5.2.1 Problem Resolution Process

Figure 5-1 shows one of the critical support processes that currently exist is the problem resolution process. This process is utilized when a system issue arises. HEC's Problem Resolution Process, as shown in Figure 5-1, provides the correct steps in collecting the problem, sending the problem to the correct people for authorization and resolution and requesting resolution confirmation from the problem originator. However, in a couple of outages, the problem was not correctly identified or resolved; thus, the problem occurred again and caused an additional outage. Assuming this process is consistently followed, there may be difficulties in reproducing the problem which make it difficult to know if the problem has or has not been correctly resolved. HEC also has a method of documenting problems for their systems in a SIRT List and a Change Order List. These lists provide the following information: applicable agency that submitted the problem, the agency priority of the problem, description of the problem, estimated completion date, and status. The lists provide an excellent summary for tracking problems and a similar tracking capability should be implemented city-wide for all of the public safety system problems identified. This list could also support the risk management process by providing input on the major issues that need to be resolved and identified.

Additionally, the problem process resolution appears to be followed by all stakeholders when system outages and system performance degradations are experienced. The breakdown occurs when non-critical system issues and problems are identified, especially for issues with functionality of the system. There is currently no clear, documented escalation process for functionality issues. The escalation procedures for non-critical system issues, as well as the communication feedback on resolutions or decisions to end-users raises such functionality issues.

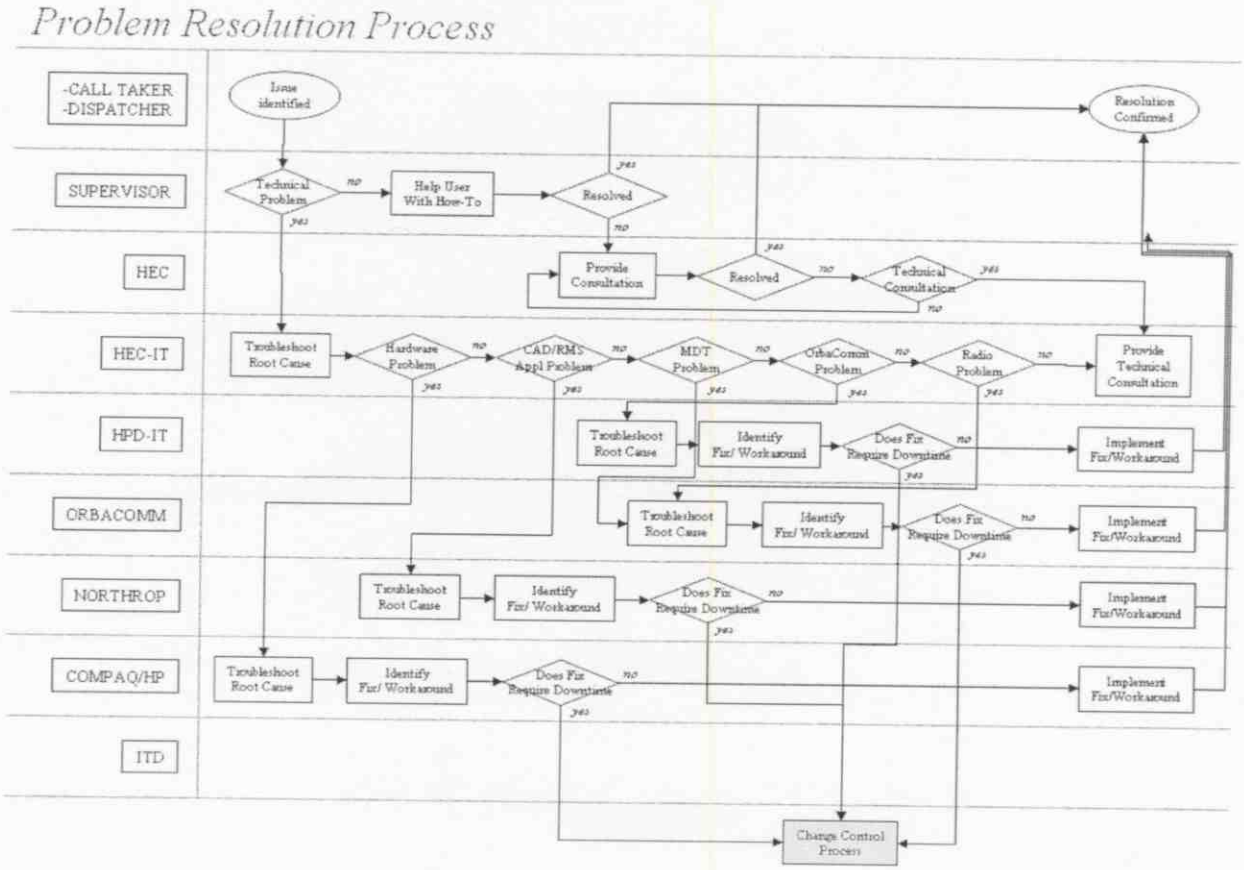

Figure 5-1. Problem Resolution Process

5.2.2 System Enhancement Process

The system enhancement process shown in Figure 5-2 is used to address issues that have been identified as changes to the original or existing system functionality or architecture that the City of Houston accepted as part of the acceptance sign-off between Northrop Grumman and the City of Houston.

All system changes are considered enhancements and therefore must undergo a process of review to determine the following: whether the change is needed, impacts of the changes to the existing functionality and architecture, prioritization of requested enhancements/changes, funding for the enhancements/ changes, and the expected turnaround for the vendor to deliver agreed/accepted enhancements.

The HEC System Enhancement Process, is a good process. The diagram shows that the proper steps, correct people, and validation are included. However, the actual turnaround time from when the enhancements are approved by HEC and the time it takes for the vendor to deliver the

agreed to enhancements is not in alignment with customer expectations and appears not to be in accordance with mutually agreed to timelines established at the beginning of this process.

MITRE recommends that HEC and Northrop Grumman establish an enhancement/release task team to clear out the backlog of changes and enhancements in existence for quite some time now. These changes/enhancements have been reviewed, designed, approved, and scheduled for development but no enhancement deliverables have been provided.

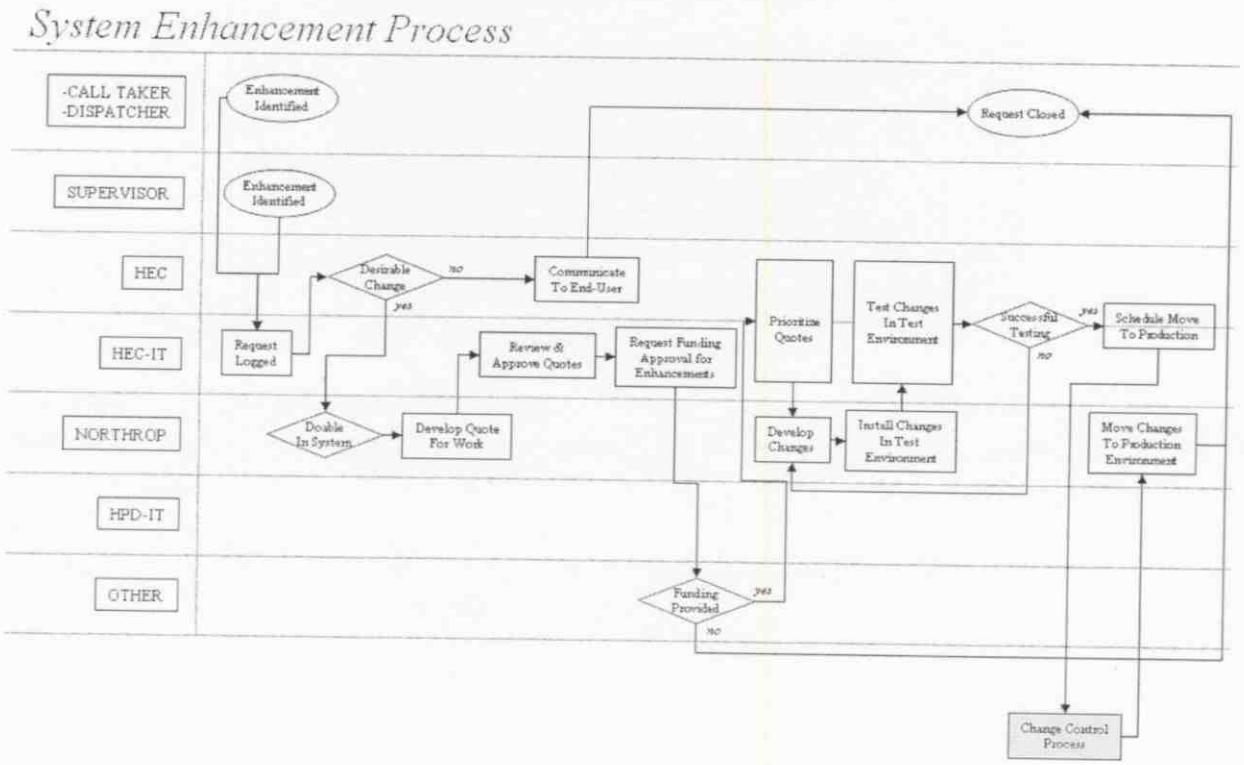

Figure 5-2. System Enhancement Process

5.2.3 Change Control Process

Figure 5-3 illustrates the existing Change Control process in place at HEC for changes. The source of changes can either be enhancements or problems/issues that are affecting the system performance.

The HEC Change Control Process is not complete. It does not provide details on the following:

- Approval process
- Review board
- Organization roles
- Tracking of changes
- Configuration control

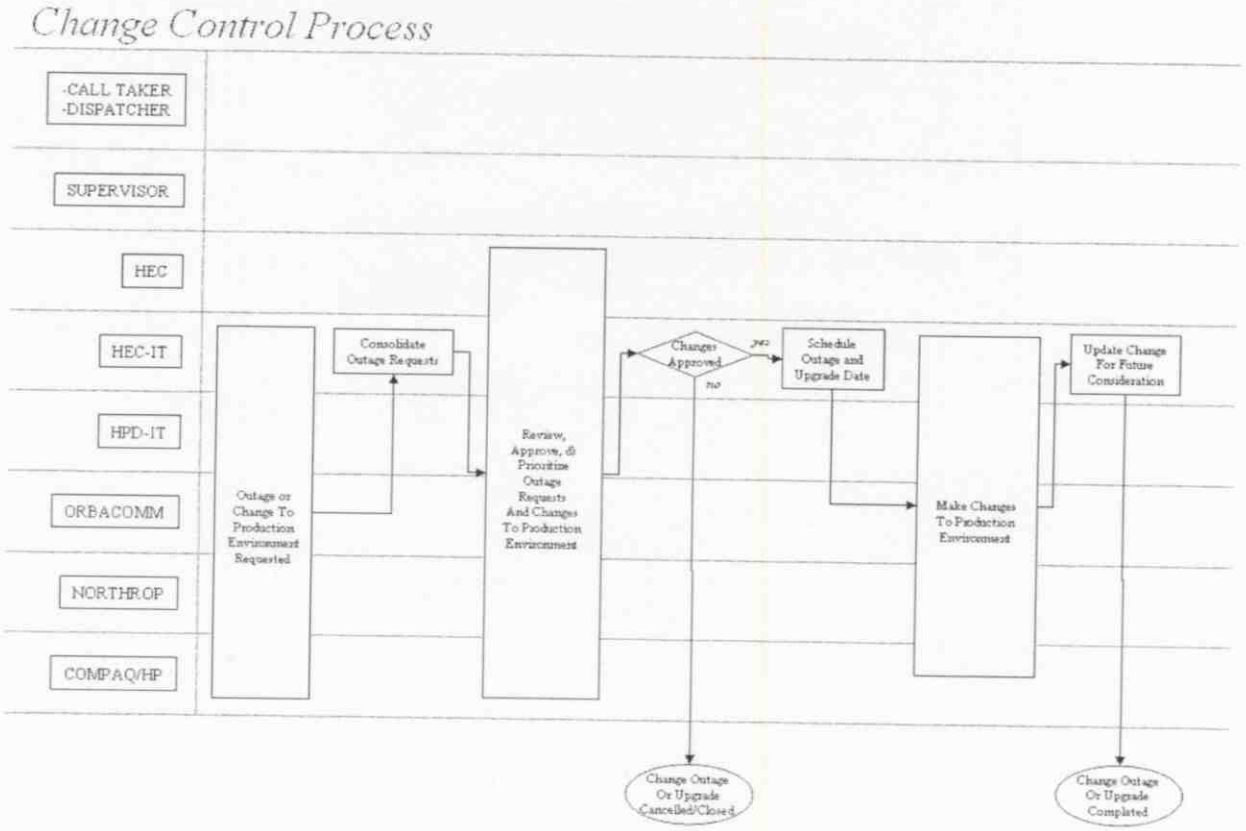

Figure 5-3. Change Control Process

While the change control process is understood by all IT support stakeholders, no evidence of documented procedures and change control communications were identified. The lack of documentation makes it difficult to conduct after action reviews (AARs) on executed changes. Furthermore, documentation on successfully testing as well as back-up procedures for proposed

changes was also not found increasing the risk of prolonging change outages in case of unsuccessful changes, as well as mitigating risks of proposed changes.

5.2.4 Recommended Engineering Processes

The MITRE analysis of the existing and recommended processes evaluated several engineering processes. The team recognized the benefit of each of the processes but realized it would be unrealistic to implement all of them at this time. The critical processes that are lacking and are recommended include risk management and configuration management. An effective risk management process focuses on the risks with the highest probability of occurring and greatest impact if they do occur. For example, the single point of failure and high priority SIRTs may be risks identified by the City of Houston. This process will help the City of Houston become more proactive rather than reactionary. To be effective, the risk identification must be solicited from all departments, contractors, and the Greater Harris County 9-1-1 Emergency Network and it must be visible to all team members so that risks are seen from all points of view. To avoid an unwieldy number of risks from being tracked, the risk identifier simply "proposes" risks. A risk review board, with representatives from HFD, HPD, HEC and ITD should be used to review a proposed risk and then either accepts or rejects the risk. After risk identification, the risk should be assessed for their impact on cost, schedule, technical performance or other impacts such as regulatory, security, or political. The risks should then be prioritized based on their probability of occurring and the consequences if the risk were to occur. The risk review board, senior leadership and budget authorizers decide which risks should be given resources for mitigation.

Next, risk managers should be assigned for the risks given resources. Risk managers should develop mitigation plans, determine how they will know if a mitigation is successful and develop contingency plans in the event a risk mitigation is not successful. They then track the status of the mitigate on plan and close the risk when appropriate. This risk management process results in the avoidance or minimization of the impact of consequences of risks with the smallest expenditure of funds.

The MITRE team also recommends that the City of Houston implement a city-wide configuration management process. The "Little Book of Configuration Management," November 1998 from the Software Program Managers Network provides an ideal framework for creating a configuration management process.

As defined in the above source, configuration management is the basic project control mechanism that establishes and maintains the integrity of products through the project's life cycle. Configuration Management will support the City of Houston by providing:

- Configuration Identification -- The ability to identify what information has been approved for concurrent use in the project, who owns the information, how the information was approved for CM control, and the latest approved release.
- Configuration Control -- The configuration control process and procedures designating the level of control through which each work product must pass (for

example, author control, project-level control, acquirer control); identifying the persons or groups with authority to authorize changes and to make changes at each level (for example, the programmer/analyst, the software lead, the project manager, the acquirer); and the steps to be followed to obtain required authorization for changes, to process change requests, to track changes, to distribute changes, and to maintain past versions. Change control provides the mechanism to build software systems for tests that have a known configuration and can be exactly reproduced.

- Status Accounting -- Formalized recording and reporting of the established configuration documents, the status of proposed changes, and the status of the implementation of approved changes. Status record information provides an accessible and current record of the status of each controlled piece of information that is planned to be used, the content of each release from CM, and who has checked out or is working on a piece of information that the test organization plans on accessing through CM.
- Reviews and Audits -- Frequent evaluation of the content, baseline integrity, and release integrity of all controlled products to ensure they conform to their configuration documents.

5.3 Training

The MITRE analysis included a review of training documents and interviews with the staff to gain an understanding of the past and current training. Two types of training were identified as important to preparing staff to operate and sustain the system. The first is operator or user training for the CAD system and the other components used in the performance of call taking or dispatching. The second is the training of the HEC and support staff to support the monitoring, maintenance, management, and utilization of the system.

The two methods use different models for the training relationship. The user training side of the HEC is performed by training staff that is part of HEC (call taking) or assigned to HEC duties (dispatching). The relationship between HEC staff and system providers in this area is a "train-the-trainers" model. The training from Northrop Grumman and third-party training providers to the HEC IT and support staff uses a direct training model, as it assumes that the trainees will be doing the work themselves.

The assessment focused on identifying future training issues for the CAD user community and support staff at the HEC. As such, it identified the steps that can be taken to ensure that the training needs of the CAD system users will be met as the system evolves and changes. In turn, this will include recommendations that will address processes used in managing changes in the CAD system.

5.3.1 IT/Support Staff Training

Initial requirements for training of the support staff are detailed in the Scope of Services Section E, Training Plan, June 13, 2001. The discussions with Northrop Grumman personnel and HEC