APPLYING TOTAL QUALITY MANAGEMENT IN HEALTHCARE INFORMATION SYSTEMS

by

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FINAL READING APPROVAL

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ABSTRACT

Several methods exist for monitoring software development. Few formal evaluation methods have been applied to measure and improve clinical software application problems once the software has been implemented in the clinical setting.

A standardized software problem classification system was developed and implemented at the University of Utah Health Sciences Center. External validity was measured by a survey of 14 University Healthcare Consortium (UHC) hospitals. Internal validation was accomplished by: an in depth analysis of problem details; revision in the problem ticket format; verification from staff within the information systems department; and mapping of old problems to the new classification system. Cohen's Kappa statistics of agreement, used for reliability testing of the new classification system, revealed good agreement (Kappa = .6162) among HELP Desk agents in consistency of classifying problem calls.

A monthly quality improvement report template with the following categories was developed from the new classification system: top 25 problems; unplanned server downtimes; problem summaries; customer satisfaction survey results; top problems details; case analyses; and follow-up of case analyses.

Continuous Quality Improvement (CQI) methodology was applied to problem reporting within the Office of Information Resources (OIR) and a web-

based ticket entry system was implemented. The new system has resulted in the following benefits: reduction in problem resolution times by one third; improved problem ticket information; shift of 2 FTEs from call center to dispatch due to the increased efficiency of the HELP DESK; and a trend in improvement of customer satisfaction as measured by an online survey.

The study provided an internal quality model for the OIR department and the UUHSC. The QM report template provided a method for tracking and trending software problems to use in conducting evaluation and quality improvement studies. The template also provided data for analysis and improvement of customer satisfaction. The study has further potential as a model for information system departments at other health care institutions for implementing quality improvement methods. There is potential for improvement in the information technology, social, organizational, and cultural aspects as key issues emerge over time. There can be many consequences to the data collected and many consequences of change can be studied.

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ACKNOWLEDGMENTS

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INTRODUCTION

Continuous Quality Improvement (CQI) as Process Management

Systems analysis is the study of a business problem domain to recommend improvements and specify the business requirements for the solution. [1] In the context of this thesis, systems analysis refers to the study of information systems at University of Utah Health Sciences Center (UUHSC) in regard to the clinical software evaluation domain. Process management occurs as an evaluation of the system or part of the system. Process management is an ongoing activity that establishes standards for activities, methods, tools, and deliverables of the {information system} life cycle.[1] Continuous quality improvement which falls under the umbrella of the Total Quality Management philosophy embraced by many health care institutions today is the science of process management.[2] The thesis involves review and analysis of the current methodology for tracking computer software applications problems; revision of the classification system for entering problem tickets into a software problem tracking database; reliability testing of the revised classification system using Kappa agreement statistics; and, utilizing the Delphi technique, development of routine quality management report template to display current and trended data of software application problems from the classification system database. It also applies TQM concepts and CQI methodology for evaluation and technology

assessment, and to demonstrate improvement in processes in the Office of Information Systems (OIR) at the (UUHSC).

Benefits of Clinical Software Evaluation

Health care providers, healthcare facilities, regulatory agencies and especially information system departments, share an obligation to manage clinical software systems and promote optimum support to the clinical environment. A growing literature documents how the use of clinical software systems can improve health care delivery processes and outcomes.[3] Information systems should implement programs and provide technology to track and monitor software application functionality and end user satisfaction. Programs and technology should be in place for data mining and knowledge engineering from the information systems used to support clinical operations.[4] These programs should support data collection and storage, accessibility by managers and leaders in the information systems department for retrieval of information to support day to day operations and evaluation studies, and produce reports for long term strategic planning by administrators of information systems and the healthcare institution.

From another perspective, Friedman and Wyatt discuss five major reasons to evaluate clinical information resources[5]:

1. *Promotional:* To encourage the use of information systems in medicine, we must be able to reassure physicians that the systems are safe and benefit both patients and institutions through improved cost-effectiveness.
2. *Scholarly:* If we believe that medical informatics exists as a discipline, ongoing examination of the structure, function, and impact of medical information resources must be a primary method for uncovering its principles. (Healthfield & Wyatt, 1995) In addition, some developers examine their

information resources from different perspectives out of simple curiosity to see if they are able to perform functions that were not in the original specifications.

3. *Pragmatic:* Without evaluating their systems, developers can never know which techniques or methods are more effective, or why certain approaches failed. Equally, other developers are not able to learn from previous mistakes and may reinvent a square wheel.

4. *Ethical:* Before using an information resource, health care providers must insure that it is safe and be able to justify it in preference to other information resources and the many other health care innovations that compete for the same budget.

5. *Medico legal:* To reduce the risk of liability, developers of an information resource should obtain accurate information to allow them to assure users that it is safe and effective. Users need evaluation results to enable them to exercise their professional judgment before using systems, thus helping the law to regard the user as a "learned intermediary." An information resource that treats the users merely as automatons without allowing them to exercise their skills and judgment risks being judged by the strict laws of product liability instead of the more lenient principles applied to provision of professional services.

Currently there are no national standards by which to monitor clinical software system problems. Historically the United States Food and Drug Administration's (FDA) took responsibility for regulating medical devices through the 1976 Medical Devices Act and medical software regulation was introduced in the 1990 Medical Device Amendments to the act.[6, 7] In 1989 the FDA drafted regulations for the oversight of clinical software as a medical device and in 1996 called for public discussion of new procedures for the regulation and monitoring of clinical software systems as medical devices.[8] In response, a consortium of health information-related organizations, including the American Medical Informatics Association (AMIA), the Center for Healthcare Information Management (CHIM), the Computer-based Patient Record Institute (CPRI), the Medical Library Association (MLA), the Association of Academic Health Sciences

Libraries (AAHSL), the American Health Information Management Association (AHIMA), and the American Thoracic Society (ATS) has developed a series of recommendations for the responsible utilization and monitoring of clinical software systems.[3] In addition, four hospitals - the University of Utah Hospitals & Clinics, LDS Hospital, Vanderbilt University Medical Center, and Brigham and Women's Hospital are recipients of a grant to test the feasibility of having local IRB-like Clinical Software Process Quality Control committees monitor and review computer software in lieu of centralized FDA regulation.

Evaluation of Clinical Information Systems

Many clinical software quality improvement systems and evaluation methods are discussed in the literature.[9] Defining those that can meet the needs of an organization and successfully placing them into practice with objective measurable outcomes is the key. In all systems the two key elements of quality are reducing product defects and improving customer satisfaction.[10]

Horch states that the goals of a software quality system (SQS) are to: ensure that the problem or the need is clearly and accurately stated and that the requirements for the solution are properly defined, expressed, and understood.[11] Well-publicized software improvement models such as those defined by the Malcolm Baldrige criteria, the ISO 9000 standards, and the ASO/400 system include quality control and improvement as an essential element of process management.[11] These are incorporated into the software application development process with emphasis on standards, reviewing, testing, defect

analysis, configuration management, and security before it reaches the end-user.[11, 12]

Evaluation of Clinical Software Application Problems

Little is discussed in the literature regarding user problems and systematic methods to solve them once a software application has been implemented. There is little literature discussion about evaluating and improving software application problems within a clinical system.[13] One model that has been developed in the software community, the Capability Maturity Model (SW-CMM), can be used in organizations for judging the maturity of the software processes and for identifying the key practices that are required to increase the maturity of these processes.[14] In the CMM model, an organization moves from a lower level of undefined and chaotic software processes through several levels to reach a top level of performance. The top level includes continuous process improvement that is enabled by a quantitative feedback process and the piloting of innovative ideas and technologies. Although the CMM model could be applied in health care organizations, it has originated in the software industry and no literature was discovered regarding applicability to information systems in health care settings.

Good clinical information systems change the operational mode of patient care to be more efficient and/or effective in promoting desired clinical outcomes.[4, 12] Information resources generate more effective management of both patient data and medical knowledge. Effective process management in any

information system depends on consistent application of standard methods, tools, techniques and technologies to all information system projects.[1, 15] Effective clinical software application evaluation thus depends on a consistent methodology, or a consistent, repeatable quality improvement process that can be applied to evaluation of all clinical software applications.[16]

CQI as an Evaluation Method

Many systems employ the Quality Assurance (QA) approach to problem solving which is to put out fires by implementing periodic problem fixes to meet minimum standards. The solution to problems identified in the QA process usually ends with a subjective analysis of the data collection and the "manager fix-it implementation plan." CQI, on the other hand utilizes analytical tools from the beginning of the evaluation process with statistical analysis tools utilized on data results. The CQI process continues with benchmarking or comparing results against other health care institutions internally, locally/regionally, and nationally. CQI relates costs issues to the improvement process, thereby evaluating the best possible outcomes to all involved. CQI involves the "customer" concept. Customer is a broad term, which includes the patient, patient's families, physicians, nurses, other health care professionals, professional associates, and third-party payers. There are many overlapping relationships of customers to each other.

CQI's approach is to first develop a plan for improvement with input from the staff closest to the process, implement the plan and then to re-evaluate by

recollecting and analyzing objective data. This process repeats itself until variation is reduced and improvement is demonstrated as depicted in the Plan-Do-Check-Act (PDCA) cycle. (Figure 1). The process elements of the PDCA cycle are closely related to the structural elements that all studies share: negotiation; questions; investigation; report; and contract.[5]

The CQI movement in health care stems from an internal motivation within institutions to provide better care and services at same or reduced costs. Quality in health care means doing the *right* things *right*, melding traditional QA approaches of correcting the problem to the more current philosophy embraced by quality theorists of making continuous improvements in the processes and system to ultimately achieve the optimal clinical outcomes: satisfaction of all customers and meeting financial and operational goals. The next step is developing methods to tell us how well the job is being done which includes satisfying the customer and then developing and implementing plans to improve even further upon these processes and outcomes that have been identified.

Embracing a TQM Philosophy

Total Quality Management (TQM) embraces both QA and CQI and takes the quality approach one step further. TQM embraces a management philosophy that permeates the entire organizational structure, operations policies, and practices. It emphasizes empowerment of all employees in the system to practice QA and CQI to make total quality management happen by providing high-quality, cost-effective care. Total quality management philosophy implies

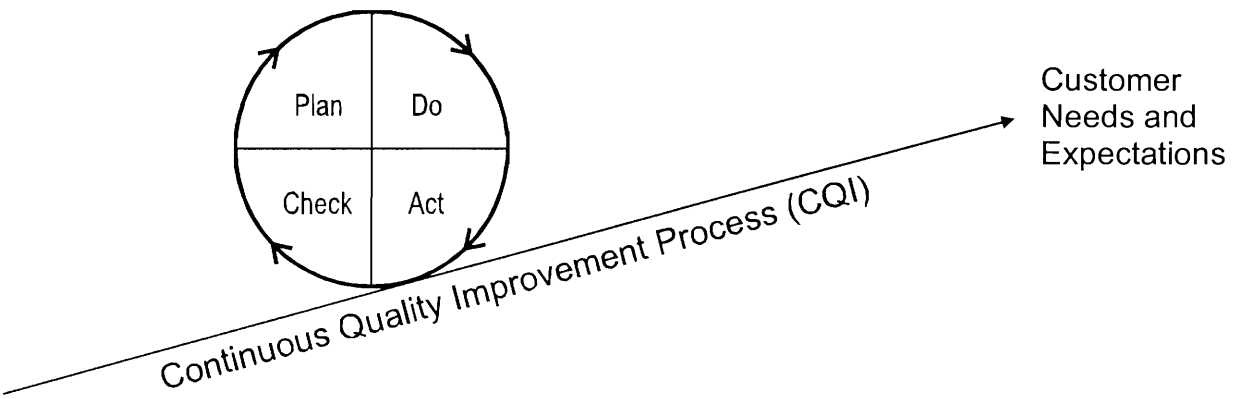


Figure 1. PDCA cycle of the Continuous Quality Improvement process. Adapted from Mateo and Kirchhoff.[17]

that we identify benchmarking partners.[17] These can include organizations or industries that are recognized for excellence or best practice in a particular process that we use, competitive health care partners with similar missions, processes, and product usage that are recognized for quality, and internal best practices within our own organization. An organization should determine our customer and financial outcomes and benchmark those with other organizations locally, regionally, and nationally. The total quality management philosophy requires an institution-wide effort for the quality program, without which lasting effects of efforts to improve quality and organizational performance are not realized. It involves leadership setting the stage with vision, mission, values, information analysis, strategic quality planning, human resources development

for education of all employees in the CQI/TQM philosophy, and quality process management. It results in both internal and external customer satisfaction and improved care outcomes and operational results. Information systems' support of Information and Analysis are a major part of the TQM picture for the entire organization as depicted in Figure 2. The TQM philosophy and process can also be adopted in totality as a department philosophy in the information systems department.

Techniques for Generating Ideas and Building Consensus

Several common quality improvement tools are utilized in the process of data collection for evaluation and analysis and are readily found in current quality literature.[17] Among those used for problem identification and prioritizing are

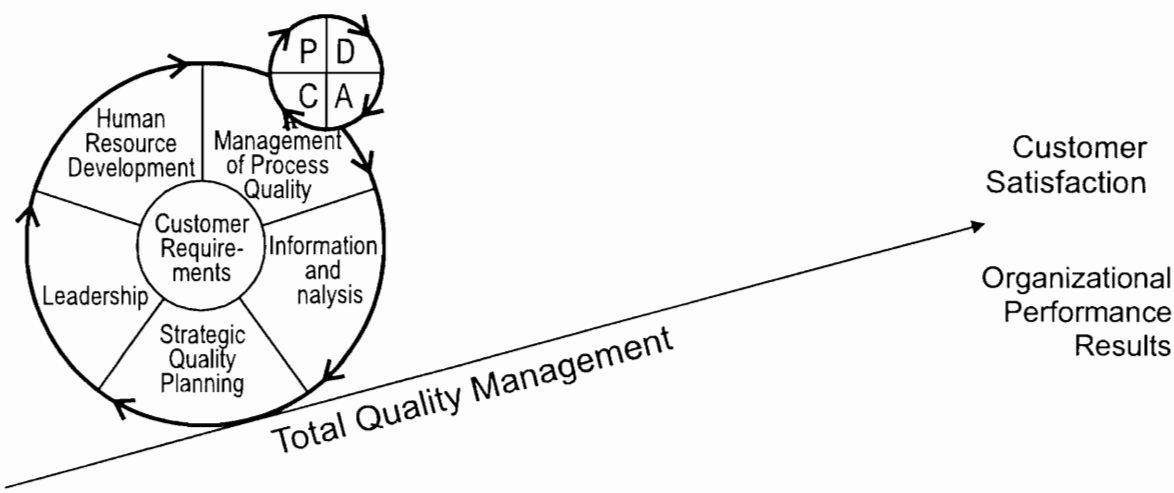


Figure 2. The Total Quality Management process. Adapted from Mateo and Kirchhoff.[17]

nominal group technique, brainstorming, and the Delphi technique. The nominal group technique is used for generating and prioritizing ideas. Although this technique is similar to brainstorming, the process is more controlled because it balances participation. Members of a group offer ideas one at a time, everyone takes a turn, and then the group clarifies and ranks the ideas. Brainstorming may be used to follow this technique.

There are three phases in brainstorming: generation, clarification, and evaluation.[17] During the generation phase, the group quickly rates thoughts or ideas in a very short time. As ideas are generated and listed using the speaker's own words, these are not judged or discussed because the focus is on the quantity of ideas rather than quality or clarification. Each idea is clarified in the clarification phase. In the evaluation phase, ideas are categorized, grouped, analyzed, and evaluated for their effect on an outcome. The cause and effect (fishbone) diagram or the affinity diagram may be used in evaluating the effect of an idea on outcome.

The Delphi technique involves distributing a survey or questionnaire about a specific issue or project, collating and assessing the responses, and repeating the process with a series of more focused surveys for as many times as it takes to reach a consensus.[18] The Delphi technique was developed by the Rand Corporation in the 1950's to use "expert opinions to arrive at a consensus for scientific data.[19] Literature review shows that academic medical departments have successfully applied the Delphi technique to resolve programmatic issues in various departments.[19-21]

Advantages of using the Delphi technique are that the technique takes a small amount of group members' time to complete the surveys and provide feedback. The process: involves equal participation of all members of the group; fosters the generation of new ideas within the group; and refines the process for which feedback is being solicited with relatively simple tools and process.

Components for Information Systems Support

Four main components support availability and functionality of information services: network systems; client computers, server computers, and application software.[22] Other distinct components include interface, database, reasoning, and maintenance programs as well as patient data, static medical knowledge, and dynamic inferences about the patient, the user, and the current activity of the user.[5] All of these components should be structured such that minimal problems occur in integrating information systems into an operational health care environment. Data storage, data mining to systematically identify problems in the system, and knowledge engineering from the information obtained are critical elements of the evaluation process. The evaluation process continues by trending the data, prioritizing critical problems and implementing and following through on quality improvement activities.

Information Systems at UUHSC

The UUHSC Office of Information Resources provides information technology infrastructure support to the University of Utah Health Sciences

Center, an academic center with a complex system of interrelated information applications from vendors as well as internally developed applications. It became a centralized office within the last few years when hospital departmental information technology (IT) support personnel were centralized to pool resources. The centralization occurred to better manage various information technology projects and to standardize the approach to information technology. The consolidation occurred also for quality and financial reasons as well as to begin implementation of a Computerized Patient Record (CPR).

The scope of responsibility of OIR includes: clinical systems, financial systems, data warehousing, ancillary systems, E-mail, wide area and local area networking, desktop support, and the help desk. OIR supports two hospitals, approximately 40 clinics, and over 7000 users spread over 84,000 square miles on a wide area network. OIR is responsible for managing over two hundred specific computer applications. [23]

At UUHSC, administration employs "Steps for TQM Deployment", based on the Malcolm Baldrige Health Care Criteria for Performance Excellence (Appendix A). Although many improvements have been made in the infrastructure and support in OIR, a need existed for a consistent, reliable method to assist OIR management in evaluating clinical software application problems. The Remedy® Action Request System, computer software for problem reporting, had previously been implemented to assist with problem calls and manage the logistics of support. Although the system had the capability to track and trend problems, according to the OIR management, problem identification

and categorization was inconsistent and sometimes inaccurate. Although the program allowed for customization, the problem categories and sub categories were not methodically developed. Problem calls were logged into a software problem tracking record by support desk personnel based solely on information from the user. The problems were then assigned to a technician and resolved without verification of accuracy of problem identification and categorization in the database, and were never updated if the problem changed. Also, new categories were periodically added at random suggestion without analysis and verification. Thus, even though the program provided trending statistics of problems, the data were inaccurate at best and not relied upon by management. Thus arose the need for an in depth analysis and revision of the support program to better meet customer needs.

GOAL STATEMENTS

The following goal statements guided this study:

1) Clinical software application problems can be systematically placed into a standard classification system.

2) A quality management report template designed from the classification system can produce reliable aggregate data reports that can be used for quality improvement and for strategic planning.

3) Through use of CQI methodology and tools, measurable improvements in OIR processes can be demonstrated by using the new classification system and newly created web problem ticket entry system.

METHODOLOGY

A subjectivist evaluation [5, 24] approach was used for the study. Key elements in the process were negotiation of the study within the OIR department and in the Software Oversight Committee; numerous ongoing formal and informal meetings with staff from the OIR department and with the Software Oversight Committee; an external validation survey for the problem classification system; an iterative process for development of the QM Template; and preliminary reports back to OIR groups and the Software Oversight Committee to generate clarification and sharpening of the study findings.

The study was based on the premise that information is organized data or knowledge that provides the basis for decision making. Information must be properly recorded and communicated; otherwise systemic errors in information lead to lost information.[2] Computers are excellent tools for producing information and generating knowledge that can be used for process management in the information systems department.

Problem Classification System

The purpose of developing a classification system was to cluster and analyze problems so that improvement efforts can be focused. To determine external validity of the current problem ticket classification system, a survey was

designed and sent through e-mail to peer information system departments of hospitals in the University Healthcare Consortium (UHC), which number approximately 77 (Appendix B). Each university hospital in the UHC has an in-house coordinator through which inquiries to fellow consortium members can be directed. The survey requested feedback regarding: 1) software or logging/documentation system used to track clinical software problems, i.e., a vendor application or self-built system; 2) method of classification, i.e., major categories such as lab results, printer problem, type of software, and how many tiers to the classification, and 3) if tracking and trending occur, the ten most frequent recurring problems. Follow-up phone calls were made as necessary to those responding to clarify and/or expand information. In addition phone calls were made to managers of the Help Desk in the hospitals in the NIH grant study that were not a part of the UHC. Fifteen responses were received and the main problem categories identified (nine) were ranked in order of frequency. (See tables in RESULTS section of the thesis).

An evaluation of the existing classification system at UUHSC was conducted to support internal validity. The existing classification system consisted of three tiers: call type; category; and item affected. System problems, software/hardware problems, and descriptive terms were inconsistently categorized into the three tiers by HELP Desk agents. An in depth analysis of a sample of problem reports occurred by selecting a total of 150 problems from existing clinical applications that had been entered into the Remedy® database (Appendix C). Entries were analyzed to determine the root cause of problems

that were included in the entries. A physician informatician and two OIR Analysts assisted in the detail analysis of problem reports. The group met for one hour weekly for approximately 12 weeks to review and analyze the external survey responses and the information in the internal problem reports. Based on the group analysis of current problems and the UHC survey, the UUHSC three tiers were revised to: problem type; category; and item affected (system, software/hardware). During the process of revision, the new classification system was reviewed with all OIR team leaders, revised based on feedback from them, and then presented to them again. In addition, the OIR analysts completed a sample mapping of the three tiers of 1355 problems identified in the old classification system to determine if they could be placed in the new classification system. The revised classification system was then presented to all OIR staff.

The Help Desk agents were trained in the new classification system and it was implemented. Also, at this time the OIR department installed a knowledge base (ServiceWare's Knowledge-Pak) to the Remedy® system to assist the Help Desk agents with accuracy and consistency in identifying problems and relevant solutions. To improve accuracy of future reports generated from the database and to validate initial entries, an additional field was added to the problem ticket entry form that required the technician to verify or reclassify the problem upon closure (Figure 3).

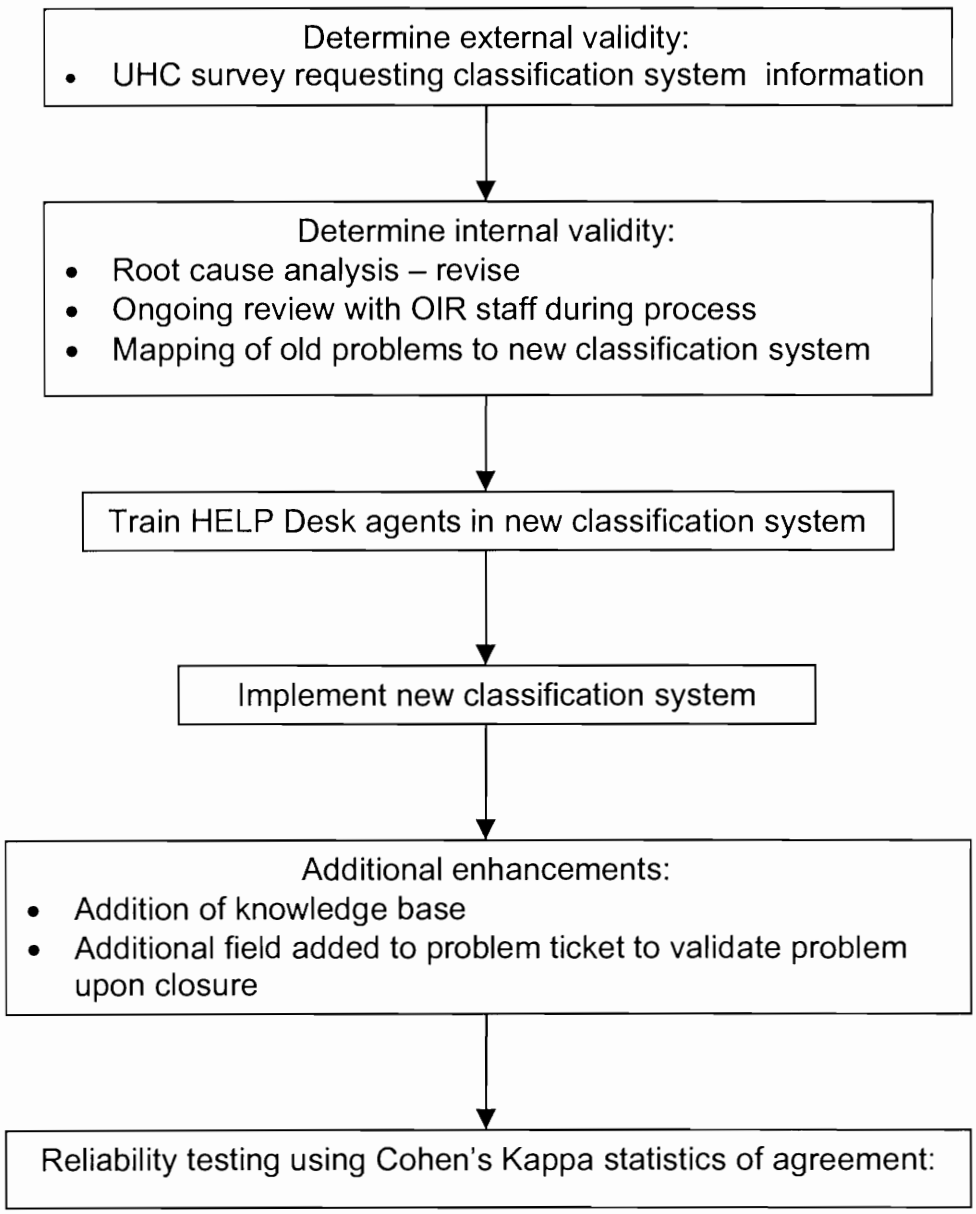


Figure 3. Flow diagram of methods for developing classification system.

Reliability Testing for New Classifications – Cohen's Kappa

After the new classification system had been in use for six months, reliability testing using Cohen's Kappa was performed on the classification system. A set of 100 problem tickets randomly selected from the Remedy® database were set up in a separate database with the new classification application. All nine Support Desk Agents were requested to participate in the study and reclassify the same set of problems from the initial entry of each problem ticket. Statistics of agreement were applied to the results to determine agreement among the agents' choices of categorizing the problem using the new classification system.

QI Report Template

After the classification system had implemented, the Remedy® database was analyzed for the type of reports that could be generated. These included: resolution times; failures in entry process; callback times; percentage of total calls; repeat users; and user satisfaction surveys. These were analyzed in discussions within the OIR executive team along with the OIR Analysts. The Delphi technique was employed to obtain a consensus on the type and format of how data would be displayed for a monthly quality improvement report template. A QM report template (Appendix C) for a proposed set of monthly reports was presented as an example when the surveys were distributed. The Delphi technique was used in a series of three monthly meetings with the following groups: 20 OIR directors/team leaders/project coordinators; and 10 Software

Oversight Committee (SOC) members. The groups were asked to rate the usefulness and prioritize the proposed set of monthly reports that presented data from the Remedy® database. The first survey asked the staff to rate usefulness of 5 proposed report categories: downtime reports; problem summary reports; top 25 problems report; top problems detail report; and case analysis reports. The survey also asked the staff to note additional characteristics of the reports they thought would be helpful. Appendix D shows the three surveys. The second survey asked the staff to rate the usefulness of the five proposed reports along with the characteristics identified in the first round of survey. In addition, it asked for usefulness rating for two additional reports that were suggested by the staff: follow-up of case analysis reports, and customer satisfaction survey results. The third survey listed the seven reports and asked the staff to rank in order of importance (Figure 4).

Continuous Quality Improvement Process and Methods

The customer service relationship (CRM) division in OIR was evaluating the purchase of a new HELP Desk phone system for UUHSC. The investigator and five members of the team met to discuss the possibility that implementing a web problem ticket entry system based on the new classification system could result in better outcomes than installing a new phone system. The group was chartered as a QI team comprised of: the Director of Desktop Support/Network Operations as team leader; two system analysts; a computer professional; the integrated data management team leader; and the investigator as QI facilitator.

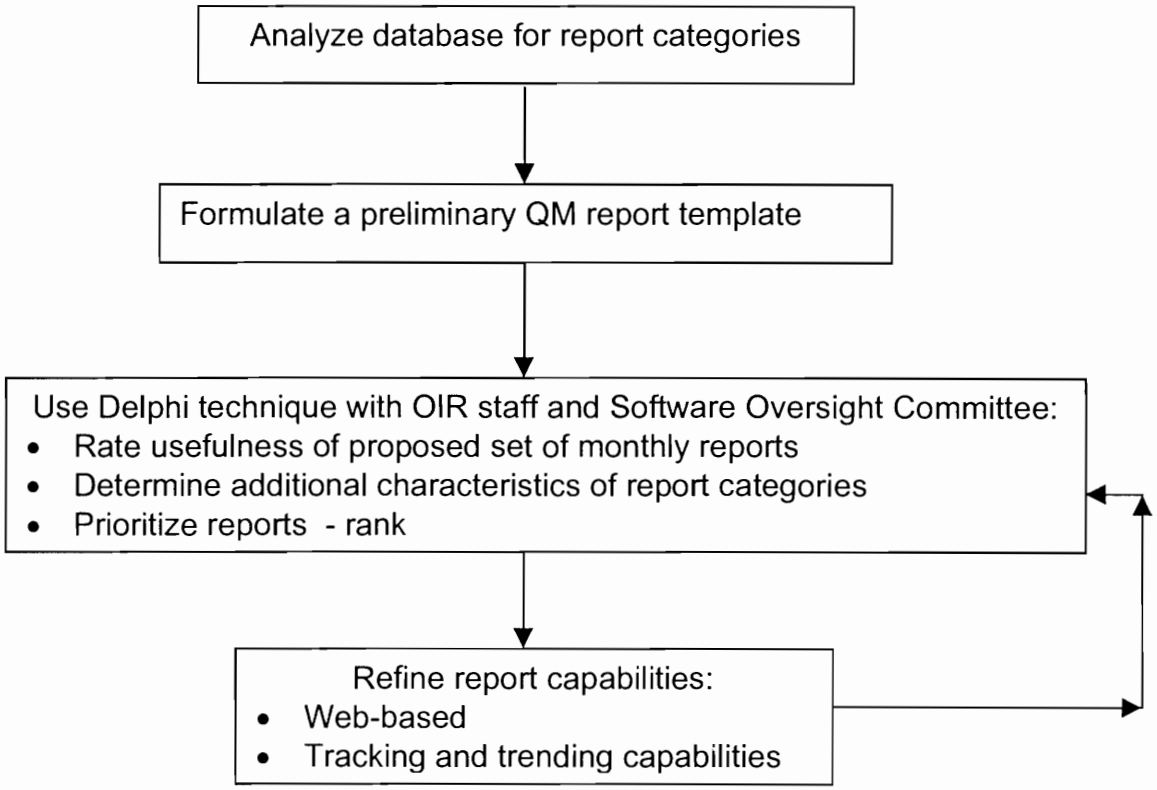


Figure 4. Flow diagram for methods for developing QI report template.

The team defined their purposes as: pursue the hospital values of "excellence" and "customer service"; and reduce Help Desk call wait times. The team met monthly for six months, and in several additional meetings to plan storyboards to display the team process. The fact that an OIR director served as leader of the group assured that the team had leadership support and buy-in as required by the TQM philosophy which the UUHSC embraced as their quality model. The CIO also sanctioned the formation and activities of the QI team.

The FOCUS-PDCA methodology in Total Quality Management was used for the QI team process.[17] A summary outline of the process is shown in Table

1. A table identifying the relationship between this quality improvement methodology and the research process and some of the tools that may be employed is displayed in Appendix E.

Table 1. The FOCUS-PDCA methodology.

FOCUS-PDCA™	
F	Find a process to improve.
O	Organize a team that knows the process
C	Clarify current knowledge of the process
U	Understand causes of process variation
S	Select the process improvement
P	Plan the improvement and continue data collection
D	Do the improvement, data collection and analysis
C	Check and study the results
A	Act to hold the gain and to continue to improve the process

Adapted from HCA Quality Resource Group. [25]

RESULTS

Problem Classification System

Through the UHC survey and follow up phone calls, a total of 15 responses were received. Responses varied and included: brief statements; discussion of methods of classifying and tracking problems; concise listings of problems; and frequencies of problems. A qualitative analysis of results is listed in Table 2 ranked in order of most frequently mentioned categories listed first. The entire results of the survey are listed in Appendix B.

Based on the expert analysis of current problems and the UHC survey, the UUHSC classification was revised to include the nine classifications as listed in Table 2. Three additional categories were added to meet UUHSC needs: Web; security; and interface. (Table 3). Appendix F provides an example of the three tiers of the new classification system.

Reliability Testing Results– Cohen's Kappa

Five of the nine Help Desk agents agreed to participate in the study to completion. Each of the five agents spent one to two hours classifying problems and completed the entire set. Results were analyzed using Cohen's Kappa for agreement. Statistical analysis revealed moderately good agreement (Kappa = 0.6162) among the agents for the top tier classification (Appendix G).

Table 2. UHC classification survey results – main problem categories

1	Password, access, exit
2	Printing
3	Software related (i.e., orders, results reporting, etc.)
4	Server/mainframe problem
5	Network connectivity
6	User related problems (i.e., training questions, non-approved downloading, etc.)
7	Hardware (mouse, keyboard, CPU, monitor)
8	E-mail
9	Data interchange errors

According to Fleiss, values greater than .75 represent excellent agreement, values below .40 represent poor agreement beyond chance, and values between .40 and .75 represent fair to good agreement beyond chance.[26]

The proportions of possible agreements ranged from .2 to 1. With five raters, there are 20 possible different pairs of agreement, making 20 possible combinations of agreements between any 2 raters. The overall proportion of these 20 for a single item constitutes that item's level of agreement across raters. The tickets were sorted in ascending order from lowest proportions of agreement. Letter codes corresponding with the categories chosen for each ticket were

Table 3. Results of UUHSC reclassification

1	Access
2	Database
3	E-mail
4	Hardware
5	Network
6	Operating Systems
7	Printing
8	Security
9	Server
10	Software
11	Web
12	Interface

assigned. Results were then analyzed further for patterns of disagreement.

Forty-two percent (39/92) of tickets were in total agreement. For these 42%, the categories used in agreement were: Access, 33%; Hardware, 31%; Server (R), 15%; Email, 10%; Network, 3%; Software, 3%; Web, 3%; Database, not used; Interface, not used; Printer, not used.

Of the moderate proportions of agreement (.6) for each item, three categories were used for each ticket. Variance occurred most frequently in the software category (65% of all variances). In the lowest proportions of agreement

(≤ .4), variances occurred most frequently in the access and the software categories, respectively. Access category was involved in choices 92% of time, and Software was involved 58% of time. The occurrence of both Access and Software in the categorizations for the same ticket in this set of 12 tickets was 58%. These results indicate that software and access are less specific than other categories and perhaps are a catch-all for indecision.

A qualitative analysis of the details in the tickets of the lowest agreement revealed that the problem could have some relationship to all three categories chosen; some problems fit under multiple categories. This suggests that the categories need to be evaluated and revised for more specific differentiation among categories. The overall results demonstrate reasonable agreement among Help desk agents and that the agents accept the classification system.

QM Report Template

Initial report categories for the QM Report were: server unplanned downtime reports; problem summary reports; top 25 problems; top problems detail report; and case analysis reports.

The survey asked for rating of importance of the above on a scale of 1 to 5 with 5 being most important. It also prompted comments on various suggested characteristics of the reports such as time increments, location, and planned versus unplanned (downtime). Each time the survey was presented in the iteration process, a sample report was presented for reference.

Based on the feedback from the first survey (APPENDIX D), two additional categories were added: follow-up of case analysis reports; and customer satisfaction survey results.

Survey #2 – Rating Report Categories

The survey was revised after the responses to the first survey were received. The staff were again asked to rate the categories as listed above, and also requested to rate the characteristics of each report as well. Additional characteristics were added such as: source of problem, i.e., server, networks, application, user; clinical versus non- clinical; severity; and time to resolution. Again a sample report, also revised based on the feedback from survey #1 was presented. The same scale as used in survey #1 was used. An advantage of the process was that each time staff saw the survey and revised report, the potential information that could be provided became more clear allowing staff to more accurately rate the usefulness of the reports. Having a clearer understanding of the reports each time they were presented enabled the staff to offer more feedback on the process and potential report. Using the iterative process in meetings with the staff allowed a quicker resolution of the process. For example the question of representing a report in *uptime* versus *downtime* arose. Although *uptime* presents a more positive picture for reporting and staff favored that descriptive during the first phase of the iteration, it was established that most other hospitals reported the problem in the negative, so for benchmarking purposes, it was left as *downtime*.

Additionally feedback on the report in terms of format, legends, and clarity for graphs and charts could be readily established. For example, under the problem reports, it was readily apparent that the clinical problems - those from the software applications that were used directly for patient care - were buried in the report display and could not be differentiated from the nonclinical issues. In the Top 25 Problems Report, it was noted the clinical issues are buried deeper in the classification tiers and the network issues were reflected more in this report. Thus a method for filtering out the nonclinical problems was added to the method for producing the template. An example of preferences in method of presentation was bar graphs versus pie charts for display of patient satisfaction survey responses. Although the survey results favored bar graphs initially, pie charts were used in the final report format. Pie charts are used to represent percentages equaling 100% whereas bar graphs are used to display data with percentages not equaling 100%. [27, 28]

Survey #3 – Ranking Report Categories

The third iteration to the same groups as survey #1 and survey #2 involved prioritizing the reports for the standard monthly template. The results are as follows with top importance listed first: top 25 problems report; downtime reports; Remedy® problem summary reports; user satisfaction survey results; case analysis reports; top problems detail reports; and follow-up of case analysis reports (Appendix H).

Additional comments at this stage also provided valuable information for refinement of the information displayed. For example, it was suggested to add a 'Top 10 Solutions' category to this report to provide information for analysis on problem resolution techniques being employed by the department. Other report issues such as presenting not only the departments with the highest frequency of problem calls, but listing the type of calls for the highest frequencies was suggested by the group.

It was also determined at this stage that problem detail reports would be produced upon request from an individual team leader or manager. An example of how the detail reports could be useful was provided by the clinical informatician who provided an in-depth analysis of a sample of 70 pages of detail reports representing 98 printer problem entries. It was determined that half of the problems were configuration problems; 24 were indiscernible as to the actual problem due to lack of documentation; 14 were server problems; 5 hardware problems; 4 unknowns; 2 network problems; a vendor problem; and a technician error. Other categories that had no occurrences in this set of problems are user error and application error. An analysis of common themes revealed: recurrent problems configuring printers in Windows/Novell environment; NDS printer queue rights, configuration errors; printer cables; jet direct printer interface cards – configuration updates; and user education/documentation for fixing configuration problems. From this analysis, specific printer information could be extracted for the case analysis section of the report to assist management groups and CQI teams better analyze problems and plan for resolutions (Figure 5).

Printer Problems – 98 calls March

C – Configuration problem	46
X – No documentation	24
S – Server problem	14
H - Hardware problem	5
? – Problem unknown	4
N – Network problem	2
V – Vendor (NDS problem)	1
T – Technician error	1

Common issues:

Recurrent problems configuring printers in Windows/Novell environment
NDS printer queue rights, configuration errors
Printer cables
Jet Direct printer interface Cards – configuration updates
User education / documentation for fixing configuration problems

Potential Solutions:

Draft Classification for Problem analysis

V – Vendor problem
U – User error
N – Network
S – Server
A – Application error
H – hardware problem
? – Unknown cause
T – Technician error
C – Configuration problem
X- No documentation provided

Figure 5. Example of case analysis report

Quality Report Template

Additional comments were provided by the staff regarding aspects of each report, as they were with each iteration, and were incorporated into the final report format (Appendix H). Also, the staff were provided feedback from the previous survey prior to asking them to complete the next iteration. With the Delphi technique, we were able to move from a global report of the issues to a more detailed and meaningful report of information for analysis.

At the close of this project, the first report with three months of trending have been distributed to the OIR executive group and the OIR team leaders to begin using for operations management and quality improvement. The report is web based and interactive allowing the staff to view additional details for certain aspects of the report or view trending for longer than the three-month period. It can also be printed and viewed in hard copy. Initial feedback is that the reports are proving to be useful information from which to determine improvement opportunities and from which to plan operational activities. Leadership has committed to continue quality management initiatives by dedicating resources in the appointment of a Customer Relations Manager to work with the Help Desk and the department overall in improving customer service.

CRM CQI Team: Pursuing Excellence and Customer Satisfaction

Web Problem Ticket Entry

After initial brainstorming and prioritizing of improvement opportunities, it was decided that pursuing a web-based problem ticket entry system feeding into the Remedy® database and utilizing the new problem classification system would be the focus of the improvement activities. The FOCUS-PDCA improvement methodology was employed to direct the activities of the group (Table 1). Two storyboards that depicted the team's project were developed and displayed in the hospital Storyboard Fair which occurred at two different times during the year. The team met for six months.

Customer Satisfaction Survey and Team Outcomes

The outcome of the project was that web-based ticket entry system was implemented which links to a customer satisfaction survey upon notification of the closure of the ticket to the user. The new system has resulted in the following benefits: problem resolution times reduced by one third, from 60 hours at the start of implementation to 40 hours after six months (Other QI activities may also have contributed to this reduction), (Figure 6); measurement of customer satisfaction (Figure 7); improved problem ticket information; and a reallocation of 2 FTEs from call center to dispatch due to the increased efficiency achieved at the HELP DESK. An intangible benefit was that more productive

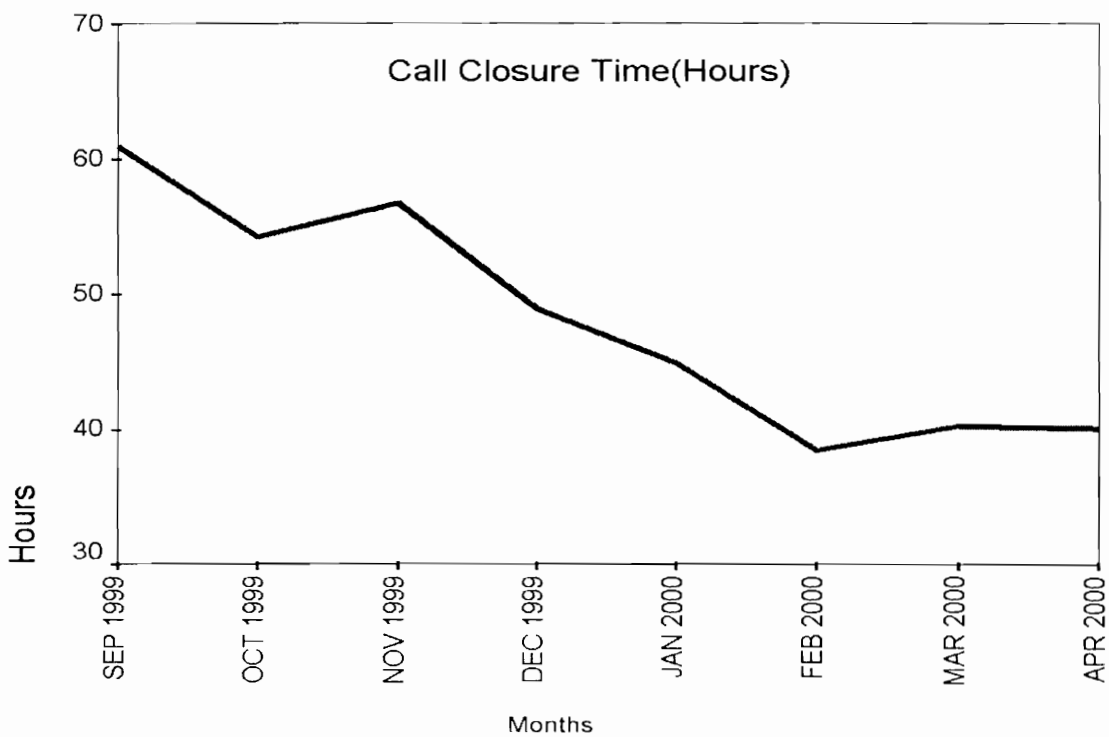
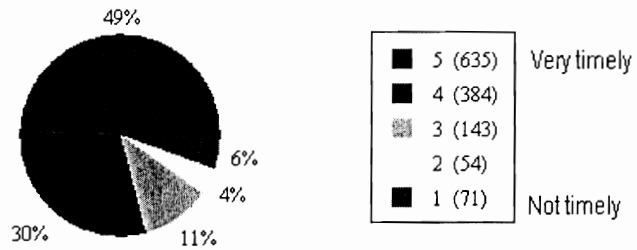


Figure 6. Call closure time for all projects.

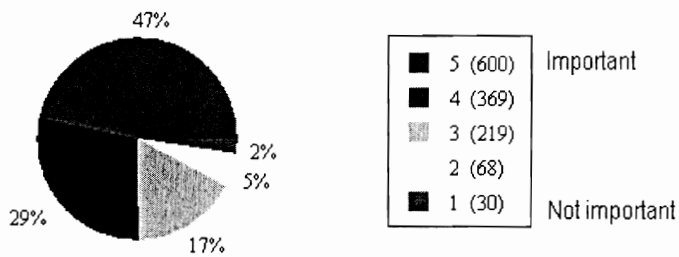
work time was achieved by moving more resources to problem resolution instead of call answering.

The team helped to meet department and organizational goals by: partnering with the user to improve customer service; empowering the customer to control their own service level; improving the efficiency of resources; and improving the data entered into the Remedy® database from which the QM reports would be run. The team was nominated for and won the annual *Hospital Quality Through "U" Process Improvement Team Award* for 2000. Each team member was presented a certificate and a financial reward and received recognition at the Annual Awards banquet. One of the best outcomes is that the team served as a QI team model within the OIR department and spurred interest and enthusiasm for other staff to become involved in CQI activities. They registered for hospital sponsored TQM classes, began attending CRM division quality meetings, and accepted assignments from management to initiate QI projects.

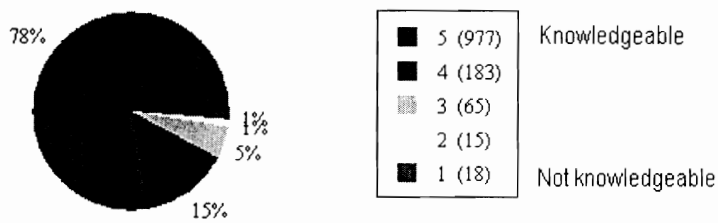
1. Was your trouble ticket resolved in a timely manner?



2. Relative to the issue this Trouble Ticket addressed, how important was a timely resolution?



3. Was the support technician knowledgeable and professional?



4. How do you rate the overall service provided on this trouble ticket?

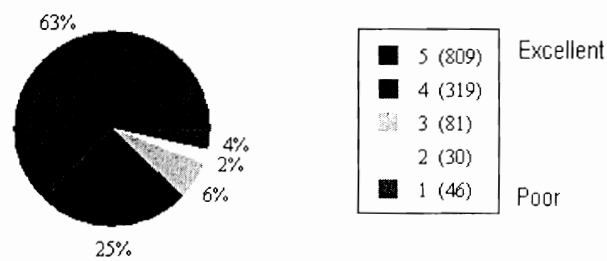


Figure 7. Customer satisfaction survey results.

DISCUSSION

Benefits of Continuous Quality Improvement

As information technology continues to have a profound effect on clinical decision-making, clinicians and technologists must continue to work together to achieve systems that enhance patient quality and managerial decision-making. Strategic information systems can provide opportunities for data analysis enabling health care professionals to better support decisions. Cost effectiveness of systems and resources is a major driving force for improvement studies. At a time of spectacular research breakthroughs in the life sciences and advances in medical care, all academic medical centers face serious financial stress due to employers' and governments' determination to control health care spending.[29] The next generation of healthcare information systems must help the clinician and management to assimilate the myriad of data and to make fast and effective decisions; thus the need for reliable applications with as few problems as possible for decision facilitation. We can offer reliable application systems by using reliable data and CQI methods to trend and analyze data, and plan solutions to clinical software application problems. Finally, but of foremost priority, developing reliable methods and standards for evaluation and improvement of interaction between health care providers and computers can

contribute to improvement of clinical outcomes to ultimately benefit patient care delivery.

Internal and External Quality Model

The OIR chose to embrace the TQM philosophy employed by the hospital and have begun applying Continuous Quality Improvement methodology to information systems analysis. Continuous quality improvement methodology as employed in this study served as a quality model in the OIR department. The project has spurred interest of other staff in becoming involved in the quality process and applying the techniques and principles to their projects. Team leaders' interests were peaked and they were willing to participate, provide input and accept feedback in the process. Although there were multiple internal and external cultural shifts occurring, staff in the department are interested in learning more about their customers' needs and improvement opportunities to better serve them.

Further evaluation of the Remedy® classification system is an open issue. It is possible the top tier classification should be revised based on the results of the Kappa agreement statistics. Some of the categories that are used most frequently in the lowest proportions of agreement could be revised to better differentiate the problems. Further analysis could include studying the solutions to the problems to determine best solutions. One solution may work for multiple problems. A goal could be to implement unique solutions to problems so consistency in service could be obtained. The Kappa statistics could be further

analyzed for use and agreement among agents for the three different tiers in the system.

The potential exists for application of the newly developed classification system at other institutions that have an electronic medical record. Currently, one of the other hospitals in the NIH grant study has installed the Remedy® system and implemented the classification system based on results of this study. This could be a beginning of standardization of classifications of clinical software application problems that can serve as a foundation for benchmarking and sharing of successful improvement strategies among health care institutions.

The study was able to establish a reliable data reporting foundation on which CQI/TQM processes can expand. It also produced a quality model for other staff in the OIR department and the UUHSC via the successful CQI team and storyboards that were displayed. The time required for the technological processes for revising and refining the report template; personnel time issues of OIR staff, and the study timeline made it necessary to limit this study to the above. Analysis of the detail reports required intensive review and proved to be very time consuming.

Further work that could move the department forward in its TQM model is the analysis and trending of the monthly reports over time. Although developed and initially useful, the process is not yet fully implemented and integrated into the workflow process or used for decision facilitation. Further evaluation and analysis is needed for the report template and data to continue to be useful. Doing so would provide valuable information for analysis of problems identified,

planning of solutions, and evaluating outcomes of application problem solutions and evaluating patient care problems as well. Additionally, qualitative analysis of the reports and their usefulness as rated by the team leaders, managers, directors, and CIO for their individual areas is an important step of the quality process. Based on the Kappa results, it would be beneficial to re-evaluate and make necessary adjustments to the classification system and the report template to continue to provide reliable data.

Also, other evaluation methods such as the Capability Maturity Model could be explored and compared to TQM to determine the best model for managing information systems in a healthcare setting.

CONCLUSION

Evaluation and technology assessment differ from mainstream views of research.[24, 30] There is no theoretical limit to the questions that can be asked in a subjectivist evaluation study. Many consequences of change can be studied; there can be many consequences from the data collected. There is potential for improvement in social, organizational, and cultural contexts as key issues emerge over time.

Starting a quality model for clinical information systems is a time-consuming task that is doomed to failure without adequate groundwork and support from leadership. Strategic planning, preparation of staff with education of terminology and process, creating infrastructure to support quality processes, and outlining individual roles in the process are essential steps that will promote success. It requires a change of culture supported by the overall organization. The key component of culture change is commitment, not only of leadership, but also of staff, administration, and support departments across the entire organization. The role of the customer, both internal and external cannot be overstated. Long term success of a department or an organization links quality with customer satisfaction.[10]

This project has created a classification system with reliable data for information systems evaluation, created a QI Report template that can be used

by managers and team leaders in day to day operations as well as long term strategic planning, and initiated QI processes in the OIR department. In the process it has created a clearer identification of customer needs and improvement opportunities for information systems at the UUHSC. The OIR department may be better able to implement strategies to better meet those needs. Continuing the QI processes of planning, implementing, measuring, evaluating, and revising again will over time result in more efficient work processes, reduced costs, and increased customer satisfaction.

APPENDIX A

STEPS FOR TQM DEPLOYMENT

Steps for TQM Deployment Overview

CATEGORY	AWARENESS	KNOWLEDGE & EMPOWERMENT	IMPLEMENTATION	INTEGRATION & EVALUATION
LEADERSHIP	Read, review and share mission, vision and values.	Create atmosphere that promotes excellence. Show a willingness to listen and learn.	Develop departmental mission, vision and goals. Establish an environment where everyone's capability is enhanced.	"Walk the talk."
STRATEGIC PLANNING	Review Hospital Process Improvement Plan and strategic goals.	Share ownership with department team in the development of the TQM Plan. Involve physicians in the planning process.	Develop and implement TQM Plan. Align departmental plan and goals with Hospital Process Improvement Plan and strategic goals. Develop reward and recognition program.	Translate TQM Plan into specific actions and improvements. Create evaluation check points to measure progress toward goal attainment.
FOCUS ON PATIENTS, OTHER CUSTOMERS AND MARKETS	Create a vision for superior customer service. Demonstrate a commitment to service excellence.	Identify customers; determine their needs and expectations. Listen and respond to customers.	Align services with customer needs and expectations. Develop a complaint protocol.	Monitor customer perceptions of quality. Base reviews, rewards and recognition on customer service.

INFORMATION AND ANALYSIS	Identify local and national benchmarking partners.	Identify best practices. Define core processes. Select key quality characteristics to measure effectiveness of core processes.	Measure key quality characteristics. Collect valid, reliable and meaningful data.	Compare current data to benchmarking partners. Identify variances from best practices.
STAFF FOCUS	Promote employee involvement, empowerment, team work and innovation.	Provide training in TQM. Develop team work skills. Train functional team leaders. Train and establish functional teams.	Develop departmental orientation program. Develop continuing education program. Fully integrate reward and recognition program.	Evaluate team dynamics. Assess effectiveness of training program. Evaluate reward and recognition program. Assess level of staff-satisfaction, well-being and morale.
PROCESS MANAGEMENT	Develop climate that supports continuous process improvement.	Provide training in the concepts of process improvement. Flow chart current and ideal core processes.	Monitor, evaluate and improve core processes using the FOCUS-PDCA™ model or rapid cycle change process.	Provide rapid feedback and resources. Implement standardized approaches. Employ control measures to keep processes within acceptable limits.
ORGANIZATIONAL PERFORMANCE RESULTS	Share benchmarking data with team. Share examples of successful improvement projects.	Share process improvement results with team, other departments and organization.	Measure existing status relative to established goals on an ongoing basis.	Evaluate trends. Demonstrate impact on productivity, quality, customer satisfaction and financial outcomes. Revise improvement process and goals accordingly.

APPENDIX B

UHC SURVEYS

INFORMATION SYSTEMS CLINICAL SUPPORT SURVEY RESULTS

August 2, 1999

The following survey was conducted during May 1999 by electronic mail to all hospitals in the University Health System Consortium. Fourteen responses were received (inclusive of UUHSC). In addition, a response from one of the hospitals not in UHC but in the NIH grant study is included.

The University of Utah is requesting your assistance with the following inquiry. Please direct this inquiry to your Computer HELP/SUPPORT Desk manager:

1. What software or logging/documentation system do you use to track incoming clinical software problems? i.e., a program such as Remedy or a self-built system?

INSTITUTION #1

We use *Peregrine's "ServiceCenter"* product.

INSTITUTION #2

Remedy

INSTITUTION #3

MCG has a support staff of 9 technicians and a customer base of 6500.
We are currently using an older *Bendata Heat* version, but will be upgrading *to Computer Associates* Service It product this summer as part of our Y2K initiative and our need for better reporting features.

INSTITUTION #4

We are currently using *Peregrine's Service Center*. We are in the process of implementing *Tivoli's Service Desk*.

INSTITUTION #5

(We currently have two Help Desks - one for the Hospital and one for College of Medicine. I will primarily answer for the Hospital. There is an evaluation in progress of the feasibility of combining the two Help Desks. If and when that happens the answers to the questions may be different).

We use an IBM mainframe package call *Info Man*. Our mainframe Operations staff handles our Help Desk and Info Man is what they are used to using. We experimented with Remedy because that was what the micro-computer analysts wanted to use (they are the folks are Help Desk people call when a problem needs to go to the next level). But the MC analysts could not be coaxed, bribed or threatened into actually doing

problem tracking so we allowed our Help Desk to revert back to the use of Info Man. (I know, this sounds like a management problem and it is. We just haven't dealt with it yet.). Anyhow, without customization Remedy lacks the field auto-fill capabilities we have on Info Man so Info Man is much faster to use when opening a problem while talking to a user on the phone.

INSTITUTION #6

The MCVH Help Desk is currently using the *SupportMagic* help desk software product. SupportMagic was formally marketed by MagicSolutions, and is now marketed and supported by Network Associates, Inc. We have recently initiated a project to replace SupportMagic, with the *Computer Associates' Advanced Help Desk (AHD)* system.

Problems in SupportMagic are classified in categories, called subjects. Although these subjects have a hierarchical structure, it is not a true parent-child relationship. Therefore, our problem classification and reporting, is done on only one level, for all subjects defined to the system.

INSTITUTION #7

We use *HEA*T 5.0 from Bendata Inc. The implementation of this call tracking system occurred on 4/16/99. We are still building the reports and configuring call types, however the application is stable.

INSTITUTION #8

We currently use *Peregrine's PNMS III* system using their proprietary P4 database. This includes problem, change and asset management. We are in the process of migrating this to their newest product, ServiceCenter (v2.1), within the next few months.

INSTITUTION #9

Use Lotus notes based called HELP which is marketed by GWI, Inc. We recently (February 1999) migrated to this product after using an in-house developed system for many years prior.

INSTITUTION #10

We use *Remedy*; presently, we're on version 3.0 but will upgrade early next year (we want to get beyond the Y2K fixes for everything else on campus first).

INSTITUTION #11

Remedy

INSTITUTION #12

Support Magic

INSTITUTION #13

We are currently using a home grown Access database but are in the process of developing our new database using *Remedy*.

INSTITUTION #14

We use a mainframe based product called *Solve Central* from Sterling Software.

INSTITUTION #15

Remedy.

2. How do you classify the problems? i.e., do you have major categories such as lab results, printer problem, etc., or do you classify problems by the type of software....how and how far do you break down the categories into the more specific problem?

INSTITUTION #1

We classify problems using major categories such as the problems you used in your question mainly because there are Soooo many apps between the various hospitals we cover the drag down lists for the Level 1 people answering the phones would become too cumbersome to handle in a timely manner.

INSTITUTION #2

Problems are broken down into for categories or levels which determine the severity of the problem:

Level 1: Networking issues, System issues, those that affect patient care.

Level 2: Problems that relate to specific departments or have departmental type of affect such as printers, certain departments which for various reasons should take priority, and, to be honest, VPs and other troublesome characters.

Level 3: Standard problems that typically affect only the user who is calling in

Level 4: Wish list such as a request to install a new device

Documentation on this is actually quite extensive and there is a caveat that any user may escalate any problem at their discretion. It becomes the responsibility of the Help Desk manager to work with departments should they abuse this privilege.

Problems are distributed and tracked by those departments that provide support such as Help Desk for break/fix, Networking, Technical Support, Clinical Applications, Patient Accounting Applications, Business Applications, and Security. We may shortly increase this to provide support for remote locations.

INSTITUTION #3

We have the following categories (custom problem ticket classifications with specific data gathering requirements for each):

DATABASE	DATABASE PROBLEMS
HELPCALL	STANDARD QUICK OPEN OF PROBLEMS/QUESTIONS
MICROHARD	PC / LAN / PC-MAINFRAME HARDWARE PROBLEMS
MICROSOFT	PC / LAN / PC-MAINFRAME SOFTWARE PROBLEMS
MVSSOFT	MVS/XA OPERATING SYSTEM/SUBSYSTEM PROBLEMS
NETHARD	3270 MAINFRAME COMMUNICATIONS DEVICE PROBLEMS
NETSOFT	MAINFRAME COMMUNICATIONS SOFTWARE PROBLEMS
ONLSOFT	ONLINE APPLICATION PROBLEMS/SECURITY PROBLEMS
PRODAPPL	STANDARD PRODUCTION BATCH PROBLEMS
REQUEST	SERVICE REQUESTS
SYSHARD	OPERATING SYSTEM HARDWARE PROBLEMS
TELECOM	TELECOMMUNICATIONS DEVICE PROBLEMS
VENDOR	VENDOR RELATED PROBLEMS
VMSOFT	VM/XA OPERATING SYSTEM/SUBSYSTEM PROBLEMS

We realize these are archaic designations (were built back in the mid-1980's) and they will be changed in favor of less specific categories (am hoping to implement just HARDWARE / SOFTWARE categories, with actual hardware and software component / resolution analysis lists for detailing the actual problem and to aid in reporting - this is where the Lab Results, Printer
reset, client instruction type categorization will occur).

INSTITUTION #4

It would be cumbersome to drill down too far when classifying problems in our current system, but the enhanced sort capabilities of our new system should allow us to be more specific in call tracking.

INSTITUTION #5

Currently, we are classifying by group, such as application, hardware, software, communications, etc. Each of these are broken down into more specific categories, such as the specific application, hardware device, etc. Tivoli's Service Desk uses a SCIM (System, Component, Item, Module) model. We are in the process of developing our SCIM's.

INSTITUTION #6

We have basically a single classification for all problems originating from PC workstations (and several classifications such as hardware, system software, application software for mainframe related problems). We do distinguish between various types of PC problems by means of problem record fields in which we store device type (e.g., PC or printer), problem type (e.g., hardware failure or forgotten password),and/or application (email or computer based patient record).

INSTITUTION #7

To answer your second and third questions, I have attached an extract

report from our SupportMagic database, in an EXCEL file format. This report is an analysis of some of the help desk calls, that we have processed between January 1, 1999 and today, May 27, 1999. It lists each subject, a description of the subject, the quantity and the percent of total, for each occurrence of the subject.

INSTITUTION #8

We only have 16 call types right now ranging from Mainframe Hardware to Desktop Applications. There are few specific problem types because of the link from that particular call type to a detail screen where we can setup specific questions to ask the end user for problem determination.

INSTITUTION #9

We categorize our tickets primarily as specifically as possible. We have five levels of categories available for use within the HELP Product -- with level 1 being the most general (hardware or software) and level 5 being the most detailed (Microsoft Office 97, HP LaserJet 4000n, etc.)

INSTITUTION #10

Because the help desk fields questions from all areas of campus (i.e., academic, research, and administrative areas as well as the medical center), we break down calls initially by system or software (e.g., ANSOS, Keane, Summit, PC-WordPerfect) and then by problem summary (we have about 50+ canned descriptions and then allow free-form text entry for more specific information). Our problem summaries are _very_ generic so that they can be used for a variety of systems/applications. For example, the summary "request new account" can be used for everything from a NetWare account to an Oacis account; it's the combination of the two that distinguish it. Also, we use the system/application information to automate assignment to an on-call person or to second-level support personnel.

INSTITUTION #11:

Problems are classified by category, type and item. (example:
> category: PC, type: hardware, item: hard drive)

INSTITUTION #12

We use major categories such as the name of the Enterprise application system.

INSTITUTION #13

We are struggling with the same issue right now. We are planning for the categories to be very broad and have only about 5 or 6 of them. For example,
Category: Application Type: Excel Description: Charting
Category: Hardware Type: Printer Description: jam

INSTITUTION #14

We classify our problem calls using the following Symptom types:

Application problem
Communications problem
Data problem
Documentation problem

Environmental problem
General hardware problem
Operational problem
Problem Log
Report problem
Security problem
General software problem
System Problem

We then have more specific sub types within each symptom type. Example, for Application the symptom sub types would be listed as follows:

Abnormal termination
Functioning incorrectly
Processing stopped
Processing loop
Bad response time
Not available to users

INSTITUTION #15

Hierarchical system of classification, 3 levels deep; classify by both software and problem types; also use severity of urgent, high, medium, and low.

3. If you track and trend problems in your institution with clinical software applications, are you willing to share the top 10 recurring problems?

INSTITUTION #1

We don't track specific clinical software applications top ten but I'll share with you our Top 5 Help Desk calls. They are;

#5 - Usability
#4 - Email problems
#3 - Patcom resets
#2 - Loggin problems
And the Number 1 problem call to the Help Desk
#1 - Printing woes!!!

INSTITUTION #2:

I don't think that we track to the granularity that you are askinghere, but we would be willing to discuss with you those kinds of issues which seem to dominate. Although, we have had several key implementations here due to Y2K and typically, those implementations generate the highest volume.

INSTITUTION #3

Network connectivity, printing, and password issues are the most common problems that plague our support desk, but operating system errors are rapidly catching up.

INSTITUTION #4

1. password resets
2. report problems

3. user education issues
4. problems created by system upgrades
5. interface problems

INSTITUTION #5

We only do very rudimentary reporting on problem trends. But we do know that problems with printers (from jams, to out of paper, to unknown print destinations) are at the top of our list of recurring problems. (Some of us would like to outlaw printers.) Other top ten problems include forgotten passwords and problems booting up a machine. As I indicated, in the future we may well combine the Hospital and College of Medicine (COM) Help Desks which would change our world. I know that COM uses a home-grown, Oracle-based problem tracking system that is pretty sophisticated and probably does more in areas of your questions 2 and 3 than Info Man.

INSTITUTION #6:

To answer your second and third questions, I have attached an extract report from our SupportMagic database, in an EXCEL file format. This report is an analysis of some of the help desk calls, that we have processed between January 1, 1999 and today, May 27, 1999. It lists each subject, a description of the subject, the quantity and the percent of total, for each occurrence of the subject.

INSTITUTION #7

I do not have a problem sharing this information, however the database is still too new at this point to report on this particular statistic. How many users do you support in your organization? How many Help Desk people do you staff? Is it ok to share this information and the phone statistics that you report on?

INSTITUTION #8

Password resets
- Terminal session resets
- Printer session resets
- Performance related application degradation (recently installed a new patient management application, which included a brand new, unfamiliar operating system / hardware platform)
- Client how-to's
- Data interchange interface failures (our data hub for HL7 conversion / transmission - primarily between the Patient Management system, ancillary clinical departments and other clinical systems like Patient Accounting)

INSTITUTION #9

As we have only been on the system since February of this year, we don't have the long trending information available. However, based on experience and information from our old system, most calls tend to be connectivity issues such as user id, password, LAN connection, hung mainframe session, printing, etc. Issues related perhaps more to PC use in general as opposed to specific issues with specific applications or functions within the application.

INSTITUTION #10

While we are somewhat capable of doing this, we do not regularly track clinical software problems (though I can tell you that the #1 "problem" is users "needing" to be reset in Keane, though that educational/technical problem will go away with the next patient registration installation).

INSTITUTION #11

1. Problem ordering labs
2. Can't chart meds
3. How to place order before patient is admitted
4. Can't print labels
5. Interface problems
6. System error codes
7. Access problems
8. Printing problems
9. Demo downloads problems
10. Can't exit application

INSTITUTION #12

We don't track/trend as we are just getting under way with our clinical applications . Will be willing to in the future.

INSTITUTION #13

Yes, but we haven't gotten that far. I asked our developer the same question and he replied that they are very spec

INSTITUTION #14

Our top ten list would include the following:

1. Password issues for multiple applications on multiple platforms
2. Printer connectivity problems
3. Email access issues
4. Specific Application procedural questions
5. Missing report problems
6. Facilitating communication between related departments for technical communications problems
7. Hardware problems, printers, monitors, mouse, keyboard, etc.
8. System availability issues
9. System response time issues
10. Training inquiries

INSTITUTION #15

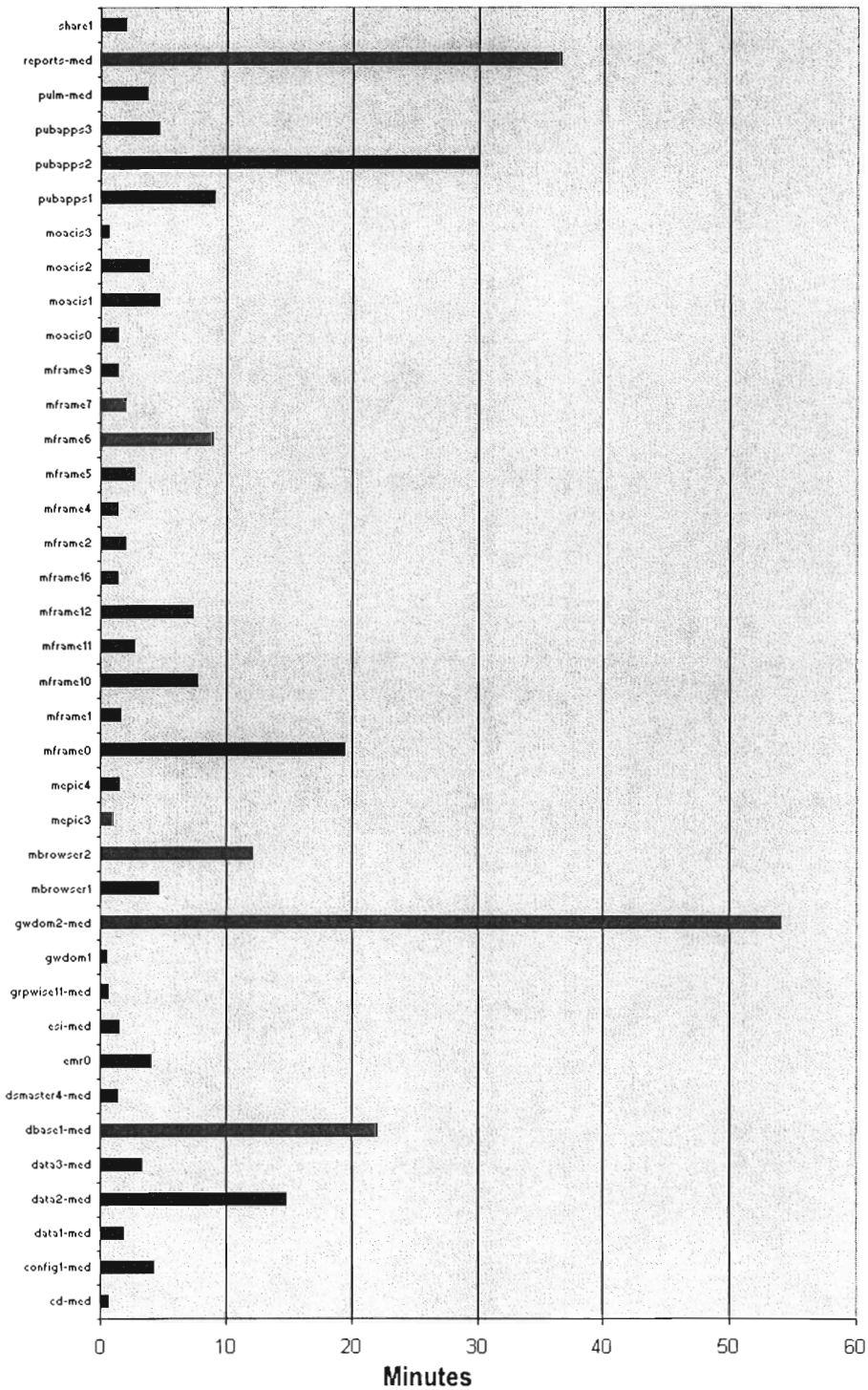
Password/access, e-mail, software, hardware, printing, information request, network, server, operating systems, virus, web.

APPENDIX C

PROPOSED QM REPORT TEMPLATE

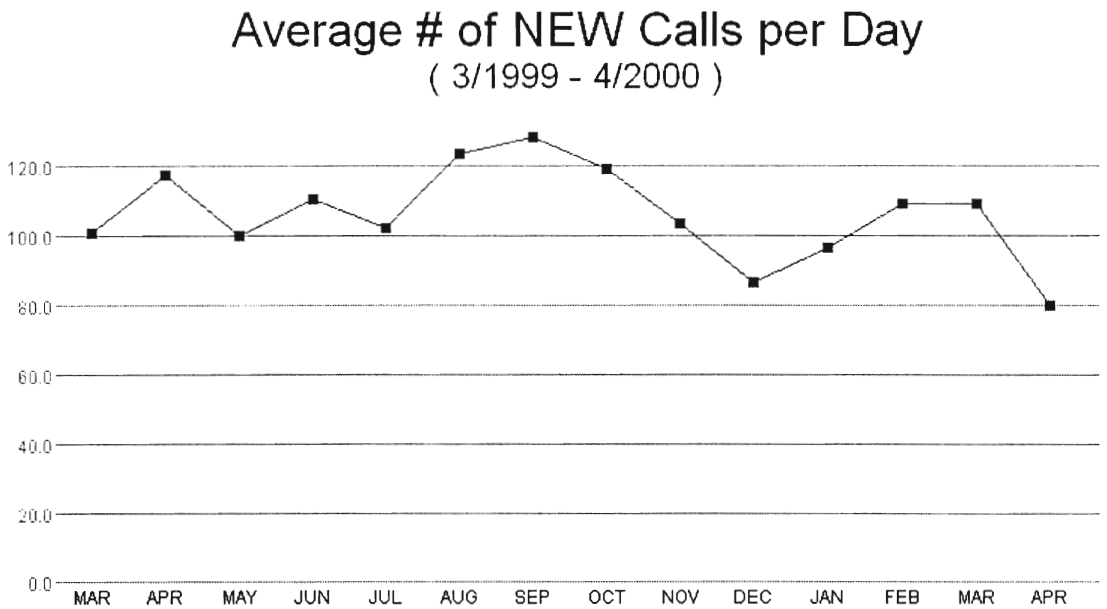
OIR QUALITY MANAGEMENT REPORT-MARCH 2000

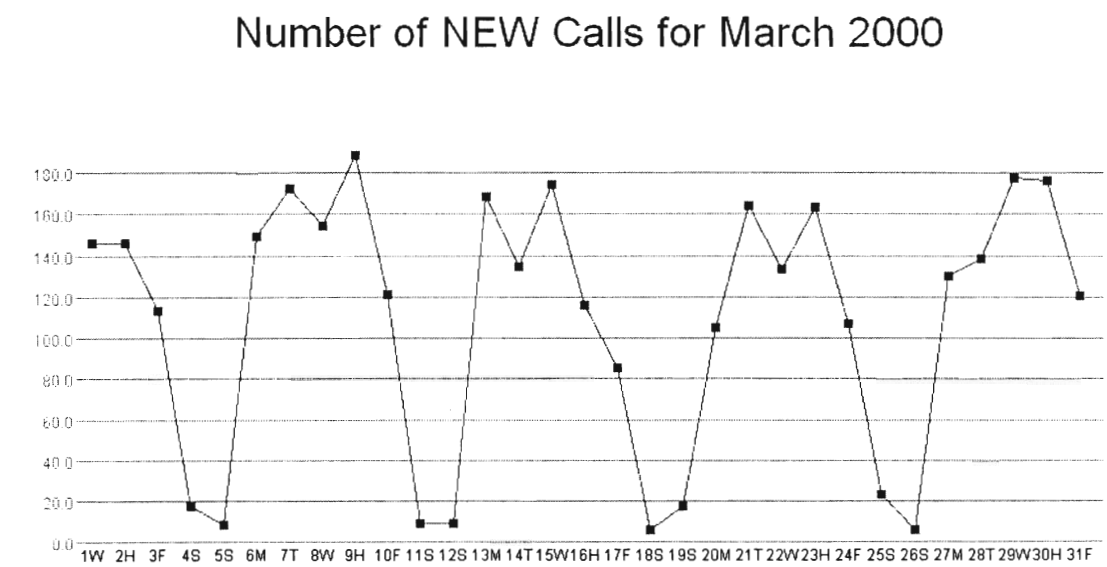
1. DOWNTIME REPORT



Unplanned Server Downtime in Minutes / Event

2. REMEDY PROBLEM REPORT





Problem Type

ACCESS	1424
HARDWARE	646
SOFTWARE	502
EMAIL	215
NETWORK	200
SERVER	183
PRINTING	142
DATABASE	80
WEB	26
INTERFACE	9
OS	2
SECURITY	1

Category

METAFRAME	654
NDS	479
GROUPWISE	305
PRINTER	245
PC	172
OACIS EMR	136
ALLEGRA	111
CONNECTION	105
IDX	102
WBT	82
ACIS	74
MONARCH	38
PORTS	36
MS WORD	34
INTERNET EXPLORER	33
MONITOR	29
SNA SESSION	28
KRONOS	27
VIRUS	27

LOCATION

U HOSP-1	327
U HOSP-A	252
BROADWAY	249
AMBASSADOR	243
U HOSP-3	136
WASATCH CLINICS	121
U HOSP-2	117
U HOSP-4	100
SOM-DEANS	91
UNI	90
SOM-3	87
U HOSP-5	87
546 CHIPETA/RED BUTTE	83
REDWOOD	82
U HOSP-B	81
SOM-A	66
MORAN EYE CENTER	65
SOM-1	55
SOM-IM	53
HPER NORTH	48
SOM-5	46

DEPARTMENT

U OF U HEALTH NETWORK	562
PATIENT ACCOUNTING	309
OFFICE OF INFORMATION RES	242
UNIVERSITY NEUROPSYCH INSTITUT	108
PHARMACY	82
GRAD MED ED	74
HOME HEALTH	67
REHAB 2	67
HEALTH INFORMATION	65
EMERGENCY	60
INTERNAL MEDICINE	57
ENGINEERING	56
SCHOOL OF MEDICINE-DEANS	54
FACULTY PRACTICE ORG	51
OPERATING ROOM	51

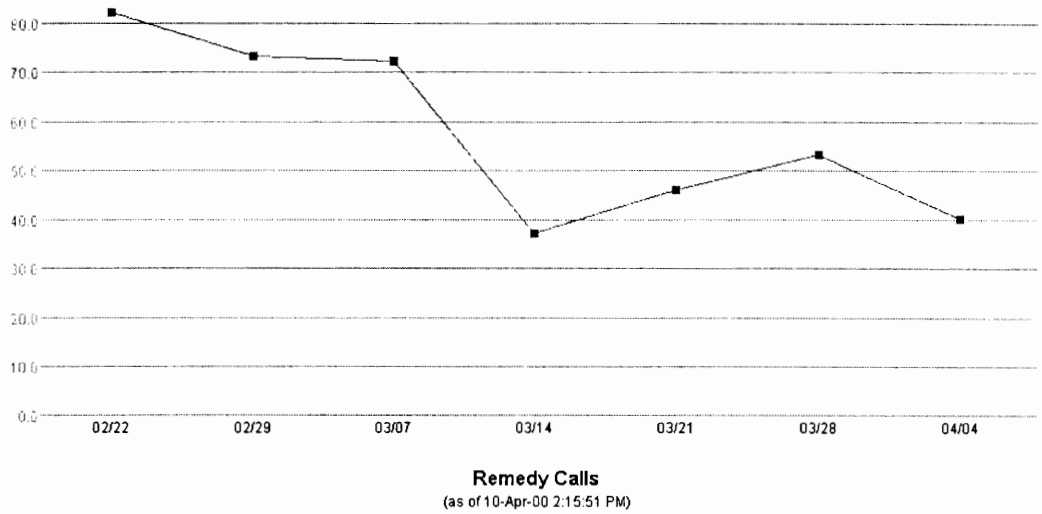
3. TOP 25 PROBLEMS REPORT

PROBLEM	FEBRUARY	MARCH
ACCESS-METAFRAME-UNABLE TO LOGIN	147	250
ACCESS-NDS-ACCESS DENIED	68	201
ACCESS-METAFRAME-SYNCHRONIZE PASSWORDS	106	188
EMAIL-GROUPWISE-OTHER	74	136
HARDWARE-PRINTER-NOT PRINTING FROM ANYTHING	45	99
HARDWARE-PRINTER-OTHER	52	88
SERVER-METAFRAME-CORRUPT PROFILE	64	70
NETWORK-CONNECTION-UNABLE TO CONNECT TO NETWORK	30	63
ACCESS-GROUPWISE-CHANGE PASSWORD	21	61
HARDWARE-PC-OTHER	31	59
ACCESS-METAFRAME-ACCOUNT LOCKED	17	58
NETWORK-CONNECTION-OTHER	9	42
HARDWARE-WBT-NEEDS FLASHED	23	38
SERVER-NDS-OTHER	11	37
ACCESS-IDX-TOO MANY CONNECTIONS	33	35
ACCESS-ALLEGRA-OTHER	18	34
PRINTING-NDS-Print Que Capture/ Share Name	0	34
SOFTWARE-INTERNET EXPLORER-OTHER	11	33
SOFTWARE-OTHER-INSTALL REQUEST	15	30
SERVER-METAFRAME-APPLICATION PROBLEM	32	29

4. TOP PROBLEMS DETAIL REPORT.

ACCESS-METAFRAME-UNABLE TO LOGIN

Number of calls created per Week
between 02/22/2000 and 04/10/2000
for Short_description = ACCESS-METAFRAME-UNABLE TO LOGIN



ACCESS-METAFRAME-UNABLE TO LOGIN

Call Details - 105291

User is having extreme difficulty loging in on metaframe box....caps lock on...tree & context keeps changing..had user log in as . 00103659.hospital.uhosp made sure tree & context were right....failed...changed passwords....logged in as User at my workstation and was able to get in....had user change work stations...still couldn't get in...monitor bar code 807098....metaframe cpu bar code....805552...user says she doesn't have a problem logging in at other clinics just this one.

Work Log

Date Entered: Thursday, Mar 23, 2000
Entered By:
Details: Status= Assigned, Severity= Medium. Assigned to: OIR-SupportDesk, .

Date Entered: Thursday, Mar 23, 2000
Entered By:
Details: Resolved over the Phone// I had user go to advance and then into org tree and refresh location and then user was able to get in// Status= Closed, Severity= Medium. Ticket last assigned to: OIR-SupportDesk.

Call Details - 103989

metaframe login request//told user where to submit request on the web

Work Log

Date Entered: Friday, Mar 10, 2000
Entered By:
Details: Resolved over the Phone Status= Closed, Severity= Low. Ticket last assigned to: OIR-SupportDesk.

Call Details - 102870

User questioning why he has to "mess" with his context each time he logs. told him how to enter his distinguished name so he doesn't hve to use the advanced tabe each time

Work Log

Date Entered: Wednesday, Mar 01, 2000
Entered By:
Details: Resolved over the Phone Status= Closed, Severity= Low. Ticket last assigned to: OIR-SupportDesk.

Call Details - 102873

Reports that when she attempts to login in she gets an unexpected login failure on Metaframe. I reset her password and synched them and she was still not able to get in. I cleared the intruder lockout and she was still unable to get in. Forwarding to dispatch...

Work Log

Date Entered: Wednesday, Mar 01, 2000
Entered By:
Details: Status= Assigned, Severity= Medium. Assigned to: OIR-SupportDesk.

Date Entered: Wednesday, Mar 01, 2000
Entered By:
Details: They have old 2310 temrinals that may be failing. Probably should replace the terminals with GT310 Status or Severity has changed on this ticket: Status= Reassign, Severity= Medium. Assigned to: OIR-RemoteRPC.

Date Entered: Wednesday, Mar 01, 2000
Entered By:
Details: Ticket was modified: Status= Assigned, Severity= Medium. Assigned to: OIR-RemoteRPC.

Date Entered: Wednesday, Mar 01, 2000
Entered By:
Details: There are 2 CLosee and the one in OTR.UHOSP was locked out. I fixed that and she was able to get in. Status= Closed, Severity= Medium. Ticket last assigned to: OIR-RemoteRPC.

5. CASE ANALYSIS REPORTS

PRINTER PROBLEMS - 98 CALLS MARCH

C - Configuration problem	46
X - No documentation	24
S - Server problem	14
H - Hardware problem	5
? - problem unknown	4
N - Network problem	2
V - Vendor (NDS problem)	1
T - Technician error	1

Common issues:

Recurrent problems configuring printers in Windows/Novell environment
NDS printer queue rights, configuration errors
Printer cables
Jet Direct printer interface Cards - configuration updates
User education / documentation for fixing configuration problems

Potential Solutions:

Draft Classification for Problem analysis

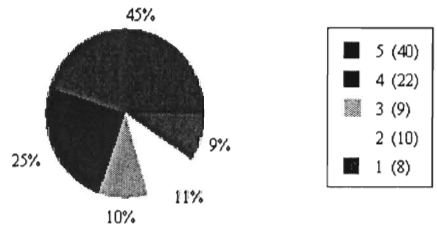
V - Vendor problem
U - User error
N - Network
S - Server
A - Application error
H - hardware problem
? - Unknown cause
T - Technician error
C - Configuration problem
X- No documentation provided

6. FOLLOW-UP OF CASE ANALYSIS REPORTS

(Resolution, Trending)

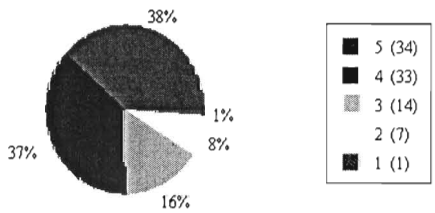
7. CUSTOMER SERVICE SURVEY MARCH

1. Was your Trouble Ticket resolved in a timely manner?



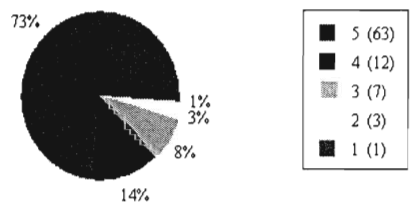
(as of 10-Apr-00 2:06:32 PM)

2. Relative to the issue this Trouble Ticket addressed, how important was a timely resolution?



(as of 10-Apr-00 2:06:32 PM)

3. Was the support technician knowledgeable and professional?



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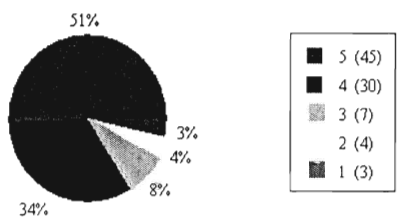
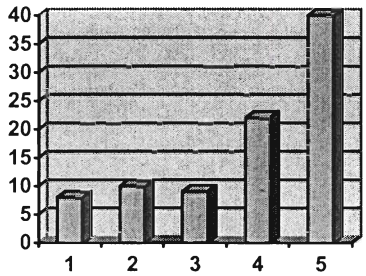
4. How do you rate the overall service provided on this trouble ticket?

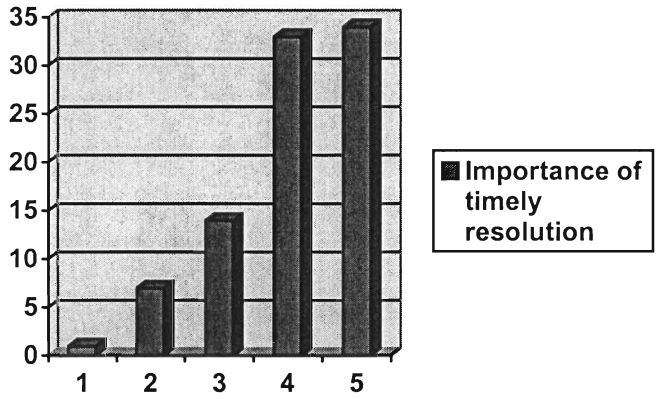


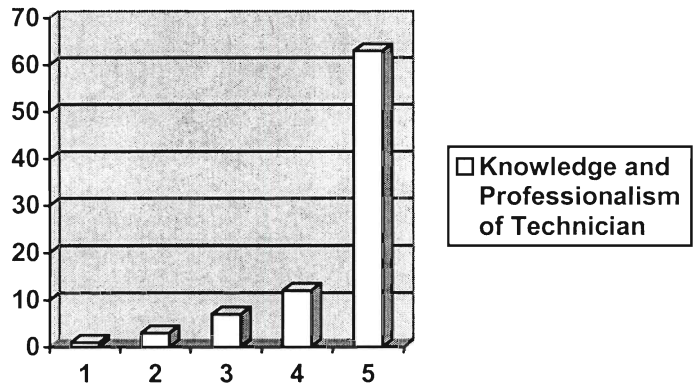
(as of 10-Apr-00 2:06:33 PM)

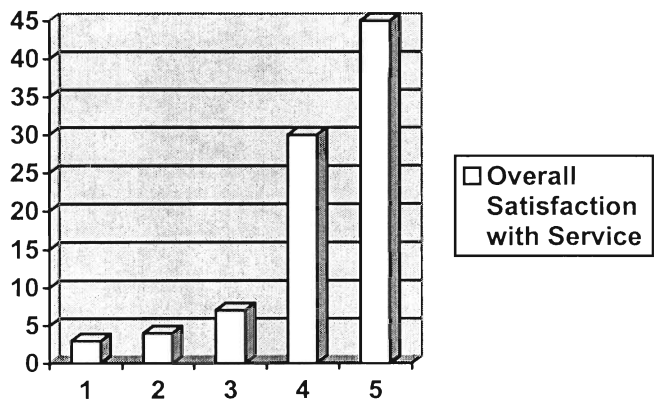
7. CUSTOMER SERVICE SURVEY MARCH

8.









APPENDIX D

DELPHI SURVEYS

Survey #1

OIR Remedy® QI Reports Survey **2-15-00**

RESULTS 4-10-00

We would like your assistance in evaluating the usefulness of a proposed set of monthly reports that present data from the OIR Remedy® database. These reports will be used to help monitor and improve the quality of clinical information systems in the UUHSC.

Please review the 5 proposed reports and rate the usefulness of the information on a **scale of 1 to 5 with 1 being "not useful and 5 being "very useful"**.

Please suggest any additional elements and or reports that you think would be helpful.

Nine individual surveys returned surveys, comments from three meetings: SOC (7), OIR Director meeting (5), and OIR Team Leader Meeting (Approx. 20)

	Not Useful				Very Useful
1. **Downtime Reports,** 4.3 i.e. planned, unplanned, etc.	1	2	3	4	5

(List any specific additional elements needed).

- Change to uptime of every system; up time vs. planned down time & infrastructure issues;

- List up time for external reports
- *Stack planned on top of unplanned;*
- *Stacked bar showing planned vs. unplanned;*
- *Ignore planned;*
- *Specify the unplanned server downtime;*
- *Publish uptime for clinical servers for everyone to see;*
- *Separate planned from unplanned downtime; report down time*
- *Up time of network, application, etc. vs. availability;*
- *Include graphs by major applications;*

- *Track by software;*
- *Maybe describe server/applications;*
- *Network; server; application – list these three*
- *Severity/importance rating*
- *Clinical vs. non-clinical*
- *Specific clinical subsets – clinical server*
- *Confusing – need more clarity in graphics & trending, i.e. Feb (Days) what does this mean?*
- *Causal analysis – programmer problem;*
- *How much is it costing U of U? Are these costs appropriately absorbed by U of U? or should they be shifted to software company? It would be helpful to determine how this information relates to warranties and support under the software and maintenance agreements, e.g. do the contracts need longer warranty periods? Do the contracts need to be changed to require different support or additional support? Do we need additional rights to replace software company consultants?*

Comments:
- Consider developing categories of unplanned down time
- # days, hours to resolution;
- User location;
- User vs. application problem;
- Columnar formats for last 6 months;
- Identify vendor problems;
- This is crucial;

	Not Useful				**Very Useful**
2. **Remedy® Problem Summary Reports**, 4.1 i.e., total calls, location of calls, problem categories.	1	2	3	4	5

(List specific additional elements needed)
- *This should be helpful for OIR teams;*
- *Add columns showing trend over 6 months to 1 year;*
- *Include additional columns showing at least 6 previous months for trending;*
- *Average # new calls per day by month helpful; problem type & problem category helpful ;user location helpful*

Comments:

- *Track time to resolution of ticket;*
- *Time to resolution or closure of ticket;*
- *Time to resolution; get rid of decimals;*
- *Airtouch (paging system) problems and down times*

- *We need to be able to differentiate between a downtime that affects users and one that doesn't. For example, on the [sample report] it listed DBASE1-MED as being down for a firmware upgrade. However, the server was NOT in production at the time;*
- *Star of identify areas on report that have new programs;*
- *Drill down for 419 Wakara Way;*
- *OIR Dept. summary – financial systems vs. clinical systems*
- *How can reports be helpful with writing contracts? Identify problems/issues not covered in contracts*

	Not Useful				Very Useful
3. Top 25 Problems Report 4.43	1	2	3	4	5

(List specific additional elements needed)
- *Good summary;*
- *Good way to start – good for identifying staff training priorities;*

Comments:

	Not Useful				Very Useful
4. Top Problems Detail Report 3.6	1	2	3	4	5

i.e. details on top 5-10 problems

(List specific additional elements needed)
- *Would like to see more topics*

Comments:
- *Should be a good tool*
- *I would think this would be helpful to OIR, not necessarily to me;*

	Not Useful				Very Useful
5. Case Analysis Reports 3.9	1	2	3	4	5

i.e., Detailed description and analysis of top problems

(List specific additional elements needed)

- *5-10 problems, not necessarily OIR can solve – adm, nsg, UUHN, etc. 1-3 months*

Comments:

- *Add #6 as follow-up to # 5 issues;*
- *trending of #5 issues*
- *I would think this would be helpful but need to evaluate usefulness over time*

Survey #2

OIR Remedy® QI Reports Survey 4-28-00

RESULTS –15 responses

The answers that were provided to the first set of survey questions were analyzed and categorized as listed below. We are again asking you to rate usefulness of these items in a proposed set of monthly reports that present data from the OIR Remedy® database. These reports will be used to help monitor and improve the quality of clinical information systems in the UUHSC.

Please review the 7 proposed reports and rate the usefulness of the information on a **scale of 1 to 5.**

1 not useful
2 a little useful
3 3 somewhat useful
4 moderately useful
5 very useful

Please suggest any additional elements and or reports that you think would be helpful.

		Not useful 1	2	3	4	Very Useful 5
1.	**Downtime Reports**					
	Please rate the usefulness of the following features:					
	% uptime graphs		*2.75*			
	% downtime graphs				*4.7*	
	Planned vs. Unplanned comparisons				*4.3*	
	Organized by source of problem, i.e. server, networks, application, user,etc.				*4.6*	
	Organized by clinical vs. non-clinical			*3.9*		
	Organized by severity/importance			*3.8*		
	What criteria would you use to determine severity?					
	Comments:					
2.	**Remedy® Problem Summary Reports**	*1*	*2*	*3*	*4*	*5*
	Preferred scale:					
	Days			*3.3*		
	Weeks			*3.1*		
	Months				*4.3*	
	Number trends				*4.1*	
	Percentage trends			*3.8*		
	Time to resolution				*4.3*	
	Drill down to location			*3.8*		
	Comments: • ***Group – list out network and also applications*** ***Add top 25 clinical also***					

3.	**Top 25 Problems Report**	1	2	3	4	5
	Trending – 6 month - or list other time increment _***3 mos, 3 mos, quarterly, monthly***				*4.6*	
	How many problems would you like to see reported? _***25, 25, 25***					
	Comments: • ***By team*** • ***By team*** • ***By teams*** • ***Break out by teams*** • ***Show percentage of total problem*** • ***Percentage of total problem*** • ***Recommend performance benchmark reports, i.e., log-in response times, clinical queries, groupwise***					
4.	**Top Problems Detail Report**	1	2	3	4	5
	How many problems would you like to see reported? __***5, all for top 25, 25***					
	Time scale for trending graph:					
	Daily			*3.5*		
	Weekly			*3.7*		
	Comments: • ***by team*** • ***break down by team*** • ***grouped by kinds of systems*** ***If have classification & ask them to code, some have serviceware solution, some have individual answers to problems; have everyone use same- top 10 solutions***					
5.	**Case Analysis Reports**	1	2	3	4	5
	Detailed description and analysis of top problems				*4.7*	
	Comments: • ***I probably won't use this report but would be used more by my team leads*** • ***Who does review?*** • ***Would need another cross-group team***					

	to use/analyze this type of info • ***1 per month***					
6.	**Follow-up of Case Analysis Reports (#5.)**	1	2	3	4	5
	Resolution				*4.6*	
	Trending				*4.4*	
	Comments: • ***Break down by team*** • ***Would need commitment from all groups***					
7.	**User Satisfaction Survey Reports**	1	2	3	4	5
	Pie Graphs		*2.2*			
	Bar Graphs				*4.8*	
	Comments: • ***Break down by category & team*** • ***Like the pie better than bar*** • ***More distinguishing shading or in color*** ***Prefer bar graph***					

Survey #3

OIR Remedy® QI Reports Survey 6-16-00

Results - 14 responses

You have previously rated usefulness of a proposed set of monthly reports that present data from the Remedy® database. Those reports are listed below. Please rank the reports 1-7 in order of importance with 1 being most important. Example reports are attached if you need to refer to them.

REPORT	RANKING (report order as listed on survey)
Downtime Reports	2.85
Remedy® Problem Summary Reports	3.21
Top 25 Problems Report	2.07
Top Problems Detail Reports	5.43
Case Analysis Reports	5.00
Follow-up of Case Analysis Reports	6.21
User Satisfaction Survey Reports	3.21

COMMENTS:

Downtime Reports: Please provide # of instances within time frames.

Top 25 Problems Report: For department breakdown, please provide analysis for type of calls in the top three frequencies.

Regarding results of 2nd Survey: Suggestion to only include aspects of reports which are rated above 3.

Ranking results in order with top importance listed first:

Top 25 Problems Report

Downtime Reports

Remedy® Problem Summary Reports

User Satisfaction Survey Reports

Case Analysis Reports

Top Problems Detail Reports

Follow-up of Case Analysis Reports

APPENDIX E

COMPARISON OF CQI/TQM AND RESEARCH PROCESS

COMPARISON OF CQI/TQM AND RESEARCH PROCESS

CQI/TQM	Useful Tools	Research
Find a process to improve. • Process prioritization • Customer Research • Review strategic/operational plans • Identify the key processes and outcomes	Opportunity Statement Pareto Diagram Prioritization Matrix Run Chart	Formulate and delimit the research problem; clarify the research question.
Organize to improve the process • Select a team/individual who has process knowledge • Create a plan	Process Improvement Plan Ground Rules	Identify principal investigators, data collectors, statisticians.
Clarify current knowledge of the process. • Look at current process • Identify quick & easy improvements • Standardize best current method	Flowchart Group Decision Making Tools	Review related literature; determine what is known about the subject and what gaps exists; develop a theoretical conceptual framework.
Understand the sources of process variation. • Measure the key processes and outcomes • Stabilize the process	Cause and Effect Diagram Data Collection Methods Flowchart Pareto Diagram Run Chart	Identify the variables. Formulate the hypothesis

• Identify process and outcome variables • Measure possible variables • Test to see if there is a relationship between the process/ outcome and potential variable	Scatter Diagram Control Charts Histogram Group Decision Making Tools	
Select the process improvement. • Evaluate improvement alternatives for their potential effectiveness and feasibility • Select the improvement	Flowchart Group Decision Making Tools	Select a research design; specify the population.
Plan the improvement. • Plan the implementation of the improvement • Plan continued data collection	Data Collection Methods Group Decision Making Tools	Operationalize; select the sample.
Do the improvement to the process. • Make the change • Measure the impact of the change	Flowchart Data Collection Methods Run Charts	Do a pilot study; measure research variables; collect the data.
Check the results. • Examine data to determine whether change led to the expected improvement	Pareto Diagram Cause and Effect Diagram Run Charts Control Charts Histograms	Analyze the data; interpret results of the study
Act to hold the gain and continue to improve the process. • Develop a strategy for maintaining the improvements	Flowchart Group Decision Making Tools	Communicate study findings to other researchers and clinicians; analyze implications for current practice; present ideas and recommendations

• Determine whether or not to continue working on the process		for future studies.

Adapted from IHI Process Improvement Models, 1995.

APPENDIX F

EXAMPLE OF NEW CLASSIFICATION SYSTEM

EXAMPLE OF NEW CLASSIFICATION SYSTEM

PROBLEM TYPE	CATEGORY	ITEM AFFECTED
ACCESS	ACIS	GAVE ACIS LOGON
ACCESS	ACIS	LOGIN REQUEST
ACCESS	ALLEGRA	ADD MENU OPTION
ACCESS	ALLEGRA	ECS SESSION NOT RESPONDING
ACCESS	ALLEGRA	USERNAME PASSWORD (VMS)
ACCESS	ANSOS	LOGIN REQUEST
ACCESS	ATU	ERROR 8: UNABLE TO OPEN ATU DATABASE
ACCESS	CICS	ACCESS TO LOWER CAMPUS
ACCESS	CICS	LOGIN REQUEST
ACCESS	CLINICAL PATHWAYS	PASSWORD
ACCESS	ESI	LOGIN NOT WORKING
ACCESS	GROUPWISE	CHANGE PASSWORD
ACCESS	IDX	CAN'T CONNECT TO CHEETAH(PC)
ACCESS	IDX - RAD	CAN'T CONNECT TO SEAL(PC)
ACCESS	INFORMS	LOGIN REQUEST
ACCESS	KRONOS	LOGIN REQUEST
ACCESS	MEGASOURCE	UNABLE TO CONNECT
ACCESS	METAFRAME	ACCOUNT LOCKED
ACCESS	MONARCH	INSTALL REQUEST
ACCESS	NACIS	LOGIN NOT WORKING
ACCESS	NDS	INTRUDER LOCKOUT
ACCESS	NETWARE 3.1	CHANGE PASSWORD
ACCESS	NETWARE 3.1	INTRUDER LOCKOUT
ACCESS	OACIS EMR	PASSWORD: ERROR CHANGING IT
ACCESS	OASIS PILOT	UNABLE TO CONNECT
ACCESS	ORDER ENTRY	LOGIN NOT WORKING
ACCESS	ORMIS	CAN'T OPEN THROUGH NAL
ACCESS	PEOPLE SOFT	LOGIN REQUEST
ACCESS	REMEDY	LOGIN REQUEST
ACCESS	REMOTE ACCOUNT	LOGIN REQUEST
ACCESS	SMARTHIRE	LOGIN REQUEST
ACCESS	STATLAN	LOGIN NOT WORKING ON HUM
ACCESS	TEAMUP	LOGIN NOT WORKING
ACCESS	TELEMEDICINE	OTHER
ACCESS	UHN - CPRS	CTR - WIDE
ACCESS	UHN - LAB	CTR-WIDE, UNABLE TO ACCESS SYSTEM
ACCESS	UHN - PHARMACY CLAIMS	SINGLE USER, UNABLE TO ACCESS SYSTEM
ACCESS	WEB	LOGIN REQUEST
ACCESS	WINCENTER	SYNCHRONIZE PASSWORDS
DATABASE	ACIS	CAN'T FIND PT. ESTABLISHED
DATABASE	ACIS	DUPLICATE MRN'S
DATABASE	ALLEGRA	CAN'T FIND PATIENT
DATABASE	ALLEGRA	TOO MANY DECISION TABLES
DATABASE	ANSOS	CONTROLLER
DATABASE	ANSOS	DATABASE ERROR
DATABASE	ANSOS	ENTERING ACUITIES

EXAMPLE OF NEW CLASSIFICATION SYSTEM

DATABASE	ATU	Add/Remove Location
DATABASE	ATU	Incorrect Report Type
DATABASE	AVS-ACUITY SYSTEM (PMS)	ADMIN / ARCHIVE
DATABASE	BOX (HI RETENTION CENTER)	CAN'T OPEN/LAUNCH SOFTWARE
DATABASE	CACTUS	SPECIFIC FN NOT WORKING
DATABASE	CARENOTES	EMERGENCY ROOM
DATABASE	CBOARD - DIET OFFICE	CAN'T ADMIT NEW PATIENT
DATABASE	CENSUS - OUTPATIENT FROM IDX	OTHER
DATABASE	CUSTOMER SERVICE	OTHER
DATABASE	DAILY CENSUS SUMMARY (INPATIENT)	CAN'T WAITH UNTILL A.M.
DATABASE	DBASE IV	OTHER
DATABASE	DOCPLUS	DOWN
DATABASE	DOWN	CAN WAIT UNTIL A.M.
DATABASE	EMERGENCY DRUG CALULATOR	PT. NOT IN DATABASE
DATABASE	EMGPRO - NEUROLOGICAL	DATABASE ERROR ALL USERS
DATABASE	EPIDEMIOLOGY	OTHER
DATABASE	ESI	BETRIEVE ERROR STATUS 2
DATABASE	FORMULARY	OTHER
DATABASE	FOUNDATION	OUTPATIENT CLINICS
DATABASE	HDM (HI)	BTRIEVE ERROR 2
DATABASE	HUMANIC	FN NOT WORKING
DATABASE	IDX - RAD	OTHER
DATABASE	INCIDENT REPORTING (PMI)	OTHER
DATABASE	INFORMS	SPECIFIC FN NOT WORKING
DATABASE	IPA	OTHER
DATABASE	LINEN SERVICES PRODUCTIVITY	OTHER
DATABASE	LOGICARE	FILE MAINTENANCE
DATABASE	MARS-MANAGED CARE	OTHER
DATABASE	MAXIMO	SUPPLY ERROR MSG
DATABASE	MEDICAL STUDENT ADMIT / SCHEDULE	RESTORE FROM BACKUP
DATABASE	MEDISERVE	PATIENTS NOT SHOWING
DATABASE	MEDREC/MEDDATA (HI)	BTRIEVE ERROR 2
DATABASE	MEGASOURCE	ATC 212 (NO PICK LIST CREATED)
DATABASE	MICROMEDEX-DRUGDEX	PHARMACY
DATABASE	OACIS EMR	BLOOD GAS: CAN'T FIND ONE PT
DATABASE	OACIS EMR	MED: NOT SHOWING UP
DATABASE	OACIS EMR	PTS: TWO IN SAME BED
DATABASE	OACIS EMR	VITAL SIGN: NOT SHOWING UP
DATABASE	OLYMPUS-ENDOSCOPY	CALL 1-800-848-9024
DATABASE	OMNICELL	STOREROOM CALL 1-800-910-2220

EXAMPLE OF NEW CLASSIFICATION SYSTEM

DATABASE	ORDER ENTRY	CURRENT VISIT NOT IN DATABASE
DATABASE	ORDER ENTRY	PT. IN WRONG LOCATION
DATABASE	PHYSICIAN PROFILING (PMI)	OTHER
DATABASE	REMEDY	SPECIFIC FN NOT WORKING
DATABASE	RESPOND FOR WINDOWS	RECORD LOCKED
DATABASE	RMCDS (TUMOR REGISTRY)	OTHER
DATABASE	ROOM TRACE SUMMARY	OTHER
DATABASE	SAMS	CAN'T OPEN/LAUNCH
DATABASE	SPCLIN LYTE	CORRUPT - REPAIR DATABASE
DATABASE	SPINE CENTER EVAL. SYSTEM	OTHER
DATABASE	STATLAN	CONNECT ERROR
DATABASE	STATLAN	NETWORK DATA RECEIVE ERROR
DATABASE	SURMED	INTERFACE DOWN
DATABASE	TDMS	SPECIFY
DATABASE	TEAMUP	BURN OUT PATIENT LOG
DATABASE	TELOPS	OTHER
DATABASE	TIEDI (ORGAN TRANSPLANT)	OTHER
DATABASE	TISSUE CENTER	OTHER
DATABASE	TOXICAL	CORRUPT - REPAIR DATABASE
DATABASE	TRANSITION/TSI FINANCIAL - AMBAS	OTHER
DATABASE	TRANSPLANTATION	OTHER
DATABASE	TRAUMABASE	OTHER
DATABASE	UHC IMS	OTHER
DATABASE	UHN MISC DATABASE	MEDICAL RECORD INDEX
DATABASE	UHN MISC DATABASE	MEMBER ELIGIBILITY
DATABASE	VISION DATABASE	OTHER
EMAIL	GROUPWISE	CAN NOT ATTACH FILES
EMAIL	GROUPWISE	WEB ACCESS PROBLEMS
EMAIL	TELEMEDICINE	CEDAR CITY
EMAIL	TELEMEDICINE	GUNNISON
HARDWARE	CARD EMBOSSER	OTHER
HARDWARE	CD - ROM	PROBLEMS
HARDWARE	FLOPPY DRIVE	PROBLEMS
HARDWARE	HARD DRIVE	PROBLEMS
HARDWARE	HCI WEB SERVER PROBLMES	CALL 581-5326
HARDWARE	IDX - RAD	VT TERMINAL PROBLEM
HARDWARE	KEYBOARD	CERTAIN KEYS NOT WORKING
HARDWARE	KRONOS	CLOCK DOES NOT WORK
HARDWARE	KRONOS	WON'T READ CARD (CALL PR)
HARDWARE	MACINTOSH	INSTALL REQUEST
HARDWARE	MODEM	NOT DIALING IN
HARDWARE	MONITOR	HAS POWER, SCREEN BLANK
HARDWARE	MOTHER BOARD	PROBLEMS
HARDWARE	MOUSE	CURSOR WILL NOT MOVE

EXAMPLE OF NEW CLASSIFICATION SYSTEM

HARDWARE	NETWORK CARD	PROBLEMS
HARDWARE	OASIS PILOT	NOT BOOTING
HARDWARE	PC	MOVE EQUIPMENT
HARDWARE	PHARMACH FAX SERVER	PROBLEMS
HARDWARE	PRINTER	CABLE CONNECTIONS
HARDWARE	SCANNER	HAS POWER, NOT SCANNING
HARDWARE	SOUND CARD	REPLACE
HARDWARE	STATLAN	BACKEND PROCESS
HARDWARE	UHN - TELECOMMUNICATIONS	NEW EQUIPMENT REQUEST
HARDWARE	UHN - TIME CLOCK	CANNOT SCAN CARDS
HARDWARE	VIDEO CARD	PROBLEMS
HARDWARE	WBT	LOCKS UP
HARDWARE	X-TERM	8 BIT BOOT COLOR MONITOR
HARDWARE	Y2K - PROBEMS	OTHER
INTERFACE	ACIS GATEWAY	ACISIF2 - ACIS WORKSTATION
INTERFACE	ALLEGRA	ADT (SMS_OUT) INTERFACE PROBLEM
INTERFACE	CAI	ALL1PROD [SRC] UNSOLICITED BLOOD GAS REPORT
INTERFACE	CEM - SUNQUEST	MISSING (DELPRSUN)
INTERFACE	STATLAN	CAN'T GET LAB ON MULT PT
INTERFACE	STATLAN	CMI_CERNER_ADT
NETWORK	CABLE PULL	OTHER
NETWORK	DIAL IN	PROBLEMS
NETWORK	IP ADDRESS	DUPLICATE
NETWORK	NAME SERVER	PROBLEMS
NETWORK	OASIS PILOT	OTHER
NETWORK	PORTS	LEFT SIDE NOT WORKING
NETWORK	PRIMARY CHILDRENS HOSPITAL	OTHER
NETWORK	ROUTER	PROBLEMS
NETWORK	UHN BANYAN NETWORK	CTR-WIDE, UNABLE TO ACCESS SYSTEM
NETWORK	UHN - TELECOMMUNICATIONS	PBX CONSOLE INOPERATIVE
NETWORK	VIDEO CONFERENCE	MOAB
NETWORK	Y2K - PROBEMS	OTHER
OS	WINDOWS	SPECIFIC FN NOT WORKING
PRINTING	ALLEGRA	EMBOSSED CARD
PRINTING	CBOARD - DIET OFFICE	TRAY TICKETS
PRINTING	HDM (HI)	CAN'T PRINT ANYTHING
PRINTING	IDX - RAD	DIAGNOSTIC REPORT
PRINTING	LOGICARE	PRINTING
PRINTING	MAXIMO	CANNOT PRINT
PRINTING	MEDISERVE	OTHER
PRINTING	MEDREC/MEDDATA (HI)	CAN'T PRINT ANYTHING
PRINTING	MEGASOURCE	IV LABES
PRINTING	METAFRAME	ADD GLOBAL PRINTER
PRINTING	MSMEDS	IV LABELS

EXAMPLE OF NEW CLASSIFICATION SYSTEM

PRINTING	ORDER ENTRY	BLOOD GAS/PULMONARY FN LAB
PRINTING	PHARMACY POS	CANNOT PRINT RECEIPTS
PRINTING	UHN - CPRS	MULTIPLE USERS
PRINTING	UHN - SYSTEM/1	CANNOT PRINT
PRINTING	UHN BANYAN NETWORK	CANNOT PRINT
SECURITY	ALLEGRA	REQUEST FOR MODIFICATION TO ACCESS RIGHTS
SECURITY	VIOLATION	SPECIFY
SERVER	BACKUP	OTHER
SERVER	ESI	ESI GATEWAY DOWN
SERVER	METAFRAME	SERVER DOWN
SERVER	NT FILE SERVER	SERVER DOWN
SERVER	OACIS EMR	ERROR CONNECTING TO SYBASE
SERVER	STATLAN	KOMODO2 SERVER DOWN
SERVER	UHN - LAB	LAB DEVICE FAILURE
SERVER	WINCENTER	APPLICATION NEW INSTALLATION
SOFTWARE	ANSOS	CAN'T OPEN/LAUNCH
SOFTWARE	ATU	Document not in Oacis
SOFTWARE	BMT BASE	CAN'T OPEN/LAUNCH
SOFTWARE	CACTUS	CAN'T OPEN/LAUNCH
SOFTWARE	CBOARD - DIET OFFICE	CAN'T OPEN/LAUNCH
SOFTWARE	CENSUS - OUTPATIENT FROM IDX	CAN'T OPEN/LAUNCH
SOFTWARE	CLINICAL PATHWAYS	INSTALL REQUEST
SOFTWARE	CLINTEC	SPECIFIC FN NOT WORKING
SOFTWARE	COMPENSATION	CAN'T OPEN/LAUNCH
SOFTWARE	COMPOUNDER	SPECIFIC FN NOT WORKING
SOFTWARE	CORTRAK (UNI)	CAN'T OPEN/LAUNCH
SOFTWARE	DAILY CENSUS SUMMARY (INPATIENT)	CAN'T OPEN/LAUNCH
SOFTWARE	EMERGENCY DRUG CALCULATOR	INSTALL REQUEST
SOFTWARE	EMGPRO - NEUROLOGICAL	CAN'T OPEN/LAUNCH
SOFTWARE	EPIDEMIOLOGY	CAN'T OPEN/LAUNCH
SOFTWARE	INCIDENT REPORTING (PMI)	CAN'T OPEN/LAUNCH
SOFTWARE	INFORMS	CAN'T OPEN/LAUNCH
SOFTWARE	INTERNET EXPLORER	OTHER
SOFTWARE	KRONOS - PAYROLL REPORTER	CAN'T SEE ALL EMPLOYEES (CALL PO)
SOFTWARE	MARS-MANAGED CARE	CAN'T OPEN/LAUNCH
SOFTWARE	MAXIMO	CAN'T OPEN/LAUNCH
SOFTWARE	MEDICAL STUDENT ADMIT / SCHEDULE	CAN'T OPEN/LAUNCH
SOFTWARE	MEDREC/MEDDATA (HI)	CAN'T OPEN/LAUNCH
SOFTWARE	MEDWATCH	SPECIFIC FN NOT WORKING
SOFTWARE	MORGAN-PULMONARY	SPECIFIC FN NOT WORKING
SOFTWARE	MS ACCESS	TRAINING REQUEST
SOFTWARE	MS EXCEL	INSTALL REQUEST
SOFTWARE	MS POWER POINT	CAN'T OPEN/LAUNCH

EXAMPLE OF NEW CLASSIFICATION SYSTEM

SOFTWARE	MS PROJECT	CAN'T OPEN/LAUNCH
SOFTWARE	MS WORD	SPECIFIC FN NOT WORKING
SOFTWARE	MTS-TRANSCRIPTION	CAN'T OPEN/LAUNCH
SOFTWARE	NAL APPLICATIONS	NEW INSTALLATION
SOFTWARE	NETSCAPE	TRAINING REQUEST
SOFTWARE	OACIS EMR	ALLERGY: ERR MODIFYING
SOFTWARE	OACIS EMR	BLOOD GAS: ERR OPENING LOIS
SOFTWARE	OACIS EMR	VITAL SIGNS: ERR MODIFYING
SOFTWARE	OASIS PILOT	NOT LOADING
SOFTWARE	OLYMPUS-ENDOSCOPY	CAN'T OPEN/LAUNCH
SOFTWARE	OQ OATS - UNI	SPECIFIC FN NOT WORKING
SOFTWARE	PALM PILOT	INSTALL REQUEST
SOFTWARE	PEOPLE SOFT	FINANCE
SOFTWARE	PHYSICIAN PROFILING (PMI)	CAN'T OPEN/LAUNCH
SOFTWARE	REMEDY	CAN'T OPEN/LAUNCH
SOFTWARE	RMCDS (TUMOR REGISTRY)	CAN'T OPEN/LAUNCH
SOFTWARE	ROOM TRACE SUMMARY	CAN'T OPEN/LAUNCH
SOFTWARE	SAFETY CAT	CAN'T OPEN/LAUNCH
SOFTWARE	SNA GATEWAY	INSTALL REQUEST
SOFTWARE	SNA SESSION	SESSION NOT RESPONDING
SOFTWARE	SPCLIN LYTE	CAN'T OPEN/LAUNCH
SOFTWARE	SURMED	CAN'T OPEN/LAUNCH
SOFTWARE	TEAMUP	TRAINING REQUEST
SOFTWARE	TELOPS	CAN'T OPEN/LAUNCH
SOFTWARE	TIEDI (ORGAN TRANSPLANT)	CAN'T OPEN/LAUNCH
SOFTWARE	TRANSITION/TSI FINANCIAL - AMBAS	CAN'T OPEN/LAUNCH
SOFTWARE	TRUAMABASE	CAN'T OPEN/LAUNCH
SOFTWARE	TSI-T1 &T2	CAN'T OPEN/LAUNCH
SOFTWARE	UHC IMS	CAN'T OPEN/LAUNCH
SOFTWARE	UHN - CPRS	UNABLE TO SCAN DOCUMENTS
SOFTWARE	UHN - PHARMACY POS	CASH REGISTER NOT WORKING
SOFTWARE	VIRUS	OTHER
WEB	APPLICATION	OTHER
WEB	BUDGET SYSTEM - HOSPITAL	OTHER
WEB	CARDIOLOGY ON-CALL SCHEDULE	OTHER
WEB	ELECTRONIC SIGNATURES	ADD USER TO EXISTING DEPARTMENTS
WEB	EMAN-ELECTRONIC MANUALS	OTHER
WEB	JOB LISTING	OTHER
WEB	LOST AND FOUND	OTHER
WEB	NACIS	REGISTER IP ADDRESS
WEB	WEB ACCOUNT	CAN'T UPLOAD CHANGES
WEB	WORKLOAD UNITS	CAN'T LOG IN

APPENDIX G

COHEN'S KAPPA STATISTICS OF AGREEMENT

COHEN'S KAPPA STATISTICS

CallID	ACCESS	DATABASE	EMAIL	HARDWARE	INTERFACE	NETWORK	PRINTING	SERVER (R)	SOFTWARE	WEB	Pattern of Agree	Total	Prop of Agree
113347	1	0	2	0	0	2	0	0	0	0	AEN	5	0.2
113561	2	0	0	1	0	0	0	2	0	0	AHS	5	0.2
113587	1	0	0	0	0	0	2	0	2	0	APS	5	0.2
114286	2	0	0	0	0	0	0	1	2	0	ASS	5	0.2
114718	2	0	0	0	0	1	0	2	0	0	ANS	5	0.2
115372	2	0	0	0	0	1	0	0	2	0	ANS	5	0.2
113280	3	0	0	0	0	0	0	0	1	1	ASW	5	0.3
113458	1	0	0	0	1	0	0	0	0	3	AIW	5	0.3
113573	3	1	0	0	0	0	0	0	1	0	ADS	5	0.3
114071	1	0	3	0	0	0	0	1	0	0	AER	5	0.3
115033	3	0	0	0	0	1	0	1	0	0	ANS	5	0.3
115387	0	3	0	0	1	0	0	0	1	0	DIS	5	0.3
113131	3	0	0	0	0	0	0	2	0	0	AR	5	0.4
113134	2	0	0	0	0	0	0	3	0	0	APS	5	0.4
113165	0	3	0	0	0	0	0	0	2	0	DR	5	0.4
113172	0	0	0	2	0	0	3	0	0	0	HN	5	0.4
113206	0	0	0	0	0	0	0	2	3	0	RS	5	0.4
113209	3	0	2	0	0	0	0	0	0	0	AE	5	0.4
113263	0	0	0	3	0	0	2	0	0	0	HP	5	0.4
113267	0	0	0	3	0	0	2	0	0	0	HP	5	0.4
113284	0	0	0	2	0	0	3	0	0	0	HP	5	0.4
113418	0	0	0	2	0	0	3	0	0	0	HP	5	0.4
113423	0	0	0	3	0	0	2	0	0	0	HP	5	0.4
114468	0	0	0	0	0	0	0	2	3	0	RS	5	0.4
115099	3	0	0	0	0	0	0	2	0	0	AR	5	0.4

COHEN'S KAPPA STATISTICS

115191	3	0	0	0	0	0	0	0	2	0	AS	5	0.4
115312	2	0	0	0	0	0	0	0	3	0	AS	5	0.4
115425	0	0	0	3	0	2	0	0	0	0	HN	5	0.4
115454	3	0	0	0	0	0	0	0	2	0	AS	5	0.4
115667	0	2	0	0	0	0	0	0	3	0	DS	5	0.4
115674	0	0	0	3	0	0	2	0	0	0	HP	5	0.4
113125	1	0	0	0	0	0	0	0	4	0	AS	5	0.6
113139	4	0	0	0	0	0	0	0	1	0	AS	5	0.6
113142	1	0	0	0	0	0	0	4	0	0	AR	5	0.6
113156	0	4	0	0	0	0	0	0	1	0	DS	5	0.6
113188	0	0	0	0	0	0	0	4	1	0	RS	5	0.6
113254	0	1	0	0	0	0	0	0	4	0	DS	5	0.6
113311	0	0	0	0	0	0	0	0	1	4	SW	5	0.6
113345	4	0	0	0	0	0	0	0	1	0	AS	5	0.6
113436	0	0	4	0	0	0	0	0	1	0	ES	5	0.6
113535	0	0	0	0	0	0	0	0	1	4	SW	5	0.6
113542	0	0	1	0	0	0	0	4	0	0	ER	5	0.6
113615	0	0	0	0	0	0	4	0	1	0	PS	5	0.6
113904	0	0	0	1	0	0	0	0	4	0	HS	5	0.6
114036	0	0	0	0	0	4	0	0	1	0	NS	5	0.6
114086	1	0	0	0	0	0	0	0	4	0	AS	5	0.6
114479	4	0	0	0	0	0	0	0	1	0	AS	5	0.6
114568	0	0	0	1	0	0	4	0	0	0	HP	5	0.6
114699	1	0	0	0	0	0	0	0	4	0	AS	5	0.6
114725	4	1	0	0	0	0	0	0	0	0	ADS	5	0.6
115322	0	0	0	4	0	0	1	0	0	0	HP	5	0.6
115441	1	0	0	0	0	0	0	4	0	0	AR	5	0.6
115659	4	0	0	0	0	0	0	0	1	0	AS	5	0.6
113123	5	0	0	0	0	0	0	0	0	0	A	5	1
113151	5	0	0	0	0	0	0	0	0	0	A	5	1

COHEN'S KAPPA STATISTICS

113176	5	0	0	0	0	0	0	0	0	0	A	5	1
113197	5	0	0	0	0	0	0	0	0	0	A	5	1
113213	5	0	0	0	0	0	0	0	0	0	A	5	1
113236	5	0	0	0	0	0	0	0	0	0	A	5	1
113317	0	0	5	0	0	0	0	0	0	0	E	5	1
113324	0	0	0	5	0	0	0	0	0	0	H	5	1
113334	0	0	0	0	0	0	0	5	0	0	RS	5	1
113364	0	0	0	5	0	0	0	0	0	0	H	5	1
113374	5	0	0	0	0	0	0	0	0	0	A	5	1
113381	0	0	5	0	0	0	0	0	0	0	E	5	1
113465	0	0	0	5	0	0	0	0	0	0	H	5	1
113476	0	0	0	5	0	0	0	0	0	0	H	5	1
113549	0	0	0	5	0	0	0	0	0	0	H	5	1
113837	0	0	0	5	0	0	0	0	0	0	H	5	1
113927	0	0	5	0	0	0	0	0	0	0	E	5	1
114060	0	0	0	0	0	0	0	5	0	0	R	5	1
114210	0	0	0	5	0	0	0	0	0	0	H	5	1
114417	5	0	0	0	0	0	0	0	0	0	A	5	1
114425	5	0	0	0	0	0	0	0	0	0	A	5	1
114800	5	0	0	0	0	0	0	0	0	0	A	5	1
114813	0	0	0	5	0	0	0	0	0	0	H	5	1
114906	5	0	0	0	0	0	0	0	0	0	A	5	1
114917	5	0	0	0	0	0	0	0	0	0	A	5	1
115040	5	0	0	0	0	0	0	0	0	0	A	5	1
115050	0	0	0	0	0	0	0	5	0	0	R	5	1
115124	0	0	0	5	0	0	0	0	0	0	H	5	1
115151	0	0	0	5	0	0	0	0	0	0	H	5	1
115158	0	0	0	0	0	0	0	5	0	0	R	5	1
115175	0	0	0	0	0	0	0	0	0	5	W	5	1
115178	0	0	0	5	0	0	0	0	0	0	H	5	1

COHEN'S KAPPA STATISTICS

115187	0	0	0	5	0	0	0	0	0	0	H	5	1
115212	0	0	5	0	0	0	0	0	0	0	E	5	1
115331	0	0	0	0	0	0	0	5	0	0	R	5	1
115397	0	0	0	0	0	5	0	0	0	0	N	5	1
115474	0	0	0	0	0	0	0	5	0	0	R	5	1
115533	5	0	0	0	0	0	0	0	0	0	A	5	1
115676	0	0	0	0	0	0	0	0	5	0	S	5	1
													62.8
										P(A)		0.683	

C=	135	15	32	88	2	16	28	64	63	17			
pj	0.2934783	0.033	0.0695652	0.1913	0.0043478	0.0348	0.0609	0.1391	0.137	0.037		1	
pj squared	0.08613	0	0.00484	0.037	1.9E-05	0.001	0.004	0.019	0.019	0.001		0.173	
												P(E)=	0.173

Kappa= P(A)-P(E) / (1-P(E))

Kappa=	0.6162

APPENDIX H

SAMPLE REPORTS FROM FINAL QM REPORT TEMPLATE

ITS Quality Management Report
September 2000

Prev Month | Next Month

I. Top Problems

TOP 25 PROBLEMS

PROBLEM	July	August	September
ACCESS-NDS-ACCESS DENIED	182	275	167
EMAIL-GROUPWISE-OTHER	228	200	164
ACCESS-METAFRAME-UNABLE TO LOGIN	122	170	122
SERVER-METAFRAME-CORRUPT PROFILE	172	212	91
ACCESS-METAFRAME-SYNCHRONIZE PASSWORDS	128	161	81
HARDWARE-PC-OTHER	55	65	79
HARDWARE-PRINTER-NOT PRINTING FROM ANYTHING	36	60	73
HARDWARE-PC-NOT BOOTING COMPLETELY	54	99	65
ACCESS-NDS-MAPPING	44	156	64

ACCESS-NDS-ACCESS TO SHARED DIRECTORIES	63	104	61
HARDWARE-PC-INSTALL REQUEST	22	23	58
HARDWARE-PRINTER-OTHER	70	64	57
PRINTING-NDS-Print Que Capture/ Share Name	75	57	52
ACCESS-GROUPWISE-CHANGE PASSWORD	51	82	50
ACCESS-METAFRAME-ACCOUNT LOCKED	39	48	50
SOFTWARE-OTHER-INSTALL REQUEST	31	34	36
SOFTWARE-VIRUS-OTHER	24	7	34
HARDWARE-WBT-NEEDS FLASHED	22	33	33
NETWORK-PORTS-MAKE LIVE	20	34	32
SOFTWARE-GROUPWISE-CAN'T OPEN/LAUNCH	27	24	28
ACCESS-ESI-LOGIN NOT WORKING	7	56	26
HARDWARE-PC-MOVE EQUIPMENT	22	19	26
ACCESS-NDS-LOGIN REQUEST	41	36	25

TOP 25 CLINICAL PROBLEMS

PROBLEM	July	August	September
ACCESS-IDX-TOO MANY CONNECTIONS	33	209	119
ACCESS-IDX-OTHER	20	51	57
ACCESS-OACIS EMR-LOGIN NOT WORKING	12	18	17
ACCESS-ALLEGRA-USER NUMBER PASSWORD (ALLEGRA)	12	4	13
ACCESS-ACIS-LOGIN NOT WORKING ONE USER/ONE WS	16	18	13
ACCESS-OACIS EMR-PASSWORD FORGOTTEN	15	29	12
SOFTWARE-OACIS EMR-OTHER	5	15	12
SOFTWARE-ACIS-CAN'T OPEN/LAUNCH	3	6	10
ACCESS-ALLEGRA-OTHER	26	43	8
ACCESS-ALLEGRA-USERNAME PASSWORD (VMS)	7	9	8
DATABASE-ACIS-PT. INFO PROBLEM	3	4	8
PRINTING-IDX-OTHER	12	6	7
ACCESS-ACIS-LOGIN REQUEST	11	17	6
PRINTING-ALLEGRA-FACE SHEET	5	5	6
SOFTWARE-ACIS-OTHER	6	6	6
DATABASE-ALLEGRA-RECORD LOCK - SUPPLY MRN / INFO	6	3	6
DATABASE-ALLEGRA-OTHER	3	7	6
ACCESS-ACIS-GAVE ACIS LOGON	16	14	5
ACCESS-IDX-CAN'T CONNECT TO CHEETAH(PC)	5	18	5
ACCESS-ALLEGRA-USER(VMS) AUTHORIZATION FAILURE	3	6	5
SOFTWARE-IDX-OTHER	10	5	5
PRINTING-ACIS-OTHER	10	13	5
DATABASE-ALLEGRA-PATIENT INFORMATION PROBLEM	6	8	5
ACCESS-IDX - RAD-CAN'T LOGON TO FILE SERVER	0	2	4
ACCESS-OACIS EMR-PASSWORD NOT WORKING	8	6	4

TOP 10 SOLUTIONS

SOLUTION	TOTAL
040305115682047 - Kill an IDX Session	141
040310298269042 - Synchoronize Metaframe and NDS passwords	120
040303895191812 - Delete associated 'ntuser.dat' files and .tmp files	54
040318766822181 - Check PC for correct NAL loading	54
040304512483549 - Change GroupWise password via NWAdmin	49
040317826420006 - Remove lock from Metaframe account	35
040305550247112 - Change NDS password via NWAdmin	32
040305635088029 - Give rights to shared group(s)	25
040326188887403 - -Login to Metaframe -Open NW Admin -Locate the user and open	24
040310317321753 - Request network access via web	23

II. Unplanned Downtimes

System Downtime(3 Month History)

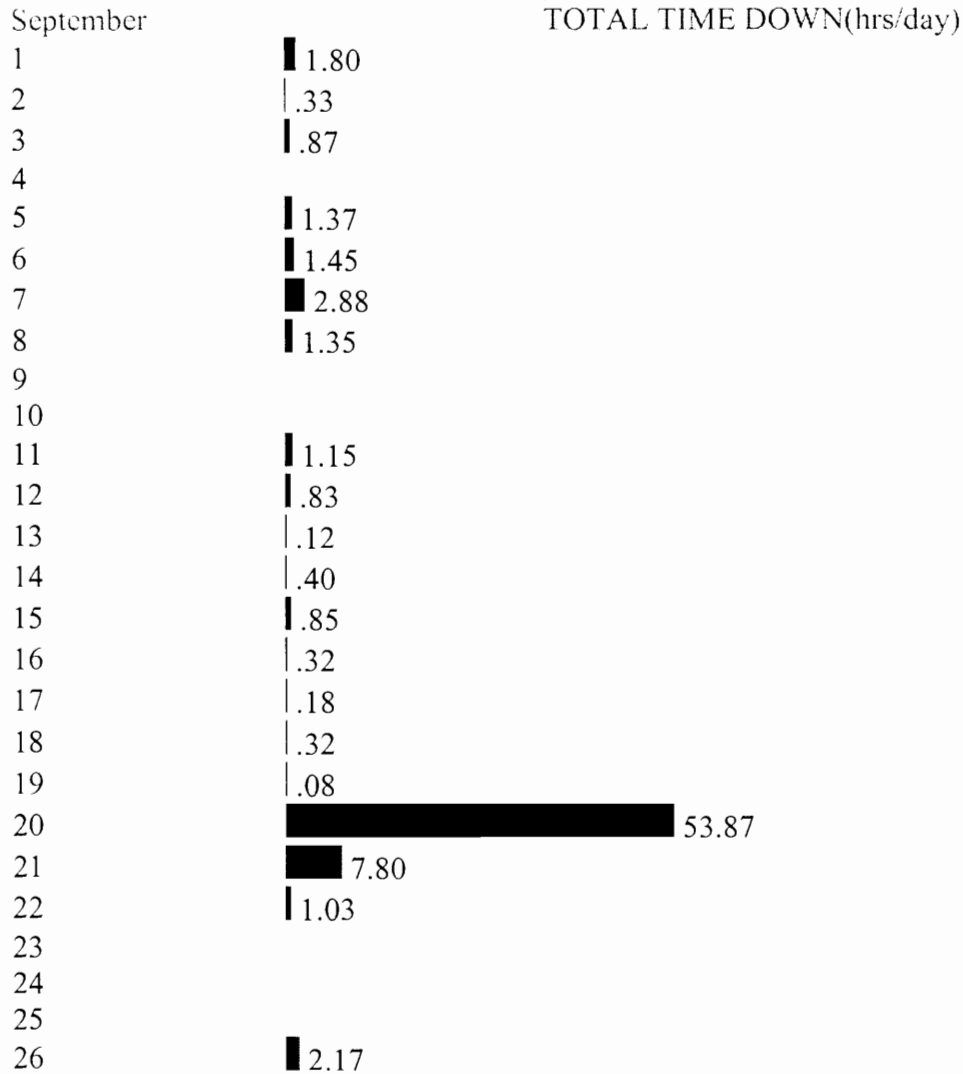
SYSTEM	MONTH	(# of Occur.)	TOTAL TIME DOWN(hrs/month)
Allegra	(September)	(1)	.12
GroupWise	(August)	(1)	.17
""	(September)	(1)	.13
Micromedex Healthcare Intranet	(September)	(1)	.17
Patient Satisfaction Svy-Rad	(August)	(1)	.75
PeopleSoft Financials	(August)	(1)	.75
cd-med	(September)	(1)	.17
dataa-med	(August)	(2)	.43
datab-med	(August)	(2)	.43
dsmaster6-med	(September)	(1)	.22
esi-med	(September)	(1)	.32
grpwise6-med	(August)	(1)	.17
gwdom2-med	(August)	(3)	.48
""	(September)	(10)	9.57
hscmgmtbdc	(September)	(1)	.17
mambas1	(August)	(4)	.80
""	(September)	(1)	.17
mambas2	(August)	(5)	1.25
mbrowser1	(August)	(1)	.17

mbrowser2	(August)	(1)	.17
mepic1	(August)	(1)	.17
""	(September)	(3)	.75
mepic2	(August)	(1)	.17
""	(September)	(2)	.67
mepic3	(August)	(1)	.17
""	(September)	(2)	.67
mepic4	(August)	(1)	.17
""	(September)	(6)	1.42
mepic5	(August)	(1)	.17
""	(September)	(2)	.65
mf2	(August)	(1)	.17
mframe-oir	(August)	(3)	.83
""	(September)	(7)	.58
mframe-test	(August)	(1)	.17
mframe1	(August)	(2)	.67
""	(September)	(2)	.23
mframe10	(August)	(5)	1.33
""	(September)	(1)	.12
mframe11	(August)	(3)	.83
""	(September)	(2)	.30
mframe2	(August)	(2)	.67
""	(September)	(3)	.52
mframe3	(August)	(2)	.67
mframe5	(August)	(3)	.75
""	(September)	(2)	.23
mframe6	(August)	(2)	.67
""	(September)	(1)	.17

mframe7	(August)	(4)	.75
""	(September)	(2)	.27
mframe8	(August)	(2)	.67
mframe9	(August)	(1)	.17
""	(September)	(2)	.25
moacis0	(August)	(1)	.17
moacis1	(August)	(1)	.17
moacis2	(August)	(1)	.17
moacis3	(August)	(1)	.17
mormis1	(August)	(1)	.17
mormis2	(August)	(1)	.17
muni1	(August)	(3)	.75
""	(September)	(1)	.08
muni2	(August)	(1)	.17
muuhn1	(August)	(4)	1.17
""	(September)	(2)	.33
muuhn2	(August)	(6)	1.83
""	(September)	(2)	.47
muuhn3	(August)	(4)	1.17
""	(September)	(1)	.08
muuhn4	(August)	(6)	1.33
""	(September)	(2)	.25
muuhn5	(August)	(6)	17.33
""	(September)	(4)	.43
muuhn6	(August)	(4)	1.33
""	(September)	(1)	.15
prnmaster1-Med	(August)	(1)	2.00
""	(September)	(4)	.68

prnmaster2-med	(August)	(2)	3.48
pubapps2	(September)	(1)	.08
pubapps3	(September)	(1)	.18
redwood-med	(August)	(1)	.75
reports-med	(September)	(1)	.12
som2-med	(August)	(1)	.20
westridge-med	(August)	(1)	.75
rtr-dmz-e0	(August)	(2)	1.17
""	(September)	(1)	1.00
sw-419-1p	(August)	(1)	1.03
sw-419-2p	(August)	(1)	1.03
sw-419-3810	(August)	(1)	1.03
sw-419-purch	(August)	(1)	1.03
sw-521-deans-1	(August)	(1)	10.00
sw-521-deans-2	(August)	(1)	10.00
sw-broadway-1	(September)	(1)	.18

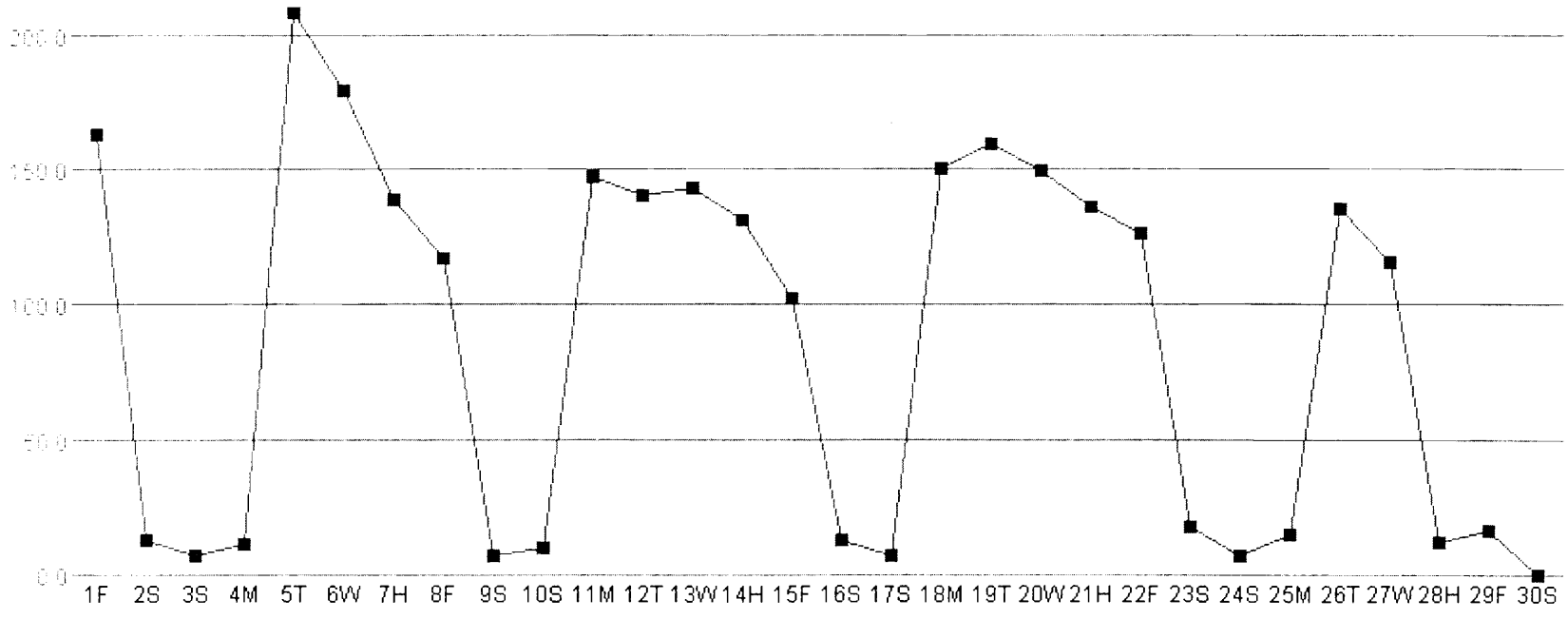
Chronological Downtime



27	.50
28	.08
29	
30	

III. Remedy Problem Reports

Number of NEW Calls for September 2000

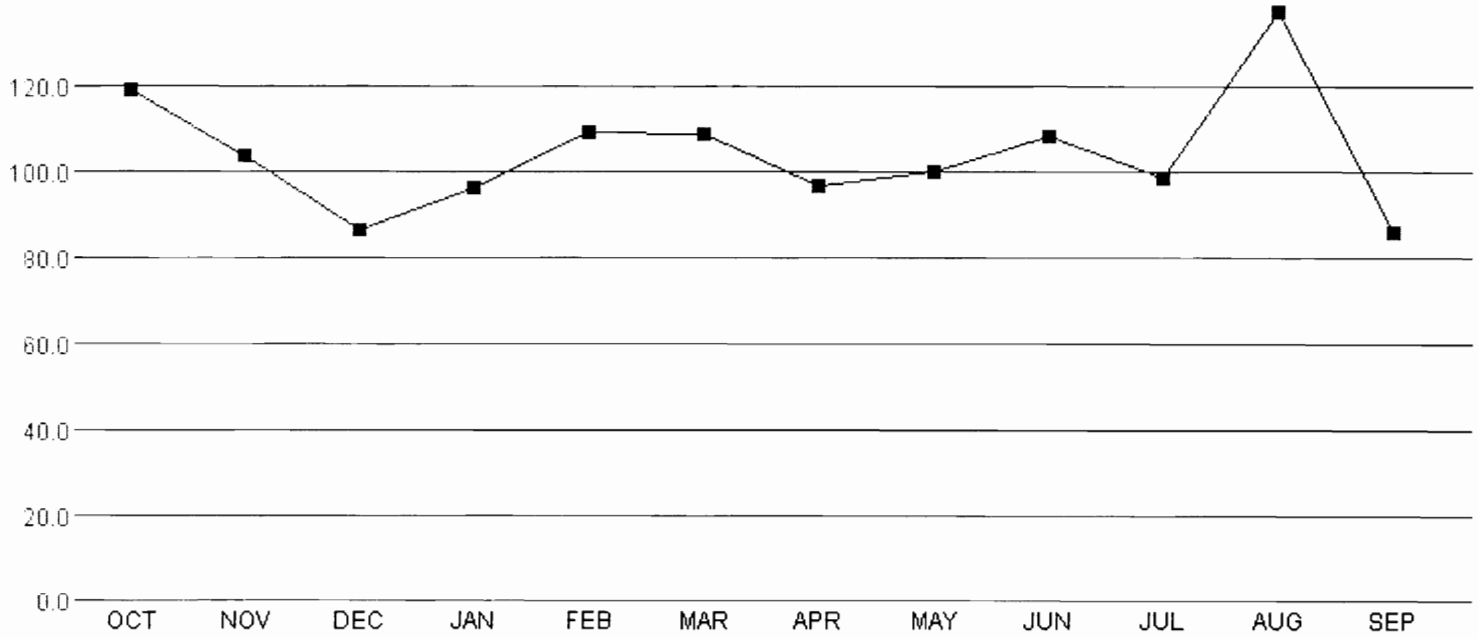


Chart

(as of 21-Nov-00 6:34:54 PM)

¤ Total for All Teams

Average # of NEW Calls per Day
(10/1999 - 9/2000)



Chart

(as of 21-Nov-00 6:34:54 PM)

¤ Total for All Teams

Problem Type

Problem Type	TOTAL
ACCESS	1135
HARDWARE	602
SOFTWARE	384
EMAIL	215
SERVER	146
NETWORK	127
PRINTING	127
DATABASE	99
WEB	36
OS	15
INTERFACE	3

CATEGORY

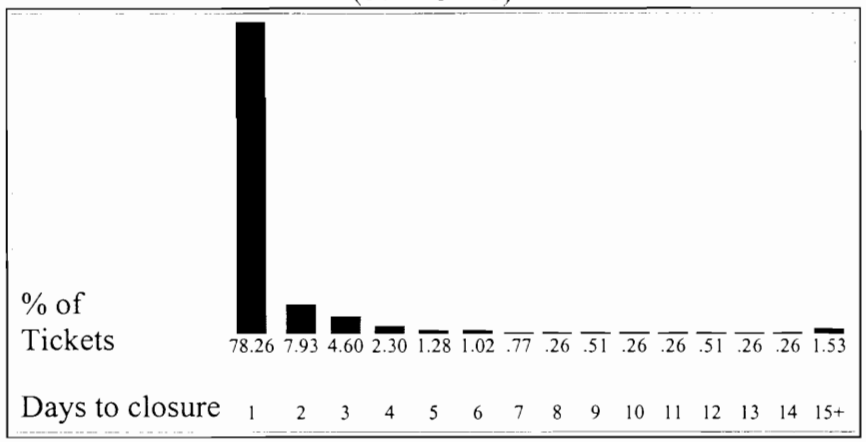
CATEGORY	TOTAL
NDS	441
METAFRAME	399
GROUPWISE	334
PC	246
IDX	198
PRINTER	174
ALLEGRA	86
WBT	70
ACIS	67
OACIS EMR	62
ESI	45
CONNECTION	42
PORTS	41
EPIC	35
VIRUS	34
NAL	25
SNA SESSION	23
MONITOR	20
MS WORD	20
NAL APPLICATIONS	19
MONARCH	19
MS OFFICE SUITE	19
INTERNET EXPLORER	19
SAFETY CAT	18
EPIC - DESKTOP	16

DEPARTMENT

DEPARTMENT	TOTAL
U OF U HEALTH NETWORK	426
PATIENT ACCOUNTING	248
OFFICE OF INFORMATION RES	153
PHARMACY	100
UNIVERSITY NEUROPSYCH INSTITUT	72
HEALTH INFORMATION	55
ENGINEERING	45
REHAB 2	45
EMERGENCY	44
GRAD MED ED	43
INTERNAL MEDICINE	42
SPD	42
PEDIATRICS/ 2 EAST	39
OPERATING ROOM	37
OPHTHALMOLOGY	33
OTOLARYNGOLOGY	33
HUMAN RESOURCES HOSP	29
PSYCHIATRY	28
SUGARHOUSE	28
MORAN EYE CENTER	26
SCHOOL OF MEDICINE-DEANS	26
PREVENTIVE CARDIOLOGY	25
ORTHOPEDIC SURGERY	24
INTERNAL MED CLINIC	23
NURSING SERVICES	23

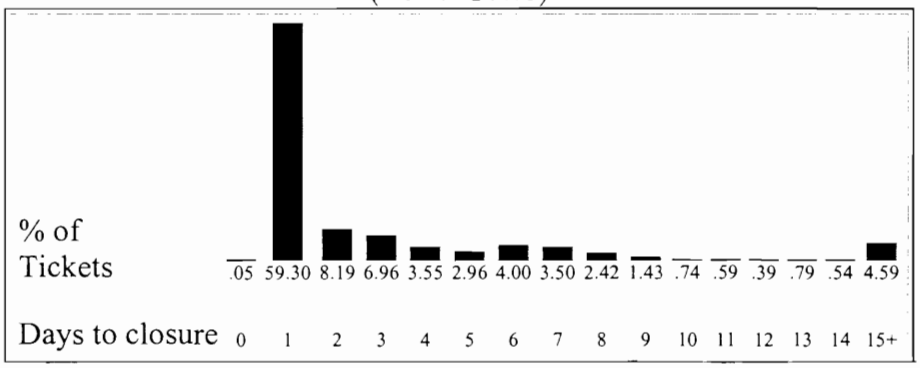
Time to Closure High/Urgent Priority Calls

(391 Calls)



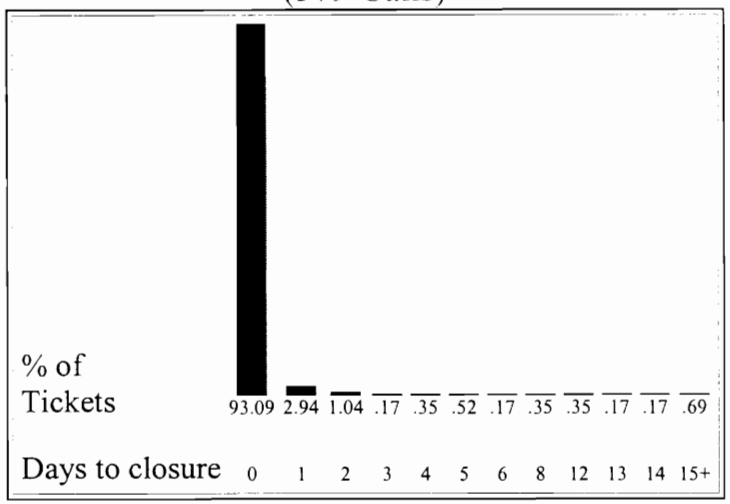
Time to Closure Medium Priority Calls

(2027 Calls)



Time to Closure Low Priority Calls

(579 Calls)



IV. CUSTOMER SATISFACTION SURVEY

1. Was your Trouble Ticket resolved in a timely manner?

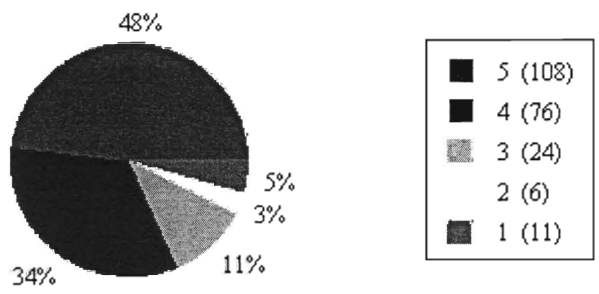


Chart
(as of 21-Nov-00 6:35:17 PM)

2. Relative to the issue this Trouble Ticket addressed, how important was a timely resolution?

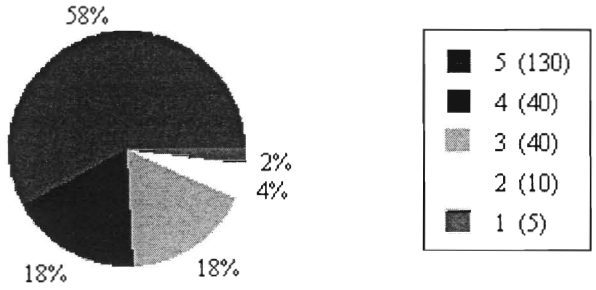


Chart
(as of 21-Nov-00 6:35:22 PM)

3. Was the support technician knowledgeable and professional?

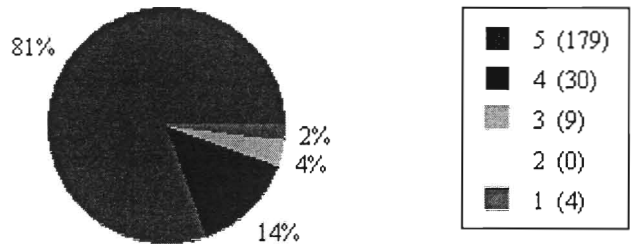


Chart
(as of 21-Nov-00 6:35:27 PM)

4. How do you rate the overall service provided on this trouble ticket?

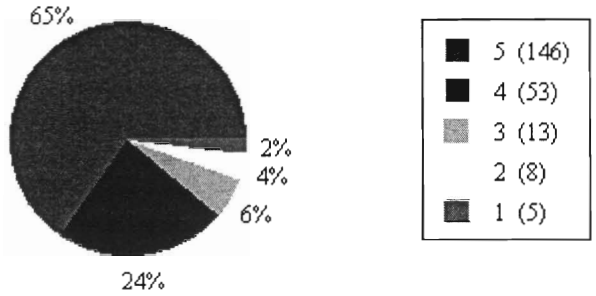


Chart
(as of 21-Nov-00 6:35:32 PM)

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