



PARSONS

PP-03

MILLSTONE UNIT 2 ICAVP
PROJECT PROCEDURES

Title:

Process Modeling, Analysis and Review

REVISION 0

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Date: 4/3/97

REVISION HISTORY

REVISION	DATE	REVISION DESCRIPTION
0	04/03/97	Procedure Initiation



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1.0 PURPOSE

The process review will provide a basis for a independent determination of whether Millstone Unit 2 processes and procedures have been established for effective configuration management on a going-forward basis.

The review will verify the adequacy, with regard to past change processes, of the results of the programs currently being implemented by Northeast Energy Company (NNECo) which are directed at identifying and resolving existing design and configuration management deficiencies.

2.0 DEFINITIONS

Design Bases (DB):

That information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted state-of-the-art practices for achieving functional goals or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals.¹

Licensing Basis (LB):

The licensing basis for Millstone Unit 2 consists of that set of information upon which the Commission, in issuing an initial operating license, based its comprehensive determination that the design, construction, and proposed operation of the facility satisfied the Commission's requirements and provided reasonable assurance of adequate protection to public health and safety and common defense and security.²

Current Licensing Basis (CLB):

The set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life

¹ 10 CFR50.2

² Source: NRC Letter of October 9, 1996 On Maintaining Plant Design



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of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73, 100 and appendices thereto; orders, license conditions; exemptions; and technical specifications. It also includes the plant specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensing correspondence such as licensee responses to NRC Bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.³

Engineering Design Bases (EDB):

The set of design constraints that are not included in the Licensing Basis but are implemented to achieve certain economies of operation, maintenance, procurement, installation, or construction. Such as:

- Information which describes a system, structure, or component
- Operating values or parameters which are not reference bounds for design
- Information which identifies functions important for economic, maintenance, installation, or other non-safety function of design basis systems, structures, or components
- Information and operating values describing the functions of non-safety systems
- Calculations, descriptions, and other "outputs"

3.0 PREREQUISITES

1. Process modeling PC network and software installed and tested.

4.0 PROCEDURE

Overview:

To make a determination of the adequacy of NNECo's Millstone Unit 2 processes and procedures, the review includes an assessment of the current processes used to change the facility design or change the characteristics, procedures, or practices for maintaining, operating, testing, and training

³ 10 CFR 54.3 (a)



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on safety or risk significant systems, structures, and components. Process modeling will be employed to provide a visual representation of the various change processes, and capture descriptive information about the processes. The model will be used as a tool for identifying any potential weakness, or areas least tolerant of error and for choosing examples from the various processes for a review of past changes.

To verify the adequacy of the recent program results of identifying and resolving deficiencies due to past change process, examples of past changes are to be reviewed. This is a technical review to determine if, (1) the changes to the plant conditions meet the current design and licensing basis documentation, (2) the design and plant information contained in multiple locations/databases are synchronous, (3) the design and licensing basis requirements have been translated into operating, maintenance, and testing procedures, and (4) the performance of modified systems/components has been verified through testing.

Global Process Controls:

- Communications with NNECo and the NRC are controlled through the Millstone Unit 2 ICAVP Communication Plan.
- Project administration items are controlled through the Millstone Unit 2 ICAVP Project Administration Manual, (PAM)
- Team members are to document records reviewed, identifying the Millstone Unit 2 numbers, including revision. Where no revision is designated, the document date is to be used. The team's documentation should be such that a qualified individual could trace the models and program verification review back to the documents used to produce the results of this effort.

4.1 GATHER DATA AND DEFINE THE MODEL STRUCTURE

Resources

Process Model Lead

Process Analyst Lead

Process Model Software

PC



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Action

4.1.1 Identify and obtain documents that provide high level descriptions of:

- 1) programs, processes, and controlling procedures and policy used to change the facility design or change the characteristics, procedures, or practices for maintaining, operating, testing, and training on safety or risk significant systems, structures, and components,
- 2) interfacing processes that can impact the licensing and engineering design basis documents,
- 3) organizational structures that perform the process activities and,
- 4) the information systems that support the process activities.

The documents needed may address:

- Major plant modifications
- Minor modifications
- Jumper, lifted lead, and bypass control
- Setpoint changes
- Design and licensing document change control
- Computer software changes
- Modification revision control
- Verification of as-built conditions
- Surveillance testing
- Design control
- Design input/criteria/requirements
- Identification and evaluation of synergistic effects
- Verification/tracking of design assumptions
- Document identification and retrieval
- Configuration control
- Drawing control
- Control room drawing updates
- Development and change control of plant operation procedures



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- Development and change control of plant maintenance procedures
- Process for determining if an activity is maintenance or a modification.
- System design performance verification
- Corrective action
- Evaluation of replacement parts
- Procurement and control of equipment for modifications
- Procurement and control of replacement and spare parts
- Commercial grade parts dedication
- Vendor manual update/changes

4.1.2 Establish and maintain a list of the various change and change control procedures that the team identifies to help ensure that the processes are included in the initial process model. The list is to be updated as change and change control procedures are identified. The list is to include a procedure title, a brief description of the objective or purpose, the procedure identification number, date, and revision.

NOTE

Generic information can be bulk loaded into the modeling software as documentation is obtained on the utilities' procedures, organizational structure, and information systems. For example:

- Organization/resource titles
- Information system titles, i.e. databases, work flow systems, etc.
- Process controls, i.e. procedure titles and numbers, regulations, etc.

Bulk loading data prior to starting the model development, helps to ensure uniform usage of data information in the model and reduces model cleanup later.

4.1.3 Review the utility's configuration management program documentation to obtain an understanding of:

- the conditions which may lead to changes in: the configuration of the plant, design/licensing basis documents, or practices for maintaining, operating, testing,



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and training on safety or risk significant systems, structures, and components.
(e.g. broken equipment, unusual operating conditions, nonconformances,
regulation changes, desire for plant improvements, etc.)

- the organizations that assess the conditions and decide whether change processes need to be implemented.
- the procedures used to control these changes.
- the organizations that perform the changes and their interfaces.

The various conditions and change procedures along with the organizations which implement, support, or manage these activities form the basis for identifying potential process interfaces. The evaluation of interfaces, which will be done later in this effort, is a key element in determining if the configuration management program is effective in controlling the plant configuration.

4.1.4 Develop the initial model structure and level 0 diagram. Based on the review of the utility's documentation and the experience of the Process Model Lead, decide on a initial model structure that will:

- Identify the conditions that may result in a series of decisions regarding whether the configuration of the plant, design/licensing basis documents, or practices for maintaining, operating, testing, and training on safety or risk significant systems, structures, and components will be impacted.
- Identify the organizations that will need to be considered in the interface model.
- Contain the various Millstone Unit 2 change processes and their boundaries.

Action Output

Level 0 diagram

List of the various change and change control procedures

List of interface organizations

List of initiation conditions that can lead to the use of configuration management controls and processes



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Bulk loaded process data

Process documentation to be used in developing the model

4.2 PREPARE THE INITIAL PROCESS MODEL

NOTE

The initial process model will serve as input to preparation efforts for the System Vertical Slice Review (SVSR) to help familiarize the team on where design and licensing basis information can be found, the kind of documentation that should exist on past change activities, the organization responsible for various parts of the change process, and a general understanding of the kinds of change processes that exist at Millstone Unit 2. The initial process models will also identify potential weakness or areas least tolerant of error that will be considered when choosing what to review within the system.

Resources

Process Model Lead

Process Modeler(s)

Process Model Software

PC

Action

- 4.2.1 Develop a decision model on how conditions are identified and evaluated for potential impact on plant configuration and design/licensing documents, or practices for maintaining, operating, testing, and training on safety or risk significant systems, structures, and components.
- 4.2.2 Prepare an interface model that captures how various organizations interface with the configuration management processes.
- 4.2.3 Prepare an initial process model based on the utility's procedure documents and the model structure identified by the level 0 diagram. The initial model is expected to be one or two levels illustrating the high level process. By reviewing the utility's procedures the Process



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Modeler will attempt to identify and diagram the following information with a 4-dimensional model technique:

- Activities - a description of the work step.
- People, Tools, and Hardware/Software Supports - people (job title) and things used to perform the activities.
- Information/Product Flow - information and documents that input to an activity and the output as the result of the activity. This includes forms, reports, design documents, test results, data sources, data storage, etc.
- Controls - those things that specify when an activity is performed, how it is to be performed, or the acceptable quality level. Typical controls include regulations, quality assurance requirements, industry standards, procedures, company goals, management directives, best practices, corporate culture, experience, etc.

4.2.4 The source of the information used to develop the models is to be document as part of the model, including title, identifying numbers, and revision, or date.

4.2.5 Identify and tabulate suspected missing, incomplete, or unclear information for the decision matrix model, the interface model, or the initial process diagrams.

4.2.6 Identify and tabulate potential areas of concern that require additional investigation or information to determine if a problem exists.

Action Output

Decision Model

Interface Model

Initial Process Model

Additional Data Needs

Areas of Potential Concern



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4.3 PROVIDE INPUT TO THE SYSTEM REVIEW PREPARATION

Resources

Process Model Lead
Process Analyst Lead
Process Model Software
PC

Action

4.3.1 Provide input to preparation efforts for the System Vertical Slice Review (SVSR) to help familiarize the teams with:

- the kinds of change processes that exist at Millstone Unit 2,
- where design and licensing basis information can be found,
- the information systems used and its data base(s).
- the kind of documentation that should exist on past change activities,
- the organization responsible for various parts of the change process.

This information will be conveyed to the System Review teams through use of the initial process models, and verbal transfer of process experience gained during the modeling effort.

4.3.2 Provide input to the SVSR teams on and potential issues identified during the initial modeling effort that may indicate a process weakness, or areas least tolerant of error.

Action Output

Transfer of information to the System Review teams to be used in preparation for conducting their technical reviews.

4.4 CHOOSE PROCESSES FOR FURTHER EVALUATION

Resources

Process Model Lead
Process Analyst Lead



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Process Model Software

PC

Action

4.4.1 Select change processes for further investigation and review. The change processes chosen for further investigation are to be selected based on:

- any potential weak areas or areas least tolerant of error identified in the initial model,
- past industry problem areas,
- processes that have changed significantly since plant shutdown,
- potential weak areas identified as part of the System Vertical Slice Reviews, and
- obtaining a good cross section of the various change process types.

4.4.2 Document the selection reasons/decisions for either choosing or not choosing each of change processes identified in the initial model for further investigation.

Action Output

Selected processes for more detailed investigation.

Documentation of the selection basis.

NOTE

The following three steps, 4.5 Review More Detailed Process Information, 4.6 Conduct Process Interviews, and 4.7 Prepare Model Decompositions can be done in any order, in series, or parallel, and as often as needed to obtain detailed information and develop a complete model for the selected processes.

4.5 REVIEW MORE DETAILED PROCESS INFORMATION

Resources

Process Model Lead

Process Modeler(s)

Process Model Software

PC



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Action

4.5.1 For the selected processes, identify, obtain and review documentation that describes in detail:

- 1) process activities and controlling procedures/instructions used to change the facility design or change the characteristics, procedures, or practices for maintaining, operating, testing, and training on safety or risk significant systems, structures, and components,
- 2) interfacing processes that can impact the licensing and engineering design basis documents,
- 3) organizational structure that performs the process activities,
- 4) the information systems and the databases that support the process activities,
- 5) information flow, documents produced,
- 6) process monitoring and reporting
- 7) process measurements

This type of information is typically found in department procedures, instructions, best practice guidelines, information database structure descriptions, etc..

4.5.2 Identify and tabulate suspected missing, incomplete, or unclear information. When additional information is needed the next activity of planning and conducting interviews can be started.

Action Output

Detailed process model information on activities, information flow, organization, information systems, activity support ,tools, and controls.

4.6 CONDUCT ADDITIONAL PROCESS INTERVIEWS

Resources

Process Model Lead

Process Modeler(s)

Change Process Expert

Millstone Personnel



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Action

- 4.6.1 Identify the NNECo organizations and the job positions that are responsible for the portions of the model, which need further data or clarifying information.
- 4.6.2 Schedule interviews in accordance with the ICAVP Communications Plan (PLN-2).
- 4.6.3 Conduct the interviews. Interviews for obtaining information on the configuration management process diagrams are to be conducted using 4-dimensional model interview good practices. The interview is conducted by at least a Process Modeler and a Change Process Expert. The process model elements are developed during the interview, which enables the interviewee to validate that the information has been captured correctly.

Action Output

Additional Process Information

4.7 PREPARE MODEL DECOMPOSITIONS

Resources

Process Model Lead
Process Modeler(s)
Process Model Software
PC

Action

- 4.7.1 Develop model decompositions for the selected processes with the detailed information obtain from the procedure reviews and interviews. The Process Modeler in conjunction with the Process Modeler Lead will decide on what level of detail, i.e. level of process decomposition, is needed to enable an meaningful analysis of the process effectiveness.
- 4.7.2 The source of the information used to develop the models is to be document as part of the model, including title, identifying numbers, and revision, or date.
- 4.7.4 Identify and tabulate potential areas of concern that will be investigated during the process analysis steps.



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- 4.7.5 If potential weak process areas are identified as part of the System Vertical Slice Reviews return to steps 5 and 6 to collect more detailed information if needed.

Action Output

Final Model Process Maps

4.8 PERFORM PROCESS ASSESSMENT

Resources

Process Model Lead
Process Modeler(s)
Process Analyst Lead
Process Analyst(s)
Process Model Software
PC

Action

- 4.8.1 Perform analysis of process effectiveness, i.e. is the right thing being done with the right resources, and are appropriate controls in place to produce the desired results? The analysis of individual processes can begin as the model diagrams pertaining to that process are completed. Analysis of the interfaces between processes can start when the model diagrams for the interfacing processes are complete. Appendix A lists the evaluation items. "Guide For Operational Configuration Management Program", DOE-STD-1073-93 and the Process Analysis team's experience are the basis for determining the effectiveness of the processes under assessment.
- 4.8.2 Document the results of the analysis along with the basis for the conclusions. The documentation is to include, if appropriate, portions of the process models or model reports that illustrate any problem areas, potential weak areas, or areas that may be least tolerant of errors.
- 4.8.3 Identify the functional outcomes required for each of the various change processes. These outcomes will be used as part of the program verification which will determine the adequacy, with regard to past change processes, of the results of the programs currently



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being implemented by NNECo which are directed at identifying and resolving existing design and configuration management deficiencies. The outcomes to be identified in this step are the functional results of a completed change process. For example a typical functional outcomes of a drawing change process is a revised drawing with a unique revision identifier. The revised drawing clearly indicates what was changed. The revised drawing is distributed and inserted into all controlled drawing sets. The functional outcomes identified for a process should not specify how the functional objectives or results are accomplished.

Action Output

Process Analysis Documentation

Functional Outcomes by Process

4.9 SELECT THE PROGRAM VERIFICATION SAMPLE

Resources

Process Model Lead

Technical Reviewers

Project Management

Action

- 4.9.1 Identify the total population of changes to the facility design or the characteristics, procedures, or practices for maintaining, operating, testing, and training on safety or risk significant systems, structures, and components since issuance of the operations license for each of the various change processes contained in the model.
- 4.9.2 If any historical change processes are no longer used by Millstone Unit 2, and thus not included in the model, identify the total population of these changes.



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NOTE

The sample for the program verification will consist of the changes that have been made to the systems chosen for the System Vertical Slice Review (SVSR), plus additional changes (that affect safety or risk significant systems, structures, and components) that may be needed to ensure that each of the various change processes are included in the sample.

4.9.3 Identify the changes associated with the systems selected for the SVSR.

4.9.4 Choose additional change items/packages for inspection to ensure that each of the various change processes are included in the inspection. The additional items need not be associated with the systems selected for the SVSR. Use the following criteria for selecting the number and specific change items are to be inspected:

- Past industry configuration management problem areas.
- Possible decision, interface, or process weakness identified during the modeling and analysis effort.
- Changes that involve numerous organizational interfaces. (Experience shows that organizational interfaces is a common area for process gaps.)
- Change processes not "owned" by the design organization. (Experience shows there is a higher likelihood that processes not owned by the design organization will have inadequate design change review interfaces)
- Change processes that have undergone extensive change since the plant shut down.
- Changes that have a high potential for affecting the design basis or licensing documents.
- Similar change items that occurred within a close time period can be grouped together. Some of the representative change items within the group can then be selected for detailed inspection to determine if any problems exist.



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- The sample should include a cross section of technical disciplines, i.e. mechanical, electrical, piping, instrument and controls, structural.

Action Output

Configuration management program verification sample

4.10 PERFORM THE PROGRAM VERIFICATION

Resources

Process Model Lead

Technical Lead

Technical Reviewers

NOTE

The intent of the program verification is not an evaluation of previous change processes used in the past, but rather a review to determine the effectiveness of NNECo's recent efforts to identify and correct design or licensing basis deficiencies that may have resulted from the ineffectiveness of past change processes. This is a "out-come" based comparison of the current conditions versus the current design and licensing basis.

The inspection will be performed on a sample of past change documentation and the resulting plant configuration, maintenance, operations, testing, or training changes. The review will look for:

- unrecognized modifications to the plant
- departures from the plant licensing or design basis documents
- acceptable documentation of the results of the change and its basis.

Action

4.10.1 Review the change items identified in the inspection sample to determine if the change process functional outcomes, are complete and accurate. Review the change (modification, setpoint change, material substitution, etc.) for proper identification of impacts on:

- Preoperational Test and Startup Test Data and results



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- Design Bases Documents
 - UFSAR
 - Plant Drawings
 - Design Analysis (Calculations)
 - Current Procedures and Tests
 - Plant Technical Specifications
 - Vendor Documentation
 - Plant Procedures
 - Plant Personnel Training
 - Probabilistic Risk Assessment (PRA)
- 4.10.2 Review documentation and perform walkdowns to determine if the systems' design bases are maintained and plant configuration properly documented.
- 4.10.3 Reviewers will document discussions of significance with NNECo personnel.
- 4.10.4 Reviewers will document which records were reviewed, identifying the Millstone Unit 2 numbers, including revision. Where no revision is designated, the document date is to be used.
- 4.10.5 The reason for a review activity will be documented, as well as the specific basis for any conclusions drawn.
- 4.10.6 As concerns or potential issues are identified during the review, they are to be documented for further investigation.
- 4.10.7 Potential issues are to be followed up to determine that either 1) upon obtaining further information, no problem exists, or 2) it is a valid issue with a documented basis for the deficiency, or 3) it can not be resolved at this time.
- 4.10.8 Valid issues, findings and unresolved items are to be communicated to management for evaluation, classification, and reportability. Each valid issue and finding will be provided with a complete description of the deficiency, including all pertinent information.



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Program verification results

Program verification documentation

4.11 CHOOSE ADDITIONAL SAMPLES

Resources

Process Model Lead

Technical Lead

Technical Reviewers

Project Management

Action

4.11.1 If the program verification discovers valid issues, the project management team will consider expansion of the inspection sample. The sample will be expanded when it will facilitate determination of whether a valid issue or finding is an isolated mistake or is an indication of a systematic problem.

4.11.2 If the decision is to increase the sample size return to step 4.9 to select specific change items to be added to the program verification and proceed to perform the additional reviews.

Action Output

Decision to expand the sample size or not

Documentation of the basis for the decision



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4.12 PREPARE REPORT

Resources

Process Model Lead
Process Modelers
Technical Lead
Technical Reviewers
Process Analyst Lead
Process Analyst(s)
Process Model Software
PC

Action

- 4.12.1 Collect the results of the process modeling, process analysis, program verification (including the change items inspected via the System Vertical Slice Reviews).
- 4.12.2 Prepare a draft report of the Tier 3 activities and conclusions. The report is to consist of, as a minimum:
- input to an executive summary
 - a summary description of the methods used
 - models that illustrate the existing process
 - a summary of the process analysis results identifying any findings or concerns regarding process breakdowns, potential weak areas, areas that are least tolerant of errors, lack of process measurements, etc..
 - a summary of the program verification results
- 4.12.3 Support internal ICAVP reviews as necessary.
- 4.12.4 Resolve comments and finalize the report for issue.



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Final Report

Project backup documentation

5.0 REFERENCES

"Guide For Operational Configuration Management Program", DOE-STD-1073-93



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APPENDIX A PROCESS ANALYSIS EVALUATION ITEMS

Process Related Issues

- Redundant processes leading to different results
- Missing processes or process steps
- Fragmented processes with interface gaps
- Processes that do not interface with the design or configuration process or determine whether a change impacts design basis, licensing, or configuration documents.
- Overly complex processes

Organizational Issues

- Lack of structure
- Proper organizations not identified for interface, review, and approvals
- Over centralized process
- Fragmented process
- Fragmented chain of command
- Matrix organization conflicts
- Span of control problems

Information Issues

- Lack of needed information
- Conflicting information
- Lack of timely information
- Fragmented information
- Information distributing problems
- Multiple access to information
- Security of information
- Documentation not clearly understandable
- Documentation not complete



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Management Control Issues

- Activities that are not controlled, i.e. no procedure or controls
- Processes that are over-controlled, e.g. so many approvals that there is no accountability
- Process that are under controlled, i.e. process results are not consistent
- Conflicting process controls, e.g. group goals vs. Corporate goals
- Conflicting agendas
- Regulatory commitments not applied to the proper activities
- Controls not address quality requirements
- No Goals/Standards
- Management control loop missing or broken
- No process flexibility within defined boundaries.
- Process so rigid or overly complex that activities are by passed
- Over-lapping areas of responsibility

Quality Related Issues

- Missing quality indicators
- Inappropriate metrics
- No metrics
- Unrealistic standards/goals
- Lack of timely error identification and correction
- Lack of accountability
- Lack of performance analysis
- Lack of performance reporting

Resources/Support Issues

- Lack of sufficient people
- Lack of skills
- Lack of support from other groups
- Too many support personnel (fragmented support)
- Lack of tools
- Lack of hardware
- Lack of software
- Lack of support accountability