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Survey of Information Systems at Daktronics, Inc.

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Survey of Information Systems at Daktronics, Inc.

by

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A Paper Presented in Partial Fulfillment

of the Requirements of

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Abstract

Measuring the value (or effectiveness) of Information Systems (IS) is difficult at best. The objective of this case study is to research measures used to gauge exactly that, the value of IS investment. Many IS researchers including DeLone & McLean (DeL 92, DeL 03), Davis (Dav 89), Mathieson (Mat 01), and Goodhue (Goo 95) view measuring user perceptions via survey as one piece in the puzzle of determining what effect Information Systems are having on individual work performance, which gets closer to the value. So, this case study examines perceptions of users of Information Systems (also called enterprise applications) at Daktronics, Inc. To measure user perceptions, empirical data was gathered by surveying users (employees) at Daktronics, Inc. To determine what measures and questions to include in a survey, the context of what recent goals, or themes, for IS was reviewed.

Recent Daktronics Information Systems initiatives (as seen in Appendix C) have been aligned with such business initiatives as regionalization (the move of more sales staff into regional offices and continued expansion of service staff in regional offices). A survey of users was done to gather the empirical data on user perceptions in three of the six categories from DeLone and McLean's IS Success model. The three categories are (1) quality of the system, (2) quality of the information, and (3) impact on the individual. In addition, demographic data was collected in order to see if differences could be measured in the above categories within the following demographic areas: (1) physical access to corporate resources, (2) longevity with the company, (3) level of management and (4) user involvement in an IS project.

The results from this case led to recommendations for Daktronics IS leaders on the use of the DeLone and Mclean IS Success model and selection of appropriate measures and demographics.

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Chapter 1 Overview

Objectives and Deliverables

The objective of this case study is to research and provide recommendations on how to better measure the effectiveness of Information Systems at Daktronics, Inc. As for measures, the research performed will include a review of appropriate measures of IS. The goal of this project is to provide research and findings valuable enough to assist the IS group (Enterprise Information Systems) as they work towards developing a framework for measuring success (value from investment, a comparable measure to ROI calculations) and proper use of resources (invest in areas with highest benefits to organization). The deliverable of this project is this case study. The case study will be a starting point for this next year's management planning cycle and hopefully provide a methodology for future IS reviews and planning cycles. The expectation of the case study is to provide the IS leaders at Daktronics with a research base to provide better measurements of the value of IS.

Company

Daktronics, Inc. is located in Brookings, South Dakota. The company was started in 1968 by two electrical engineering professors (Dr. Duane Sander and Dr. Aelred Kurtenbach) from South Dakota State University. The professors started Daktronics with the objective of creating job opportunity in the local area for the talented students they were teaching who often left South Dakota upon graduation due to lack of job opportunity. The company started from humble beginnings out of a garage and meetings at their kitchen tables. Among the first employees was a master's student of one of the founding professors. That student, Jim Morgan, is now the CEO and President. Daktronics' vision is "To be the world leader at informing and entertaining

people through dynamic visual communication systems". Daktronics currently has around 1,800 employees with the majority working out of corporate office in Brookings, SD, USA. However, there is a vital workforce in over 40 offices spread across North America, Europe and now Asia. Daktronics is a public company that is actively traded on the NASDAQ stock exchange under the symbol DAKT. On June 1, 2005, Daktronics announced fiscal year 2005 annual net sales of $230.3 million with a net income of $15.7 million. Recent news releases show that Daktronics has strong leadership positions in, and is one of the world's largest suppliers of, electronic scoreboards, computer-programmable displays, and large screen video display and control systems. The company excels in the control of large display systems for customers around the world in sport, business and transportation applications. Daktronics designs, sells, manufactures, and provides services for the products listed above. To accomplish this, many skill sets exist within Daktronics, including electrical engineering, mechanical engineering, software engineering, computer engineering, computer science, firmware design, structural/civil engineering, sound engineering, project management, construction management, industrial management, manufacturing, purchasing, animators, video production, graphic artist, marketing, technical writing, electronics service technicians, sales…etc. This level of diversity in skills and information needs makes providing common tools and support for information systems challenging. The EIS (Enterprise Information Systems) department takes on this challenge.

Information Systems Group

Carla Gatzke leads the EIS department. She is the senior manager with responsibilities for Personnel department, EIS department, and Corporate Secretary. Typical of most senior managers at Daktronics, Carla has been with the company most of her career and has an engineering degree, electrical engineering. She also has a master's in business administration.

This combination of business and technical in both education and experience is common among the leaders in the EIS department. At the heart of Weill's book on IT (Information Technology) Governance (Wei 04) is the concept that companies that exhibit characteristics of having IT people that are business savvy and business people that are IT savvy correlates to those companies having higher profits from their investments in IT. The large investments made in most organizations in a centralized IT (EIS department) are based on fundamental economic principles such as economies of scale and labor specialization (McC 93).

The EIS department (see figure 1.1) consists of three groups that currently total 28 fulltime and 15 student employees.

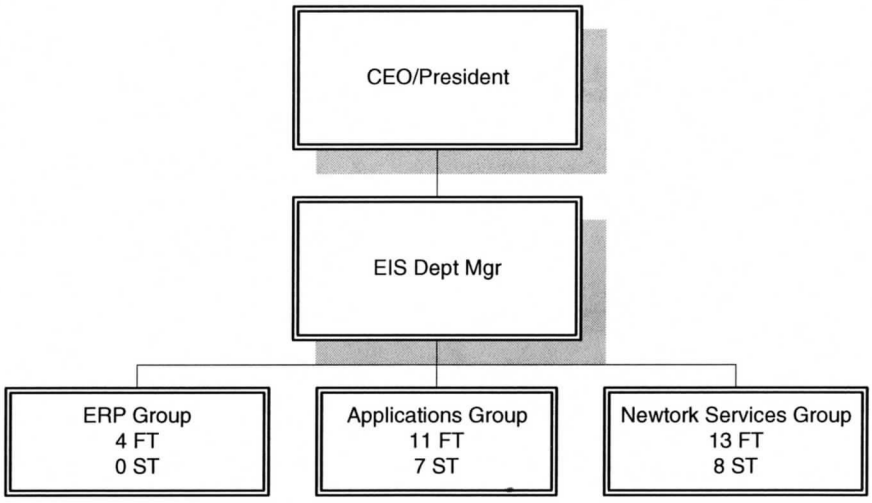

Figure 1.1: EIS Organizational Chart

The ERP group supports the ERP system and related systems like financial analysis system fed from the ERP system. The leader of this group has been with the company for over ten years. The Applications group (see Appendix D for Organizational Chart) supports software development for web applications, database administration and development, document management system, contact management system, lead/sales pipeline system, business

intelligence systems (reporting systems), intranet, and internet sites. Vince Connelly, author of this document, is the leader of this group and has been with the company for eight years. The Network Services Group supports servers, operating systems, infrastructure, devices, and various department level software. The leader of this group has been with the company for about ten years.

Each year during the planning cycle, the EIS group defines a theme, or goal, for the upcoming fiscal year. The theme is usually tied directly to where significant effort and funding will be put. EIS Themes (can be seen in appendix C) for the last few years have been the following:

- FY01 (May 2000 – April 2001): **Stability**. During this period, Daktronics was experiencing both network and application instability. This was due to several reasons that were all addressed in that fiscal year.
- FY02 (May 2001 – April 2002): **Connectivity**. As Daktronics was expanding and moving more people into regional offices, IS focused on raising the number of offices connected and quality of connectivity from offices to corporate facility by improving and expanding VPN and internet bandwidth as well as working with offices on selecting office locations with proper availability of quality services.
- FY03 (May 2002 – April 2003): **Security**. Identified the need to strengthen our security practices and infrastructure while at the same time making security a reasonable level of ease of use for regional workers.
- FY04 (May 2003 – April 2004): **Seamless Connectivity**. In FY02, EIS took on connectivity as a theme. In FY04, the theme was revitalized and expanded to focus on ensuring the staff outside the corporate headquarters had as much access to systems and

resources as the staff at corporate. Significant progress was made during that year and continues to be a focus today. As the organization continues to expand nationally and internationally, seamless connectivity has become a core requirement of IS.

- FY05 (May 2004 – April 2005): **Integration**. As a continuation/extension to seamless connectivity, integration was selected to make accessing system information easier for the user by not needing to worry about what system the information resided in. The intranet would bring the information together in an appropriate way from wherever the source(s) resides. EIS discovered barriers in our skills, development practices and systems, which led to a proposed restructure of the Applications group. The proposal (Appendix I) was made to senior managers in December 2004 and was unanimously consented to. The proposal included aligning the EIS Applications group with the engineering software groups' tools and platforms. This might sound like a simple (slam dunk) decision. However, the decision has a ripple affect of multi-year projects to migrate the systems including on the Network Services side.
- FY06 (May 2005 – April 2006): **Platform Building (Architecture)**. The above decision in FY05 led to this theme. Network Services is moving to a new directory service this year and then planning for email system move the next year. The Applications group restructured and started on rewriting the intranet and related applications to the new platform. This year, the Applications group is also looking at possibly replacing one enterprise system, document management. Replacing a document management system will be a multi-year project. The expectation is three years before all content in the existing system would be migrated to a new system allowing the old system to be taken offline.

- FY07 and on: In each of the next few years, another enterprise level system is on the chopping block with the exception of the ERP system. However, there is discussion that one of the systems in the next few years might pull some functionality out of the ERP system.

Over these upcoming years, a need exists for measures that describe the effectiveness of IS spending. Currently, IS expenditures at Daktronics averages about 2% of net sales each year. That is low considering the average expenditure by corporations to be at 4.2% as reported by Gormolski (Gor 01) at Gartner in 2001. There is a significant difference between these numbers, significant enough to question the validity of the numbers. Daktronics does run all of the IS and computer related purchases through the EIS department in order to trap the entire expenditures. Questions come to mind including:

- Is Daktronics really doing that much better at managing the costs of IS than other corporations? Or,
- Is Daktronics incurring costs or lost opportunities in other areas?

However, in and of itself, the numbers do not tell anything. The comparison does not tell us that Daktronics' IS spending is doing better than other corporations or that Daktronics is not spending enough (i.e. incurring greater costs or causing lost opportunity in other areas). Daktronics needs to find meaningful measures that directly point at the value being obtained from IS spending, which will answer the questions above. As Weill (Wei 04) notes in his book on IT Governance: "As IT has become more important and pervasive, senior management teams are increasingly challenged to manage and control IT to ensure that value is created". The need to ensure and find measures in order to show value leads us to research, to experiment and to

refine until Daktronics can confidently measure value with the dimension of time for comparisons.

Chapter 2 Research

This chapter is to cover the literature review and research done to obtain information for this case study.

Review of Literature and Websites

An initial review of the literature on the measures of IS returned a large number of results. Upon review of the articles, it was apparent that an article by DeLone and Mclean (DeL 92) was a seminal piece in the area of IS success models. As noted in the EBSCOhost database, the DeLone and McLean's article "Information Systems Success: The Quest for the Dependent Variable" was cited by other articles over 180 times. Figure 2.1 provides an overview of the six categories (System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organizational Impact) that make up the DeLone and McLean IS Success model while table 2.1 lists possible measures for each category. Interestingly, these categories of the D&M IS Success model are rooted in communications theory done by Shannon and Weaver in 1949 (Sha 49).

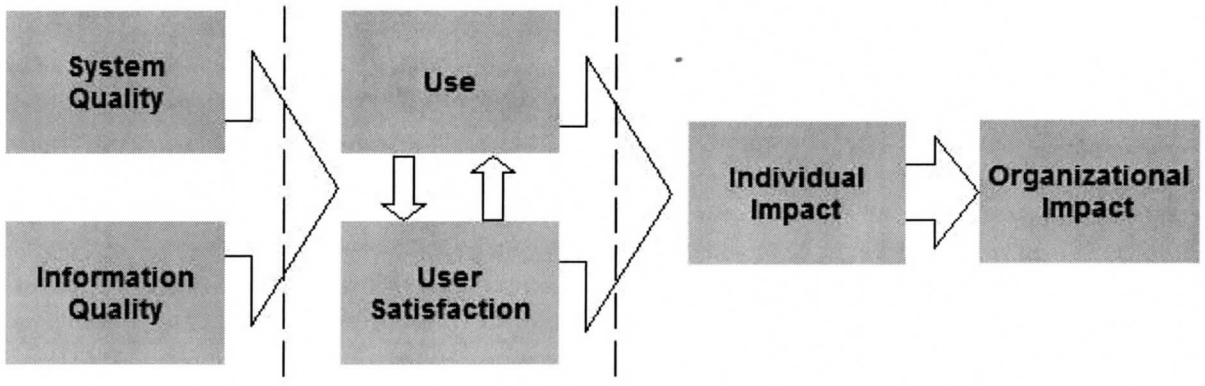

Figure 2.1: DeLone and McLean's IS Success Model – Original (DeL 92)

System Quality measures the system itself. Measures include system performance, reliability, processing time, system flexibility, level of detail, resource utilization, data and system integrity and others. Physical monitors of the system can gather data for several of the system quality measurements.

Information Quality measures the output of the information system. Measures include quality of report output, information accuracy, output timeliness, reliability, completeness, currency, relevance, precision, formatting, aggregation, clarity...etc. More measures for this category and the following categories are in table 2.1. The measures in this category are mostly subjective. A survey is a good way to gather this information.

Use (Information Use) measures utilization of either the reports or actual system by users. DeLone and McLean (DeL 92, DeL 03) advocate using actual measurable usage in place of user self-reported use when possible. Using system usage measurements is the most objective measures found. Discrepancies are consistently found with user self-reporting of usage.

User Satisfaction measures the level of satisfaction in using both the system and output from the system. User satisfaction ties closely to what the user gets in return for using the system (i.e. how well it fits their task needs). User satisfaction is subjective and most frequently done with surveys. User Satisfaction and Use impact each other. The more a user uses a system usually the higher they rate user satisfaction due to better understanding of the system. Training can also play a role in this area. Also if user satisfaction is high, usually the more use the system gets by that user. DeLone and McLean (DeL 92) make sure to point out that when measuring user satisfaction the need exists to determine whose satisfaction should be measured. They state that if the system is non-voluntary in use that the management satisfaction is the important group to

measure. Seddon (Sed 98) focus on the need to target the stakeholder to be measured when trying to determine IS success. Seddon notes top management and users as two groups to measure. User Satisfaction is measured most frequently as the indicator for IS success, probably because it is easiest to obtain data for.

Individual Impact is the effect the information has on an individual's behavior. This is listed as the most difficult to define and capture. Measurement is mostly subjective. The value is in the eyes of the decision maker. The inference by DeLone and McLean (DeL 92, DeL 03) is that Individual impact will lead to organizational impact.

Organizational Impact is even harder to measure and capture. DeLone points to Matlin (Mat 79) on the difficulty that cost/benefit analysis has on capturing "intangible benfits". DeLone points out a proposed cost/benefit modification by Johnston and Vitale (Joh 88) that takes the portion that can be broken down financially to regular cost/benefit and then adds top managements judgment of value-add for the items that are harder to capture.

To further strengthen the pervasiveness or impact of the D& M IS Success Model, the Association of Information Systems has a link on their home page under specific research types titled "IS Effectiveness" that focuses on explaining the D&M IS Success Model. The web page is not from DeLone and McLean. The page is maintained by Grover, Purvis and Coffey (Gro 05). They updated the model based on research from others including the proposal by Pitt and Watson (Pit 97) for Service Quality. They added Service Quality as another dimension that needs to be measured for a complete picture of success. Their model can be seen in Figure 2.2.

	A	B	C	D	E	F
1	**System Quality**	**Information Quality**	**Information Use**	**User Satisfaction**	**Individual Impact**	**Organizational Impact**
2	Data accuracy	Importnace	Amount of use/ duration of use:	Satisfaction with Specifics	Information Understanding	Application Portfolio:
3	Data currency	Relevance	# of inquiries	Overall Satisfaction	Learning	Range and Scope of App
4	Database contents	Usefulness	Amount of connect times	Single-Item Measure	Accurate Interpretation	Number of Critical Apps
5	Ease of use	Informativeness	Number of functions used	Multi-Item Measure	Information Awareness	Operating Cost Reductions
6	Ease of learning	Usableness	Number of records accessed	Information Satisfaction:	Information Recall	Staff Reductions
7	Convenience of access	Understandability	Frequency of access	Difference between information needed and received	Problem Identification	Overall Productivity Gains
8	Human factors	Readability	Frequency of report requests	Enjoyment	Decision Effectiveness:	Increased Revenues
9	Realization of use requirements	Clarity	Number of reports generated	Software Satisfaction	Decision Quality	Increased Sales
10	Usefulness of System features and functions	Format	Charges for system use	Decision-Making Satisfaction	Improved Decision Analysis	Increased Market Share
11	System accuracy	Appearance	Regularity of use		Correctness of Decision	Increased Profits
12	System flexibility	Content	Use by whom?		Time to Make Decision	Return on Investment
13	System reliability	Accuracy	Direct vs. Chauffeured use		Confidence in Decision	Return on Assets
14	System sophistication	Precision	Binary use:		Decision-making Participation	Ration of Net Income to Operating Expenses
15	Integration of systems	Conciseness	Use vs. nonuse			
16	System efficiency	Sufficiency	Actual vs. reported use			
17	Resource utilization	Completeness	Nature of use:			
18	Response time	Reliability	Use for intended purpose			
19	Turnaround time	Currency	Appropriate use			
20		Timeliness	Type of information used			
21		Uniqueness	Purpose of use.			
22		Comparability	Levels of use:			
23		Quantitativeness	General vs. specific			
24		Freedom from bias	Recurring use			
25			Institutionalization/ routinization of use			
26			Report acceptance			
27			Percentage used vs. opportunity for use			
28			Voluntariness of use			
29			Motivation to use			

Table 2.1: Success Measures by Category from D&M IS Success Model (DeL 92).

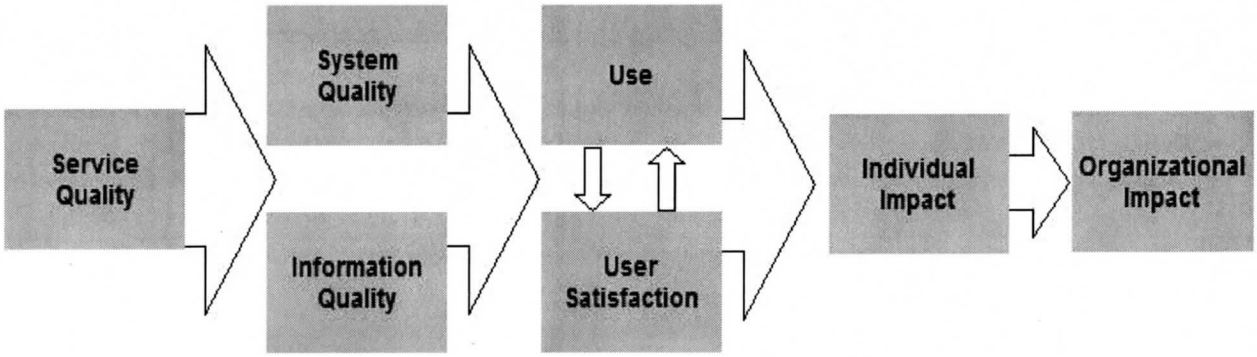

Figure 2.2: Association of IS version of D&M's IS Success Model (Gro 05)

In 2003, DeLone and McLean (DeL 03) revisited their 1992 article in order to review if the model is still valid and what updates might be needed. They agreed with the need to add Service Quality to the model with the way information systems had evolved during those ten years. DeLone and McLean used the example of an eCommerce system and the impact of service quality. Service Quality plays a more significant role based on the level of voluntary use of the system. They put Service Quality on the same starting level as System Quality and Information Quality. Service quality measurements include empathy, reliability/dependability, assurance, responsiveness and tangible. They also clarified Use by separating the intent to use and actual use while still leaving them in the same dimension. To keep the model simple and due to persuasive arguments from many articles during the interim, they decided to collapse individual and organizational impact into one category called Net Benefits. They like the term Net Benefits because of the inherent understanding in the pros and cons that sum up to generate benefits. This correlates with their understanding of weaknesses and trade-offs in all information systems. The resulting updated model is Figure 2.3.

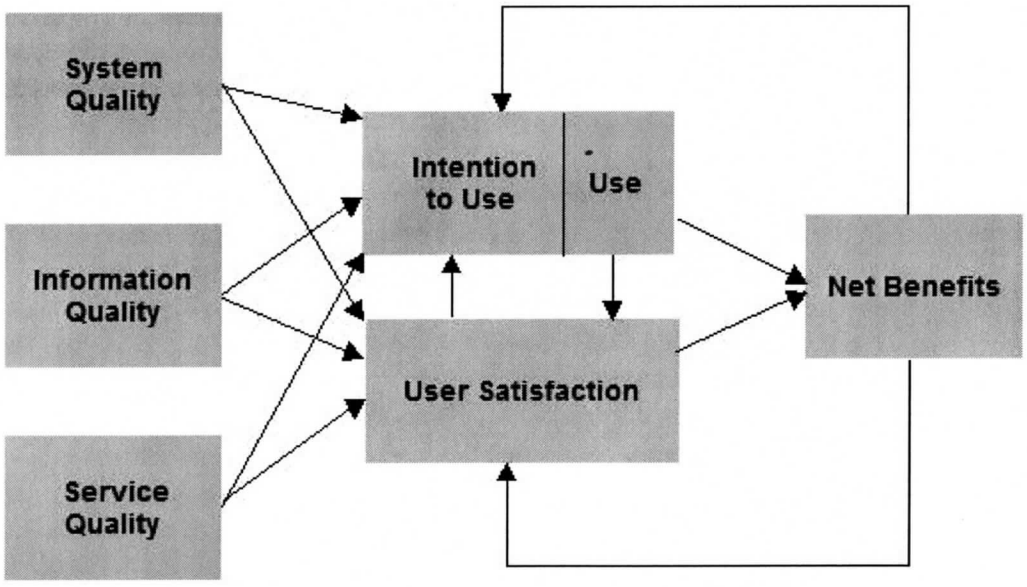

Figure 2.3: DeLone and McLean's Information Success Model – Updated (DeL 03)

DeLone and McLean note in both articles (DeL 92, DeL 03) that the measurements selected for the categories needs to be based on the context of the research (i.e. situational). They do recommend researchers to use existing measures when available to allow for better comparisons between research articles. They also conclude that when feasible actual use measures should be used instead of self-reported use measures.

A couple years before DeLone and McLean's model come out, Davis (Dav 89) put out an article about perceived usefulness and perceived ease of use and the impact on user acceptance of technology. This paper is interesting when combined with readings of DeLone and McLean (DeL 92, DeL 03) and Goodhue and Thompson (Goo 95). As Davis writes, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." While perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort." Davis theorizes that these two perceptions (i.e. perceived usefulness and perceived ease of use) have an impact on use acceptance of technology. The paper is an interesting read especially from a psychology/behavioral sciences viewpoint. It highlights items like the role of self-efficacy, which underscores the importance of making quality support and training resources available for information systems. The more that the user feels that they will be able to perform the task before they even start the more likely they are to start and use the system. This strengthens the use of standards in systems that reduce learning curves and feel familiar to users. The paper also covers usability testing during product development cycle as way to meet ease of use objective. Also interesting in the article are questions that focus on gathering the users attitudes towards both perceived usefulness and perceived ease of use. These questions could be used in many situations. In Davis's conclusions, he sees causality chain for ease of use - > usefulness - >

usage. He also infers that ease of use can contribute to overall job performance due to taking less effort. Overall, his article plays to what you would intuitively expect for conclusions.

Goodhue and Thompson (Goo 95) also refer to DeLone and McLean's (DeL 92) article. Mostly to "go beyond" what DeLone and McLean wrote. Goodhue focuses on the fit between the Task and Technology as the key driver for individual performance. This article can be looked at as a way to focus on the category of Individual Impact in D&M IS Success model, possibly to measure the impact through the fit of the technology to the task. He stresses that the higher the fit with the task the higher utilization the system will get which will lend the system to having more complete, timely, and accurate information. They also touch on the impact of user involvement in IS projects. They discount the importance that by participating the user will use the system simply because of a sense of commitment from participation. They write about the higher likelihood that the better fit between task and technology will exist with user involvement. In the end, they do not minimize the importance of user involvement; but rather, focus it on the higher likelihood of the end result of involvement being a system that better fits the users needs.

Mathieson and Peacock (Mat 01) address another factor in technology acceptance due to influence of perceived user resources. The focus is on the effect of perceptions surrounding the availability of adequate resources as to whether the system will be used or not. This extends beyond self-efficacy. Are there barriers to using the information system like lack of time, expertise, connection problems, lack of support, adequate documentation, training, job experience, position of individual, organizational level, distance, services from IS, tech support, vendor support, accessibility, response time, cost to access…etc. These are good items to

measure in the general practices of IS to remove as many perceived barriers whether based on real fact or not.

Each of the articles contributes to the thought process and identifies circumstances where their model fits best. DeLone and McLean (DeL 92, DeL 03) work to keep the Delone and McLean IS Success model simple and allow researchers to supply context to their research from using the model. They go even as far as writing that the model is more to show a process flow and relationship than a causal relationship. Even though inferences are made as to the belief that the sum of individual impact affects the organizational impact.

Chapter 3 Methodology

The objective of this chapter is to identify the methodology used for measuring value of IS at Daktronics.

Survey Methodology

A survey was used to get employees' perceptions about the information systems they use to do their work. DeLone and McLean (DeL 92, DeL 03) recommend using objective measures when possible. The use of a survey is a subjective measure. Their seminal article (DeL 92) points out places best suited for objective and subjective measures. The survey (see appendix G) used for this case study focused on using the DeLone and McLean Information Systems Success model (see figure 2.1). This version of the model was selected due to standing the test of time. The survey focused on the categories befitting the subjective measurement tool, a survey. The survey looks at measurements covered by reference material in the research section on topics like accuracy, completeness, timely…etc. The results from the survey should give Daktronics leaders a barometer of where the information systems stand from the subjective viewpoint of users. The survey was created with input and review of many people. First, input was gathered from the staff that is responsible for information systems, the EIS (Enterprise Information Systems) department. An email was sent to the EIS staff. The email described that a survey was going to be done and asked what type of input or issues they are interested in knowing the user's opinion. Issues that by better knowing the users opinion might change how the EIS staff delivers service. The response to this approach was light; but, a starting point. This approach is a preferred starting point by the author for two reasons: (1) the feedback that it does get is without blinders/constraints being put on (i.e. the author leading them down a particular path by making suggestions to them or reviewing existing questions with them) which by not doing can lead to a

new line of questioning and (2) this approach informed the EIS staff of what is going on (i.e. planted a seed) which can help when approaching them later to review the survey. They might have thought of something in the meantime.

After the email was sent and feedback gathered, the feedback was combined with a list of questions that are rooted in the D&M IS Success Categories like Information Quality, System Quality, and Individual Impact as well as some of the other models like Mathieson's (Mat 01) perceived resources issues. The survey format used was recommended by Dr. Christoph and is consistent with survey forms used by Goodhue (Goo 95). From this basis a rough draft was created. Carla Gatzke, EIS manager, and the author went through a couple iterations of revisions to the survey that changed the order of questions, layout of the survey, wording of questions, changed one question to be a fill in the blanks of the top three systems used by the survey taker and added one open ended question with a text box to fill which allowed the user to identify any system improvement(s) that they think would improve their work performance. We knew by making these changes that some of the questions would not be able to be included for statistical purposes. However for immediate feedback for business purposes, we felt it would be important to allow the user to have a place to vent their concerns and ideas about the information systems.

As for statistical review purposes, a few areas for lines of questioning and demographic comparisons were focused on. More demographic information on users was taken than anticipated needing. Each demographic question was made more granular than anticipated needing. Additional demographic questions were added as well. All of this was done in case during analysis of the results, the results led to additional hypothesis that would require further the additional demographics data. As for demographics, four areas of focus for contrasting

opinions within the following groups became interesting from both the research and EIS initiatives over the last few years. Areas of interest are:

(1) based on physical access to resources at the corporate facility

(2) based on time employee has worked with the company

(3) based on level of management

(4) based on working with EIS on a project

Hypotheses (null hypothesis) derived from the areas of interest are:

(1) Working outside of corporate office would not make a significant difference on user opinions regarding information systems.

(2) The length of time being employed by Daktronics would not make a significant difference on user opinions regarding information systems.

(3) Whether a person was in management or not at Daktronics would not make a significant difference on user opinions regarding information systems.

(4) Having worked with EIS on an information systems project would not make a significant difference on user opinions regarding information systems.

The above hypotheses are based on issues raised in articles discussed in the research chapter. The physical access to resources at corporate also addresses the success of EIS themes for the last five fiscal years (FY01-FY05). The question is whether there are any significant differences within these demographic groups. The null hypotheses states that there are no significant differences in their opinions about information systems.

The statements written for the survey focused on the areas that are critical to both the purpose for and success of information systems. The focus was put on three of the categories from the D&M IS Success Model (DeL 92, DeL 03):

(1) System Quality (Survey Statements: 3,4,6,8,9,12,13,14,16,18,20,23)

(2) Information Quality (Survey Statements: 7,8,9,10,24,25)

(3) Individual Impact (Survey Statements: 2,5,11,14,15,17,19,26)

The actual survey statements can be found in Appendix G and the measures in each DeLone category listed above are highlighted in table 2.1. The statements in the survey that are not listed above are for informational purposes only and do not directly correlate to one of the three categories. EIS leaders look at these categories and feel the group has made progress in the last few years; but, the information systems are not where they desire service to be.

Response bias was considered when writing the survey statements. The statements were not written in a manner that the positive affect is always on the side of agree. Some questions were written where the positive result (i.e. IS is effective) would be the user answering disagree.

Now, with a more refined survey, the EIS staff was used as a pilot group for taking the survey. The EIS staff was emailed the survey with guidance to take the survey while noting how much time the survey took to complete, if any statements were confusing, and any suggestions from wording changes. The survey was written to take less than ten minutes for a user to complete. Ten minutes of employee time was deemed by management to be the maximum time allotted this endeavor. The feedback from the pilot group was very helpful and led to another round of revisions. Once revisions based on feedback were completed, the "final copy" was sent to the

EIS staff and EIS manager, Carla Gatzke. Wrapping up revisions to the survey was important in order to get the survey out in time to be included in a company seminar being held. This company seminar (Daktronics Services Seminar) held once a year brings employees from all parts of the company (functional groups, business units, regional offices…) together. The survey was passed out as users went into the dining area for lunch. A basket next to the exiting area was available to collect the results. That was the first distribution method. The second distribution went to about 80 more users that were not at the seminar. The distribution method used was an individualized email with a PDF eForm attached. The PDF eForm included a button at the bottom of the second page that when clicked opened the users email program, attaches the completed survey and inserted the return to email address. The email included short instructions explaining what the survey was and the options for filling it in. The objective was to prevent response bias by having a sizable results population that included even distribution between demographics as well as not having all statements with the desired result being on the agree side of the scale.

Chapter 4 Survey Results

The objective of this chapter is to review the results of the survey.

Overview

Of the returned surveys, a couple of surveys had to be discarded due to being incomplete or erroneously filled out. The result was 81 usable surveys. The response rate was close to 50%. The demographic distribution is listed in table 4.1.

Demographic	Categorized	Number of Surveys	Percentage
Frequent Physical Access to Corporate Resources	Yes	53	65%
	No	28	35%
Employed with Daktronics less than 2 years.	No	22	27%
	Yes	59	73%
At some level of management at Daktronics	Yes	37	46%
	No	44	54%
Worked in the last year with EIS on a project.	Yes	40	49%
	No	41	51%

Table 4.1: Survey Results Demographic Distribution.

The survey data set and calculations can be found in Appendix H. As stated in the methodology chapter, the survey focused on three D&M IS Success categories and four demographic areas of interest that resulted in the creation of four hypotheses.

D&M IS Success Categories

(1) System Quality (Survey Statements: 3,4,6,8,9,12,13,14,16,18,20,23)

(2) Information Quality (Survey Statements: 7,8,9,10,24,25)

(3) Individual Impact (Survey Statements: 2,5,11,14,15,17,19,26)

Demographic Areas of Interest

(1) based on physical access to resources at the corporate facility

(2) based on time employee has worked with the company

(3) based on level of management

(4) based on working with EIS on a project

Hypotheses (null hypothesis)

(1) Working outside of corporate office would not make a significant difference on user opinions regarding information systems.

(2) The length of time being employed by Daktronics would not make a significant difference on user opinions regarding information systems.

(3) Whether a person was in management or not at Daktronics would not make a significant difference on user opinions regarding information systems.

(4) Having worked with EIS on an information systems project would not make a significant difference on user opinions regarding information systems.

Overall Results

This section starts by reviewing the averages of everyone that took the survey. The subsequent sections will dig into the survey by reviewing the categories and hypotheses.

For each statement, the average (mean) and variance (standard deviation) were calculated. The averages for the entire population can be seen in figure 4.1. The standard deviation can be found in table H.1.

From the overall averages, statement 2 had by far the strongest opinion with a 1.225 average with the lowest variance (standard deviation) of 0.418. This user opinion states that IS has a significant impact on work performance and efficiency. This in and of itself is significant about the impact IS has at Daktronics. However, the statement by itself does not indicate whether that impact is positive or negative. Statement 11 brings focus to the positive and negative impact of IS at least in regards to the use of data. Statement 11 states that if data were more accurate, timely and/or complete, my work performance would improve. This statement (11) received the second strongest opinion with an average response of 1.713 and variance (standard deviation) of 0.732. This response conveys that users believe that if data were to improve a positive affect would occur in their individual performance. Along this same line with the third strongest opinion by users is that data in the Information Systems are critical to their performance (statement 7, average of 1.788, variance of 0.791). These statements show EIS that improving the quality of data is what users perceive will improve their work performance.

Another statement (24) with a significant opinion is that having a single complete view of data (e.g. customer info) is more important than it being easy for individual groups to store information. The opinion on this question combined with the other strong opinions leads to the

line of thought that if Daktronics is able to bring data supporting subject matters into a more complete picture that job performance should increase for many users regarding their data needs.

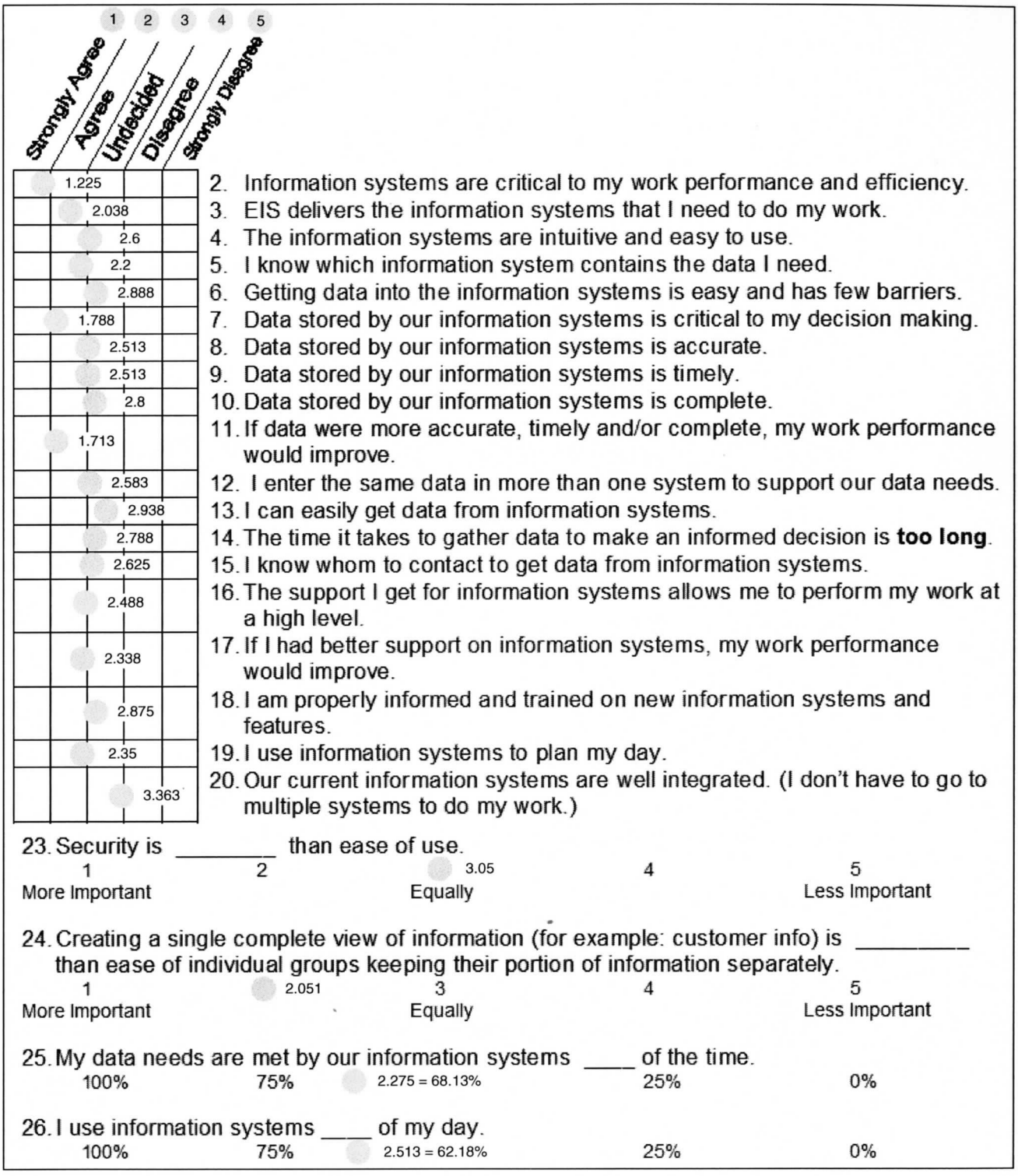

Figure 4.1: Averages for All Participants Plotted on Survey Form

Category Results

This section digs into the results of the D&M IS Success categories.

System Quality Category

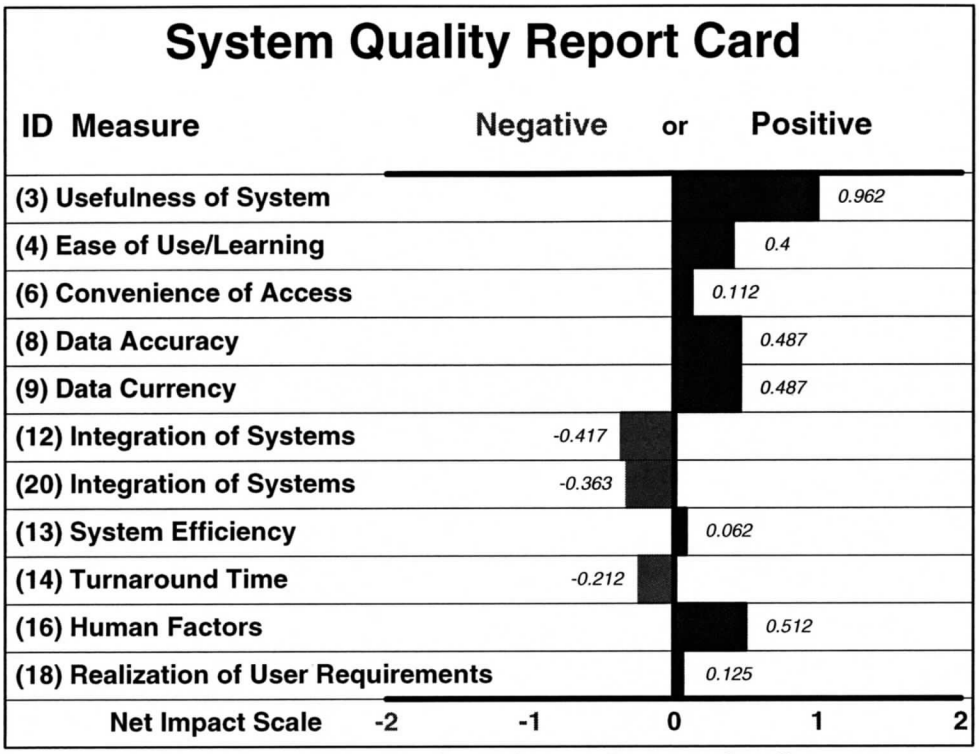

Figure 4.2: Report Card Chart: System Quality

survey statement ID	measure from D&M model	average from survey	consequence (positive or negative)	net impact pos = 3 - avg neg = avg - 3
3	Usefuness of System	2.038	+	0.962
4	Ease of Use/Ease of Learning	2.6	+	0.4
6	Convenience of Access	2.888	+	0.112
8	Data Accuracy	2.513	+	0.487
9	Data Currency	2.513	+	0.487
12	Integration of Systems	2.583	-	-0.417
13	System Efficiency	2.938	+	0.062
14	Turnaround Time	2.788	-	-0.212
16	Human Factors	2.488	+	0.512
18	Realization of User Requirements	2.875	+	0.125
20	Integration of Systems	3.363	+	-0.363
23	Ease of Use	3.05	NA	NA

Table 4.2: Report Card Data: System Quality

Review of the data shows areas of concern (negative impact items), areas to watch (close to zero impact) and areas of interest (solid positive impact). The areas of concern point heavily at the measure of integration as reported by responses to statements 12 (enter same data in more than one system) and 20 (systems not well integrated). The only positive from this is that the results confirms the basis for why the Applications group is restructuring and plans laid out for the next few years to select and implement IS that do work better together. Upon further review of statement 14 concerns are raised about the phrasing of the statement and possible response bias due to highlighting (put emphasis on) the words "too long". However when combined with statements (6, 13 and 18) in the area to watch, the barrier to using data cannot be minimized by discounting response to statement 14.

The EIS staff is greatly concerned with the IS not becoming a black hole for data and of marginal value due to barriers including ease of entry, multiple entry, ease of retrieval and users properly informed on how to use. These barriers prevents the IS from realizing completeness, timeliness and accuracy that provides the value to decision-making and task performance. The positive from this categories results is the user's perception that EIS is delivering the IS that is important to their work.

Statement 23 was not included in the report card analysis due to not having a positive or negative connotation. The statement was included to simply get an understanding of how well user's perceived the inherent tradeoff between ease of use and security that IS groups address on every project and information system. The surprising result is that users responded with almost exactly equal importance between security and ease of use. The expectation was for the response to be solidly on the ease of use side. The response rate for this statement would be interesting to

compare if the response rate prior to the compliance work surrounding Sarbanes-Oxley legislation was known. The dimension of time would be of value for providing context to many statements in relation to initiatives and work undertaken by EIS department and company.

Information Quality Category

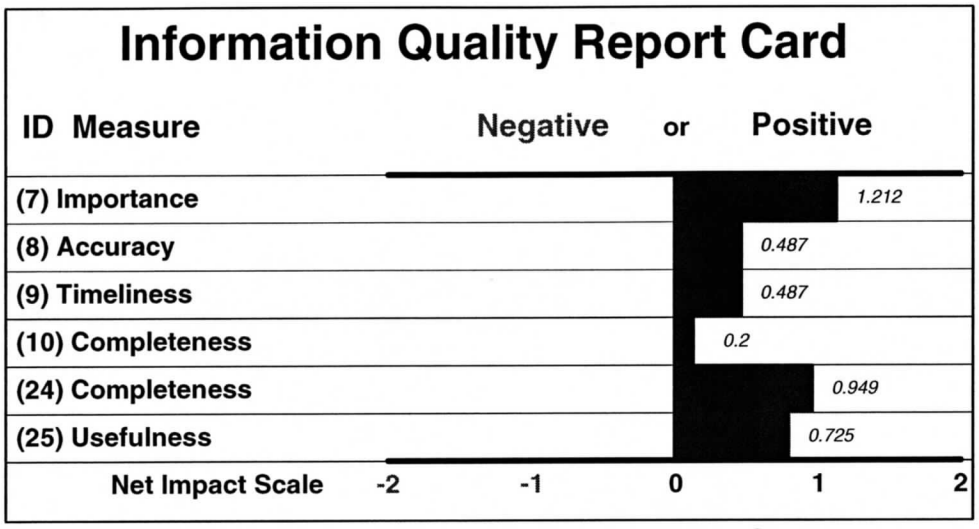

Figure 4.3: Report Card Chart: Information Quality

survey statement ID	measure from D&M model	average from survey	consequence (positive or negative)	net impact pos = 3 - avg neg = avg - 3
7	Importance	1.788	+	1.212
8	Accuracy	2.513	+	0.487
9	Timeliness	2.513	+	0.487
10	Completeness	2.8	+	0.2
24	Completeness	2.051	+	0.949
25	Usefulness	2.275	+	0.725

Table 4.3: Report Card Data: Information Quality

Reviewing the results from the Information Quality report card conveys certainty about the importance and desire for completeness and conveys the uncertainty about the actual completeness of data. This is positive and identifies the opportunity to raise confidence by continuing efforts that foster completeness of data. One current effort underway is to provide a higher level of data modeling between databases and systems. This effort includes not only

dedicated staff, such as database administrators and developers, but also system administrators to identify commonality between systems to ensure synchronization (e.g. a department lookup table should not have different values, labels and status between HR, ERP, CRM, DM... systems and should have consistent data types and use similar primary keys when possible in order to link data between systems). Another effort is continuing through the corporate intranet to consolidate the viewing of data from the various master sources by subject or task need as well as consolidating data into the master sources from side processes where business groups keep data in MS Excel spreadsheets and user MS Access databases. Positive results from these efforts will impact the issue of completeness. The question can also be raised about the user's access to knowledgeable database reporting staff that can take the user's subject matter question and bring the appropriate data together for the user or work with EIS staff to trap the data appropriately. This question should be further reviewed in the individual impact category under the measure of information awareness.

Individual Impact Category

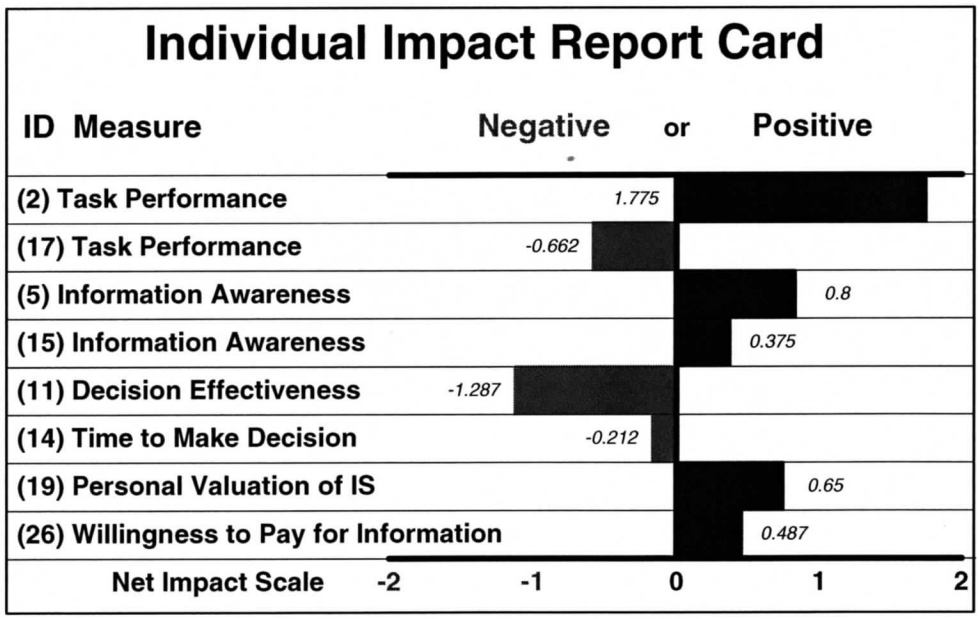

Figure 4.4: Report Card Chart: Individual Impact

survey statement ID	measure from D&M model	average from survey	consequence (positive or negative)	net impact pos = 3 - avg neg = avg - 3
2	Task Performance	1.225	+	1.775
17	Task Performance	2.338	-	-0.662
5	Information Awareness	2.2	+	0.8
15	Information Awareness	2.625	+	0.375
11	Decision Effectiveness	1.713	-	-1.287
14	Time to Make Decision	2.788	-	-0.212
19	Personal Valuation of IS	2.35	+	0.65
26	Willingness to Pay for Inormation	2.513	+	0.487

Table 4.4: Report Card Data: Individual Impact

In regards to reviewing information awareness as suggested by review of Information Quality, statement 15 had mediocre positive response that indicates users know who to contact to get data from information systems. This does leave the question regarding the effectiveness, adequate response time and quality of service for fulfilling report requests as well as how frequently does a user even request the data when they need it.

Reviewing the Individual Impact report card conveys the dichotomy within the measure of task performance between the users strong belief in the criticality of IS to their work performance and efficiency while conveying that better support would improve their individual work performance. The question rises what support is the user considering. Proper training and dissemination of information (e.g. system functionality and features) would be one portion of IS support that might be an issue. However, the users response to statement 18 indicates users on average feel that they are properly trained and informed. The next line of questioning would go to service quality, which this survey did not measure. The next measure to show up in the area of concern was decision effectiveness with a strong negative rating. The measure of decision effectiveness captured by statement 11 appears to coincide with findings in the Information Quality report card

regarding the opportunity that improvements in information quality (specifically completeness) would translate to increased individual performance. Efforts in the area of information quality should be carefully considered and furthered reviewed to identify potential areas of most impact on individual performance.

Hypotheses Results

This section digs into the results found by reviewing all of the statements against each of the hypothesis to see if any of the statements could disprove any of the null hypotheses.

(1) Working outside of corporate office would not make a significant difference on user opinions regarding information systems.

Significant differences in opinions of staff working majority of time in the corporate office as compared to staff with limited access to corporate office, by working in a remote office, at home or travel, exist for two statements in the survey (25 and 26). Statement 25 looks at the Information Quality measure of usefulness. Staff working in the corporate office find that their data needs are met 70.75% while staff with limited access to corporate facility (i.e. work in a remote office, at home or frequently from hotels…) find their needs only being met 63.4% of the time. Secondly, corporate staff surveyed self-reported a higher rate of Information Systems use. Corporate staff report using IS 66.05% of the day while non-corporate staff report 54.48% use rate.

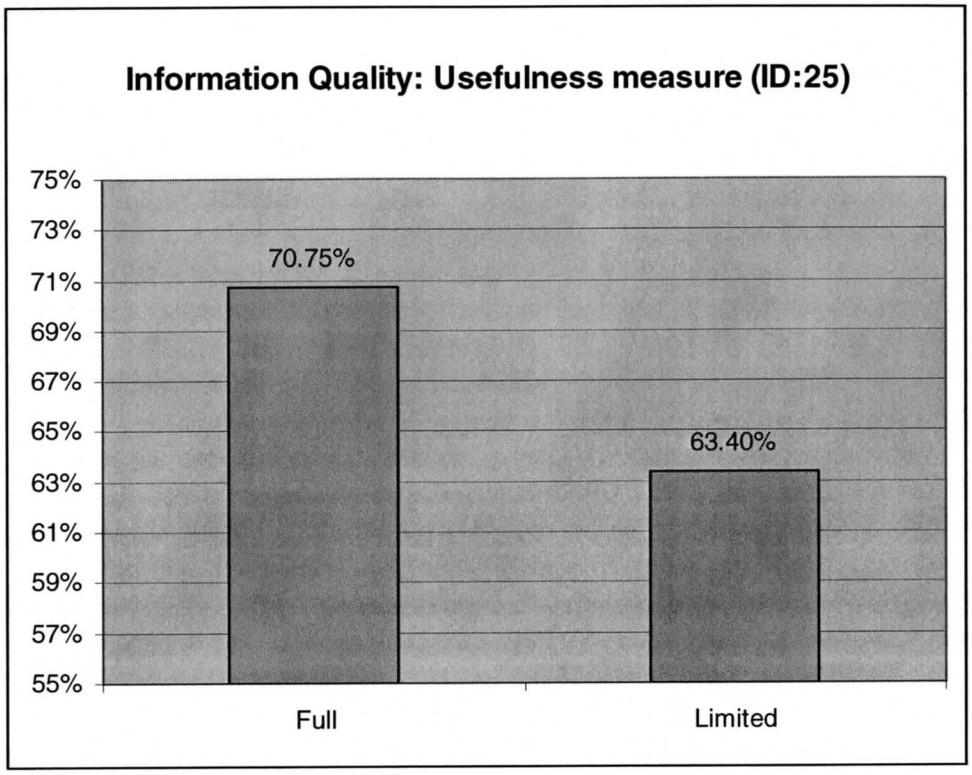

Figure 4.5: Hypothesis Chart: Non-Corporate Staff's Data Needs are met less

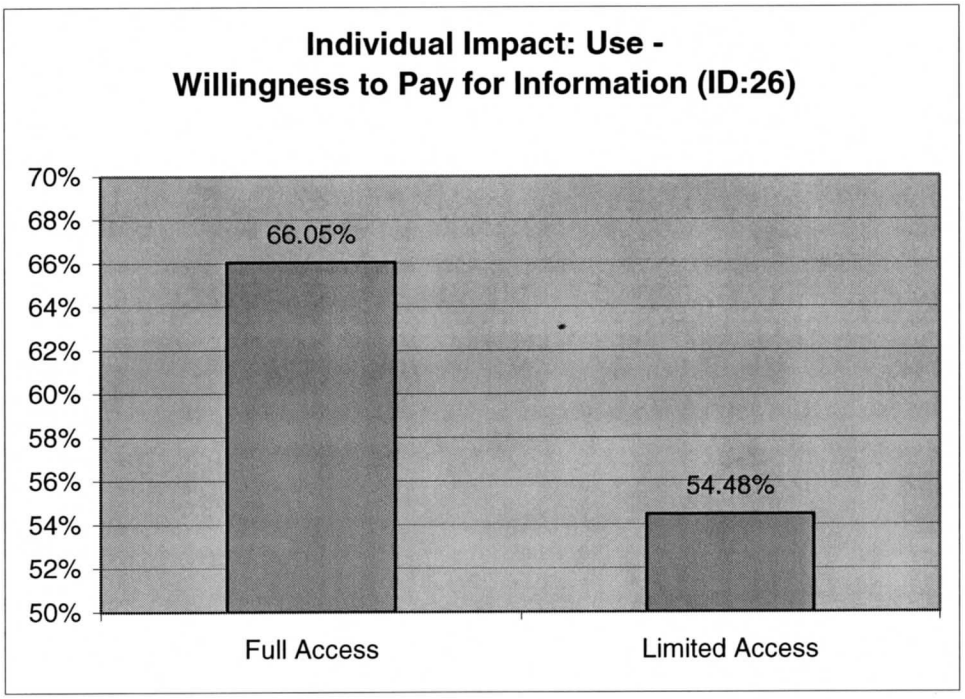

Figure 4.6: Hypothesis Chart: Non-Corporate Staff Uses IS Less

(2) The length of time being employed by Daktronics would not make a significant difference on user opinions regarding information systems.

No significant differences could be measured relating to longevity of employment with Daktronics. The null hypothesis is not rejected for any of the questions in this survey.

(3) Whether a person was in management or not at Daktronics would not make a significant difference on user opinions regarding information systems.

Significant differences in opinions for management compared to non-management were found to exist for statement 8, which addresses accuracy of data. Accuracy of data falls into two success categories: System Quality and Information Quality. Management is more confident in the accuracy of data stored in information systems than non-management. This is consistent with responses senior managers gave during interviews the author performed as a follow-up to the survey. The managers have used other methods to validate the information in order to build trust in accuracy. The data used for management decisions would have had more consideration during system planning and subsequent revisions. No surprise management has a higher satisfaction rate for data accuracy.

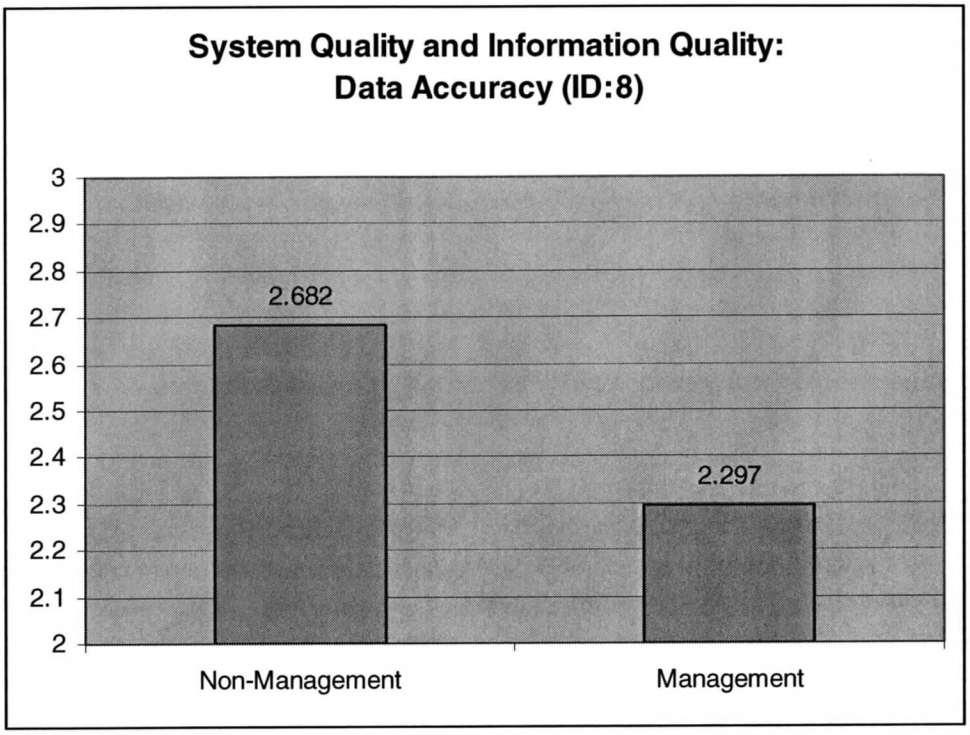

Figure 4.7: Hypothesis Chart: Management Finds Data More Accurate

(4) Having worked with EIS on an information systems project would not make a significant difference on user opinions regarding information systems.

Significant differences in opinions were found for staff that worked with EIS on a project in the last year regarding measures of realization of user requirements (statement 18) from Information Quality category (see figure 4.8) and completeness (statement 10) from System Quality category (see figure 4.9). This is no surprise to IS staff. The employees, working with EIS on projects, are helping to define system requirements, which should lead to higher satisfaction rate as Goodhue (Goo 95) points out in his article about the fit between task and technology. This does convey that EIS staff should continue to try to involve as many affected users as feasible and possible when working on IS projects. As for the measure of completeness, the staff working

with IS are just as aware as EIS staff of the data that is stored by individual groups off to the side, which is planned to be addressed in future projects.

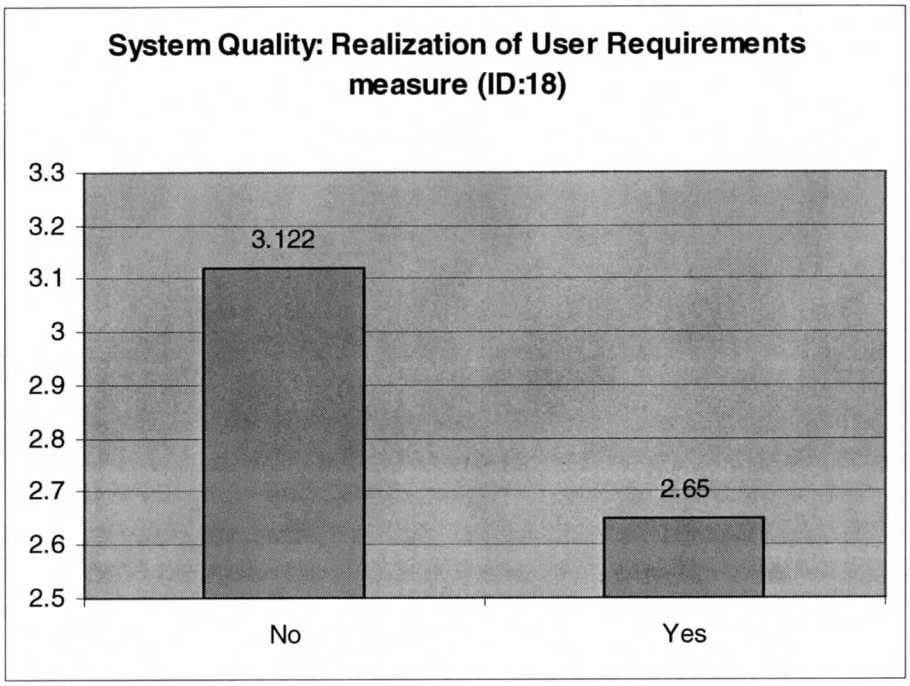

Figure 4.8: Hypothesis Chart: Staff Working on IS Projects finds Higher Realization of User Requirements

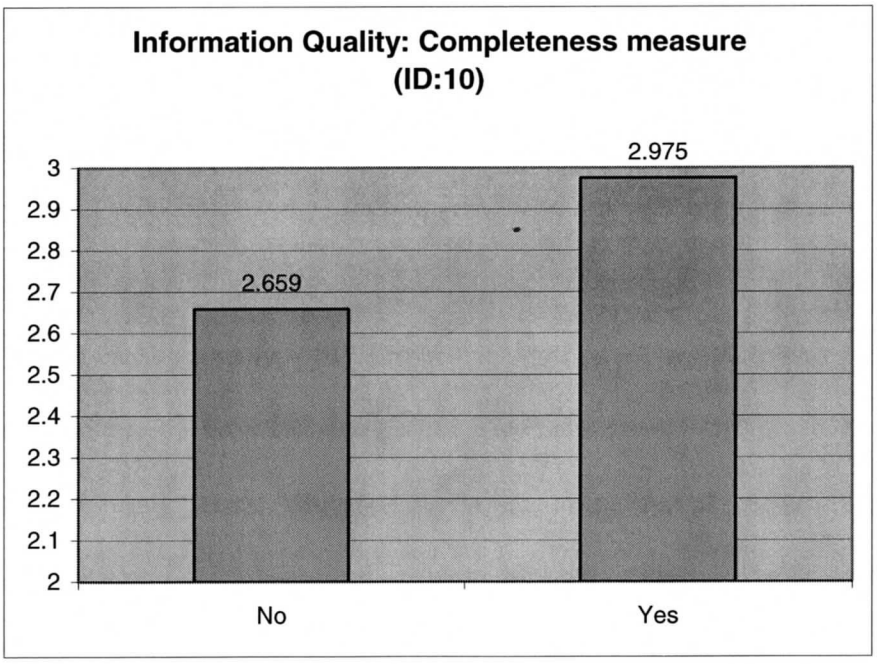

Figure 4.9: Hypothesis Chart: Staff Working on IS Projects find Data less Complete

Chapter 5 Conclusion

Discussion

The research and results from this case generated the following conclusions.

The DeLone and McLean Information Success Model with the appropriate selection of measures will provide a framework for measuring the effectiveness of IS. The 2003 version (see figure 2.3) appears to be the appropriate version due to the inclusion of Service Quality category. The research clarified the different methods for collecting the measures needed to make a complete and thorough evaluation of IS effectiveness. The model and supporting articles (DeL 92, DeL 03) help with what the right mix is between subjective and objective measures as well as to possible measures.

According to the users' perceptions, opportunity exists at Daktronics for improving the individual's work performance by having more complete data and integration.

The survey results validated the current EIS theme for architecture building with the underlying objective of being to address the integration and completeness of data to improve individual users work performance. The survey also verified that user participation in EIS projects makes a difference on acceptance due to better requirements as pointed out by Goodhue's article (Goo 95). The survey also gave a clear understanding that user perceptions in the area of having the same access whether at corporate or in an offices is not yet realized which is evident in the lower percentage of times the information systems are meeting the remote employees needs and simply the amount they use the systems as pointed out by Mathieson's article (Mat 01). Also, conveyed that management and non-management don't have the same perceptions of how accurate the data

is as pointed out by Seddon's article (Sed 98). Understanding the difference would be informative.

These findings lead to the following recommendations to Daktronics.

Recommendations for Daktronics

The DeLone and McLean IS Success Model from 2003 (see figure 2.3) would be a good starting point for developing a framework for measuring IS success. I would recommend that the IS leaders review the model and identify measures appropriate to get at the value of IS goals, themes. The use of demographics in the hypothesis led to interesting findings. Review the demographics to determine the right ones to capture. The correct mix of measures and demographics will create a solid base of information for analysis, especially with the time dimension being added. The value of the time dimension for analyzing trends make the upfront work of identifying the proper measures, demographics and correct/consistent phrasing of survey statements worthwhile.

Be careful of wording the statements in a manner that evokes response bias as I did in survey statement 14 by emphasizing particular words. Statements like number 17 are also in danger of creating response bias by simply being vague and true for all users without cost/benefit balance (i.e. the extreme being that if an IS person sat next to me all day that would save me 20 minutes everyday thus increasing my work performance). The point being the need is to create checks and balances within the survey statements. The following summarizes the survey enhancements recommended.

Survey Enhancements

- 7 point versus a 5 point scale. If I was to do the survey over today, the scale would be switched to a seven point scale where 'somewhat' agree or disagree would be added on each side of neutral/undecided. During follow-up interviews, some users told me they put undecided because they didn't fully agree (or disagree, if appropriate) but leaned that direction.
- Remove emphasis in statements. Do not use highlighting to emphasize particular words.
- Keep sentences poignant. One sentence was wordy. It had 40 words in it. Users expressed concern with the length of the sentence and confusion it caused them. Had to read it a couple times to try to understand.
- Improve wording of statements. Try not to use wording that encourages everyone to answer the same. For example, statement 17 asks if the user had better support would work performance improve. This is not quantifiable on either side. How much support for how much improvement. Need to come up with a better way to phrase this question.

In addition to the survey instrument, I make the following recommendations to IS leaders for the next (FY07) planning cycle.

- Identify appropriate **measures** of IS success. As a group, review table 2.1 to identify measures in the various categories that will identify if the work being done by EIS is effective and the resulting value from that.
- Identify appropriate **demographics**.
- Identify **how to trap** the measures. With the guidance provided about which measures provide the best analysis when obtained objectively, review what can be obtained reasonably via objective means (i.e. actual use measurements).

- For example, during user acceptance testing a survey can be given to get the measures for Intent to Use then followed up at a later date by looking at actual usage in the production environment.

- Additional research. Continue to research ways to better engage business leaders and users to participate in the governance of IS. Create the proper mix that maximizes value of IS for all employees and business units. A good starting point might be for the leaders to all read the IT Governance book by Weill (Wei 04).

Note to Daktronics staff: This document and supporting material are stored in the document management system under document number DP-05472. The format of this paper followed DSU graduate paper standards not Daktronics standards.

Recommendations for DSU

Doing this case study and the research surrounding it was a significant growth period for myself that showed me the value of learning proper research techniques and the use of professional/scholarly journals. The recommendation is to find more opportunities during the graduate program to include proper methods of researching and the value of having a professional/scholarly journal in your regular reading list. As a graduate degree prepares students for leadership positions that will require the student to address problems that have not previously been solved by their organization, having a strong base of researching will strengthen the individual's positive impact on the organization. Another lesson to point out is the weakness that I found in my skills for statistics. The importance is that statistics is used by the scholarly journals to validate their findings. I find it important to be able to understand the statistics being used to determine the validity of their approach. The graduate program ensuring the strength of

the candidates understanding of statistics would be positive. In my case, I have taken many years of mathematics (through Calculus 3). However, I had only ever taken one statistics course, which was during my first year of undergraduate course work. For this research to address my weakness in statistics, I sought assistance from a statistics expert. The expert that I sought was Chad Birger. Chad teaches statistics at the University of Sioux Falls. I knew Chad from the time that he worked at Daktronics in the EIS Applications group while pursuing his Master's in Mathematics from SDSU. Chad worked with me to explain the proper methods to use for my analysis. Dr. Christoph reviewed the statistical methods used, as well.

Thank You – Dr. Richard Christoph

I thank Dr. Christoph for putting this case on the right track by taking time to guide me in how to properly research and make a case. I also want to thank him for taking the time to review the materials of this paper.

Thank You – Carla Gatzke and Daktronics

I thank Carla Gatzke and Daktronics for permitting me to take employee time to perform the survey and subsequent interviews with staff. I would also like to thank Carla for her patience with me during this process and mentoring.

Thank You – Chad Birger

I thank Chad for taking the time out of his summer to explain statistics with me and help me review what methods to use for analyzing the survey results.

Thank You – Dr. Stephen Krebsbach

I thank Dr. Krebsbach for participating in reviewing this case and suggestions on how to improve the format.

About the Author

I, Vince Connelly, have been at Daktronics for eight years.

Note about appendices and included material

This material continues to evolve and improve as lessons are learned from industry best practices, our own experiences and addressing staffing issues like numbers, types of positions, and individual strengths. All of the material included has been created during the time the author was in the MSIS program at DSU. Being in the educational environment at the same time as addressing these issues helped contribute to the solutions shown. Each of the documents included in the appendix are the work of many people. I am just one of the contributors.

Education and Experience of Author

Accounting (A.S.) and USMC from 1993-1997. Completed by taking classes at night from Park University and University of Maryland while in the United States Marine Corps (USMC) working in two Military Occupational Specialties (MOS), Accounting Technician (MOS# 3451) and Computer Specialist (MOS# 4066). I joined the USMC contracted to be an accountant. After initial training (boot camp and combat training), I was sent to a six-week accounting technician course. Competition in the class was strong. Several people had been to college for accounting. One person had a bachelor's in accounting and joined the USMC with the long-term goal of joining the FBI. In the end, all that separated him and me was one point in the entire six

weeks. I was fortunate enough to be the one at the top of the class. At completion of the training, the military sent me to the Defense Accounting Office (DAO) at Camp Pendleton, California, USA and then a couple years later to a Comptroller office for III Marine Expeditionary Force (MEF) at Camp Courtney on Okinawa, Japan. The first two weeks at the first duty station (DAO) was pivotal for my evolution into the field of IS. The first week of training went well. The job was to fix errors in the accounting system. By the third day of the second week, I approached my mentor to let him know I completed the packet (that we got the first day of every week) and to see what else I could learn. He let me know that what I just completed is what we do all week every week. That dismayed me, since I would be there for two more years. By the end of that second week, a senior staff member approached me about the possibility of moving to the computers (IS) group. I jumped at the opportunity. Not because I knew anything about computers or had a real interest, but because it would be challenging. While in these roles, the impact of information systems on an organization became very apparent to me. I was and am fundamentally a businessperson that sees the importance Information Systems play in running any organization. The computer specialist was a new MOS in the military at that time. I obtained the MOS from on the job training (OJT) while working at the DAO. The IS group in the DAO focused on the Information Systems that supported USMC's use of the SABRS (Standard Accounting and Budgeting Reporting System) system for the western half of USA. I learned PC repair, networking (BANYAN VINES), an optical disk system, server administration, and impact of reporting distribution in support of a large-scale enterprise wide system. To assist with the job, the USMC sent me to industry BANYAN VINES network administrator training. At my second duty station in Okinawa, they awarded me the Navy and Marine Corps Achievement Medal for improving the management of a multi-million

dollar set of accounts through the use of Information Systems and supporting the offices computer needs. During this period, I started to form a belief in the value of combining both business and technical education. So after completing my military duty, I thought about pursuing computers further but was discouraged after visiting South Dakota School of Mines and Technology's Computer Engineering program. The program touted their high percentage of placement of their graduates outside of South Dakota. That discouraged me since I didn't want to be forced to leave South Dakota after college. So, I went a different route for the technical side.

Economics (B.S.) and Daktronics from 1997-2000. Upon leaving the military, I moved to Brookings, SD and completed this degree as a fulltime student at South Dakota State University while working in a student position (part-time) at Daktronics in the EIS department. I worked at Daktronics as a database report writer assisting with the transition to a new ERP system. During this period of education, I was pursuing a double major of Economics and Mechanical Engineering (ME). I did not finish the ME degree. I was half way when I decided to pursue the masters in IS, instead. I had been working in IS for six years by that point and realized my higher interest was in software and use of systems to manage an organization. This realization culminated while taking a computer programming course with fellow ME students. Several of them complained about the class while I loved the class with the play of logic based on rules. This class made me realize that I was pursuing ME for the wrong reason. My fundamental reason for taking the ME was that belief in combining business and technical education. My grades were fine but my passion was not there. That was the beginning of shifting my technical education to Information Systems. At this same time, DSU was starting the MSIS program. So as my undergrad education was coming to a close, I took my last undergrad final on a Friday in

May 2000. The following Monday was both my first day as a fulltime employee at Daktronics and my first class as a master's student. The next five years would be an amazing growth period for me and the group.

Information Systems (M.S.) and Daktronics from 2000-2005. This research paper is the culmination of this period's education and experience. In 2000, my focus at Daktronics was on database reporting and scheduling systems, which are commonly referred to as business intelligence tools. I assisted the business groups that had reporting needs. During this time, I worked with my boss to recommend a structure that placed staff in the business groups to assist their information needs. This structure continues to evolve to this day. From research found while working on this case, I hope to work with IS leaders to continue to improve the human infrastructure supporting IS needs of the organization. Having IS staff in the business groups focused on the business group's information and IS needs seems to be a good fit combined with the IS Support Matrix strategy covered in Appendix F.

In 2001, a student came on board to help me with database reporting. A few months later, an opportunity existed to take responsibility for the fledgling document management system. The administrator was leaving the company. I took the opportunity and added this to my responsibility for database reporting. The student carried most of the database reporting load this year while I focused on learning the document management system by attending administrator training on the application from the vendor and database administrator training from Oracle. During my first year with this system, we reviewed migrating engineering drawings to this platform. We decided to postpone another year. That was a good decision. That year was a significant learning curve for me about the system's capabilities.

In 2002, the student doing database reporting came on board as a fulltime employee focusing on the database reporting needs of the organization. This person had not only been my first student employee that I supervised, but now the first fulltime employee. This assistance freed more of my time to focus on the document management system. Later that same year, the person responsible for the contact management system, sales pipeline and support of the HR system was also moved over to me to assist with more of the daily administration of the document management system. At the end of this year, a staff member that supported our users of the contact management system while working on our help desk in the network services group was moved into my group. He transitioned to take over the contact management and sales pipeline systems. The old administrator now focused more on assisting with the document management system. This year, we did take on the engineering drawings migration project and went into production in summer 2003. Also that year and through 2003, the need to look at a new HR system was identified. The staff member focusing on database reporting had also taken on supporting the HR system. This staff member participated in the migration to the new HR system and supporting the Personnel department's needs during that first year.

In 2003 more transitions occurred, a student that had been doing web programming graduated. I made a case to open a fulltime position that we had a real need for and the student would fit. We opened the position and the student accepted. The position focused on integrating the document management system's web pages into our existing intranet. During that summer, the employee that was assisting with administrating the document management system accepted a position in a business group as a liaison with our IS group. Shortly after that, the document management administrator that had previously left the company in 2001 was in the job market again. So, I approached management about putting an offer together for this person. We did and he

accepted. He took the lead role as system administrator for the document management system. I shifted to focus more on our corporate intranet. In 2003, we also looked at enhancing our sales pipeline application. The system administrator and myself spent many hours discussing this system. He spent many hours following up with users to discuss their needs and tasks that they did surrounding the pre-order process. In the end, we approached management about scrapping the current pipeline application and starting over with an application that encompassed more of the overall selling process and support needs. Management agreed and the project started as 2003 was coming to an end with programming commencing in early 2004. Version 1 was released in time for the 2004 company summer seminar. As 2004 proceeded, I started to focus more on the company intranet. The lead web programmer was moved under me at that time. In the year prior to this, we had been collectively referring to ourselves as the Applications group. At this time, we officially referred to the group as the EIS Applications group and I was now responsible for that group. We gathered ourselves and developed our mission statement as seen in Appendix C. At this point in early 2004, we were six fulltime and a handful of students. As we moved into the spring/summer, we added two more fulltime positions, a third web programmer and our first technical writer position to help with documentation needs and promoting the document management system. As we proceeded with 2004, we continued to run into shortcomings on our intranet projects due to limitation with our current web development platform and skills. We tackled these issues and the result was the proposal that included moving to a new platform, restructuring the group, and rewriting the intranet (see Appendix I for the actual proposal). The proposal was made to and accepted by management in late 2004 (see Appendix D for the resulting organization structure). Since then, the group has been restructuring, training and starting to rewrite the intranet. One of the objectives of the

restructuring was to align with the engineering software groups, which we have. Benefits from this alignment are already starting. Appendix J shows a proposal that the software leaders will be making to management about how the software groups are organized and structured.

The point to this section is that all of this transpired during the time I was in the MSIS program at DSU. Lessons learned while in the DSU program fueled and enhanced the quality of work being completed at Daktronics. Conversely, the experience at work allowed for more lively interaction on topics being covered in school. By having the two experiences in parallel, it is hard for me to imagine that my experience and education could have grown any faster during this same five-year period.

Glossary

Source: Dictionary.com, Answers.com or Daktronics Dictionary

EIS (Enterprise Information Systems)

More or less any kind of computing system that is of "enterprise class". This means typically offering high quality of service, dealing with large volumes of data - capable of supporting some large organization ("an enterprise"). An Enterprise Information System would typically be operated by professional system administrators and be deployed on dedicated servers. It would typically offer network connectivity and provide services that supported the operations carried out by the enterprise.

In this context, EIS is the entity (department) within Daktronics that supports all IS needs for the organization.

hypothesis

A tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation.

Information System (IS)

(1) System consisting of the network of all communication channels used within an organization.

(2) A business application of the computer. It is made up of the database, application programs and manual and machine procedures. It also encompasses the computer systems that do the processing.

In this context, Information Systems are the enterprise level applications used at Daktronics that allow employees to do their work electronically. See Appendix E for guidance given to the people completing the "Survey of Information Systems" at Daktronics.

null hypothesis

In statistics, a null hypothesis is a hypothesis that is presumed true until statistical evidence in the form of a hypothesis test indicates otherwise.

objective

(1) Of or having to do with a material object.

(2) Uninfluenced by emotions or personal prejudices.

(3) Based on observable phenomena; presented factually

p-value

In statistical hypothesis testing, the p-value of a random variable T used as a test statistic is the probability that T will assume a value "at least as extreme" as the observed value, given that a null hypothesis being considered is true. "More extreme" would mean less favorable to the null hypothesis; in some cases that means greater than, in some cases less than, and in some cases further away from a specified center.

In other words, assume that a simple null hypothesis is rejected if a test statistic T exceeds a critical value c.

The p-value does not depend on unobservable parameters, but only on the data, i.e., it is observable; it is a "statistic." In classical frequentist inference, one rejects the null hypothesis if

the p-value is smaller than a number called the level of the test. In effect, the p-value itself is then being used as the test statistic. If the level is 0.05, then the probability that the p-value is less than 0.05, given that the null hypothesis is true, is 0.05, provided the test statistic has a continuous distribution. In that case, the p-value is uniformly distributed if the null hypothesis is true.

In this context, the p-value of significance is $p < 0.1$. When $p < 0.1$, the null hypothesis can be rejected and a significant difference exists within a demographic. However If the p-value is $p > 0.1$, then the result is failure to reject the null hypothesis. For all of the p-values in this study, see table F.3.

response bias

Response bias can affect survey results if respondents answer questions in the way they think the questioner wants them to answer rather than according to their true beliefs. This may occur if the questioner is obviously angling for a particular answer (as in push polling) or if the respondent wishes to please the questioner by answering what appears to be the morally 'right' answer. An example of the latter might be if a woman surveys a man on his attitudes to domestic violence, or someone who obviously cares about the environment asks people how much they value a wilderness area.

self-efficacy

An individual's estimate or personal judgment of his or her own ability to succeed in reaching a specific goal.

In this context, self-efficacy is the indvidual's judgment about the their own ability to succeed at using an information system.

subjective

Existing only within the experiencer's mind.

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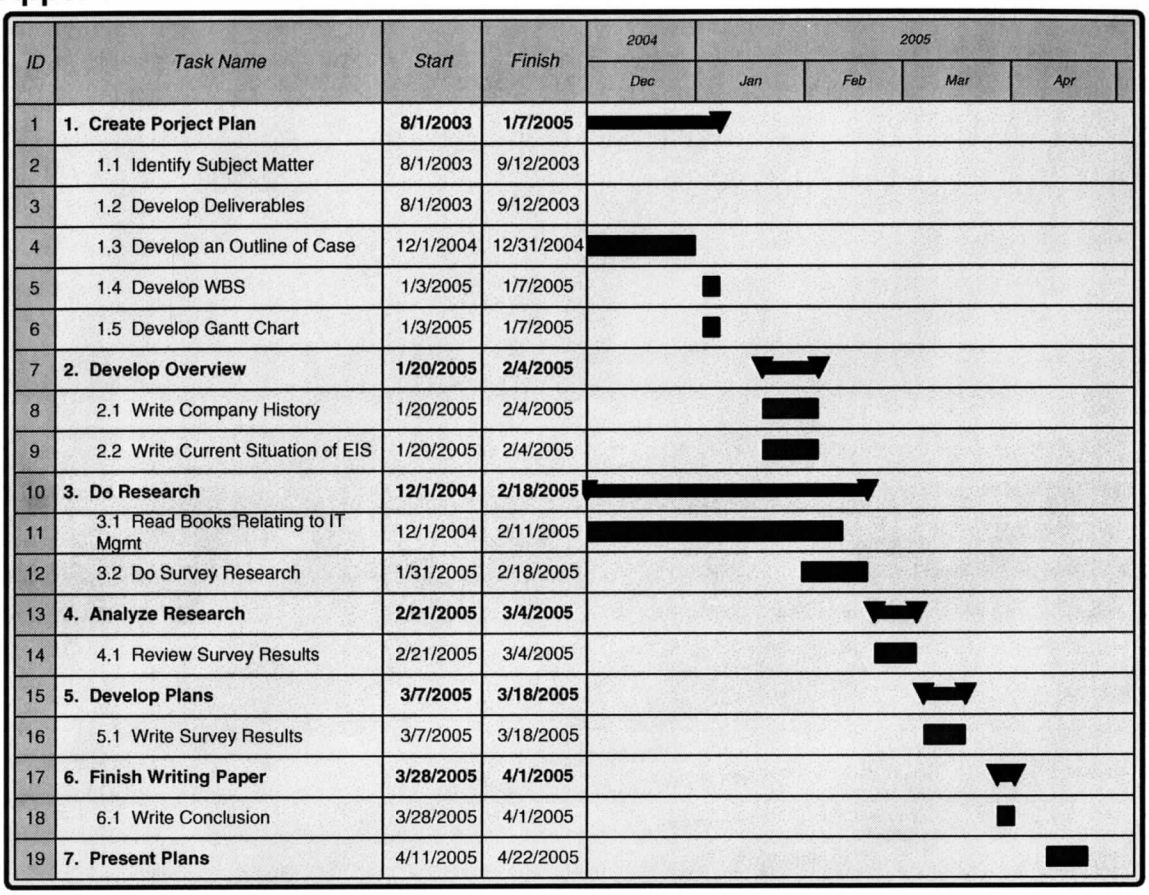
Appendix A: Work Breakdown Structure (WBS)

1. Create Project Plan
   1.1. Identify Subject Matter
   1.2. Develop Deliverables
   1.3. Develop an Outline of Case
   1.4. Develop WBS
   1.5. Develop Gantt Chart
2. Develop Overview
   2.1. Write Company History
   2.2. Write Evolution of EIS Applications Group
   2.3. Write Current Situation of EIS Applications Group
3. Do Research
   3.1. Read Books Relating to IT Management
   3.2. Do Survey Research on Success of Information Systems
4. Analyze Research
   4.1. Review Survey Results
5. Develop Plans
   5.1. Write Survey Results
6. Finish Document
   6.1. Write Conclusion
7. Present Plans

Appendix B: Gantt Chart



ID	Task Name	Start	Finish
1	**1. Create Porject Plan**	**8/1/2003**	**1/7/2005**
2	1.1 Identify Subject Matter	8/1/2003	9/12/2003
3	1.2 Develop Deliverables	8/1/2003	9/12/2003
4	1.3 Develop an Outline of Case	12/1/2004	12/31/2004
5	1.4 Develop WBS	1/3/2005	1/7/2005
6	1.5 Develop Gantt Chart	1/3/2005	1/7/2005
7	**2. Develop Overview**	**1/20/2005**	**2/4/2005**
8	2.1 Write Company History	1/20/2005	2/4/2005
9	2.2 Write Current Situation of EIS	1/20/2005	2/4/2005
10	**3. Do Research**	**12/1/2004**	**2/18/2005**
11	3.1 Read Books Relating to IT Mgmt	12/1/2004	2/11/2005
12	3.2 Do Survey Research	1/31/2005	2/18/2005
13	**4. Analyze Research**	**2/21/2005**	**3/4/2005**
14	4.1 Review Survey Results	2/21/2005	3/4/2005
15	**5. Develop Plans**	**3/7/2005**	**3/18/2005**
16	5.1 Write Survey Results	3/7/2005	3/18/2005
17	**6. Finish Writing Paper**	**3/28/2005**	**4/1/2005**
18	6.1 Write Conclusion	3/28/2005	4/1/2005
19	**7. Present Plans**	4/11/2005	4/22/2005

Appendix C: EIS Applications Group's Mission Document (DP-04354)

Rev 01

EIS Applications

Rev Date: 09-June-2005

Mission Statements

Daktronics Company: To be the world leader at informing and entertaining people through dynamic visual communication systems.

EIS Department: To facilitate company growth with profits by providing technology solutions that meet business objectives.

EIS Apps. Group: To facilitate business objectives and EIS mission by evaluating, developing, implementing and supporting enterprise applications.

EIS Themes

FY06 – Platform Building (Architecture)
FY05 – Integration
FY04 – Seamless Connectivity
FY03 – Security
FY02 – Connectivity
FY01 – Stability

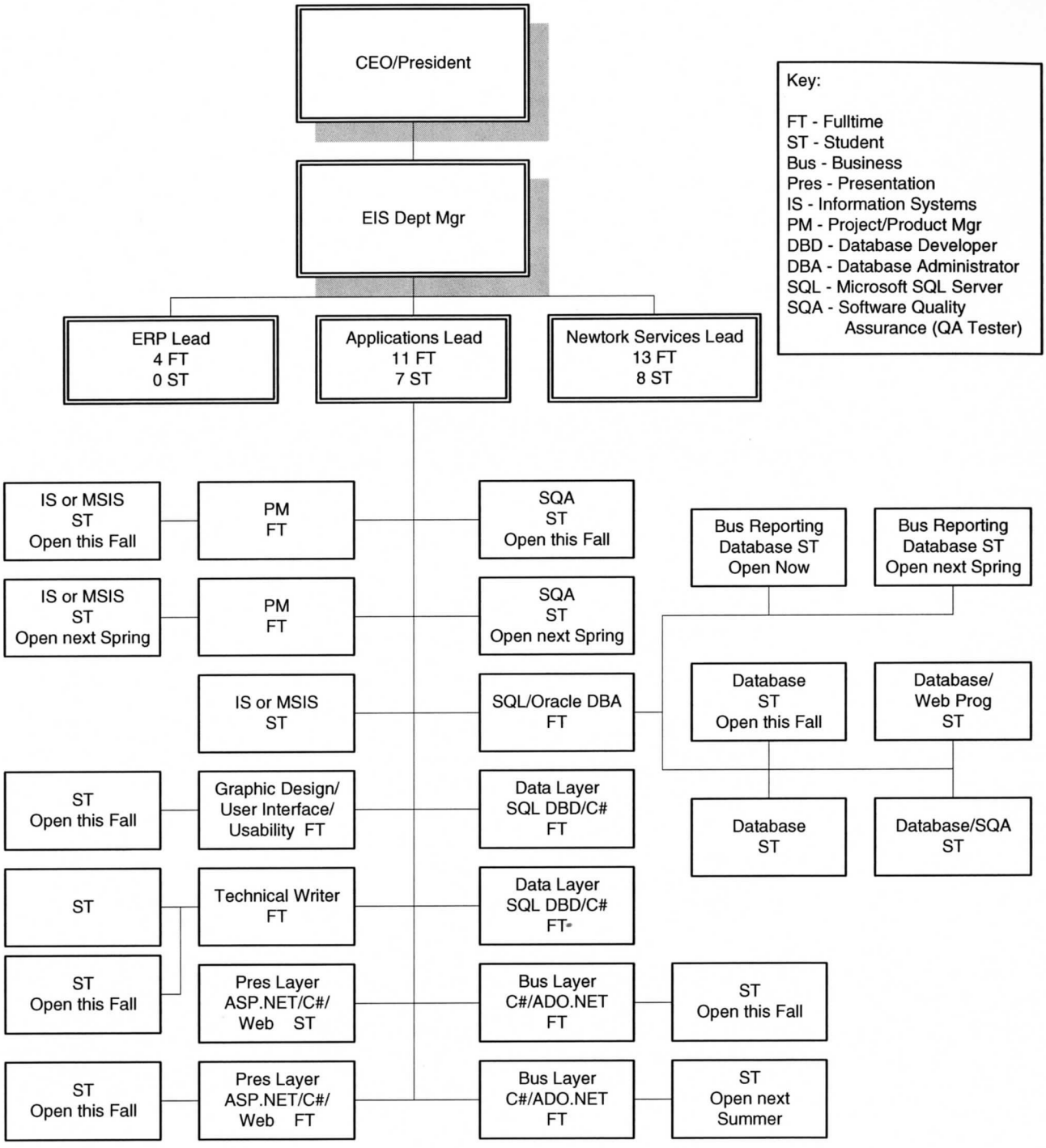
EIS Philosophy/Governance

- Server and Infrastructure: Available, recoverable, fast.
- Applications: Meet our needs now and in foreseeable future. Exploit fully. Do not purchase 'would be nice' tools. Use vendors for customizations. Update within one year of current release, except 2 years for Glovia and wait as long as possible for Windows and Office. Cover with warranty and maintenance.
- Clients: Fast enough for user tools. Trickle down. Legal on licenses.
- Security: Information is available when/where needed but not beyond.

EIS Apps. Supporting Statements

1. To be **service oriented** and seek opportunities.
2. To evaluate and document business processes and solution alternatives.
3. To develop and/or implement solutions that are scalable, supportable, standardized, and user-friendly.
4. To promote, educate, and champion applications to ensure that they are fully exploited and consistently used.
5. To develop and improve skills for personnel in and out of the group.
6. To support and maintain applications via upgrades and to seek feedback to fuel continuous improvement.

Appendix D: EIS Applications Group's Organization Chart



Appendix E: EIS Applications Group's Software Development Life Cycle (SDLC) (DP-04502)

Note: These are living documents that change as better practices are found and staffing numbers grow that better allow for specialization.

Left Half of SDLC – Overview with People

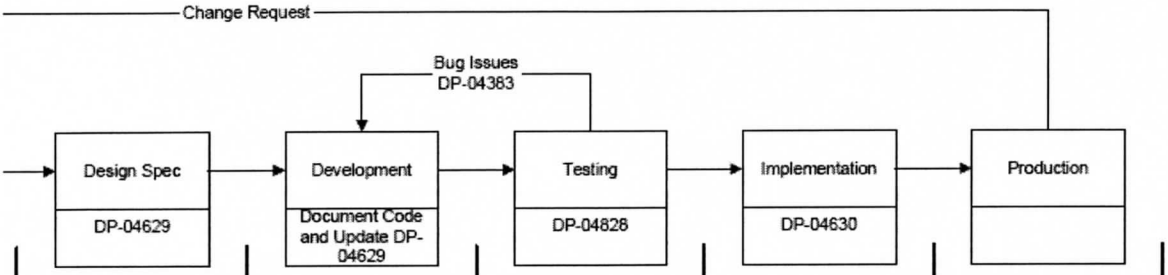
EIS Applications - Software Development Lifecycle -

Skill Groups	Role (People)	User Request DP-04381	Scope DP-04382	Requirements Spec DP-04503
	Sponsors & Users	Submit a new or change request.	Assist with defining scope.	Assist with defining requirements.
	EIS Leader (VC, KS, CG, TK)	Reviews. Then assigns Proj. Mgr., rejects or puts on backlog.	Carla Review/Approve.	Involved in timeline and approval.
PMs	**Product Mgr.** (RB, LL, BV, MC, KS)		Review/Approve.	Review/Approve.
PMs	**Project Mgr.** (RB, LL, BV, KS, JG, VC)		Works with sponsors to define and write the scope.	Organizes teams, gathers requirements and writes spec.
TW/Graphics	**TW/MKTG/Graphics** (JG, MC)		Sit in on scope approval to get overview.	Assist with renderings, writing, ensure standards, considering training needs.
Programmers	**Presentation Layer** (DR, CB)		Involved if a blatant feasibility issue exists, to save time.	Involved to the point of ensuring timelines are accurate and requirements are feasible
Programmers	**Business Layer** (GU, SK, AM)		Involved if a blatant feasibility issue exists, to save time.	Involved to the point of ensuring timelines are accurate and requirements are feasible
Programmers	**Tester/QA** (CL, JM, AM)			
Database Staff	**Data Layer/Model** (JM, CL, MH, GW)		Involved if a blatant feasibility issue exists, to save time.	Involved to the point of ensuring timelines are accurate and requirements are feasible
Database Staff	**DataBase Report Writer** (MH, BW)			Involved to the point of ensuring timelines are accurate and requirements are feasible
	Additional Resources (Vendor, Networking, ...)		Involved if a blatant feasibility issue exists, to save time.	Involved if needed or requirements affect (should sign if on critical path).

Right Half of SDLC – Overview with People

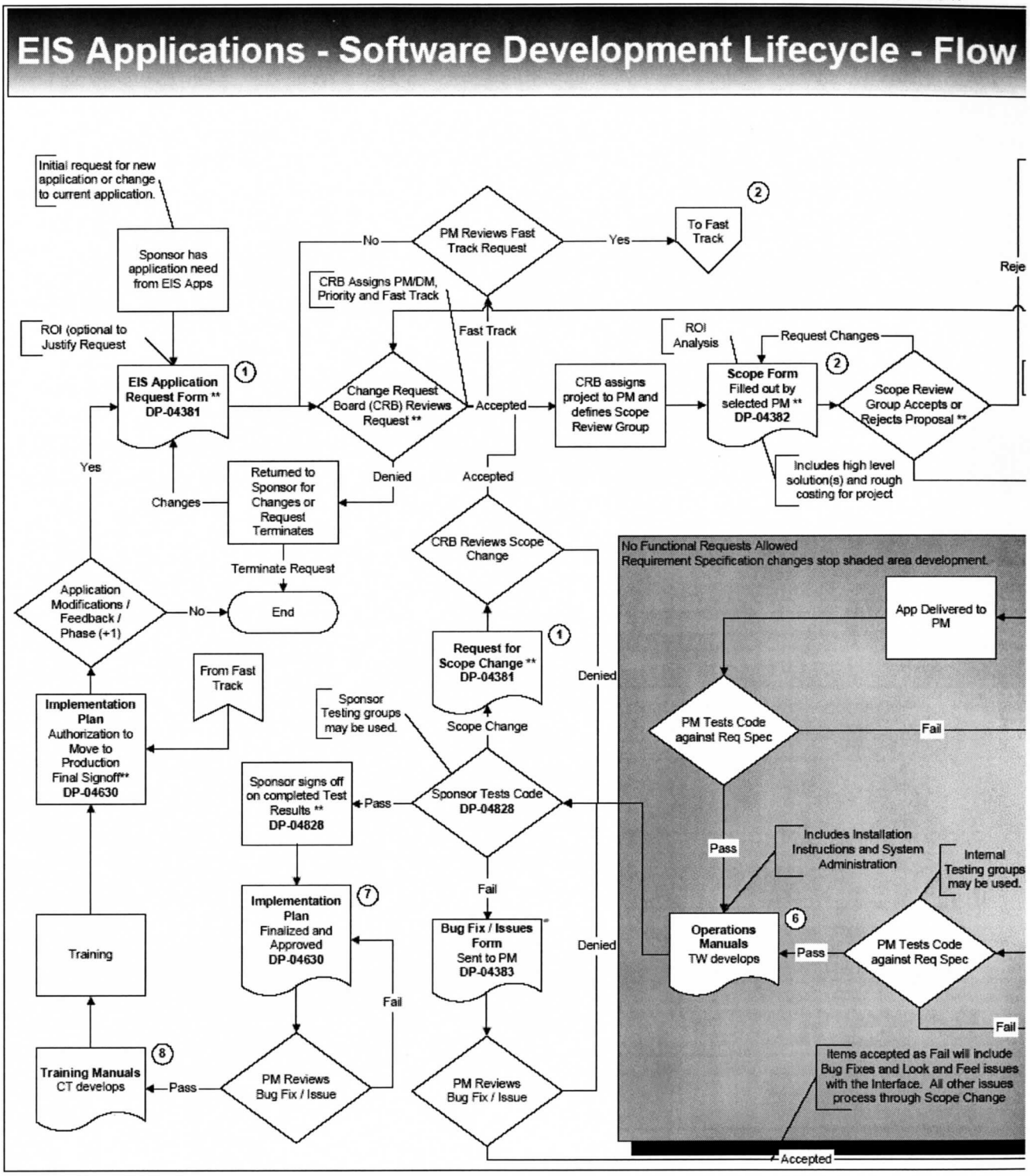
Overview with People

Wednesday, August 10, 2005
Revision 00
DP-04502

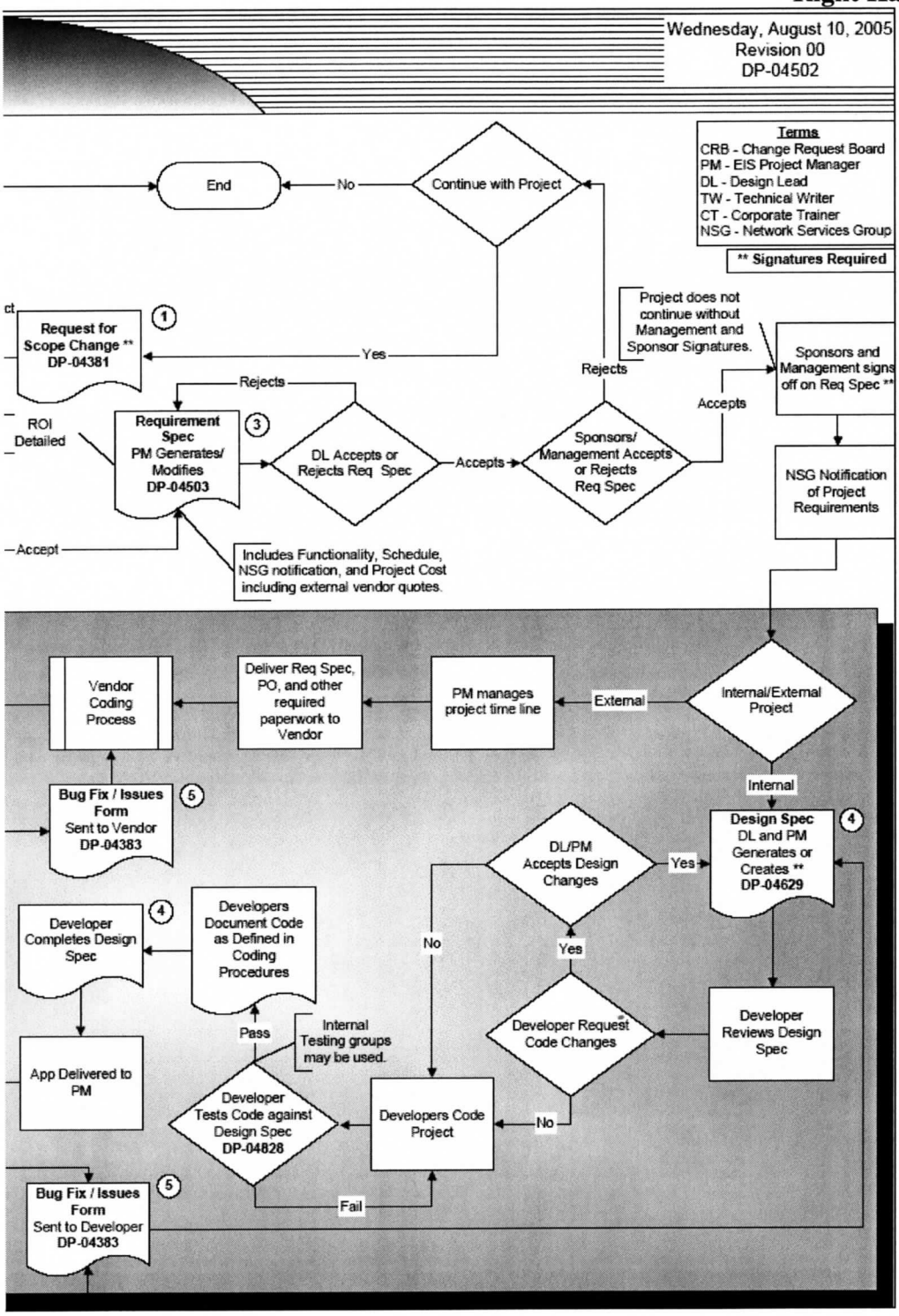


		Does user testing and provides acceptance.	Approve Timeline.	
Review/Approve.		Review/Approve.		
Review/Approve.		Review/Approve.	Review/Approve.	Responsible for operations, bugs, promotion, acceptance.
Organizes teams and works with development staff on writing design spec.	Organizes teams and manages timelines.	Organizes teams and ensure proper testing is done.	Review/Approve. Hand off from Proj. Mgr. to Prod. Mgr.	
Assists as needed.	Help Screens.	Usability testing and traking material (Help screens, manuals, MKTG).	MKTG of system and training as appropriate.	Usability test if requested by Prod. Mgr.
Leads on writing the spec and timeline.	Develop.	Does appropriate level of testing before giving to QA testers.		
Leads on writing the spec and timeline.	Develop.	Does unit level testing to prepare for QA testers.		
Involved in writing what tests will need to be performed.	Preparing testing plans.	Does testing. Then Approves before PM and User testing begins. Continues to test as bug fixes are done.		
Leads on writing the spec and timeline.	Develop.	Test as appropriate. Put in sample data as appropriate.		
Reviews reporting needs and includes in spec and timeline.	Creates reports as appropriate.	Runs created reports and creates reports needed to validate testers.	Prepare reports to go live.	Create additional reports as needed.
As needed.	As needed.			

Left Half of SDLC Flow



Right Half of SDLC Flow



Appendix F: IS Support Matrix Strategy (DP-06834)

This appendix shows the matrix support model that EIS department at Daktronics is using to align system administrators with functional groups to encourage championing across Information Systems. The objective being to encourage standards across systems, tighter integration, better structure of data, and system administrators that champion user groups (i.e. functional groups) regardless of system. The objective is to get away from the 'silo' approach to system administration.

Data Management Infrastructure

Appendix A: EIS – Corporate Applications Support Strategy Matrix

This table shows the matrix structure of EIS Systems and functional groups supported. The matrix alignment of EIS staff is critical to ensuring application integration and championing of both systems and groups of people requiring systems.

System / Functional Area	Glovia (KS)	DakPipe (RB)	Maximizer (RB)	DakDocs (BV)	Adobe (MC)	WWW (JG)	DakInfo (Vince Connelly)	UltiPro (LL, JM)	DakTime (LL, JM)	Cognos Finance (KS)	Cognos Impromptu (MH)	MS OLAP/SQL Server (JM)	Visual SourceSafe (DR)
Engineering (BV)	x			x	x		x	x	x		x	x	
Sales/ Product Mgrs (RB)	x	x	x	x	x	x	x	x	x		x	x	
HR/Personnel/ Admin (LL, JM)	x			x	x	x	x	XX	x		x	x	
Customer Service (CG)	x	x	x	x	x	x	x	x	x		x	x	
Accounting (KS)	x	x		x	x		x	x	x	x	x	x	
Marketing (MC/ JG)	x	x	x	x	x	x	x	x	x		x	x	
Tech Writers (MC)	x	x		x	x	x	x	x	x		x	x	
Graphics/ Keyframe (JG)	x	x		x	x	x	x	x	x		x	x	
Software Eng (DR/GU)	x			x	x		x	x	x		x	x	x
Project Mgmt (Vince Connelly)	x	x	x	x	x		x	x	x		x	x	
Purchasing (KS)	x	x		x	x		x	x	x		x	x	
Manufacturing (KS)	x	x		x	x		x	x	x		x	x	

DAKTRONICS DP-06834 PAGE 4 of 4
Revised by: Vince Connelly
Rev 00 13-Apr-2005

Appendix G: Survey Form (DP-07432)

Survey of Information Systems

Mailroom: Please route results to Vince Connelly in EIS

Information Systems (IS): includes all of the enterprise applications that we use at Daktronics to do our work electronically. These systems include **Glovia** (Enterprise Resource Planning system), **DakInfo** (corporate intranet), **DakTime** (timesheet entry), **DakPipe** (pre-order tracking), **Maximizer** (contact mgmt system), **DakDocs** (document mgmt), **Cognos** (database reporting), **GroupWise** (email system)...

1. List the three information systems that you use most frequently, in order of most used.

   1._____ 2._____ 3. ._____

For statements 2-21, please **check** the box that most accurately reflects your opinion:

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	
					2. Information systems are critical to my work performance and efficiency.
					3. EIS delivers the information systems that I need to do my work.
					4. The information systems are intuitive and easy to use.
					5. I know which information system contains the data I need.
					6. Getting data into the information systems is easy and has few barriers.
					7. Data stored by our information systems is critical to my decision making.
					8. Data stored by our information systems is accurate.
					9. Data stored by our information systems is timely.
					10. Data stored by our information systems is complete.
					11. If data were more accurate, timely and/or complete, my work performance would improve.
					12. I enter the same data in more than one system to support our data needs.
					13. I can easily get data from information systems.
					14. The time it takes to gather data to make an informed decision is **too long**.
					15. I know whom to contact to get data from information systems.
					16. The support I get for information systems allows me to perform my work at a high level.
					17. If I had better support on information systems, my work performance would improve.
					18. I am properly informed and trained on new information systems and features.
					19. I use information systems to plan my day.
					20. Our current information systems are well integrated. (I don't have to go to multiple systems to do my work.)
					21. I see more value in information systems that work together and allow users to easily move between the systems than to have 'best of breed' systems that provide the best features but don't or poorly integrate with the other systems.

22. What system improvement would have the most impact on your work performance?

DAKTRONICS DP-07432

PAGE 1 of 2

Revised by: Vince Connelly
Rev 04 30-June-2005

Survey of Information Systems

Mailroom: Please route results to Vince Connelly in EIS

For the remaining, **circle** the answer that most appropriately completes the statement.

23. Security is _____ than ease of use.

1	2	3	4	5
More Important		Equally		Less Important

24. Creating a single complete view of information (for example: customer info) is _____ than ease of individual groups keeping their portion of information separately.

1	2	3	4	5
More Important		Equally		Less Important

25. My data needs are met by our information systems ____ of the time.

100% 75% 50% 25% 0%

26. I use information systems ____ of my day.

100% 75% 50% 25% 0%

27. I am most concerned with data in the following area:

A. Customer B. Product C. Project D. Vendor E. Cost Acctg/Inventory F. Other

28. My key decision maker is:

A. Gross Profit B. Cost C. Quality D. Growth/Volume E. Other

29. I work the majority of time out of:

A. Corporate Office B. Regional Office C. A Hotel D. My Home E. Other

30. I have worked in my field for:

A. Less than 2 Years B. 2 – 5 years C. 5 – 10 years D. 10 or more

31. I have worked at Daktronics for:

A. Less than 2 Years B. 2 – 5 years C. 5 – 10 years D. 10 or more

32. I work in the following capacity at Daktronics:

A. Manufacturing/Operations B. Engineering C. Sales/Service D. Graphics/Animation/Mktg E. Administration

33. I work in the following business unit at Daktronics:

A. Business/Commercial B. Transportation C. Sports D. Video/Keyframe E. Other

34. My level of management is:

A. None B. Supervise Student(s) C. Supervise FT D. Lead group and report to Dept Mgr
E. Dept/Office Mgr F. Executive

35. I have worked with EIS on an information systems project in the last year:

A. Yes B. No

36. I consider my level of understanding for computer systems to be:

1	2	3	4	5
Very Strong		Moderate		Very Weak

Name: _____ Dept #: _____

Appendix H: Survey Results and Calculations

ID	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q23	Q24	Q25	Q26
S1	1	2	4	2	2	2	3	2	2	1	3	2	2	4	2	1	2	2	4	1	3	1	2	2
S2	1	1	2	2	2	3	3	2	2	2	4	2	4	3	2	4	2	2	2	2	1	3	1	1
S3	1	2	2	2	4	3	4	4	4	2	2	4	2	2	3	2	3	3	5	1	3	1	2	2
S4	1	2	2	4	4	2	4	4	4	2	2	4	2	4	4	4	4	2	4	2	3	1	3	2
S5	1	2	2	2	4	2	3	3	4	2	4	5	2	2	2	2	2	4	4	2	4	5	2	2
S6	2	2	2	2	2	2	2	2	2	3	4	2	4	3	2	3	3	2	2	2	3	3	2	1
S7	1	2	2	2	3	2	2	3	2	1	3	2	3	2	2	2	3	2	2	2	3	3	2	4
S8	1	1	1	2	3	1	1	1	1	3	3	1	4	4	1	4	3	4	1	1	3	1	1	2
S9	2	2	2	2	2	2	4	2	4	2	3	2	2	2	2	3	4	1	4	2	3	3	2	4
S10	2	2	4	4	2	2	2	2	2	1	4	4	2	4	3	2	5	1	2	2	1	2	3	2
S11	2	2	4	4	3	3	5	5	5	2	2	3		5	3	2	3	5	3	2	4	3	4	4
S12	2	2	4	2	4	2	1	1	1	1	2	3	4	1	2	1	4	4	4	1	3	1	2	4
S13	2	4	4	2	3	2	4	2	4	2	3	4	2	2	4	4	2	5	5	2	5	3	4	3
S14	1	2	2	3	3	3	2	2	3	2	4	2	4	2	2	2	4	2	2	2	1	1	3	4
S15	1	2	2	3	2	2	2	2	2	3	4	3	3	2	2	3	3	2	2	2	3	1	2	2
S16	2	3	3	2	3	2	3	4	3	1	2	3	3	3	3	2	3	2	4	1	2	2	2	3
S17	2	4	4	2	4	2	5	4	5	2	1	3	2	5	4	1	5	4	5	1	5	1	3	2
S18	1	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	4	2	2	3	3	2	2
S19	1	2	2	3	3	2	4	4	4	1	2	3	1	3	3	2	2	4	3	1	4	1	3	4
S20	1	2	3	3	3	1	3	4	1		3	3	3	2		1	3	2	3	4	3	1	3	3
S21	2	3	2	2	3	2	3	3	3	2	3	2	3	2	2	4	2	3	2		3	3	2	4
S22	1	2	2	2	2	1	2	2	2	1	3	2	3	2	2	3	2	4	3	1	3	3	2	3
S23	1	2	1	3	2	1	1	2	1	3	1	3	5	1	1	2	5	4	2		3	1	1	1
S24	1	2	2	2	2	2	4	2	4	1	2	2	4	2	4	1	2	2	2	1	1	5	2	3
S25	1	1	1	1	1	1	2	2	2	1	3	1	4	1	1	2	1	1	2	1	2	3	2	3
S26	1	4	4	2	4	4	4	2	4	2	3	5	4	2	4	2	4	4	5	3	3	3	4	2
S27	1	2	2	4	3	3	3	3	3	2	2	3	2	4	3	3	4		2	1	3	2	2	2
S28	1	1	1	3	3	1	2	2	2	1	1	3	2	2	2	3	4	1	3	1	3	1	2	3
S29	1	1	2	2	2	1	3	2	4	1	1	3	3	4	3	2	4	5	4	1	5	1	2	4
S30	1	1	1	1	2	1	2	2	2	2	3	2	4	2	3	1	1	1	2	1	3	3	2	3
S31	1	2	2	3	4	2	3	3	3	1		3	3	4	3	2	4	2	4	1	3	1	2	3
S32	1	2	3	3	2	2	2	2	3	1	3	4	3	2	2	2	3	3	3	3	3	3	2	2
S33	2	2	2	2	2	2	2	3	3	3	4	2	3	2	3	3	2	4	2	2	4	1	2	1
S34	1	2	2	3	4	2	2	2	2	2	4	3	2	2	2	3	4	2	2	2	2	3	2	3
S35	1	2	2	2	3	3	2	2	2	3	1	2	3	2	2	4	2	2	4	1	3	3	1	2
S36	1	2	5	4	3	2	3	3	3	1	1	5	2	3	3	2	5	2	4	3	3	1	4	3
S37	1	2	2	2	3	1	2	2	3	1	2	2	3	2	1	4	3	2	4	1	2	3	2	1
S38	1	3	2	1	3	1	1	2	3	1	4	4	1	5	5	1	2	1	3	1	3	1	3	2
E39	1	1	2	2	3	1	3	3	4	1	1	4	2	3	2	1	3	1	5	1	2	2	2	1
E40	2	2	2	1	3	4	2	2	2	1	4	4	3	2	2	2	3	1	4	4	4	3	2	3
E41	2	2	3	2	3	2	3	3	3	2	1	2	2	2	3	2	3	2	4	2	2	1	2	2
E42	1	4	5	1	4	2	2	2	2	2	1	5	2	4	4	2	2	2	5	2	3	1	2	1
E43	1	2	3	2	2	2	2	2	2	1	1	2	2	2	2	1	2	1	4	3	3	1	2	2
E44	1	2	3	1	4	1	3	3	3	1	4	4	4	3	3	3	3	1	4	3	5	3	3	2
E45	1	1	2	1	2	2	2	2	3	3	4	2	4	2	1	5	2	5	1	1	3	1	2	2
E46	1	1	2	1	2	1	2	2	3	1	3	4	4	1	1	1	2	1	2	1	3	1	2	2
E47	1	1	4	4	4	2	2	2	2	3	2	4	4	2	4	4	3	1	4	2	3	3	2	2
E48	1	3	4	2	4	5	4	3	5	1	2	4	3	3	2	3	3	4	5	3	3	3	3	4
E49	1	3	3	2	3	1	2	3	3	2	2	2	1	4	3	1	3	2	5	3	3	1	2	2
E50	1	2	5	3	5	1	3	2	4	1	1	5	1	4	4	1	4	4	4		5	3	4	3
E51	1	2	4	3	4	1	2	4	3	1	3	4	2	4	3	2	4	2	4	2	4	4	4	2
E52	1	2	4	4	3	1	2	3	3	1	1	3	2	2	2	3	1	3	4	1	3	1	2	2
E53	1	2	2	3	4	2	2	2	3	2	2	4	2	4	4	2	4	2	4	2	3	1	2	3
E54	1	3	3	2	2	1	2	2	4	1	3	4	2	2	2	3	2	2	4	3	3	3	2	3
E55	1	2	2	1	2	2	2	2	2	2	3	2	4	3	2	4	2	3	4	3	2	3	2	2
E56	1	1	2	2	5	2	2	4	3	1	4	5	3	2	4	2	4	2	3	3	3	3	2	1
E57	1	2	2	2	3	2	2	3	2	1	4	3	3	2	3	2	4	1	4	2	2	2	3	2
E58	2	2	3	3	4	2	3	2	2	2	1		3	3	3	3	2	3	4	1	4		2	3
E59	1	2	3	2	3	2	3	3	3	1	1	3	3	4	3	2	4	2	5	3	3	3	2	2
E60	1	4	2	1	2	1	3	3	3	2	1	3	3	3	2	2	4	1	3		3	1	2	2
E61	1	2	2	2	3	2	2	2	2	3	3	3	3	2	2	3	3	2	3	2	3	3	2	3
E62	1	2	2	2	2	1	3	2	3	2	1	2	3	2	1	4	2	1	4	3	3	1	2	1
E63	1	1	1	1	1	1	1	1	2	2	4	1	4	1	1	2	2	1	2	1	3	1	1	2
E64	2	3	4	2	3	1	2	3	3	1	4	4	2	4	3	2	4	2	4	2	3	3	2	4
E65	2	2	3	2	3	2	2	2	2	3	2	2	3	2	2	3	3	3	3	3	4	4	3	4
E66	1	1	3	2	3	2	2	2	3	3	4	2	4	2	2	3	4	2	3	2	3	3	2	4
S67	1	2	2	2	2	2	2	2	2	3	2		4	4	2	2	2	2	4	3	5	1	2	2
E68	1	2	3	1	3	1	1	4	3	1	1	2	1	1	2	1	1	1	4	1	3	1	3	3
I69	2	3	3	2	4	1	3	3	4	2	2	2	3	2	2	3	2	2	4	2	3	2	2	2
E70	1	1	3	2	2	1	2	3	3	2	4	4	1	2	2	2	3	2	4	3	5	2	3	4
E71	1	2	3	2	2	2	4	3	4	2	2	3	3	2	3	2	3	2	4	1	3	1	2	3
E72	1	2	4	2	3	1	4	2	3	1	1	3	2	2	3	1	2	1	4	2	3	3	3	3
E73	1	2	2	2	3	2	2	2	2	2	4	2	4	2	2	3	2	4	4	2	1	2	2	4
E74	1	2	2	2	3	1	2	3	3	1	2	2	2	2	2	1	3	2	3	2	3	1	2	1
E75	2	2	2	1	3	2	4	2	4	2	5	2	4	2	2	3	2	4	2	2	1	1	2	4
E76	1	2	2	2	3	2	2	2	2	2	2	3	2	4	3	2	3	2	3	2	3	1	2	3
E77	2	2	4	2	3	2	2	3	3	2	4	3	3	4	2	3	3	2	3	3	3	1	2	2
I78	1	2	3	4		1	3	3	3	1		4	2	5	3	2	2	1	4	1	4	1	3	2
I79	1	1	1	2	3	1	2	2	2	1	3	2	2	1	2	1	2	1	3	2	4	3	2	2
I80	1	2	3	2	2	1	1	2	1	1	4	2	2	2	2	2	2	2	2	2	3	2	2	2
I81	1	2	3	3	3	1	2	2	4	3	5	4	3	2	1	4	4	4	4	2	3	1	2	3
Sample Size	81	81	81	81	80	81	81	81	81	80	79	79	80	81	80	81	81	80	81	77	81	80	81	81
Mean	1.2222	2.037	2.6049	2.2099	2.8875	1.7778	2.5062	2.5062	2.8148	1.7125	2.6076	2.9494	2.7875	2.6173	2.4625	2.358	2.8889	2.3625	3.3704	1.9091	3.0494	2.0375	2.2716	2.5185
Standard Deviation	0.4183	0.7322	0.996	0.8324	0.8418	0.7906	0.9236	0.7925	0.9501	0.7325	1.1812	1.0365	0.9506	1.0673	0.8993	0.9913	1	1.1933	1.0422	0.8141	0.9341	1.0843	0.6894	0.9369

Table H.1 Survey Results with Sample Size, Mean and Standard Deviation

	A	HP	HQ	HS	HT	HW	HX	HY	HZ
1	ID	Q29	Q29_Categorized X - Frequent Corporate Access (A) Y - Limited Corporate Access (B,C,D,E)	Q31	Q31_Categorized X - less than 2 years Y - more than 2 years	Q34	Q34_Categorized X - Non-Mgmt (A,B,C) Y - Mgmt (D,E,F)	Q35	Q35_Categorized N - Not Worked with EIS in last year Y - Wored with EIS in last year
2	S1	A	X	A	X	B	X	A	Y
3	S2	A	X	A	X	A	X	B	N
4	S3	A	X	A	X	A	X	B	N
5	S4	B	Y	D	Y	E	Y	A	Y
6	S5	A	X	D	Y	F	Y	A	Y
7	S6	A	X	A	X	A	X	B	N
8	S7	B	Y	A	X	A	X	B	N
9	S8	A	X	A	X	A	X	B	N
10	S9	A	X	A	X	A	X	B	N
11	S10	A	X	A	X	A	X	B	N
12	S11	A	X	D	Y	A	X	B	N
13	S12	B	Y	A	X	C	X	B	N
14	S13	B	Y	A	X	B	X	A	Y
15	S14	B	Y	C	Y	E	Y	A	Y
16	S15	D	Y	B	Y	E	Y	B	N
17	S16	B	Y	B	Y	A	X	B	N
18	S17	B	Y	D	Y	C	X	B	N
19	S18	E	Y	A	X	B	X	B	N
20	S19	B	Y	A	X	A	X	A	Y
21	S20	B	Y	D	Y	C	Y	B	N
22	S21	B	Y	D	Y	C	X	B	N
23	S22	B	Y	A	X	B	X	B	N
24	S23	A	X	D	Y	D	Y	B	N
25	S24		Y	C	Y	A	X	B	N
26	S25	B	Y	B	Y	A	X	B	N
27	S26	D	Y	D	Y	D	Y	B	N
28	S27	B	Y	C	Y	E	Y	B	N
29	S28	B	Y	D	Y	E	Y	A	Y
30	S29	D	Y	A	X	A	X	A	Y
31	S30	B	Y	B	Y	A	X	A	Y
32	S31	B	Y	A	X	A	X		N
33	S32	A	X	A	X		Y	B	N
34	S33	B	Y	B	Y	A	X	A	Y
35	S34	C	Y	B	Y	A	X	A	Y
36	S35	A	X	A	X	A	X	A	Y
37	S36	D	Y	A	X	A	X	B	N
38	S37	D	Y	A	X	A	X	B	N
39	S38	B	Y	D	Y	E	Y	A	Y
40	E39	A	X	A	X	A	X	A	Y
41	E40	A	X	D	Y	A	X	B	N
42	E41	A	X	A	X	A	X	A	Y
43	E42	A	X	B	Y	B	X	B	N
44	E43	A	X	D	Y	D	Y	A	Y
45	E44	A	X	B	Y	C	X	A	Y
46	E45	A	X	D	Y	E	Y	A	Y
47	E46	A	X	C	Y	C	X	A	Y
48	E47	A	X	D	Y	C	X	A	Y
49	E48	A	X	C	Y	B	X	A	Y
50	E49	A	X	D	Y	D	Y	A	Y
51	E50	A	X	C	Y	D	Y	A	Y
52	E51	A	X	D	Y	A	X	B	N
53	E52	A	X	B	Y	C	X	A	Y
54	E53	A	X	B	Y	D	Y	B	N
55	E54	A	X	D	Y	D	Y	A	Y
56	E55	A	X	B	Y	A	X	A	Y
57	E56	A	X	B	Y	B	X	A	Y
58	E57	A	X	D	Y	E	Y	A	Y
59	E58	A	X	D	Y	D	Y	B	N
60	S59	B	Y	B	Y	C	X	B	N
61	E60	A	X	C	Y	C	X	A	Y
62	E61	A	X	D	Y	E	Y	B	N
63	E62	A	X	C	Y	D	Y	B	N
64	E63	A	X	C	Y	D	Y	A	Y
65	E64	A	X	D	Y	D	Y	B	N
66	E65	C	Y	D	Y	D	Y	A	Y
67	E66	A	X	D	Y	E	Y	B	N
68	S67	A	X	A	X	A	X	B	N
69	E68	A	X	D	Y	F	Y	A	Y
70	I69	A	X	D	Y	F	Y	A	Y
71	E70	A	X	D	Y	D	Y	B	N
72	E71	A	X	C	Y	C	X	A	Y
73	E72	A	X	C	Y	E	Y	B	N
74	E73	A	X	C	Y	D	Y	B	N
75	E74	A	X	C	Y	B	X	A	Y
76	E75	A	X	B	Y	D	Y	A	Y
77	E76	A	X	D	Y	D	Y	A	Y
78	E77	A	X	D	Y	E	Y	A	Y
79	I78	A	X	D	Y	F	Y	A	Y
80	I79	A	X	D	Y	E	Y	B	N
81	I80	A	X	D	Y	E	Y	A	Y
82	I81	A	X	D	Y	F	Y	B	N
88									
89	Count of X or N		53		22		44		41
90	Count of Y		28		59		37		40

Table H.2 Survey Results for Demographics with Counts by Demographic

	A	E	N	W	AF	AO	AX	BG	BP	BY	CH	CQ	CZ	DI	DR	EA	EJ	ES	FB	FK	FT	GD	GM	GV	HE
1	ID	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q23	Q24	Q25	Q26
92	**Demographic Comparison Information - Two Sample T Test**																								
93	**Corporate Office Access vs. Not (p-value**	**0.7**	**0.21**	**0.26**	**0.22**	**0.76**	**0.57**	**0.24**	**0.63**	**0.88**	**0.22**	**0.52**	**0.81**	**0.49**	**0.91**	**0.17**	**0.92**	**0.2**	**0.16**	**0.17**	**0.22**	**0.92**	**0.63**	**0.07**	**0.03**
94	Full Access (X) mean	1.208	1.962	2.698	2.132	2.83	1.736	2.415	2.472	2.811	1.774	2.623	2.906	2.698	2.623	2.321	2.377	2.792	2.208	3.491	1.906	3.057	1.962	2.17	2.358
95	Limited Access (Y) mean	1.25	2.179	2.429	2.357	2.893	1.857	2.679	2.571	2.821	1.536	2.393	2.821	2.857	2.607	2.643	2.321	3.071	2.571	3.143	1.643	3.036	2.107	2.464	2.821
96	**Company Experience vs. Little (p-value)**	**0.53**	**0.34**	**0.77**	**0.44**	**0.31**	**0.4**	**0.64**	**0.18**	**0.5**	**0.78**	**0.28**	**0.27**	**0.71**	**0.6**	**0.44**	**0.51**	**0.49**	**0.09**	**0.81**	**0.28**	**0.77**	**0.9**	**0.23**	**0.74**
97	Less than 2 Years (X) mean	1.273	1.909	2.545	2.318	2.682	1.909	2.591	2.318	2.682	1.636	2.273	2.636	2.818	2.727	2.318	2.455	3	2.682	3.409	1.636	3	2	2.17	2.455
98	More than 2 Years (Y) mean	1.203	2.085	2.627	2.169	2.915	1.729	2.475	2.576	2.864	1.712	2.644	2.966	2.729	2.576	2.475	2.322	2.847	2.203	3.356	1.881	3.068	2.017	2.322	2.542
99	**Non-Mgmt vs. Mgmt (p-value)**	**0.26**	**0.92**	**0.72**	**0.45**	**0.88**	**0.13**	**0.07**	**0.21**	**0.51**	**0.42**	**0.23**	**0.85**	**0.26**	**0.47**	**0.44**	**0.79**	**0.91**	**0.33**	**0.66**	**0.15**	**0.96**	**0.16**	**0.31**	**0.4**
100	Non-Management (X) mean	1.273	2.045	2.636	2.136	2.864	1.909	2.682	2.614	2.864	1.614	2.364	2.841	2.864	2.705	2.523	2.364	2.886	2.432	3.409	1.682	3.045	2.182	2.136	2.432
101	Management (Y) mean	1.162	2.027	2.568	2.297	2.838	1.622	2.297	2.378	2.757	1.784	2.757	2.919	2.622	2.514	2.324	2.351	2.892	2.216	3.324	1.973	3.054	1.811	2.324	2.622
102	**Worked with EIS in Last Year (p-value)**	**0.29**	**0.65**	**0.82**	**0.18**	**1**	**0.21**	**0.55**	**0.68**	**0.1**	**0.77**	**0.93**	**0.49**	**0.18**	**0.68**	**0.47**	**0.91**	**0.04**	**0.78**	**0.75**	**0.54**	**0.64**	**0.1**	**0.75**	**0.41**
103	No (N) mean	1.268	2.073	2.634	2.341	2.854	1.878	2.561	2.463	2.659	1.732	2.561	2.805	2.902	2.659	2.341	2.366	3.122	2.39	3.341	1.878	3	2.195	2.244	2.61
104	Yes (Y) mean	1.175	2	2.575	2.075	2.85	1.675	2.45	2.55	2.975	1.65	2.525	2.95	2.6	2.575	2.525	2.35	2.65	2.275	3.4	1.75	3.1	1.825	2.3	2.425

Table H.3 Demographic Comparisons by Question with p-value for T Tests and means for Demographics

	A	E	N	W	AF	AO	AX	BG	BP	BY	CH	CQ	CZ	DI
1	ID	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
92	**Demographic Comparison Information - Two Sample T Test**													
93	**Corporate Office Access vs. Not (p-value**	**0.7**	**0.21**	**0.26**	**0.22**	**0.76**	**0.57**	**0.24**	**0.63**	**0.88**	**0.22**	**0.52**	**0.81**	**0.49**
94	Full Access (X) mean	1.208	1.962	2.698	2.132	2.83	1.736	2.415	2.472	2.811	1.774	2.623	2.906	2.698
95	Limited Access (Y) mean	1.25	2.179	2.429	2.357	2.893	1.857	2.679	2.571	2.821	1.536	2.393	2.821	2.857
96	**Company Experience vs. Little (p-value)**	**0.53**	**0.34**	**0.77**	**0.44**	**0.31**	**0.4**	**0.64**	**0.18**	**0.5**	**0.78**	**0.28**	**0.27**	**0.71**
97	Less than 2 Years (X) mean	1.273	1.909	2.545	2.318	2.682	1.909	2.591	2.318	2.682	1.636	2.273	2.636	2.818
98	More than 2 Years (Y) mean	1.203	2.085	2.627	2.169	2.915	1.729	2.475	2.576	2.864	1.712	2.644	2.966	2.729
99	**Non-Mgmt vs. Mgmt (p-value)**	**0.26**	**0.92**	**0.72**	**0.45**	**0.88**	**0.13**	**0.07**	**0.21**	**0.51**	**0.42**	**0.23**	**0.85**	**0.26**
100	Non-Management (X) mean	1.273	2.045	2.636	2.136	2.864	1.909	2.682	2.614	2.864	1.614	2.364	2.841	2.864
101	Management (Y) mean	1.162	2.027	2.568	2.297	2.838	1.622	2.297	2.378	2.757	1.784	2.757	2.919	2.622
102	**Worked with EIS in Last Year (p-value)**	**0.29**	**0.65**	**0.82**	**0.18**	**1**	**0.21**	**0.55**	**0.68**	**0.1**	**0.77**	**0.93**	**0.49**	**0.18**
103	No (N) mean	1.268	2.073	2.634	2.341	2.854	1.878	2.561	2.463	2.659	1.732	2.561	2.805	2.902
104	Yes (Y) mean	1.175	2	2.575	2.075	2.85	1.675	2.45	2.55	2.975	1.65	2.525	2.95	2.6

Table H.4 Demographic Comparisons by Question with p-value for T Tests and means for Demographics – Enlarged Statements 2-14

	A	DR	EA	EJ	ES	FB	FK	FT	GD	GM	GV	HE
1	ID	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q23	Q24	Q25	Q26
92	**Demographic Comparison Information - Two Sample T Test**											
93	**Corporate Office Access vs. Not (p-value**	**0.91**	**0.17**	**0.92**	**0.2**	**0.16**	**0.17**	**0.22**	**0.92**	**0.63**	**0.07**	**0.03**
94	Full Access (X) mean	2.623	2.321	2.377	2.792	2.208	3.491	1.906	3.057	1.962	2.17	2.358
95	Limited Access (Y) mean	2.607	2.643	2.321	3.071	2.571	3.143	1.643	3.036	2.107	2.464	2.821
96	**Company Experience vs. Little (p-value)**	**0.6**	**0.44**	**0.51**	**0.49**	**0.09**	**0.81**	**0.28**	**0.77**	**0.9**	**0.23**	**0.74**
97	Less than 2 Years (X) mean	2.727	2.318	2.455	3	2.682	3.409	1.636	3	2	2.17	2.455
98	More than 2 Years (Y) mean	2.576	2.475	2.322	2.847	2.203	3.356	1.881	3.068	2.017	2.322	2.542
99	**Non-Mgmt vs. Mgmt (p-value)**	**0.47**	**0.44**	**0.79**	**0.91**	**0.33**	**0.66**	**0.15**	**0.96**	**0.16**	**0.31**	**0.4**
100	Non-Management (X) mean	2.705	2.523	2.364	2.886	2.432	3.409	1.682	3.045	2.182	2.136	2.432
101	Management (Y) mean	2.514	2.324	2.351	2.892	2.216	3.324	1.973	3.054	1.811	2.324	2.622
102	**Worked with EIS in Last Year (p-value)**	**0.68**	**0.47**	**0.91**	**0.04**	**0.78**	**0.75**	**0.54**	**0.64**	**0.1**	**0.75**	**0.41**
103	No (N) mean	2.659	2.341	2.366	3.122	2.39	3.341	1.878	3	2.195	2.244	2.61
104	Yes (Y) mean	2.575	2.525	2.35	2.65	2.275	3.4	1.75	3.1	1.825	2.3	2.425

Table H.5 Demographic Comparisons by Question with p-value for T Tests and means for Demographics – Enlarged Statements 15-26

Appendix I: Business Case for EIS Applications Group to Restructure and Migrate to Different Software Development Platform – The .NET Case (DP-05428)

NOTE: This version is edited to remove sensitive company information. The overall value of the content is not affected by the changes.

Project Scope
For
Daktronics EIS Applications Business Case for Microsoft .NET Development Platform

Project Team

Vince Connelly - EIS Project Manager

EIS Applications Group and Daktronics Software Standards Group - Project Sponsors

[redacted] - Core Team

[redacted] - Sponsor Management

Carla Gatzke- EIS Management

Table of Contents

Project Scope Approvals (Scope Review Group)

Reviewer	Approval / Comments	Signature / Date
Vince Connelly EIS Apps Group / EIS Project Manager Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Video Apps Group Project Sponsor Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Business Apps Group Project Sponsor Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Sports Apps Group Project Sponsor Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Sports Sponsor Manager Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Business Sponsor Manager Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
[redacted] Video Sponsor Manager Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date
Carla Gatzke EIS Manager Daktronics, Inc.	☐ Approved ☐ Change Request	Signature Date

Approval of this document indicates that the project scope for the defined phase have been met by this document. It is known that modifications of these requirements may result in project delays and additional cost associated with the modifications. All of the above members identified in this section must approve and signoff on the scope changes. The Daktronics EIS Project Manger and core team will approve minor changes that stay within the core scope goals, budget, and timeline.

Revision History

Date	Author	Rev	Modifications
12/01/2004	Vince Connelly	00	Initial Document

Reference Documentation

This section should identify all documentation leading to the requirement spec. Should include Project Branch Location here and a listing of the Request Forms, Proposal Forms, Scope Change Requests, and other documentation.

Doc Number	Title	Branch	Rev

Project Team Members

This section should identify all project team members as well as their expected duties.

Name	Project Role	Duties
Vince Connelly	EIS Project Manager	Lead contact for the project. Accountable for developing and managing the work plan, securing appropriate resources and delegating the work and insuring successful completion of the project. Handles all project administrative duties, interfaces to project sponsors and core team, and has overall accountability for the project.
Software Standards Group /EIS Apps Group	Project Sponsors	Provides policy definition to the Project team. Resolves all policy issues with the appropriate policy owners in order to provide a clear, decisive definition. Makes final decisions and resolves conflicts or issues regarding project expectations across organizational and functional areas. The project sponsors and the project manager have a direct link for all communication. The project manager will work directly with the project sponsors on all policy clarification.
[redacted]	Sponsor Manager	Provides executive team approval and sponsorship for the project. Has budget ownership for the project and the manager's department(s) are the major stakeholders and recipients of the project deliverables.
EIS, Software Groups	Stakeholders	Recipients of project deliverable and associated benefits. Deliverable will directly enhance the stakeholders' business processes and environment.
[redacted]	Core Team	Working project team member who analyzes, designs, and ultimately improves or replaces the business processes. This includes collaborating with teams to develop high level process designs and models, understanding best practices for business processes and partnering with team members to identify appropriate opportunities, challenging the old rules of the business and stimulating creative thinking, and identifying organizational impact areas. EIS Project manager and Core Team write and implement requirement specifications for the project and are involved in the daily process of the project.=Core Team members must be able to commit their time to the project as required.
Not Applicable	Testing Team	Team of stakeholders, developers, and others who will test the deliverables to verify the meet the requirements defined by the members of the project team. Testing team will test functionality of the application to help find bugs in the deliverables before the system moving to production. Testing team must document all test results.
[redacted] Consultant	Training Team	Train stakeholders to use new process and applications as defined in this document. Team will develop documentation and manuals and deliver training classes before application is moved to production.

Strategy

Align EIS development platforms and practices with Engineering software groups.

This would make EIS Applications a strategic strength. (An Asset not Liability)

	EIS Applications Group	Engineering Applications Groups
Focus	Web Applications & Data Mgmt	Windows Applications – Win32
Customer	Daktronics business units to include other Software Groups needs for their products.	External Customers
Current Platform/ Tools	ColdFusion MX, Dreamweaver SQL Server (DBA&DBD), Oracle (DBA only)	C++, C#.NET, ADO.NET, Visual Studio, SourceSafe, TeamTrack, MS Access, MSDE ('SQL Server Light')
Proposed Future Platform/ Tools	ASP.NET, C#.NET, ADO.NET, Visual Studio, SourceSafe, TeamTrack, SQL Server (DBA&DBD), Oracle (DBA only)	Same as current but growing in SQL Server data skills and continued growth of C#.NET. With SQL Server Express coming soon (replacement to MSDE).

Table 1. Denotes software groups alignments both currently and proposed.

Benefits to Daktronics

1. Standard Platforms. This will drive the selection process for future system purchases by EIS to ensure we can do system integrations and use available API toolkits to meet the business objectives of Daktronics.
   1.1. Database platforms already standardized on SQL Server and Oracle. SQL Server being the platform we build deep skills for both DBA and DB Developer while for Oracle we only build DBA skills to protect data with very restricted DB Development. SQL Server aligns with what Engineering software groups will be using in their products for data management needs. They can use the deep skills that will exist in EIS. (And have actually already started to use EIS.)
   1.2. Programming Development platform to be standardized on .NET based on this document. In the future, EIS would select enterprise systems that offer API toolkits and customization by .NET (over 90% of the market is split between .NET and J2EE). .NET is already the standard for Engineering software groups. Currently, EIS uses ColdFusion for development. Cold Fusion is building towards being a J2EE standard compliant web server product but has limitations and no alignment with other groups. E.g., ColdFusion can't be used for development against DakDocs using the DakDocs API toolkit. We do development separately (J2EE) and simulate integration by linking web pages. Not a good long-term solution.
2. Alignment of all Applications groups on a single Development Platform.
   2.1. Ensure future needs will be met for all groups. It is apparent to the Engineering software leaders that soon Daktronics will need to do [redacted]
   EIS and Engineering would ensure that internally we can work together to meet these objectives due to interoperability and interchangeability between groups as well as the

added strength EIS could bring due to our focus on web applications and data management.

2.1.1. [redacted] is an example of a project that will have more needs in the future. As well as current needs for web applications and data management that EIS has assisted in.

2.1.2. Another example might be the [redacted]

2.1.3. Another example might be the [redacted] Daktronics CRM (customer service) system.

2.2. Institutional knowledge will be extended. This will mean more staff is available to solve business issues whether for a company product or for a corporate application. Data Management and Web Applications are the life of our corporate applications group (EIS Apps). These skills will be needed by other software groups. Data Management is already starting to happen. Next steps will be how to securely handle and interact with data over many connection types (internet, WAN...). This need will exist for both the other software groups and for EIS Applications. If possible, it would be good not to have two different solutions developed without any real value-add just because we run on two different development platforms.

2.3. Sharing resources.

2.3.1. If priority project requires additional staff, more staff will be available to shift.

2.3.2. Use same systems to do development (i.e. Visual Studio, TeamTrack, SourceSafe,...) thus optimizing costs when purchasing and training.

2.4. Recruiting.

2.4.1. Internal Student Pipeline. With student pipeline, this alignment makes more candidates available to other groups when needed. (e.g. might have a good student coming through EIS pipeline but no need for an additional fulltime in EIS but do have fulltime opening in Video or some other group.) Transition would be minimal in this scenario.

2.4.2. Universities are teaching skills that are synchronized with this development platform. Both DSU and SDSU are developing computer science students with strong C++ experience which easily transitions to these needs.

3. Stronger Resources are available to ensure strong/full-featured applications.

3.1. Training is better on this platform especially in the local area. None for ColdFusion in this area.

3.2. Libraries of Code exist for purchase and sharing to both save untold hours of programming but to also make features available that we would have a hard time creating or be cost prohibitive to create.

3.2.1. E.g. [redacted] showed us an add-on library that he uses with features like

3.2.1.1. "Save to Excel" from tables on web pages. This particular control also allows user to move columns around, resort, highlight rows and create groupings that can all "Save to Excel" with exact changes in final Excel file. Really cool. This is an example of a set of features that would be cost prohibitive to develop for us but comes in a suite of features to be added to the developers Visual Studio used for web application development.

3.2.1.2. Standard Calendar components.

3.3. Tools exist to help with products. E.g. Visual Studio comes with a light version of Crystal Reports to allow for reporting in web applications. There are also other products with much stronger reporting to be tied into applications. This could provide huge value for us in our applications. The method we use in DakPipe to create the quote output (a report) is very cumbersome and time consuming. In this scenario, we could have multiple Quote template reports based on business criteria that would be cost effective. There are numerous uses for reporting in web apps.

3.4. .NET has international/localization built-in. This would allow corporate applications to address same international/localization needs that other software groups are doing for products. (This does require planning and takes time.)

3.5. Documentation for Visual Studio .NET is freely available from http://msdn.microsoft.com. The MSDN web site is an extremely comprehensive collection of developer resources. MSDN is arguably one of the best free online resources for developers.

3.6. There is a very strong Internet community support system in place for Visual Studio .NET, from web sites to newsgroups.

3.7. There are extensive resources in terms of published books.

3.8. There are dedicated periodicals to Microsoft development platforms. For example, MSDN Magazine is an excellent resource for developers.

Justification for Timing

1. Need time to develop staff for projects that will be coming over the next 2-3 years. Takes at least one year to get fully up to speed.
2. Upcoming projects that make the decision timing, right now.
   2.1. DakDocs New Vendor. (CMS - Content Management System)
      2.1.1. Need criteria of development platform when selecting vendor next summer/earl fall.
      2.1.2. Need to develop skills to prepare for the implementation and integrations in calendar 2006.
   2.2. Customer Service System (CRM – Customer Relationship Management). To be looked into in FY06 for decision in FY07. Need to have new intranet up and running and new skills developed to help determine if we need to buy a solution or develop our own. If we buy a solution, we will need the skills to manage customizations and integrations anyway.
   2.3. Daktronics Software Products related projects? [redacted]n, ...)
   2.4. Daktronics WWW public web site framework is 2 years old and due for revision. The new version should be on a platform that will extend further into the future.

Cutover (big picture)

1. Winter/Spring. Develop Plan, complete design documentation and start training key members.
2. Summer. Train all staff, develop intranet framework, create intranet home page, migrate one or two main applications on DakInfo (DakPipe, DakTime). In a serialized manner, all team members will work together on the projects in order
   2.1. Develop Intranet Framework

2.2. Create Intranet Home Page
2.3. Develop DakTime Application.
2.4. Develop DakPipe Application.

3. Phase out ColdFusion applications over next 2-3 years. Do this as rewrites of applications are done. Some simply need to be scrapped and new requirements defined.
4. Use as selection criteria for new document (content) management system that will be selected by late summer/early fall 2005.

Proposed Staffing in EIS to prepare for the conversion from ColdFusion to .NET

1. Add a lead programmer in Jan/Feb 2005, preferably with experience in C#.NET/ADO.NET. Get initial training in March and participate in standards/practices development before May.
2. Add Tech Writer/Multimedia web developer in Jan/Feb. To learn documentation practices and help document design specs before May and be the main documentation support for the .NET migration throughout the summer (allowing Murray to focus on Document System Vendor search).
3. Add Database Developer in May to be part of the summer project and learn from the lead database developer ([redacted]).

Staffing and Organization of Skills

Layers	Skills and Staffing	Tool(s)
Presentation	Web Skills/Multimedia. HTML, ASP.NET, JavaScript, CSS, XML, Flash… (C,D,E)	Visual Studio /Flash /Graphic Creation Tool ?
Business Logic	C#.NET/XML work with data need basic ADO.NET skills. Work with Business Analyst then write components (E,F)	Visual Studio with additional component libraries
Data Access Logic	C#.NET/ADO.NET. Object oriented programmer with deep skills. Creating reusable Components. Requests triggers/views/tables/stored procs from DBD to create reusable components to provide data. (F)	Visual Studio with additional component libraries
Database	DB Developer / DBA (G,H) Creates triggers/views/tables/stored procs for use by C# programmer at the Data Access Logic layer.	Visual Studio / SQL Server Enterprise Manager

Table 2. This table shows the layers for application development. Note: XML means all of the following (XML, XSL, XSLT, DTD, Schema Doc – XSR).

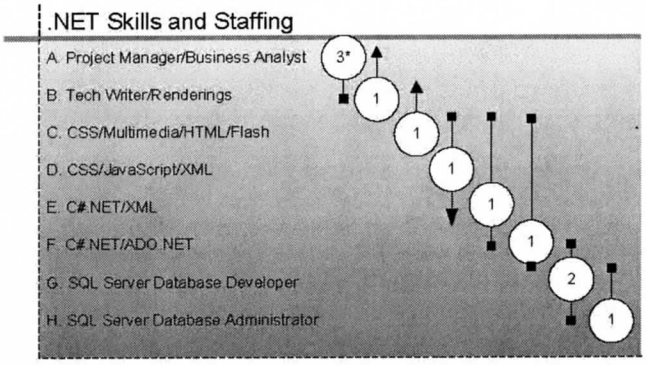


Figure 1. Shows .NET Skills and Staffing. Circle denotes focus of staff and number with that focus. The lines denote the areas that staff extend and cross-train in. See below for detail on staffing and skills by position.

See Appendix C for EIS Applications Organization Chart.

A. Project Manager/Business Analyst
   a. Staff #: 3 ([redacted] Vince Connelly) → the * is to denote this is only counting the Project Managers from Apps group. Outside of Apps group will have several PM/Business Analysts (e.g. HR/IS position, Carla Gatzke, K[redacted]

[redacted] ... more to be developed over time). Also, on particular projects/initiatives programmers/developers will be project managers. Depending on the size and type of project and type of resources to be used and coordinated (including external vendors) will determine if one of the main PMs from Apps group will be required or if other staff can take this lead role.

b. Education/Experience: IS, Business, Economics, Accounting, subject matter expert with systems thought process. Need to be good communicators and able to manage people/resources on projects.
c. Main Duty: To define the business logic required and manage the project to include resources. They have overall responsibility and accountability from project initiation to completion to include user acceptance. Documentation is an important part of their tasks. Their efficiency/accuracy/thoroughness in gathering requirements and flushing out the details determines the amount of resources used and success of project.
d. Secondary Duty: Tester/QA
e. Backup Role: Tech Writer/Renderings.

B. Tech Writer/Renderings
   a. Staff #: 1 ([redacted])
   b. Education/Experience: English for IS, English, Journalism. Strong communicator both in writing and training class forum.
   c. Main Duty: Assist with documentation, manuals, help menus, definitions, renderings, training, requirements gathering, usability testing.
   d. Secondary Duty: Testing/QA.
   e. Backup Role: Project Manager/Business Analyst, MultiMedia/HTML/CSS/Flash.

C. MultiMedia/HTML/CSS/Flash
   a. Staff #: 1 (New Hire)
   b. Education/Experience: Multimedia/Graphics, Web Design, CIS, English for IS.
   c. Main Duty: Develop presentation layer. Focus on usability and standards. Add appealing visible layout to application while following and defining user interface usability best practices.
   d. Secondary Duty: Testing/QA
   e. Backup Role: Renderings, Tech Writing, CSS/JavaScript/XML

D. CSS/JavaScript/XML
   a. Staff #: 1 ([redacted])
   b. Education/Experience: CIS, Web Design, (Computer Science should pick this up quickly).
   c. Main Duty: User interface needs and advanced layout needs at presentation layer. Need to think in reusable components mindset.
   d. Secondary Duty: Testing/QA
   e. Backup Role: MultiMedia/HTML/CSS/Flash, C#.NET/XML (some cases)

E. C#.NET/XML
   a. Staff #: 1 ([redacted])
   b. Education/Experience: (Computer Science, CIS)
   c. Main Duty: Business Logic layer. Object oriented thinker. Works with business analyst to ensure logic and error handling is done properly to address business process or logic.

d. Secondary Duty: Peer Code reviews, Test/QA
e. Backup Role: CSS/JavaScript/XML, growing towards ADO.NET

F. C#.NET/ADO.NET
   a. Staff #: 1 (New Hire – need experience)
   b. Education/Experience: (Computer Science with Math, Computer Science, some CIS)
   c. Main Duty: Work at Data Access Logic layer. Object Oriented Programmer with deep skills. Perform peer code review. Need to think at a big picture level to ensure reusable components are properly structured and available for reuse. Work with database developer to get needed database work done. Then write code in reusable components to address the data according to DBD instructions. Need to understand databases to make proper requests.
   d. Secondary Duty: Assist other software groups with their data/ADO.NET needs.
   e. Backup Role: C#.NET/XML, CSS/JavaScript/XML, Flash, CSS

G. SQL Server Database Developer (DBD)
   a. Staff #: 2 ([redacted])
   b. Education/Experience: (Computer Science, some CIS)
   c. Main Duty: Model database, create all database code (T-SQL statements, triggers, stored procs, functions, views...), optimize database calls (indexes, optimized T-SQL statements), do DTS work, support ADO.NET needs, support other software groups on any database needs. Develop, create, maintain and support OLAP needs and initiatives to include SQL Analysis Server. Assist with any data migration/transformation needs (i.e. DTS or whatever other method).
   d. Secondary Duty: foster data management needs throughout the company like doing one-on-one training for report writers in business groups.
   e. Backup Role: SQL Server DBA, ADO.NET

H. SQL Server Database Administrator (DBA)
   a. Staff #: 1 (New Hire – position posted)
   b. Education/Experience: (Computer Science, CIS)
   c. Main Duty: Protect data! Develop and document continuity plans. Test backups and recovery processes. Check logs accordingly. Work with Pro/IT to optimize database servers. Foster data management infrastructure needs throughout the company like doing one-on-one training with report writers in business groups and developing business ISC/report writer staff for business groups. Focus on the ISC/BA layer of the Data Management Human Infrastructure (see Appendix B). Facilitate Data Management meetings. Learn Oracle to be DBA for that platform as well for ProE system and serve as backup to ERP Oracle DBA.
   d. Secondary Duty: Testing/QA for DBD work and verify data integrity.
   e. Backup Role: SQL Server Developer

Migration Plan (to include Support from [redacted])

Project Timeline/Schedule (to be developed with consultant and core team)
See Appendix E (.NET Migration Plan in Detail).

[redacted]

Benefits to Daktronics Engineering Software Groups for participating

1. Learn more about C# on a ramped up basis.
2. Learn more about databases and best practices.
3. Learn about EIS Apps documentation practices including Design Specs and document management.

Benefits to EIS Apps for having [redacted] and Dak Engineering Software Groups Participating

[redacted]

2. Engineering Software Groups participation helps with
   2.1. Identify where EIS can help with their projects and create institutional knowledge (leverage resources)
   2.2. Create synergy and best practices/standards between and for the company.
   2.3. Ensure EIS follows company standards.
   2.4. Learn and use same tools (like TeamTrack, SourceSafe, Visual Studio...)

Systems Considered for Migration

1. DakInfo Home page / Authentication/Security model
2. DakPipe
3. DakTime
4. DakStats WebSynch

Financial Estimations [redacted]

The rest of the document has been excluded due to sensitivity with staffing names, etc... The main content and justification is above.

Appendix J: Overview of Software Development at Daktronics (DP-07353) – Proposal Pending Review by Management

This document is a proposal that software leaders are preparing to propose to senior management. The document serves as an example of the value of alignment proposed and approved by .NET case (appendix I).

Daktronics Software Development Overview

Vision for Software

To use software to provide products and services that are intuitive, time sensitive, robust and integrate appropriately in order to attract, retain, and foster tighter relationships with our customers. The products and services provided should generate new perpetual revenue streams while at the same time continuing to lower costs of servicing customers. Our customers include external customers, resellers/partners, suppliers, service companies, and Daktronics employees and subsidiaries.

Overview

This document gives an overview of software development at Daktronics. This document covers the who (the go-to people by technology), how (committees), where (additional resources exist) and what (tools are used) of software development at Daktronics. For the most part, Daktronics uses and has aligned our software development tools and practices with Microsoft technologies and platforms.

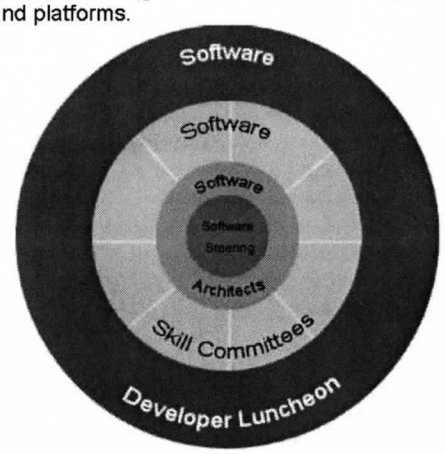


Figure 1 Software Organization Wheel

Software Steering

Committee	Objectives	BPE	ITS	EIS	SPE	VPE
Steering	Business Opportunities, Staff Training, Recruiting, Organization, Initiatives, Partnerships (MS Partner), contract programming	AK	KS	Vince Connelly	TK	TM

Mission

To address business issues and opportunities relating to software. Members usually include the staff that supervise or responsible for software groups. Issues/Opportunities examples include: staffing, recruiting, equipment, organization/structure, training opportunities, budget planning and execution. This group will report findings to Daktronics Engineering Managers group.

Frequency

The group plans to meet once a month on fourth Wednesday. A member can also call for additional meeting as needed.

Software Architects

Committee	Objectives	BPE	ITS	EIS	SPE	VPE
Architects	Technical Opportunities, Review/Approve Standards, Plan Developer Luncheons, Convene/Organize Skill-Committees, Source Control, Licensing, UML, Team Track/Bug & Request Tracking, Code Reviews, Install Shield	AB JW	KS	GU DR	SM DK	JS ST

Mission

To address technology issues and opportunities relating to software. Develop better software programs and programmers through the development of common software libraries, tools, practices and training classes. This group will report findings to the Software Steering Committee.

Frequency

The group plans to meet once a month on third Wednesday. A member can also call for additional meeting as needed. An EIS technical writer will attend to take meeting notes. The notes and appointments will be CC: to the Software Steering Committee.

Software Skill Committees

Skill Committee	Objectives	BPE	ITS	EIS	SPE	VPE
C++	Language	AB			CS	JS
C#.NET	Language		AM	GU	CS	ST
Data Access	ADO.NET SQL Server/MSDE XML/XSD/XSLT	JW DB		JM CL	DK	ST
Web Technologies	ASP.NET HTML CSS Java Script	JW	KS AM	DR	DK QS	KP
Security	HTTP/HTTPS SSL HS Encryption	DB AK	BL	GU BS PE	QS	ST KP
Quality Assurance	Automated testing scripts Tools used	MD	MP	CL	DS	TC
Libraries	DSDN DakLib Infragistics	AB	AM	GU	SM	ST
User Interface	UI Design, Usability	AB	KS	JG	SM	BJ
Tech Writing	Manuals, Documentation	KR	KR	MC	AH	TR

Mission

To develop subject matter expertise, best practices/standards that guide all software groups and ensure backups of staffing on each skill. This will be done via teamwork, experience and research by members from across the company. The sub-committee members ensure that at Daktronics each skill is staffed and trained appropriately including backup members for each skill. These sub-committees make proposals to, report their findings to and seek approval from Software Architects Committee.

Frequency

Meetings will be scheduled as needed to ensure proper development and use of standards for that sub-committee. A committee member or the Software Architects Committee can request a meeting be convened to address a topic.

Software Developer Luncheon (SDL)

Attendees

All software developers are invited to attend.

Mission

To share information among Daktronics software developers.

Frequency

The group plans to meet once a month on second Wednesday. A special meeting can also be called by the Software Architects committee.

Tools

Tool	Description
MS Visual Studio	Development environment.
MS Visual Source Safe	Source code storage and management.
Team Track	Change request, enhancement request and bug tracking software.
RoboHelp	Help screens development tool.
Rational Robot	Tools used by software testers to run test scripts, both automated and manual. Also used for regression testing.
Compuware DevPartner	Tools used to track memory usage, source code documentation review, code coverage, and performance analysis.

FY06

Theme: Alignment

Goals:

- [redacted]

- [redacted]

FY05

Theme: Maintenance

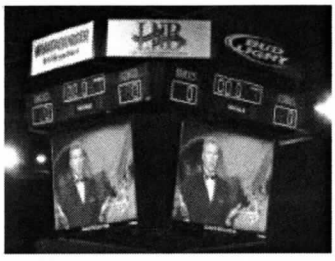
Goals:

- [redacted]

Appendix K: Presentation Slides from Presenting this Paper at DSU

Survey of IS at Daktronics

Presented
by Vince Connelly
on August 11, 2005
to DSU MSIS Program



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DAKTRONICS

Agenda

- Overview of Case
- Research Done
- Methodology Used
- Review Results
- Conclusions Found

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Overview of Case

- Objectives and Deliverables
- Company - Daktronics
- Information Systems Group – EIS Dept

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Overview – Objectives & Deliverables

- Research methods to measure IS Effectiveness (I.e. Success).
- Provide recommendations to IS leaders at Daktronics at to an appropriate method.
- Deliverable for MSIS Program: the case study document.

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Overview – Daktronics

- Founded in 1968.
- Location: Brookings, SD, USA.
- By Two Engineering Professors at South Dakota State University
  - Dr. Aelred Kurtenbach
  - Dr. Duane Sander
- Reason: To create job opportunity for students who want to stay in SD.

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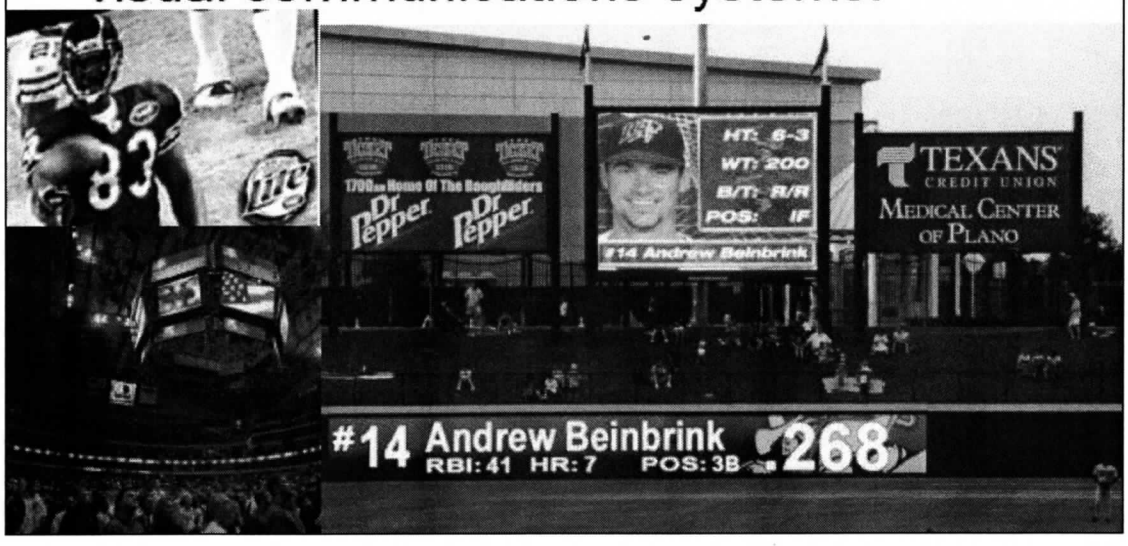
Vision:

To be the world leader at informing and entertaining people through dynamic visual communications systems.



Overview – Daktronics - Size

- Sales for FY ending April 2005.
  - Net Sales: $230 million
  - Net Income: $15.7 million
- Employees: over 1800
- Locations:
  - Corporate: Brookings, SD
    - majority of employees.
  - Regional: over 40 offices nationally and internationally

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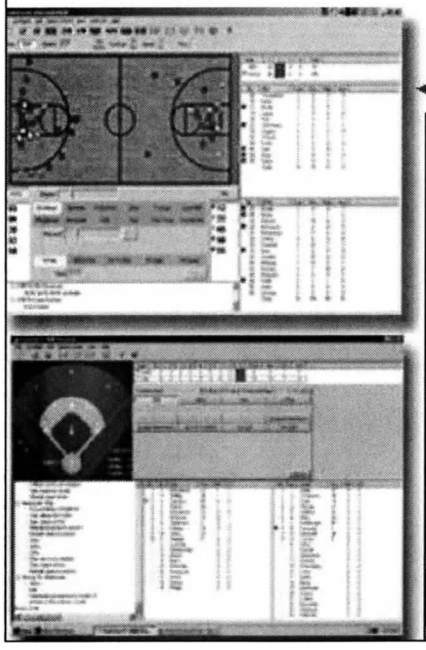
Products:

- Electronic Signs.
- Software Solutions – also.



Sports Stats

Video Networks

Overview – Skills at Daktronics

- Engineering (Corporate)
  - Mechanical
  - Electrical
  - Computer (Software and Firmware)
  - Structural/Civil
- Manufacturing/Installation (Corporate -mostly)
  - Industrial and Manufacturing Mgmt
  - Project and Construction Mgmt
  - Inventory/Supply Chain Mgmt

Overview – Skills at Daktronics

- Service and Support (Corporate and Region)
  - Electronics Service Technicians
  - Sales Staff
  - Graphics Artists
  - Animators
  - Video Producers
  - Technical Writers
  - Marketing

Overview – Skills at Daktronics

- Diversity of skills and information needs makes providing common tools and support for information systems challenging.

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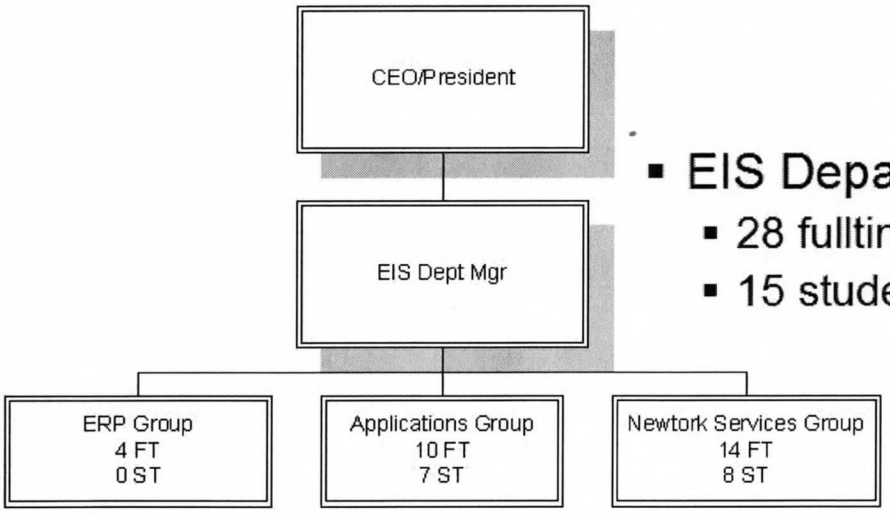
Overview – IS Group



- EIS Department
  - 28 fulltime
  - 15 students

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Overview – EIS Themes (Goals)

- FY01 Stability
- FY02 Connectivity
- FY03 Security
- FY04 Seamless Connectivity
- FY05 Integration
- **FY06 Platform Building (Architecture)**
- FY07+ strategic alignment of enterprise applications with business needs

Overview – EIS/Industry IS Spending

- Daktronics: averages 2% of Net Sales
- Industry: averages 4.2% of Net Sales

Overview – IT Governance by Weill

- excerpt from Weill's book on

IT Governance:

"As IT has become more important and pervasive, senior management teams are increasingly challenged to manage and control IT to ensure that value is created"

Research

- Overview
- DeLone & McLean: IS Success Model
- Davis: Perceived Use & Ease of Use
- Goodhue & Thompson: Task-Fit
- Mathieson & Peacock: Perceived Resources
- Seddon: Whose Perspective Counts.

Research - Overview

- Reviewed literature and professional journal databases for measures of IS
- Large number of results exist.
- Upon review of articles, an apparent seminal article appeared over and over
- The DeLone and McLean article
  - "Information Systems Success: The Quest for the Dependent Variable"
  - Cited by over 180 articles.

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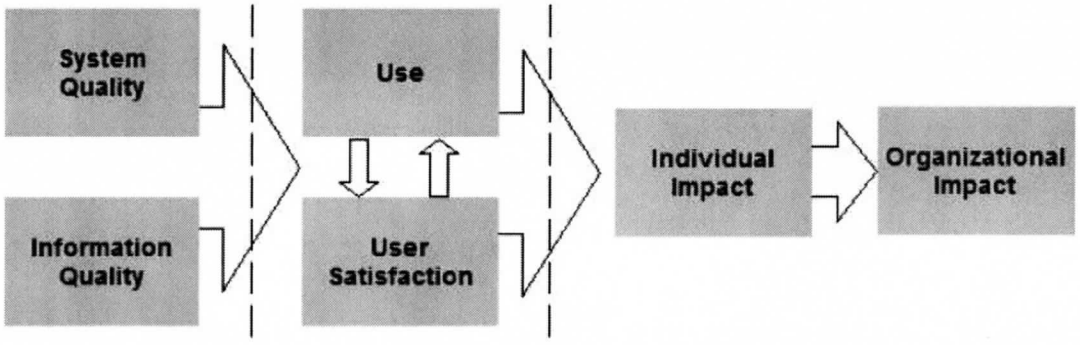
DeLone and McLean (1992 & 2003)

- IS Success Model (1992 version)



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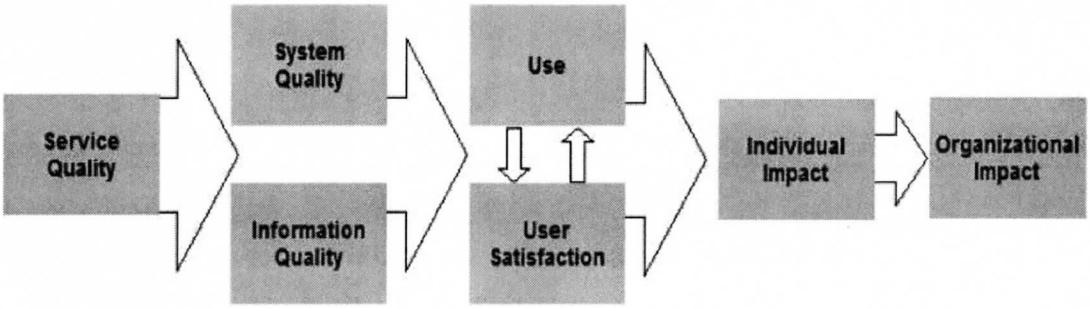
DeLone and McLean (1992 & 2003)

- IS Success Model (AIS version)



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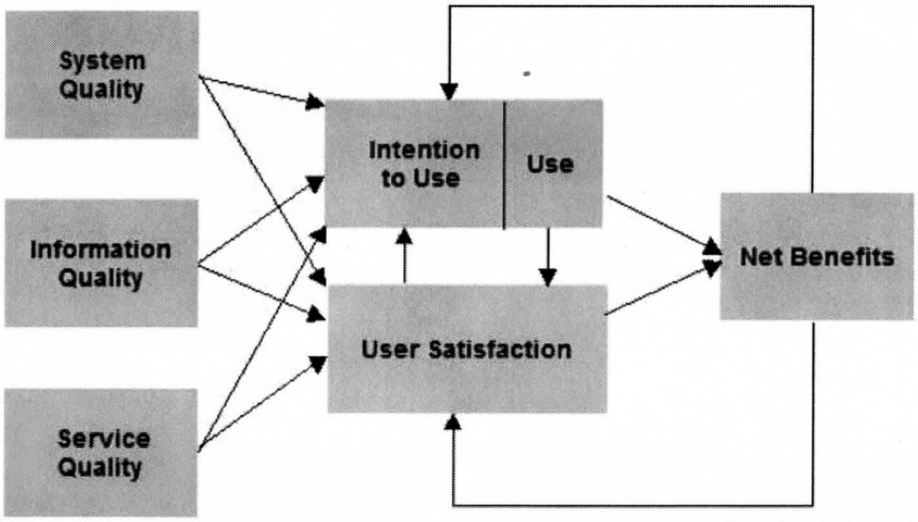
DeLone and McLean (1992 & 2003)

- IS Success Model (2003 version)



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DeLone and McLean (1992 & 2003)

- IS Success Model (2003 version)
- Found model to still be Valid
- Added:
  - Service Quality
  - Clarified Use/Intent to Use
  - Combined Individual and Organizational Impacts into Net Benefits

Davis (1989)

- Perceived Usefulness and Perceived Ease of Use.
  - Perceived Usefulness: the degree to which a person believes that using a particular system would enhance his or her job performance.
  - Perceived Ease of Use: the degree to which a person believes that using a particular system would be free of effort.
- Causality chain: Use>Useful>Usage

Goodhue & Thompson (1995)

- Fit between Task and Technology as the key driver for individual performance.
  - Higher the Fit between Task and Technology the higher the utilization
    - which lends the system to having more complete, timely and accurate information.
- User Involvement
  - Simply participating not cause for use
  - By participating create a better Fit.

Mathieson and Peacock (2001)

- Perceived User Resources.
  - Impact of perceived barriers on use of information systems
  - Barriers include:
    - Lack of time
    - Lack of expertise
    - Lack of support
    - Connection problems
    - Lack of documentation
    - Distance
    - ...etc.

Seddon (1998)

- Who to measure success for.
  - Seddon puts focus on the who portion of measuring for success. Exactly who to measure success for (the main stakeholders). He leans towards management in most cases.

Methodology

- Survey
- Steps taken:
  - Gather input about what to survey.
  - Combine input with research to hypothesize.
  - Review/Revise with Executive.
  - Pilot Survey.
  - Distribute, Collect and Document.
  - Analyze Data.

Methodology – Areas of Interest

- Physical access to resources at corporate facility
- Longevity of employee with Daktronics
- In management or not.
- Worked with EIS on a project or not.

Methodology – Hypotheses (null)

1. Working outside of corporate office would not make a significant difference on user opinions regarding information systems.
2. The longevity of employee with Daktronics would not make a significant difference on user opinions regarding information systems.
3. Whether in management or not would not make a significant difference on user opinions regarding information systems.
4. Having worked with EIS on an IS project would not make a significant difference on user opinions regarding information systems.

Results

- Demographics Distribution
- Overall Review of Averages
- D & M IS Success Category Review
- Hypothesis Results

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Results – Demographic Distribution

Demographic	Categorized	Number of Surveys	Percentage
Frequent Physical Access to Corporate Resources	Yes	53	65%
	No	28	35%
Employed with Daktronics less than 2 years.	No	22	27%
	Yes	59	73%
At some level of management at Daktronics	Yes	37	46%
	No	44	54%
Worked in the last year with EIS on a project.	Yes	40	49%
	No	41	51%

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Results – Overall Averages

- Statements 2, 11, 7 and 24
- Show that users believe that if EIS imporves the quality of data and provide a single complete (combined) view for users, the result will be an increase in work performance for the users.

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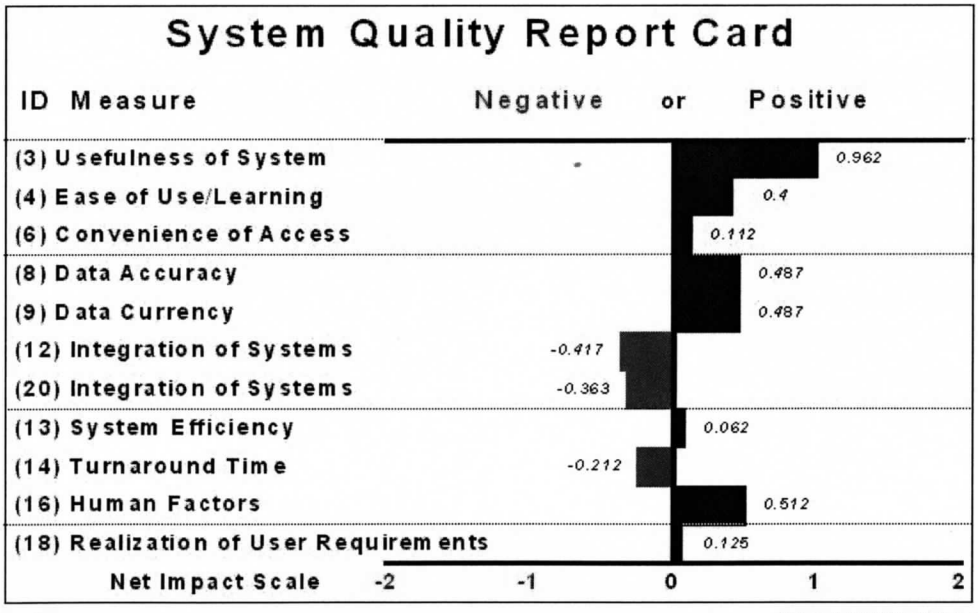
Results – D&M IS Categories



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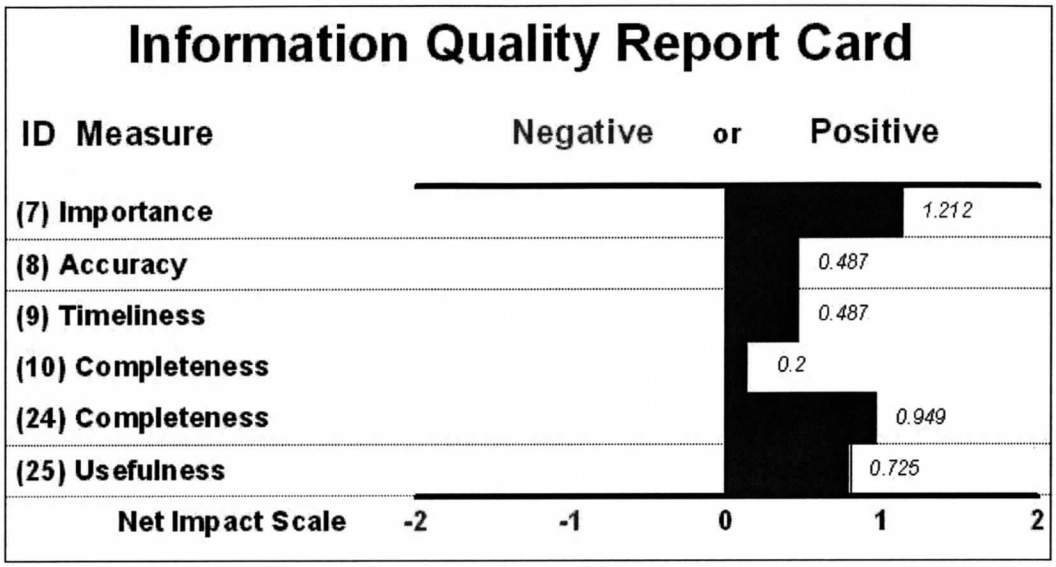
Results – D&M IS Categories



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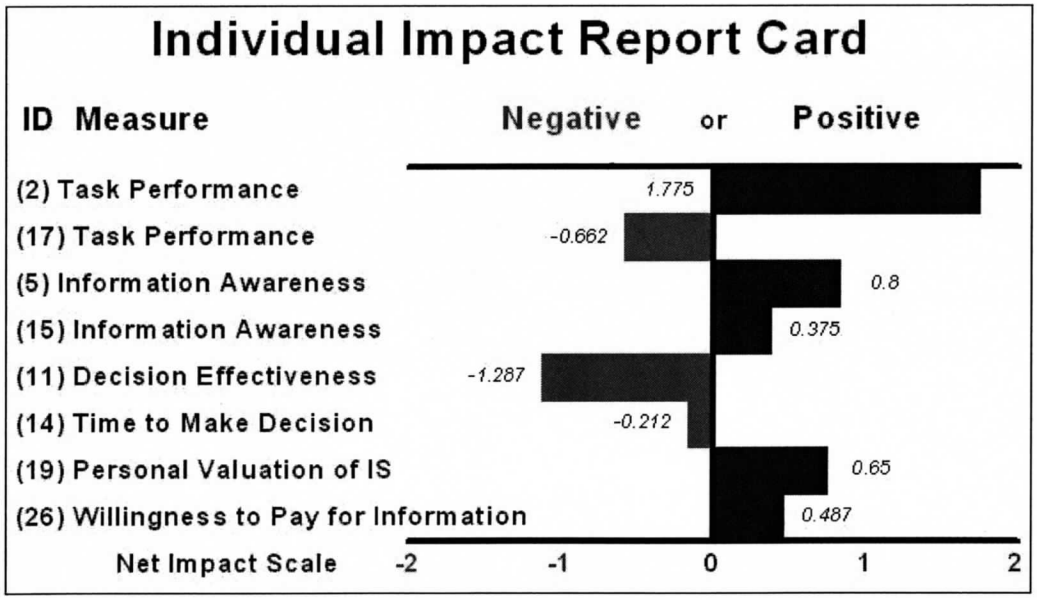
Results – D&M IS Categories



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Results – Hypothesis: (1) Resources

- Hypothesis: Working outside of corporate office would not make a significant difference on user opinions regarding information systems.
- Significance was found for statements 25 (Usefulness) and 26 (Willingness to Pay).
- Correlates to the research of Mathieson and Peacock (2001)

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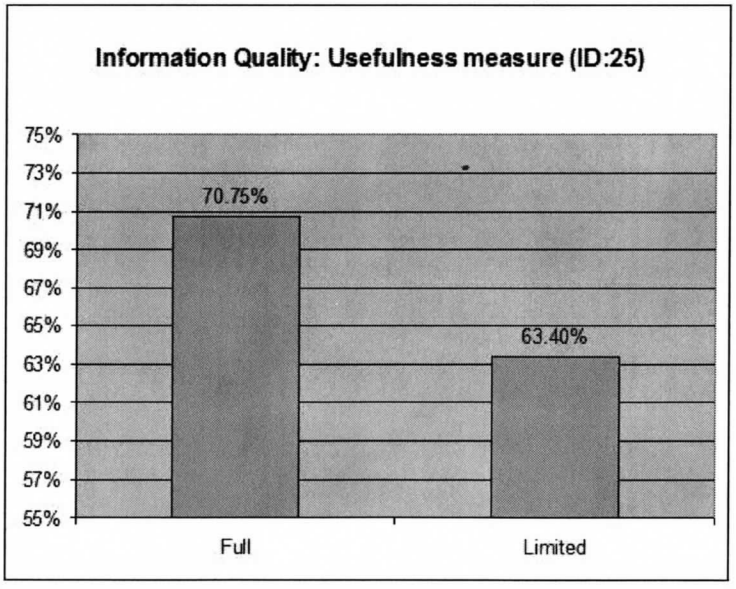
Results – Hypothesis: (1) Resources



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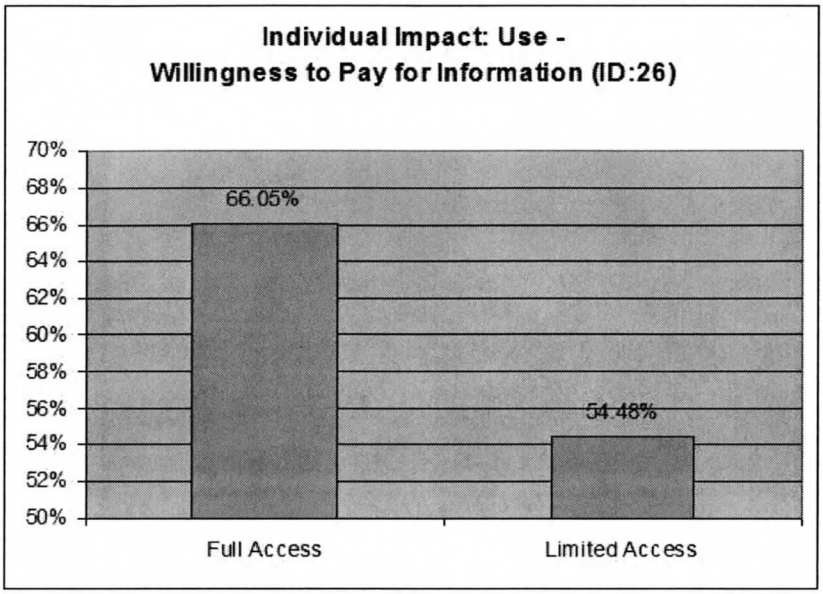
Results – Hypothesis: (1) Resources



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Results – Hypothesis: (2) Longevity

- Hypothesis: The longevity of employee with Daktronics would not make a significant difference on user opinions regarding information systems.
- No Significance could be determined for any question. The null hypothesis stands for all questions.

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Results – Hypothesis: (3) Management

- Hypothesis: Whether in management or not would not make a significant difference on user opinions regarding information systems.
- Significance was found for Statement 8 about data accuracy.
- Management believes data accuracy to be higher than non-management which correlates to Seddon's article.

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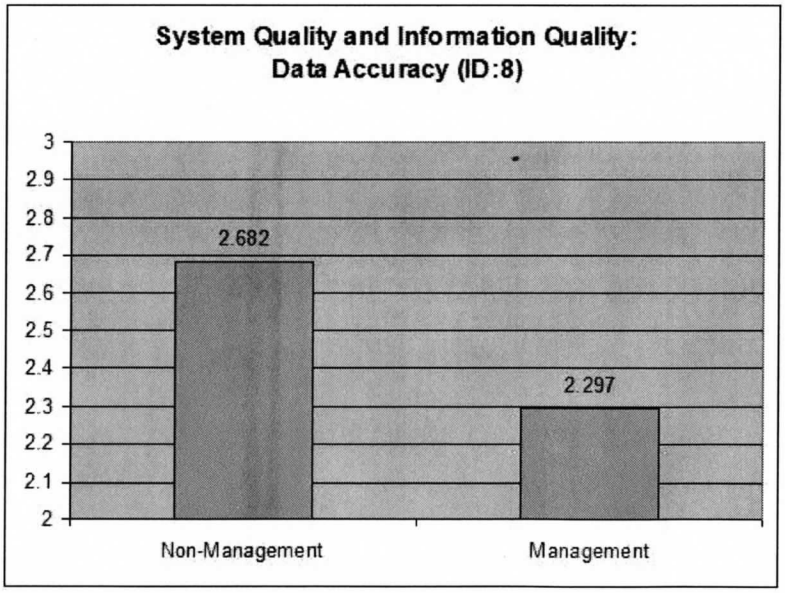
Results – Hypothesis: (3) Management



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Results – Hypothesis: (4) Involvement

- Hypothesis: Having worked with EIS on an IS project would not make a significant difference on user opinions regarding information systems.
- Significance was found in statements 18 (Realization of User Requirements) and 10 (Completeness).
- Correlates to Goodhue and Thompson's research about user involvement

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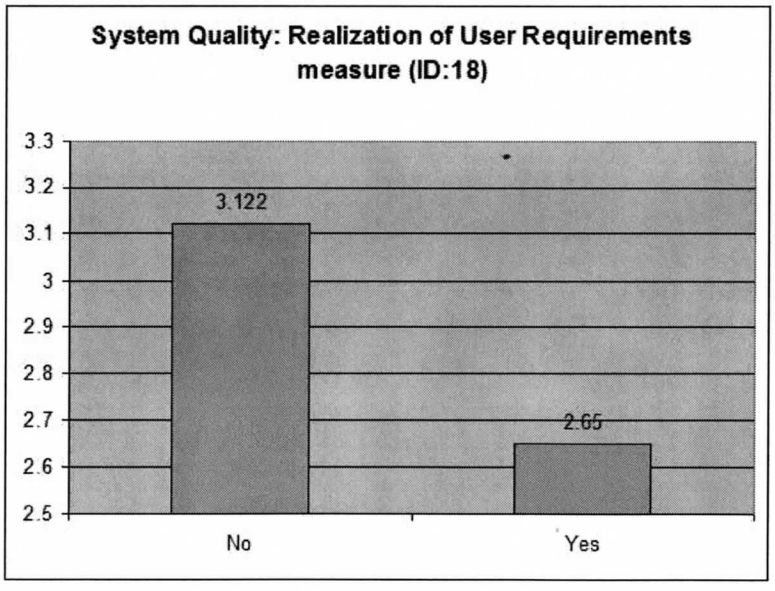
Results – Hypothesis: (4) Involvement



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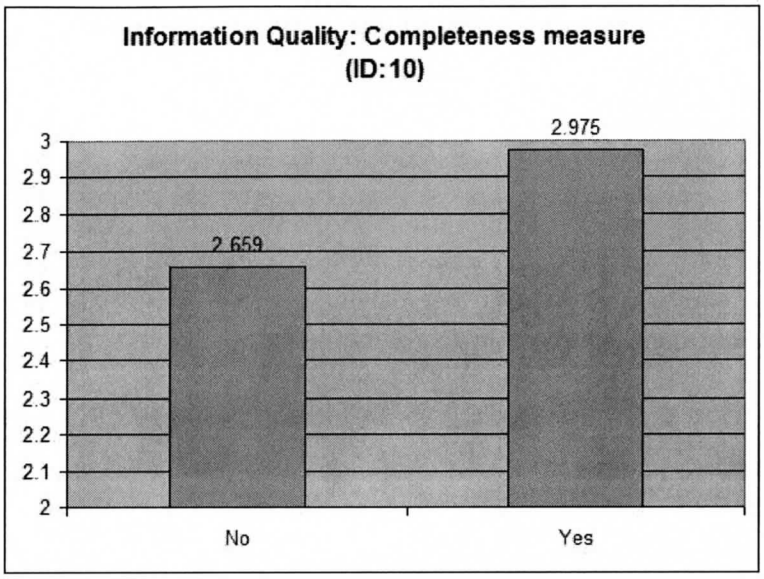
Results – Hypothesis: (4) Involvement



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Conclusion

- Recommendations to Daktronics
  - Use D&M IS Success Model 2003 version
  - IS Leaders review and select appropriate measures
  - Determine which measures can be obtained from actual use
  - Further research into items pointed out in results
  - Develop a Survey that can measure over time (I.e. static questions for consistency)

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