Obstacles to Implementation of new Computer Technology within
the Renton Fire Department

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Abstract

The author’s applied research project (ARP) utilized the descriptive method of research to identify past and potential obstacles that may impede implementation of new computer technology within the Renton Fire Department. Recommendations will be made to the fire department of findings utilizing this information.

The problem is the Renton Fire Department will be implementing a new computerized integrated records management system in early 2004. In past years, similar attempts have failed, which resulted in loss of data, time and fiscal resources critical to maintain an effective organization.

A combination of a review of published materials, personal interviews, surveys and personal observations were utilized to answer the following questions.

- What have organizations outside the fire service found to be hurdles when implementing new computer technological programs?
- What have organizations inside the fire service found as hurdles to implementing new computer technology?
- What are successful practices and methods for implementing new computer technology into an organization?

The literature review and the personal interviews were able to identify successful and unsuccessful practices used across the country both in the Fire Service and private industry.

The surveys were issued to the fire service in Washington State only. The conclusions found similar results as to the literature review and personal interviews. Training, communications,
employee buy in and a detailed project plan were the ultimate factors for successful implementation of computer technology.

The personal interviews provided information indicating private industry and the fire service undergo similar computer technological hurdles during implementation. Standards of practice are available that will assist organizations and provide guidelines for project implementation.
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INTRODUCTION

Obstacles to Implementation of new Computer Technology within the Renton Fire Department

In 1995 the City of Renton developed a technology plan for all divisions of the city. This plan was to provide guidelines and establish procedures for computer technological upgrades and infrastructure modification well into the future. The plan was placed under the direction of the Information services director for the City (C Duffy, personal communication, October 20, 2003). This plan called for all divisions within the city to develop a strategic plan for the future of their organization. The plan was complete with the exception of the Fire Department.

In 1999 with the assistance of a committee of members from the fire department, Information services, Police, Public works, Transportation and a private consulting firm (Public Safety Consultants Inc.), the fire department developed their portion of the cities overall plan.

The Renton Fire Department’s goal was to take the current stand-alone software programs currently used and replace it with a total records management system. The system software will be required to link program modules and provide the needed reporting capability and strategic analysis used to master plan the future of Renton’s Fire Department. This software system will collect and report emergency fire and aid incident data, fire prevention commercial property, permitting, code data, arson investigation, fire department asset management, in addition to personnel tracking, roster scheduling, medical and health information.

The problem is the Renton Fire Department will be implementing a new computerized integrated records management system in early 2004. In past years similar attempts have failed,
which resulted in loss of data, time and fiscal resources critical to maintain an effective organization.

The purpose of this applied research project is to identify past and potential obstacles that may impede implementation of new computer technology and to provide recommendations to the fire department administration. This applied research project will accomplish this by researching successful methods and practices used in both private industry and the fire service. The descriptive method of research, through the use of published material, personal interviews, surveys and personal observations were used to answer the following questions:

What have organizations outside the fire service found to be hurdles when implementing new computer technological programs?

What have organizations inside the fire service found as hurdles to implementing new computer technology?

What are successful practices and methods for implementing new computer technology into an organization?

**BACKGROUND AND SIGNIFICANCE**

The City of Renton is located on the south shore of Lake Washington in the northwest portion of the State of Washington. Officially becoming a city in 1901 it has a rich history stretching back to the 1850’s. Home to such corporations as the Boeing Commercial Airplane Company, PACCAR, and IKEA the city considers itself as having a pro-business climate. The city maintains a proper mix of residential, commercial and industrial use. With over 54,000 residents and 33,000 additional people employed within the city. Renton maintains a strong sense of
community shown by its beautiful parks, abundant housing development projects transforming the central downtown, in addition to the new IKEA Performing Arts Center.

The population within the city limits is 54,900 with a Greater Renton Area population of 165,000. The city covers over 17.2 square miles and has an assessed valuation of $5,959,258,370. The city operates a Mayor-City Council form of government. (*Renton Washington: city government web site, 2003*). There are 7 sitting members on the Council who are elected in non-partisan elections to serve a four-year term. The Mayor is also elected by a non-partisan vote to a four-year term of office. The Mayor appoints a City Manager to administer city policies. In addition to the city council, a number of boards and advisory committees assist the City Council in the developing and governing the City of Renton.

The city is broken down into 8 functional divisions, each lead by a division head assigned to insure the proper leadership and vision of their perspective areas. These divisions are the Fire Department, Police Department, Economic Development Neighborhood and Strategic planning, Community services, Human Resources and Risk Management, Finance and Information Services, Administrative Judicial and Legal Services and Planning Building/ Public Works. (*see Appendix A*)

The Fire Department is lead by the Fire Chief with the assistance of two Deputy Chiefs, 5 Battalion Chiefs and additional officers and staff. (*see Appendix B*).

Due to the size and complexity of the fire department the Administrative division determined, the Battalion Chief in charge of the Fire Prevention Bureau would direct and lead the Integrated Records Management Project (IRMS) for the department (*see Appendix C*). The project is a 1.2 million dollar endeavor spanning 3 years of implementation. The intent of this project is to design a system to replace a number of software programs and databases thus
combining the information into one main Integrated Records Management system. The current software programs used by the fire department are scheduled for replacement in early 2004. These systems and software are out dated and no longer supported by their original vendors or current city Information Services staff.

Informal discussions within the administrative staff and rank and file officer core indicated a frustration with the lack of a specific direction, communications and training in past efforts to implement new computer technology within the fire department (J. Bray, personal communication, October 14, 2003).

This research project was completed as required by the National Fire Academy’s Operational Policies and Procedures Applied Research Guidelines manual (Academy, 2003, September-b).

The determination of hurdles and successful practices when implementing new computer technology within the Renton Fire Department relates to Unit 3, 4, 5 and 7 of the National Fire Academy’s Executive Development course manual (Academy, 2003, September-a). Unit 3, Change Management deals with specific change models both personal and psychological. This unit gave insight as to what organizations could expect when implementing change. Unit 4 Research provided the author the basis and structure to understand and produce an Applied Research Project (ARP). Unit 5 Change and Creativity, discussed challenges to organizations during change and what may assist the organizations creativity during this process. Unit 7 Organizational Culture and Change, lead the author to review the basic culture of the Renton Fire Department and how implementation of new computer technology would affect cultural change within this organization (Academy, 2003, September-a).
The United States Fire Administration (USFA) operational objective, to respond appropriately in a timely manner to emerging issues, directly relates to the emerging issue of the City of Renton’s ability to control spending and strategically plan for the future. Implementation of new computer technology within the Renton Fire Department is one of the cities emerging issues (Academy, 2003, September-b).

It was anticipated that the research information contained within this ARP would be utilized by the City of Renton and other agencies considering implementation of new computer technology.

**LITERATURE REVIEW**

A review of pertinent literature was conducted at the National Fire Academy, utilizing the Learning Resource Center (LRC). Additional literature was provided direct mail utilizing the National Emergency Training Centers LRC reference service. The King County Library system Renton branch was also utilized for specific literature information. The Internet provided specific information on the City of Renton in addition to the National Fire Academy’s LRC. Interviews and questionnaires were also used to provide additional information and background.

What have organizations outside the fire service found to be hurdles when implementing new computer technological programs?

The research concluded in organizations outside the fire service a number of hurdles can be found when implementing new computer technology. The author determined four distinct areas associated with this question, communications, training, detailed project plan and buy in of the end user (see Appendix F, G, H, I, J, K and L).
Communications is one of the basic functions that will affect every aspect when implementing computer technology into an organization (R. Baumgardner, personal communications, December 16, 2003). Effective communications provides the necessary energy that is so critical for productivity. The communication process includes information sharing. This information must be clear, relevant and produced in a timely manner (Egan, 1988). Communications must be shared at all levels within the organization, which will lead to the next basic function, employee buy-in. Communications is essential to the success of any project may it be technical or administrative. This seemingly simple function when not utilized will lead to misunderstandings and may produce results that are not intended (S. Larson, personal communications, October 25, 2003)

Employee buy-in was the next hurdle found to be prominent within industry. A connection between technology and the employee values has been determined to produce the attitude with some employees that “if God wanted us to fly he would have given us wings, or this is not broken why change it”, directly relate to society and a willingness to change (Baier & Rescher, 1969).

In the early eighties the term Technostress was coined. The introduction of word processing systems into industry created resistance among employees (Brod, 1982). This was new technology and an increase in employee frustration was seen. This frustration translated into additional costs for companies facing these changes (Heifetz & Linsky, 2002). An employee who has been use to typing on a manual typewriter using the one finger method now must learn how to use a word processor. This change and associated resistance and frustration created delays in schedules, decreased performance and limited productivity. The ability for an employer to understand this resistance is critical (Brod, 1982).
Factors affecting employee buy in may be stated in terms associated with computer anxiety. There are seven fears: the fear of change, losing status or power, interacting with a computer, the impact of computers on society, isolation, failure, and job displacement (Appelbaum & Primmer, 1990).

Too often, computer software specialists do not involved the end user in the new technology design. The new product in theory should produce the necessary productivity results the company has asked for. Since the end user was not involved with the design nor asked what would help make their job more productive. Many times the implementation of a new program has failed. This has cost industry millions of dollars (B. Dochnahl, personal communication, December 1, 2003).

Training, the next area of importance, must consider the needs of both the employee and the company. The target audience must be determined when developing the training. The hurdles come when the training is not appropriate to the job or experience level or needs of the individuals being trained. In house trainers may be utilized but too often management expects these individuals to learn and develop appropriate training in a non realistic time period (Appelbaum & Primmer, 1990).

The personal interview with industry representatives each stressed the lack of training or inappropriate training leads to delays and cost over runs (see Appendix I, J, K and L).

Industry has found hurdles occur when new technology is placed in the organization as a tool and training on the use of that tool is overlooked (see Appendix I, J, K and L).

A detailed project plan is the next area contributing to hurdles found when implementing computer technology. Planning is essential when considering technology changes (Baier & Rescher, 1969). The lack of a well thought out detailed project plan has placed a number of
companies in situations where economic recovery was impossible. The project plan is the system design and necessary instruction sheet that outlines all aspects of what, who, when and how new technological implementation is to take place (Appelbaum & Primmer, 1990). This project plan is the script that ties the other three functions; communications, training and employee buy in together, Larson, Marush and Baumgardner each stress this as the biggest factor leading to hurdles (see Appendix I, J and L.).

What have organizations inside the fire service found as hurdles to implementing new computer technology?

The fire service is not unique and faces the same hurdles as private industry. Communication, training, employee buy in and a project plan are similar issues and hurdles faced in the fire service. Computer technology changes so rapidly and the availability of custom applications is so prevalent that the use of paper and pencil seems desirable. Too often fire departments use multiple programs tied together with custom interfaces, creating problems when changes are needed (Elliott, 1999).

Both the fire service and private industry purchase technology they have found to be less than desirable. Research and homework is necessary to insure fire departments do not purchase something they are not going to use (Streger, 2002, August).

One factor critical to the fire service during emergency operations is that the failure of one particular piece of technology should not create a failure of the overall system. The lack of redundancy and reliability may have serious repercussions (Paquette, 2001, May/June).

(Green, 1989) states that many fire chiefs’ lack the technical expertise associated with new computer technology, finding them inadequate to make the appropriate choices in this area. Many departments rely on Sales reps or information services individuals to make the difficult
choices for their departments. Many departments have found the product does not provide the service promised or the system is too difficult to operate.

Record keeping has always been a challenge for fire departments. Improved technology provides this ability and allows the user to centralize its record keeping. The Pitfalls come when the software does not live up to expectations (Rowan, 1999, January).

Complexity is another hurdle associated with new computer technology. This new technology has allowed the fire service to store information and produce records and reports on just about anything. When this information is needed during emergency operations all too often it is difficult to retrieve in a timely manner and requires specialized training (Truty, 1997, December).

Like in private industry fire departments have found individuals less than enthusiastic to change in their day-to-day operations. Difficulty occurs when implementing a new system and only one or two individuals with in the organization have bought into the new program (Dezelan, 1995).

Standardization is a key component in any organization. The fire service depends on standards from health and safety to operating procedures. Standards must be considered and implemented in the form of training, equipment and configuration when implementing computer technology. The organization must drive technology and not the opposite (Panuccio, Samuel, & Walthall, 1997, December).

Chief Duffy of the Renton Fire department noted that one of the major hurdles during previous attempts to implement new computer technology was that upper management did not understand the price tag associated with implementation of a new system. Funding was a huge hurdle to overcome. Issues between the Information Services Division and the fire department
hindered any chance of a full review process and request for proposal (RFP) for a records management system and new computer technology. Per Chief Duffy this was a cultural and personality issue between the two groups (C. Duffy, personal communications, October 18, 2003).

Julie Bray of the Renton Fire Department noted a difficult obstacle for her to overcome during new computer technology implementation was the lack of consistent training provided to the personnel who were using the previous systems. Miss Bray was assigned as the in house trainer for each new software system placed in operation. Funding was not available allowing her to provide the time and resources necessary to smoothly transition to a new system. In addition to the training issues the software did not do what was promised. Customized interfaces were developed creating complexity and limiting the number of individuals able to access all the information available (J. Bray, personal communications, October, 15, 2003).

**What are successful practices and methods for implementing new computer technology into an organization?**

Chief Tidwell in a personal interview noted a well-defined project plan is crucial to the success of any new technology implemented into an organization. This plan must bring together all aspects of the total program and be accepted by all parties involved (J. Tidwell, personal communications, October 29, 2003).

A successful project plan must be managed and the standards and procedures with in this plan must be flexible. Revisions in system design will create changes and delays. The plan must allow for these changes. The project plan should assign areas of responsibility and provide schedules that are realistic and attainable (Forst, 1992, December).
Projects of this nature and degree of complexity require coordination and most important cooperation between all parties and divisions involved. Success is found when all parties work together for a common goal (Wmain, 2003).

The personal interview with industry representatives each stressed training is a mandatory process of success. Industry has found hurdles occur when new technology is placed in the organization as a tool and training on the use of that tool was overlooked (see Appendix I, J, K and L) These same findings were true for the personal interviews within the fire service (see Appendix F, G, H and L). The use of appropriate applications coupled with training will allow the end user the necessary familiarity to accept the new technology (Coleman, 2002, March).

Employee anxiety can cause resistance to the acceptance of a new system or equipment. Appelbaum and Primmer discuss three distinct areas that are necessary to reduce anxiety among personnel when instituting a new system or program. These areas are system design, training and user support (Appelbaum & Primmer, 1990).

With system design it is necessary to develop simple and easy to use software and hardware products. The individuals utilizing this system should be a part of the design and implementation process.

Training must be conducted with the input of the companies Information services people (IS) and have the full support of upper management. Companies and organizations must realize they will spend as much money training their personnel as they spend on each personal computer.

The third part of this triad is user support. User support utilizes proper manuals, availability of trained specialists and a users group that allow people with in the same learning levels to share information (Appelbaum & Primmer, 1990).
**PROCEDURES**

Definitions

ARP - Applied Research Project

FEMA - Federal Emergency Management Agency

USFA - United States Fire Administration

LRC – Learning Resource Center located at the National Fire Academy Emmitsburg Maryland.

IS- Information services. A division or group within an organization used to oversee, design, repair and training other employees in the use of all software and hardware operations.

IRMS-Information Records Management system

RFP- Request for Proposal

The author used the descriptive form of research to answer three basic questions and develop this paper. A combination of personal interviews, literature review, a survey questionnaire and personal observations provided the documentation necessary to culminate all materials researched and form a recommendation to the Renton Fire Department. The desired outcome of this research is to provide the Renton Fire Department with successful recommendations to implementing new computer technology.

To determine the answers to the research questions required researching materials available through the National Fire Academy’s Learning Resource Center, the King County Library System, trade journals, purchased literature and Internet materials.
Seven personal interviews were conducted during the month of October, November and December. The author chose these individuals to interview due to their position or history within a particular company or organization. The author had personal knowledge of each of these individuals’ accomplishments and assumed each person would have either direct or indirect knowledge of the material being researched.

Three individuals from outside the fire service, three within the fire service and one private consultant with a background both in the public and private sectors were used to provide a basis to answer three distinct questions. These interviews provided historic background information, specific procedures used by industry in addition to lessons learned.

The first two interviews were employees of the Renton Fire Department. These two individuals were chosen by the author due their direct involvement in past attempts by the Renton fire department to implement new computer technology. The author initiating the interviews made personal contact. The first interview was with Battalion Chief Chuck Duffy of the Renton Fire department and the second was with Julie Bray Data Technician for the Renton Fire Department. Appendix F and G provide an outline summary of these interviews.

The third interview was conducted with Donna Marush Director, System Sales North America and Pacific for the ALSTROM EAI Corporation. Mrs. Marush was chosen for her involvement with implementation of computer technology in the private sector. ALSTROM EAI Corporation is a Transmission and Distribution company providing services and solutions for electrical transmission and distribution used around the country (D. Marush, personal communications, October 14, 2003). Appendix I contains the summary outline of this interview.

The fourth interview was conducted with Retired Chief Jim Tidwell of the Forth Worth Texas Fire Department. Chief Tidwell was chosen for his involvement as project director of a 17
million dollar program to implement new computer technology including a computer aided dispatching system into the Fort Worth Fire Department (J. Tidwell, personal communications, October 29, 2003). Appendix I contains the summary outline of this interview.

The fifth interview was conducted with Steve Larson Corporate Account Executive for Microsoft. Personal contact by the author was used to initiate this interview. The author chose Mr. Larson for his involvement in providing project management and software and hardware solutions to major corporations (S. Larson, personal communications, November 25, 2003). Appendix J contains the summary outline of this interview.

The sixth interview conducted was with Bernidine Dochnahl retired Vice President of Human Resources for Puget Sound Energy Corporation. Mrs. Dochnahl was interviewed for her background in providing the training and necessary resources to the employees of PSE during numerous technology upgrades (B. Dochnahl, personal communications, December 1, 2003). Appendix K contains the summary outline of this interview.

The final interview was with Robert Baumgardner a private consultant for Public Safety Consultants Incorporated. Mr. Baumgardner has been and is directly involved with purchase and implementation of new computer systems in both Police and Fire Departments around the country (R. Baumgardner, personal communications, December 16, 2003) Appendix L contains the summary of this interview.

A cover letter (see Appendix D) to include a questionnaire containing 8 questions (see Appendix E) was sent to 94 fire agencies within the State of Washington. This questionnaire was developed to solicit information from Washington State fire departments with regards to their experiences during computer technology implementation. The Washington State Association of Fire Marshals was used to distribute the questionnaire in October 2003. Nineteen agencies
responded by December of 2003. The information from these questions was compiled and listed in (see Appendix M). The Fire Marshals organization was chosen for its representation across the state of Washington. The author assumed this distribution would provide a relevant cross section within a specific regional area.

Additionally personal observations were conducted to provide information on a department level to identify hurdles and successful practices when implementing new computer technology. The author as an observer did this during computer training sessions conducted by City of Renton personnel.

The initial literature review took place at the National Fire Academy’s Learning Resource Center, during the weeks of September 8th and 15th, 2003. Additional literature was sent in October of 2003 via mail to the authors address in Washington State. Per request, this literature was provided by the Learning Resource Center’s reference service. The Internet was also utilized to review materials relevant to the research questions and provide a history and background on the City of Renton and other organizations.

During the months of September, October, November and December the research material was used to answer each of the research questions. Recommendations by the instructors from the Executive Development course were used to document all reference materials used in this review. The purchase of a software program EndNote 7 by Thomson ISI Researchsoft, assisted the author in the proper formatting as required by the Executive Fire Officer Program Operational Policies and Procedures Applied Research Guidelines (Security, 2003).

Limitations

The author noted several limitations with this research. A limitation of a six-month time period is placed on the submittal of all EFO papers. Thus analysis of the topic being researched
is limited. The author chose implementation of computer technology as the basis for the research. A multitude of material is available on this subject and available for research. The author in an attempt to be as complete as possible understanding the limitations, focused on a limited part of the topic.

The author assumed during the personal interviews, all information provided by each individual was truthful and accurate. The author recognizes the limitations of memory in regards to time and detail. The author also recognizes that personal opinions and experiences of the individuals interviewed are being considered.

The author recognizes the limitations in the use of the questionnaire utilized within this research. The author has a limited ability to analyze the data retrieved from the questionnaire. Other variables are possible thus limiting and affecting the research.

**RESULTS**

What have organizations outside the fire service found to be hurdles when implementing new computer technological programs?

The research concluded in organizations outside the fire service a number of hurdles can be found when implementing new computer technology. The author determined four distinct areas associated with this question, communications, training, detailed project plan and buy in of the end user. Each area affects the other thus making one no more important than the other. Like a foundation of a building failure of one weak column will create a catastrophic collapse.
The lack of a detailed project plan creates numerous hurdles when implementing new technology into a company. A detailed project plan is the blueprint and instruction sheet that provides the necessary diagram to insure the vision of the project is carried out (S. Larson, personal communications, November 25, 2003).

Donna Marush of the ALSTROM Corporation (D. Marush, personal communications, October 14, 2003) and Bernadene Dochnahl former Vice President of Human Resources for Puget Sound Energy (B. Dochnahl, personal communications, December 1, 2003) stressed this fact as did Mr. Larson in each of their personal interviews (S. Larson, personal communications, November 25, 2003).

Within this project plan comes the choice of software and hardware used in the project. Hurdles come when these products are complicated and difficult to use (Appelbaum & Primmer, 1990).

Communication is the next area of importance. The author found this area is a common issue associated with many hurdles or obstacles when implementing new computer technology. The lack of communication between groups, divisions or even individuals creates cost over runs and time delays. Thousands of dollars have been wasted due to limited communications or the lack of communications (B. Dochnahl, personal communications, December 1, 2003).

Training is the next area associated with hurdles during implementation. Industry has found the lack of or improper training leads to data entry errors, inaccurate data, and a reduction in productivity. The lack of funding for employee training has also been found to create the same issues (Appelbaum & Primmer, 1990).
One of the issues associated with the east coast cascading power failure and back out of 2003 was caused by procedural and training deficiency (D. Marush, personal communications, October 14, 2003)

Employee buy in or end user buy in is the last critical area associated with hurdles. Each interview reflected this point. Steve Larson of the Microsoft Corporation spoke of the employee fear, uncertainty and doughty. Mr. Larson has found this directly relates to employee buy in. Implementing new computer technology cannot be done in a vacuum. The end user must be part of the equation. When management rolls out a new product without the input and understanding of who must utilize this operation the result is failure. This becomes costly and time consuming. Without proper executive sponsorship and a clear management vision shared with all members of the team, buy in is impossible.

Mr. Larson noted three additional hurdles that are common within industry. Scope creep, over committed and under delivered. Scope creep relates to the detailed project plan. This plan can be flexible but the overall scope must be consistent. When the overall scope of the project continues to grow or is not consistent the goal of the project becomes a moving target.

Corporations will over commit resources or under estimate the resources needed, with expectations of completion dates that are unrealistic. This again results in costly delays and frustrations among employees.

Under delivery is associated with promises that are impossible to meet or expectations that are too high for the end product. Vendors and subcontractors have promised the moon with less than adequate delivery (S. Larson, personal communications, November 1, 2003).
Additional factors associated with hurdles are vendor support and vendor reliability. Both areas must be researched by the purchasing organization prior to purchase and commitment (Layman, 2001, December).

What have organizations inside the fire service found as hurdles to implementing new computer technology?

The research concluded in organizations inside the fire service a number of hurdles can be found when implementing new computer technology. The author determined similar findings as with organizations outside the fire service. The Fire Service has distinct issues associated with, communications, training and buy in of the end user.

Fire departments the same as private industry have found individuals less than enthusiastic to change in their day-to-day operations. Difficulty occurs when implementing a new system and only one or two individuals within the organization have bought into the new program (Dezelan, 1995).

Robert Baumgardner of Public Safety Consultants Inc. states there are a number of issue common to Fire Departments and Government operations. New public safety records management systems are technically complex, organizationally complex, extremely expensive, not done that often, the project manager is either not equipped or overwhelmed and political risks comes into play (Baumgardner, August 27, 1999). Mr. Baumgardner noted communication is essential for employee buy in. Too often the vision of the top leadership is not that of the rank and file. Many times this happens due to a break down of communication in addition to the lack of a detailed project plan (R. Baumgardner, personal communications, December 16, 2003).
Chief Duffy of the Renton Fire Department found that a detailed plan of action, communication, training and buy in by upper management, the Information Services Division of the City of Renton in addition to the end user is critical. Chief Duffy determined failure of previous computer software implementation efforts within the Renton Fire Department was due to a brake down in communications and buy in of both upper management and the Information Services Division of the City. This fact translated into reduced project funding and limited training resources. Chief Duffy noted one addition fact. Both vendors of systems purchased by the fire department did not provide what they had promised (C. Duffy, personal communications, October 18, 2003).

The results from the survey questions 6 and 7 relate to this section. Questions 6 asked did you identify hurdles when implementing the new computer technology? Question 7 asked how did you overcome these hurdles? (see Appendix M)

The results were similar to private industry. Communication, training, planning were again listed. Employee or committee of end users was listed as what was used to overcome hurdles. The two items listed that were prevalent in the survey the interviews and also noted in the literature was the need for a project manager and outside consultant. Both of these were used to overcome hurdles and create successful practices. Sidney W. Frost out lines these factors in a review of his work as the Systems Programmer for the Austin Fire Department Austin Texas (Forst, 1992, December).

What are successful practices and methods for implementing new computer technology into an organization?
Effective communications provides the necessary energy that is so critical for productivity. The communication process includes information sharing. This information must be clear, relevant and produced in a timely manner (Egan, 1988).

The results obtained from the surveys (see Appendix M) produced a number of successful practices used by Fire Department to overcome hurdles. Communication, training, long range planning and stake holder buy in are all listed.

The research concluded procedures and documentation is available to the Fire Service. Standards of practice during project implementation are also available and when used properly will asset in reducing improper purchasing, costly delays and employee dissatisfaction.

The Microsoft Corporation uses and offers to their customers what they call the Microsoft Operations Framework (MOF). This is a proven approach that is both effective and reliable. Details can be found on this process in addition to industry statements of success (Clark, 2000).

The National Fire Academy has seen the need to assist fire service leaders with the implementation of new computer technology. These projects are usually large, expensive and require strategic planning. The two week Executive Planning course offered by the National Fire Academy, will assist in the learning and understanding of the entire process when under taking a project of this nature (Weaver, 1990).

The literature noted when choosing a system, the purchase of off the shelf ready to use software is the proper option. Additionally something that is not going to be used should not be purchased (Streger, 2002, August).
DISCUSSION

Study Results versus Specific Findings

The literature research was able to identify a number of hurdles found when implementing new computer technology both within the fire service and private industry.

The use of a detailed project plan is essential in both industries. Technology changes at such a rapid pace that inadvertent and none expected results may occur, causing difficult situations that could have been dealt with if planning had taken place (Baier & Rescher, 1969). Without the use of a detailed project plan, information is not available to the employees who need it. This fact also relates to proper communication (Egan, 1988).

Without the use of a project plan companies implementing new technology develop scope of project creep. The project continues to grow causing both the management and employees grief (S. Larson, personal communications, November 25, 2003). The Renton Fire Department found this to be evident (C. Duffy, personal communications, October 18, 2003). Chief Duffy noted that the Director of Information Services would not allow the Fire Department funding or guidance to implement new computer technology due to the lack of a detailed project plan to include strategies for the future.

The author found that both private industry and the Fire service leadership are required the necessary due diligence of a detailed project plan. This fact was common in the literature, survey and interview results.

Employee buy in was the next factor associated with hurdles found in both the Fire Service and private industry. The research concluded too often the employee has no idea what the vision of the project is nor have they been involved in the planning process. The system is
designed without the input of the end user. A disconnect is formed creating errors not only in the
design but in the end product (Forst, 1992, December).

Julie Bray of the Renton Fire Department noted that employee buy in was not evident in
previous attempts to implement new computer technology into the Renton Fire Department. The
lack of shared information and understanding with the rank and file created difficulties with
employee performance and data entry (J. Bray, personal communications, October 14, 2003).

Fear and uncertainty when dealing with change affect employees universally. The
research found no difference between private industry and the fire service. Employers have
found individuals less than eager to change the way they have done things over the years
(Dezelan, 1995).

Steve Larson of the Microsoft Corporation determined issues relating to employee buy in
are created by: 1. The project being developed in a vacuum. 2. No vision by upper
management. 3. Management did not do their homework (S. Larson, personal communications,
October 25, 2003).

The author determined from both the study results and specific finding that
communication or lack of communications create most hurdles associated with implementing
new computer technology.

The fire service survey, personal interviews in addition to the literature all support these
findings. Fire Departments find providing communication and information to firefighters on a
24-hour shift schedule difficult (Rowan, 1999, January).

Chief Tidwell of the Fort Worth Fire Department noted a lack of communication between
the cities information services staff and the project manager, created a system failure during a
peek activity period (J. Tidwell, personal communications, October 29, 2003).
Mr. Larson of the Microsoft Corporation, Mrs. Marush of ALSTROM and Mrs.
Dochnahl of Puget Sound Energy all stress the lack of proper communications have created
issues in their perspective industries during technology implementation (see Appendix I, J, and
K).

Chief Duffy noted communications issues attributed to the failure of one previous
software implementation. The flow of information between the individual assigned to the project
and upper management was severed due to personality issues. This lack of communication
allowed the purchase of an inadequate product. The software was used for a one-month period
and later replaced (C. Duffy, personal communications, October 18, 2003).

The lack of or inadequate training is the forth factor associated with hurdles in both the
fire service and private industry. The fire service surveys (see Appendix M) noted training as a
factor in the results for question 7. How did you overcome these hurdles? And question 8. What
successful practices and methods did you use to implement the new technology?

Increases in error rates and inaccurate data entry can be associated to a lack of system
understanding. This directly relates to training issues (Brod, 1982). Training and education must
be accomplished and supported by upper management (Appelbaum & Primmer, 1990).

The Renton Fire department realized the critical need for training when members of the
fire suppression division relayed information to Chief Duffy. Although the individual providing
software system training to the suppression staff was technically proficient with the product, this
person did not posses the necessary skills required of an instructor (C. Duffy, Personal
communications, October 18, 2003).
Successful practices

The research and findings were very similar, providing a number of successful practices used in both private industry and the fire service when implementing new computer technology.

There are eight steps used to develop and implement a proper system. Design, development, testing, training, implementation, documentation followed by feedback/review and finally maintenance (Truty, 1997, December). The study vs. finding provides little differences with the exception of the order individuals prioritize and communicate these eight items.

The author noted that sixteen out of the 19 Fire Departments responding to the survey found that new computer technology was very important to the fire service. Three departments found computer technology only somewhat important. Seventeen Departments had implemented new computer technology in the last four years. Thirteen out of the seventeen departments implementing new technology note hurdles during implementation. Three departments had no trouble and three departments did not respond to that question (see Appendix M).

The author noted in addition to the four important areas when implementing a new computer technology project, (project plan, communications, training and employee buy in). There were a number of notations in the Fire Department surveys adding the use of a private consultant and project manager (see Appendix M) this was noted in the questions, what was done to overcome hurdles and what were successful practices used when implementing new computer technology.

The personal interviews with private industry noted the use of a project manager was very important. The private industry interviews did not make any statement as to the use of a private consultant (see Appendix I, J, K).
One additional factor was noted by the author, when life safety is involved it is critical the new system provide for the necessary redundancy in the event of a failure. One point of failure should not disable the entire system (Paquette, 2001, May/June).

The Renton Fire Department in the past has relied on its internal resources when implementing new computer technology. Funding has been limited with less than a detailed project plan. Past training has utilized one individual limited in the necessary skills required for such a task. Communications and buy-in from both the Administration and the employee group was limited (C. Duffy, personal communications, October 18, 2003).

The Renton Fire Department will be implementing a new computerized integrated records management system in late 2003, early 2004. In past years similar attempts have failed, which resulted in loss of data, time and fiscal resources critical to maintain an effective organization. The study clearly recognizes standards of practice that should be followed when implementing new computer technology.

The literature, surveys and personal interviews with the Fire Service (see Appendix F, G, H, L and M) note a private consultant versed in the industry is an important resource. The use of a detailed project plan is a necessity (R. Baumgardner, personal communications, December 16, 2003). Employee buy-in and feedback is essential. Organizations must insure there is a proper flow of information both up and down the chain of command (Weaver, 1990). Chief Tidwell of the Fort Worth Fire Department stress in his interview proper training is crucial to the success of any project (J. Tidwell, personal communications, October 29, 2003).

Chief Ernie Mitchell wrote in the President’s Column of the International Association of Fire Chiefs newsletter (Mitchell, 2003). The fire service needs to be smarter when fighting fires. Chief Mitchell notes the use of technology is one way this can be done. Local data must be
analyzed and submitted on a national level for comparison by all departments across the country. This will allow us to identify problems and determine the appropriate solutions.

**RECOMMENDATIONS**

1. The Renton Fire Department must adequately evaluate the overall needs of the department when considering new computer technology.

2. The Renton Fire Department with the help of an industry consultant develops and adheres to a detail project plan. This plan should include the assignment of a project manager and strategies for future technology changes. The use of a project team made up of support staff and end users should be included.

3. The Renton Fire Department should develop and implement a communication process that provides for feedback from upper management and the end user.

4. The Renton Fire department should develop a training program that meets the needs of its personnel and is fully funded.

5. The Renton Fire Department should consider sending individuals to the National Fire Academy’s Executive Planning course.

6. National Fire Service Groups such as The International Association of Fire Chiefs should work to assist their members with the necessary educational tools, to plan for the rapidly changing environment of computer technology.
REFERENCES


APPENDIX A

City of Renton

City Council

Boards & Commissions

City Council Liaison
Julia Medzegian

Chief Administrative Officer
Jay Covington

Mayor
Jesse Tanner

Fire Department
A. Lee Wheeler

Planning/Building/Public Works
Gregg Zimmerman

Human Resources & Risk Mgt.
Michael Webby

Finance & Information Services
Victoria Runkle

Police Department
Garry Anderson

Community Services Department
Dennis Culp

Economic Development, Neighborhoods & Strategic Planning
Alexander Pietsch

Administrative, Judicial & Legal Services Department
October 15, 2003

Dear Fire Service Representative:

I am currently enrolled in the National Fire Academy’s Executive Fire Officer Program. A requirement of the program is the completion of a research paper. I have decided to research the implementation of new technology and hurdles associated with this process. In order to complete this paper, I am surveying as many departments as possible. Please take a few moments and complete the attached survey. I appreciate any assistance you can provide for this project.

The completed survey can be faxed to me at the above number or e-mailed to: lrude@ci.renton.wa.us. The results of the survey will be available by March 2004. If you are interested in the results, please let me know and I will forward them to you. Thank you again for your assistance.

Sincerely,

Lawrence A. Rude

Lawrence A. Rude
Battalion Chief/Fire Marshal
APPENDIX E

RENTON FIRE DEPARTMENT

1055 S GRADY WAY

RENTON, WA. 98027

(425) 430-7000

FAX (425) 430-7044

The purpose of this survey is to determine what have fire service organizations determined as hurdles to implementing new computer technology. In addition what are successful practices and methods for implementing new computer technology into an organization.

Please take a moment and complete the following survey. When completed, please return the survey by fax or by e-mail to lrude@ci.renton.wa.us. Your cooperation in this effort is greatly appreciated.

1. Name of Department:

2. Number of members on the Department:
3. Type of Department: □ Career □ Volunteer □ Combination

4. How important is new computer technology in the fire Service?
   □ Very Important □ Somewhat Important □ Neutral □ Somewhat Not Important □ Not Important

5. Has your department implemented new computer technology in the last four (4) years?
   □ Yes □ No

6. If yes, did you identify hurdles when implementing the new computer technology?
   □ Yes □ No

7. How did you overcome these hurdles?

8. What successful practices and methods did you use to implement the new technology?

Thank you for taking the time to complete this survey. Survey results will be made available after March 2004. Requests should be sent to lrude@ci.renton.wa.us.
APPENDIX F

Interview summary - Chief Chuck Duffy

Summary of Battalion Chief Chuck Duffy Interview
Date October 18, 2003
Location Renton City Hall 6th floor Fire Conference Room

How long have you been employed with the Renton Fire Department?
22 years.

What is your rank and position with the Renton Fire Department?
Battalion Chief in charge of B shift.

What position did you hold with the department and what were you responsibilities?
Lieutenant in charge of a suppression crew.
Captain in charge of Training.
Battalion Chief in charge of the Fire Prevention Bureau.
Acting Deputy Chief in charge of Prevention and Training.

Has the Renton Fire Department implemented new computer technology in the past?
Yes a number of times.

Was the implementation successful?
Parts of it yes but most of the time no.

What did you find to be hurdles when implementing the new computer technology?
Upper management did not understand the new technology
Lack of funding due to the overall cost of the system.
Both upper management and the suppression staff did not see a need.
A homegrown system was limited but in place.
Two past vendors did not produce what had been promised.
One system was not capable and failed within a month.
Communications with rank and file limited.
Personality issues and communication issues with the Director of IS.
Cultural issues with the department.
No strategic plan for the future.
Not enough resources to research the needs of the department.
No funding for training personnel.
Limited ability of the individuals assigned to train the staff.
The communication with upper management was cut off.

What were the results of the implementation attempts?
Loss of time.
Loss of data.
Loss of fiscal resources.
Employee dissatisfaction and frustration.
What did you find to be successful practices when implementing the new computer technology?
The knowledge and assistance other fire departments provided. One member of a neighboring fire department provided us with a custom access program that allowed us to retrieve the needed statistical data.

What would you consider to be necessary when implementing new computer technology?
A detailed project plan and a strategic plan.
Information sharing and communications within the department.
The support of upper management and the Information Services Director.
Funding to include the necessary cost of training, resources and maintenance.
An understanding or buy in of all department personnel.
APPENDIX G

Interview summery - Julie Bray

Summary of Julie Bray Interview
Date October 14, 2003
Location Renton City Hall Fire Conference Room

How long have you been employed with the Renton Fire Department?
22 years

What is your position and responsibilities with the Renton Fire Department?
Data Technician assigned to data entry of incident and EMS reports, assist with computer equipment and data systems for the department.

Has your department ever implement new computer technology?
Yes, many times.

Was the implementation successful?
Twice it was not successful.
The only time it was successful was when it was very simple and small.

What did you find to be hurdles when implementing the new computer technology?
One person decided what to buy without talking with the people who needed to use it.
No time for training.
No direction from upper management.
No plan.
Personalities.
No communication with the people needing to support the operation.
No money or overtime.

What were the results of the implementation attempts?
Upset people.
Lost information and data.
Wasted money and time.

What did you find to be successful practices when implementing the new computer technology?
Keep it simple.
Talk with the people that are going to use it.
Have the necessary money needed to do it right.
Upper management needs to understand what is needed.
Provide the necessary time to do the job right.
Proper training and sharing information is important.
What would you consider to be necessary when implementing new computer technology?
  Have a plan.
  Find out what is really needed.
  Fund the project.
  Talk to everyone on a regular basis.
  Give the people the necessary training.
Summary of Chief Jim Tidwell Interview
Date October 29, 2003
Location Sun Mountain Lodge Winthrop, Washington

What was your position and responsibilities with the Fort Worth Fire Department?
Deputy Chief and Acting Chief of the department. Now retired.
Beside duties of the Deputy Chief I was the project manager for the upgrade of our
Computer Aided Dispatch system and new records management system. A 17 million
dollar project.

Has your department ever implement new computer technology?
Yes many times.

Was the implementation successful?
Some of it was and some of it was not.

What did you find to be hurdles to implementing new computer technology?
The computer people did not speak the same language.
Understanding of what is needed and what is just nice to have.
People not wanting to change.
The technology changes faster than what one would expect.
Promises from the vendors that did not materialize and lack of sales support.
Communication with all departments and divisions associated with the project.
Training of the individuals and staff personnel needed to train the end user.

What did you find to be successful practices when implementing the new computer technology?
The overall vision by the leadership of both the department and the City.
The total funding required not only of the project but the necessary training or personnel.
Having a detailed plan of action.

What would you consider to be necessary when implementing new computer technology?
Bring all individual associated with a large project together. Insure each is on the same
page and moving in the same direction.
Have a competent project manager and team with a well-defined project plan.
Have a vision and overall plan of action.
Insure the city leadership down to lowest member of the fire department buys into what is
to be accomplished.
Provide the necessary funding.
Listen to the end user.
Do not over commit. Implementing too much too fast will overwhelm you personnel. Provide the necessary training to all personnel. Insure the vendors will be used are reputable and will provide what is promised.
APPENDIX I

Interview summary - Donna Marush

Summary of Donna Marush Interview
Date October 14, 2003
Location Pigata Restaurant Bellevue, Washington

What is your position and responsibilities with the ALSTROM EAI Corporation?
Director of system sales of North America and Pacific.
Responsible for customer sales, support and implementation.

Could you provide information about your company?
French owned company with offices around the world.
The company builds energy management system, energy production systems,
transmission and distribution system and ocean liners.
Sales and operations of system through out the United States.

Has your department ever implement new computer technology?
Many time in many countries for many customers.

Was the implementation successful?
Yes. We have had failures.

What did you find to be hurdles to implementing new computer technology?
The end user not being involved in the product design.
The benefit to the company not defined.
Limited training.
Implementation time lines to aggressive.
Limited communication within the company.
Standard operating procedures not changed to meet the needs of the new technology.
(The lack of changes in procedures is what I consider to be one of the causes associated
with the 2003 east coast blackout)
Project plan continues to grow.

What did you find to be successful practices when implementing the new computer technology?
A well-defined project plan designed around a 5-year vision.
Goals and objectives are put in place to include the vision of top management.
The necessary research completed to insure what is implemented is what is needed. This
must include a tangible needs benefit study to include cost of sales and overhead.
A project team to include the proper target groups utilizing the systems.
Detailed performance measures must be met before company wide implementation.
Empowerment of your personnel they are an important factor to your success.
Defined roles of all involved in the process.
Provide the necessary training to the end user.
Insure communication is timely, accurate and abundant. This help user buy in.

What would you consider to be necessary when implementing new computer technology?
A strategy and vision of management.
A project plan
A project team made up of designers, management and end users. We call this a tag team.
Insure there is a communication process between all parties involved. When communication fails or brakes down so does the project.
Provide the time and funding for training of personnel.
Insure the end user is willing to use the new system. Employee must believe in and agree with the changes.
Provide for delays and additional costs.
Obstacles to Implementation 50

APPENDIX J

Interview summary - Steve Larson

Summary of Steve Larson Interview
Date November 25, 2003
Location Restaurant Renton, Washington

What is your position and responsibilities with the Microsoft Corporation?
Corporate Account Executive responsible for the design and implementation of computer production and management systems for large corporation.

Has your Company ever implement new computer technology?
This is our main focus.

Was the implementation successful?
Yes. If it is not successful we don’t get paid.

What do you find to be hurdles to implementing new computer technology?
Fear, uncertainty and doughty of the personnel.
The system is too customized.
Over commitment and under delivered.
The company did not do the necessary Due diligence.
The project is done in a vacuum.
The IT manager did not do their homework.
No company vision.
No buy in of the employee
No communication.
After roll out the company is still operating the old system.
Lack of executive sponsorship.

What did you find to be successful practices when implementing the new computer technology?
The company had a vision and a project plan.
The system was well defined.
The company accounted for the possibility of delays and provided a flexible schedule.
Training was available for all involved.
The project manager provided communication both inside and outside the company.

What would you consider to be necessary when implementing new computer technology?
Develop a strategy and get the employees involved. Have a good plan of action.
Clear roles and responsibilities.
Proper Executive linkage high up in the company. Upper management must have a clear lens into the nuts and bolts of the system.
The account manager must know the business fully.
Communication, Communication, Communication.
The criteria for success must be know by all.
The companies IT department must be involved.  
Flow chart the operations and prep for the conversion.  
Brainstorm what could go wrong and plan for it.  
Provide a means for feedback, morning after meetings.  
Sustained engineering, keep it running.
APPENDIX K

Interview summary – Bernadene Dochnahl

Summary of Bernadene Dochnol Interview
Date December 1, 2003
Location Coffee shop Renton, Washington

What was your position and responsibilities with the Puget Sound Energy Corporation?
Vice President of Human Resources responsible for company risk management.
I am currently on the Board of Directors for Mutual of Enumclaw, Washington Cities High Risk Pool and a number of other corporations and foundations.

How long were you with Puget Sound Energy?
From 1977-1989

Did your Company ever implement new computer technology?
Yes.

Was the implementation successful?
Not always. We had a Customer information system failure that cost the company ten million dollars.

What did you find to be hurdles to implementing new computer technology?
- Inadequate project plan.
- Fear that people would lose their jobs. Employee resistance to change.
- Change management techniques were not used.
- Upper management focused on the past rather than the future.
- The end users were not involved in the design process.
- Implementing with too many techies and not enough operational people.
- The project is too big and promises too much.
- Computerize manual transactions rather than create a preferred future with technology.
- Improper planning for the maintenance of a technology change.
- Inadequate documentation.
- Inadequately prepare and budget for long term maintenance of the system.
- Inadequate communications.

What did you find to be successful practices when implementing the new computer technology?
The use of a development team to include operations people.
The use of a project plan that accounts for milestones.
The use of incentives for the team. Monetary bonuses.
What would you consider to be necessary when implementing new computer technology?
Create a development team to include operations people.
All technology changes should be mission driven.
Define the basis for success and then provide for it.
Proper project plan.
Direct communication to everyone involved.
Buy a package and minimize customization.
Implement in modules if possible.
All organizations should periodically do a value analysis on the function and work with in the company.
Train personnel before the change is implemented.
Summary of Robert Baumgardner Interview
Date December 16, 2003
Location Renton City Hall Fire Department conference room

What is your position and responsibilities with Public Safety Consultants Inc.?
I am a senior consultant, responsible for information technology consulting for government.

How long have you been with this Company?
6 years.

Has your department ever implement new computer technology?
Yes. We provide this service for our clients.

Was the implementation successful?
Yes. When the customer follows a plan of action, the end result is successful. There are always issues associated with implementing computer technology. These issues can be minimized if you are careful.

What did you find to be hurdles to implementing new computer technology?
Lack of management commitment.
Lack of a clear vision at the start.
Lack of trust on both the management side and the employee side.
Lack of communications.
Mismatched expectations.
Ineffective project management.
Rigidity of participants.
Lack of change management.
Inadequate staffing.

What did you find to be successful practices when implementing the new computer technology?
When the top leadership works together with the end user.
When there is a clear plan of action.
When the IT department works with and not against the department implementing the new system.
When there is a free flow of information and communication up and down the organization.
When the end users are well trained before the system is implemented.
What would you consider to be necessary when implementing new computer technology?
   Focus on the customer; evaluate the costs.
   Insure collaboration, share information with all parties involved. Insure everyone agrees not just upper management.
   Think of the big picture, think enterprise wide, think globally.
   Focus on opportunities for the operation not just locally.
   Provide for and listen to the necessary feedback.
   Provide the training and resources needed to insure success.
APPENDIX M
Survey Questionnaire Data

Data determined by survey question.

1. & 3. Fire Departments Responding to Survey

<table>
<thead>
<tr>
<th>Total Number of Fire Departments Responding to Survey</th>
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<tr>
<td>Career Departments</td>
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<td>Volunteer Departments</td>
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<td>Combination Departments</td>
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4. Importance of New Computer Technology

<table>
<thead>
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<tr>
<td>Very Important</td>
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<td>Neutral</td>
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5. Departments implementing new computer technology

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<tr>
<td>Yes</td>
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6. Departments finding hurdles when implementing new computer technology

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<th>Finding Hurdles When Implementing New Technology</th>
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<tr>
<td>Yes</td>
<td>13</td>
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<td>No</td>
<td>3</td>
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</table>
7. Was done to overcome hurdles?

<table>
<thead>
<tr>
<th>Training for all personnel</th>
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</thead>
<tbody>
<tr>
<td>Fire Officer Project Manager</td>
</tr>
<tr>
<td>Flexibility of procedures</td>
</tr>
<tr>
<td>Use of a private consultant</td>
</tr>
<tr>
<td>Clear communication</td>
</tr>
<tr>
<td>Good technicians</td>
</tr>
<tr>
<td>Committee of end users</td>
</tr>
<tr>
<td>Hired a project manager</td>
</tr>
<tr>
<td>Work with Cities Information Services Division</td>
</tr>
<tr>
<td>Education of Public Officials</td>
</tr>
<tr>
<td>Work with other Fire Departments</td>
</tr>
<tr>
<td>Reasonable implementation time frame</td>
</tr>
<tr>
<td>Phased implementation</td>
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<tr>
<td>Shared funding needs with other division within our jurisdiction</td>
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8. Successful practices and methods used to implement new technology

<table>
<thead>
<tr>
<th>Stakeholder meetings</th>
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</thead>
<tbody>
<tr>
<td>Good project manager</td>
</tr>
<tr>
<td>Detailed RFP (request for proposal) with interviews</td>
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<tr>
<td>Training</td>
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<tr>
<td>Proper funding</td>
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<td>Long Range planning</td>
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<tr>
<td>Obstacles to Implementation</td>
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<tr>
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<tr>
<td>Develop a relationship with local Information services division</td>
</tr>
<tr>
<td>Manage Employee expectations</td>
</tr>
<tr>
<td>Follow up</td>
</tr>
<tr>
<td>Refresher Training</td>
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<td>Hired a technician to assist with implementation</td>
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<td>Communication and regular meetings</td>
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<td>Detailed procedures</td>
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<td>Quality assurance program with follow up</td>
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