999, a small software development company located on the outskirts of Washington, D.C. is faced with several strategic decisions regarding the marketing and financing of its high-tech products. The principals of the company must decide the type and dollar amount of financing they will try to secure, which of their two products should be the focus of their marketing efforts and how they should structure an equitable compensation plan for their existing and future employees. Cash flow has been an ongoing problem for this small company, which began as a one-person technical consulting company and has grown into a consulting and product development company with several full and part-time employees. While consulting has traditionally paid the bills, the CEO is interested in becoming a part of the "Internet Revolution" with the development of multimedia streaming applications.

BACKGROUND

On the evening of September 3, 1999, Mark Snuffin and his small staff sat around the living room of Mark's house, which also served as an office, and contemplated the future of their company, DataNaut Incorporated ("DataNaut").

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DataNaut was at a critical stage in its development. The three-year-old consulting company had just completed a business plan for a new product idea and was in the early stages of developing a demonstration model (a "demo") that would be used to illustrate the product's features to potential investors. Although Mark and his team were confident that the new product would be a success in the marketplace, they were also aware that raising sufficient capital to finance the development of this product at such an early stage would be a challenge.

Since its inception, DataNaut had financed its daily operations with a steady flow of income from consulting work. Mark's goal in founding DataNaut was to create a company that would focus on developing next-generation technologies for the Internet. Mark started the company with an advanced concept for broadcasting audio and information, and the resulting product was extremely innovative. Mark had always been "ahead of the curve" with his inventions, and he was sensitive to timing issues with respect to Internet technologies. His team was also acutely aware of the importance of timing, and the product issue had become an increasingly important topic of discussion within DataNaut.

DataNaut's reputation for expert consulting services was growing, and Mark was involved with several simultaneous projects that consumed the majority of his time. The existing contracts were scheduled to last into the following year, and Mark remained busy planning his life around these contracts. Even though the consulting revenue was increasing steadily, DataNaut often found itself in a cash-crunch. The management of cash flow became a delicate issue in Mark's small company, as the receipt of payments for consulting services rendered did not always correspond to the payment of bills and payroll. In addition, Mark subcontracted much of his consulting work to individual software developers, and the cost of doing so was high (Exhibit 1). Mark often felt that the time spent on consulting was an opportunity cost to pursuing product development.

Mark knew that he could maintain his consulting practice and grow it steadily over time, but his passion was in product development. DataNaut's situation had changed dramatically over a period of four months, and Mark had recently hired a strategic consultant to help him sort out the various issues that confronted his company. It was time to make a decision.

SETTING THE STAGE

Prior to forming DataNaut in May 1996, Mark had worked for several years in prestigious consulting firms. By 1996, the Internet had exploded, becoming a legitimate environment in which to conduct business. Mark decided to venture out on his own and form a consulting company that would specialize in extending Microsoft technologies to the Internet, while maintaining a product business that would focus on the development of turnkey Internet applications called "Weblications".

For the past three years, DataNaut has operated as a virtual corporation, using an outsource model to support business operations. DataNaut has utilized outsourcing partners to assist with software development, telecommunications and visual imagery, as well as functional areas such as accounting and legal services.

In October 1998, Mark hired a full-time software engineer, Eric Lorenzo, to assist with the consulting practice. In May of 1999, Mark hired two MBA students, Monique LaChance and Paul Lee, to handle the business aspects of the company's operations, including marketing, business development and financial planning. In hiring the MBA students, Mark hoped to rekindle the product development side of his business, which had become a lower priority due to an increase in consulting work.

CASE DESCRIPTION

DataNaut is divided into two core businesses, one dedicated to Weblication (product) development and the other focused on consulting services for Microsoft BackOffice solutions.

As of September 1999, DataNaut outsourced a portion of its consulting and Weblication development to five different consultants, four of whom lived between Washington, D.C., and Baltimore. The fifth consultant lived in Australia and assisted mainly with highly technical graphic