Success with Manufacturing Applications: Implementation of Materials Management/3000

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Introduction

1. Objective: The purpose of this paper is to describe and discuss key elements involved in defining the processes for the implementation of Materials Management/3000. This discussion is not intended to be complete - only descriptive, depicting the wide range of activities involed in the process of implementation. Of paramount importance throughout this paper is "user involvement". Any successful implementatin must work with the user community in all phases of the project.

2. Process: The following topics will be discussed in the body of this paper.

   a. Project Team Development: Identification of project team members and structure as an integral part of the implementation process.
   b. Operational Audit: Analysis of the current manufacturing organization, including the interfaces to other control systems.
   c. Develop Implemenation Plan:
      -General Design: Define system objectives; develop conceptual design models; and apply organizational constraints to the general design.
      -Detailed Design: Translate general design into a usable format for customizing Materials Management/3000.
   d. Customizing: Implement the modifications generated from the previous step. Verify these changes as you begin preparations for user training.
   e. User Implementation: Training schedules for all affected users should be established and adhered to.
   f. Installation: Perform all necessary testing of the customized Materials Management/3000 system, test interface programs and complete all required user training. A pilot system should be initiated at this time.
   g. Completed Implementation: Full-scale start up of the system with user reliance upon the system.

h. New System Audit: Between three and six months after implementation of any module, a system audit should be conducted to determine the success of the implmentation process.

3. Structure: The systems implmentation structure should be people-oriented, team-oriented, and participative geared toward the development, implementation and monitoring of the company's management systems. This structure, if properly developed and supported, will not only help avoid the confusion and frustration that usually accompanies automation; it will also provide a good balance between data processing and user organizations.

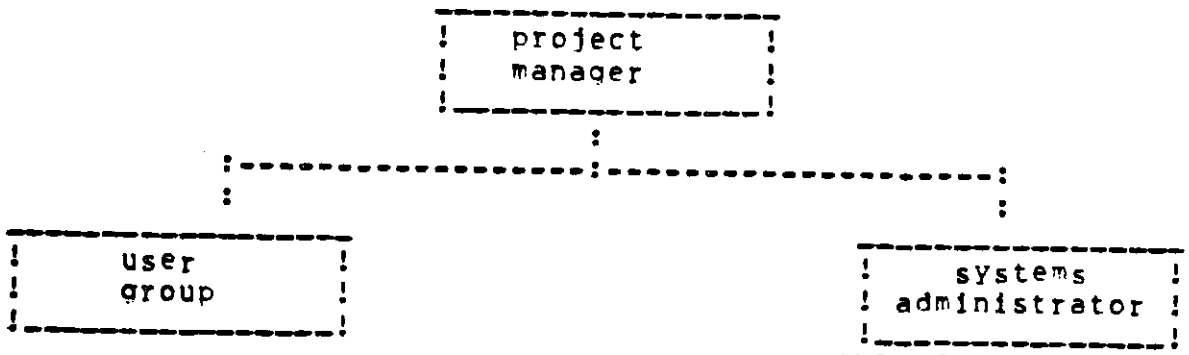
4. Summary: This paper will describe the implementation of the entire system. However, the actual implementation process is often made up of modularized implementation sequences. Modules of Materials Management/3000 may be installed in a variety of different sequences. The module sequence is is dependent upon the specific needs of the manufacturing organization involved. Determining the implementation sequence is a function of the Project Team and is accomplished during the Design Phase. These guidelines are appropriate for implementation of each module cluster as well as the entire system.

Project Team Development.

1. Objective: To define a project team within the company organization which will oversee the implementation process and ensure its success.

2. Process: The success of a manufacturing system implementation is dependent to a large extent upon the effectiveness of the Project Team designated to monitor the implementation. This team must have the authority and responsibility for all phases of implementation of Materials Management/3000. The group should be composed of working representatives from the affected departments, and should undergo a continuing education program in Materials Planning topics.

3. Structure: The following functions should provide the core for the Project Team.



The Project Manager is responsible for planning, orgranizing, and controlling the project team. A review of some of the tasks involved in successful management of the project team is included here.

* Planning activities, tasks, and end results
* Coordinating tasks and resources
* Interfacing between team and management
* Effective utilization of systems and user personnel
* Monitoring project status against plan
* Identifying problem areas (both functionally and technically)
* Solving problems and dealing effectively with crisis situations

User commitment is essential to the success of any information system implemenation. An individual should be identified as the focal point for user group involvement in the

process. The responsibilities of this position are:

* Represent user needs and requirements
* Keep user departments informed of the project status
* Educate users in the concepts of formal manufacturing concepts
* Train users on effective utilization of the system

The System Administrator is responsible for the technical implementation of Materials Management/3000. These responsibilities include:

* Understanding user needs and including those requirements within the system
* System Customization
* Data entry and system conversion
* Interface with related systems
* System performance

4. Summmary: Directed by the Project Manager, the Project Team is a key working group in the implementation process. The exact make-up in personnel of the Project Team will vary from company to company, however, it is essential that an individual be designated and held responsible for the functions outlined here.

Operational Audit

1. Objective: To ensure the customer has a complete understanding of their manufacturing organization, as it stands today; and to identify informational requirements of the system. The purpose here is to complete an objective analysis of the existing manufacturing systems (manual and automated). This will familiarize the project team with the current procedures, the people in the user departments and their functions, and the interfaces to the present system.

2. Process:
   a. Identify existing systems flows, i.e. manual and automated -- formal and informal. These systems include master scheduling, bills of materials (including work centers, standard routing & cost accounting information), inventory and order control, order processing, materials planning. Example of tools employed here are system flow diagrams, data base schema's, decision level analysis, information flow analysis and input/output analysis. Decision level analysis breaks a system down into decision points which control resourses (both tangible and intangible). Examples of resources are inventories, employee skills and so forth. These resources are defined and appropriate decision rules are formulated by management. The analysis determines how the information will be produced to meet the requirements of these decision rules. Information flow analysis shows what information is required, by whom, and from where it is obtained. Input/output analysis simply shows the data inputs and information outputs of a system without concern for decisions made from the outputs.
   b. Identify unsolved problems, e.g. production problems, people problems, software/hardware, etc..
   c. Identify policies, e.g. lead times, order policies legal, managerial, accounting, engineering, etc..
   d. Identify existing costs.
   e. Requirements analysis will be done by the systems analyst in the customers organization. There are three general steps involved, first the analyst and the user community need to generate ideas on what information is needed by them to effectively do their jobs. Second, this information must be validated for relevance and then prioritized. Last, the economical and technological feasibility must be assessed.

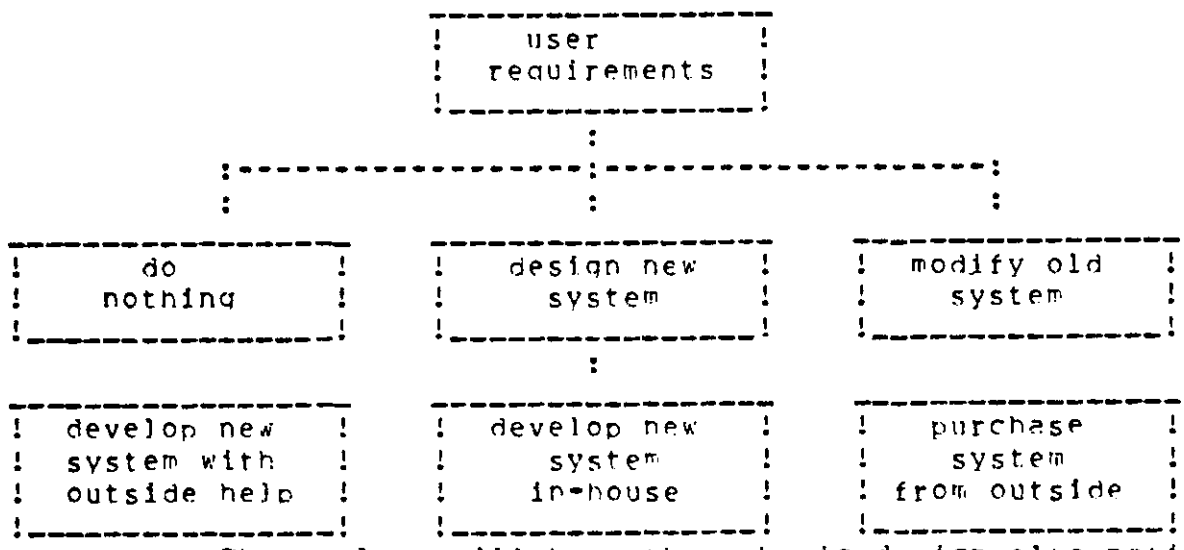
3. Structure: An established project team.

4. Summary: At this point we have a documented statement of where this organization's current information systems stands, both it's strengths and weaknesses.
   Studying the existing system provides the analysis with: one, effectiveness of the present system; two, resource recognition, what is available in terms of hardware and people; three, conversion knowledge, when the new system is implemented the analyst has identified what tasks are necessary to begin operating the new system and to phase out the old system; and fourthly, he has a common starting point with management, to minimize 'resistance' of the change in the organization, the analyst can contrast the new system to the old system and demonstrate that it is not entirely new, and specifically show points of similarity and differences.

General Design.

1. Objective: To define system objectives; to develop conceptual design models; and to apply organizational constraints.

2. Process: Defining system objectives results from evaluating requirements described in the previous phase. The goal is obtained by abstracting certain characteristics from all the information requirements.
Development of conceptual design models entails developing high level flow diagrams which generally describe inputs and outputs of the system, treating the system as a 'black box'. Once the model is established, the analyst begins to pragmatize it by applying the additional systems requirements (i.e. costs, performance, reliability, maintainability, flexibility, installation schedule, expected growth potential and anticipated life expectancy and considering the available organizational resources.
Applying organizational constraints to the design process requires the extensive use of organizational resources. Many activities are pursued within the organization which also require use of these resources. Thus, the information system must vie with these other activities to obtain necessary resources. Organizational resources are usually allocated to those activities which will provide the greatest cost/effectiveness to the organization.
A summary of basic design alternatives is demonstrated below.



The analyst will have three basic design alternatives when evaluating a set of system and user requirements: (1) do nothing (2) modify existing system and (3) design new system. When the decision is to design a new system, the analyst considers the 'make' or 'buy' alternatives. In our case the decision is to buy.

3. **Structure: Generally the HP3000 Industry Specialist is not actively involved in these steps.**

4. Summary: At this time the customer has identified where they are and and where they want to be. This information is the basis for customizing the Materials Management/3000.

Detailed Design - Preparation for Customizing.

1. Objective: To translate the requirements specified in the general conceptual design into a format which will facilitate customizing Materials Management/3000; to propose an implementation strategy for this system; and to install the standard Materials Management/3000 system. The purpose is to minimize the total elapsed time of implementing a usable system.

2. Process: The industry specialist will provide the customer with aids which will facilitate the initial customizing requirements. These pre-customizing aids reflect the standard system as it leaves the factory, they are contained in the Industry Specialist Consulting Kit. They are as follows:
   a. Schema information - detailed description of all the data items, their data types, field sizes, default values and the data sets they appear on.
   b. Screen definitions and layouts.
   c. Report layouts.
   d. Forms file listings - listings from VIEW of the forms file, this will be done at the customer's if possible.

   The System Administrator's manual describing customizing contains all the information you will need to list other customizing aids. These are not necessary at this stage, but if for some reason they are needed the industry specialist will have access to these aids at their office.
   The proposed implementation strategy is a prototype development plan. That is, to first bring up the system as is, then start the customizing in phases. This piecemeal approach will get the customer up on the system allowing him to become familiar with it and to start their testing. The customizing will be completed in phases, thus minimizing overall complexity of the project, since it is easy to recustomize the system.

3. Structure: **The Industry Specialist is now taking an active role in the implementation design, working with the customer in preparing for system customization.**

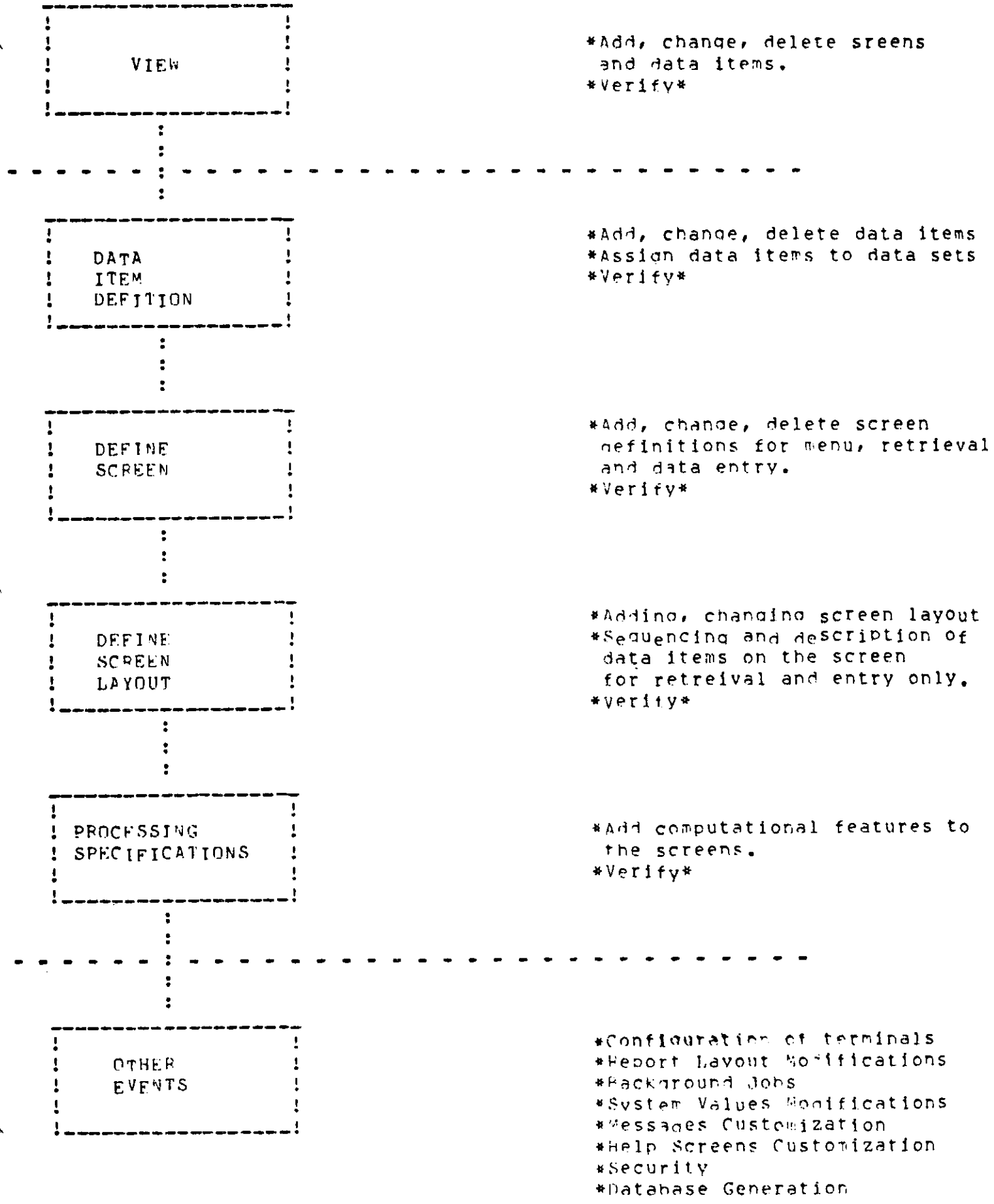
4. Summary: This phase contains two main events one, installing the standard system and two, preparing for customizing. Outputs will be the initial required modifications of the standard product. That is, discrepencies in data items and data sets; and screens to be modified, added or deleted. preliminary investigation for the other parts of customizing will be started now and initial customizing will commence.

Customizing Materials Management/3000.

1. Objective: To complete the required customization of Materials Management/3000 to fit the needs of the customer; to identify measures of data base integrity; to identify and implement security requirements; and to initiate user training.

2. Process: The needed processes will be broken down into functions. The timing is implied by the order presented for tasks a, b & c.
   a. Organize the screens by category, i.e. add, change, delete. Complete VIEW screen layout forms (Appendix I), keep them ordered by category. Next either RUN FORMSPEC or enter VIEW via the customizer. In VIEW, the order in which you modify the forms file is not important, but it is best to do all adds at one time and so on for changing and deleting. Remember to compile the forms file before exiting VIEW.
   b. The next step is the data item definition within customizer. This entails the adding, deleting and changing of data items existing in Materials Management/3000. Use the Data Items Work Sheet (Appendix II) to organize your modifications to the data bases. This form allows you to organize these updates by data set. This sheet's information can also help with assigning the new data items to data sets, via the 'ADD FIELDS TO A DATA SET' screen.
   c. Following the definition of your data items you can modify the standard sreens supplied by Materials Management/3000. There are two functions involved in modifing screens in customizer, first is screen definition and secondly defining the screen layout. Note that for MENU Screens you only define the screen, there is no layout function. The Screen Worksheet (Appendix III) contains both functions. The top portion corresponds to the screen defition and the bottom is the screen layout. When entering this information on the system, you should do all your sreen definitions together and then do all your screen layouts. The reason for this separation is two fold, first the screen has to be defined before you can do the layout and secondly these functions are separated in the system. Therefore, it is better to do the screen defintions first then do the layouts.
      Now that we have modified all the necessary screens and data sets, we can develop and enter the processing specifications. There spec.'s are not the same as the ones seen in VIEW,they are however a mechanism which will enable the user to perform some computional operations on data at the time the screen is being processed by Materials Management/3000. Appendix IV contains a Processing Specifications worksheet, this can be used in organizing and entering the required operations for the screens.
   d. The above processes are the main events of customizing, there are many other tasks which must be performed prior to the final implementation of Materials Management/3000. Here the order is not important. These functions are:
      (1) Terminal Configuration -- Appendix V;
      (2) Report Layout Modifications -- Appendix VI;
      (3) Background Job Schedule -- Appendix VII;
      (4) System Values -- Appendix VIII;
      (5) Customizing Messages;

CUSTOMIZATION --- THE MAIN EVENTS

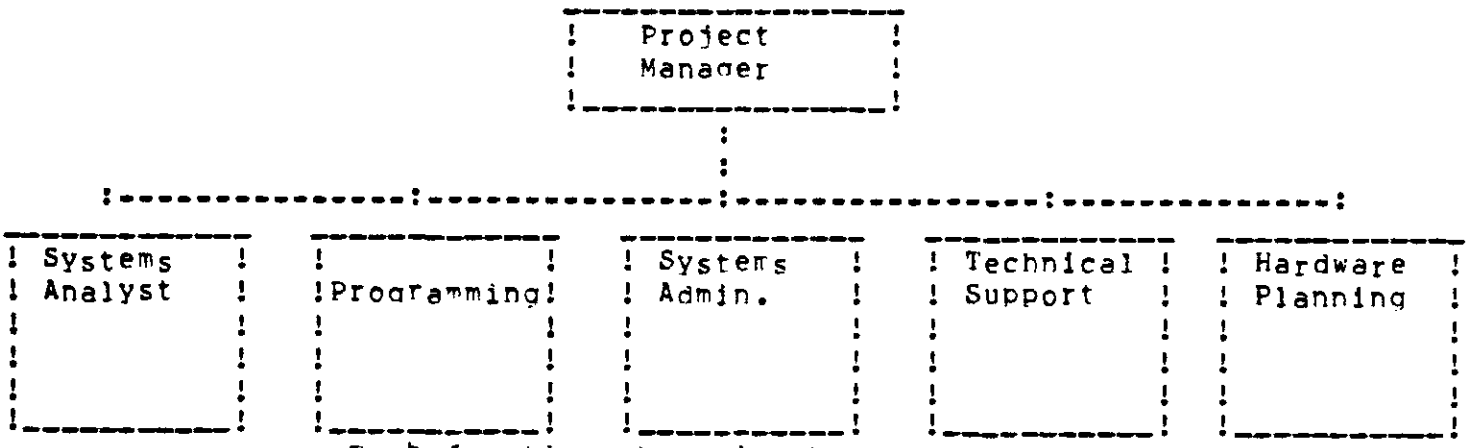


-- FIGURE 1 --

(6) Customizing Help Screens;
(7) Security;
(8) Database Generation.

Functions (1) through (4) have associated worksheets provided in the appendices to help in organizing, entering and verifing the results on the system. All these tasks are addressed in the System Administrator Manual. Also security can be done at various levels in this system, at the lowest level -- data item level, at an intermediate level -- VIEW and at the highest level -- terminal security.

3. Structure: A full staff with programmers to design and program the the interfaces between Materials Managment/3000 and the other functions of the company (e.g. accounting).



Each function shown in the above chart has certain duties to perform, they will vary from company to company. Some responsiblities of the system analyst would be the initial analyst work of the materials and manufacturing departments,analyst work on Materials Management System, training, manual procedures, file conversion, conversion from the old system to the new one and design work on the interface programs. The programmer would be involved with writing interface and conversion programs, file conversion and system testing. The systems administrator would be involved with customizing, user training, and some analyst work. Technical support and hardware planing will be supporting and planning for the hardware. Finally, the project manager will be responsible for the administration of the entire project. This person will also be communicating with top management and other key managers soliciting their support and reporting current status of the project.

4. Summary: Following this phase we would have completed all the necessary tasks in customizer and VIEW. We will have a fully cusomized system. The validity of all the modifications rests on a complete and precise validation of each task after is completed. The forms supplied in the appendices provide an effective means to verify your results by comparing them with the aids supplied by the customizer. These forms are designed such that they are consistent with the screens in customizer and with each other, thereby minimizing the complexity of this verification process. Once the modifications have been validated by the systems administrator (and even in conjunction with the analyst) we are ready for our initial tests.

User Implementation

1. Objective: To establish education and training programs for end-users to ensure achievement of skills necessary for proper use of the system.

2. Process: Education and training must translate the general principles of MRP into the specifics of operations at the company. Education is defined here as the learning of manufacturing concepts and basic operations of the system. Training is the develop of skills in using the particular tools provided by the system. Education and training should be provided at the appropriate level of detail and on the appropriate portion of the system for all personnel that can have an effect on the success of the system. A generalized outline is included here.

    1. Hewlett-Packard training courses on the HP3000
        * Programmer's Introduction
        * System Operator
        * System Manager
        * Image--optional
        * V/3000--optional

    2. Hewlett-Packard training for Materials Management/3000
        * System Administrator I
        * System Administrator II
        * These courses are designed to "train the trainers"

    3. Formal Manufacturing Concepts
        * ASI video courses on Managing Production and Inventories and MRP.
        * These courses should be given to personnel at all levels of operation including top management.

    4. In-house User Training
        * Each department is responsible for training personnel on the specific use of the computer and the application.
        * Procedures and decoumentations for users, operations, and the system administrator should be completed at this time.
        * Development of backup-recovery and disaster plans.

3. Structure: The Project Team is expanded to include department representatives and training teams.

4. Summary: The people part of an MRP system is fully 80% of the system. The system will work only when people uderstand what it is, how it works, and what their responsibilities are. For this reason, education and training are critical steps in the implementation process.

Installation

1. Objective: To install a pilot start-up system and to perform all required system tests which would insure the integrity of the Materials Management/3000 system.

2. Process: Several controlled test must be completed prior to final conversion to the new system. A start-up pilot installation can provide an excellent format for testing the system. There are three main areas to test:
   1. Loading programs--data base loading;
   2. System tests--verification of customized system;
   3. Interface progams--verification of user programs.

   A pilot system also gives the operating departments an opportunity to learn the new system functions while the daily volumes are still at relatively low levels.

3. Structure: The entire project team will be involved in this phase.

4. Summary: The pilot start-up is a necessary phase of the implementation process. The pilot system can help identify problems and solutions before the total system is in place. Solutions at this stage can be more readily implemented than at a later point in system conversion. Firm timetables should be established for completion of the pilot phase, with adequate time for implementation of operating procedure changes as problems are identified.

Completed Implementation

1. Objective: To complete system installation and to establish effective utilization of the system by the users.

2. Process: At this point in the implementation, users have been trained and the system has been tested. The final steps at this stage are:
   1. Load data bases;
   2. Perform test runs of batch processes;
   3. Initialize and test interface programs;
   4. Switch over from existing systems.

   Depending upon the complexity of the conversion, it may be advisable to run modules of Materials Management/3000 in parallel with existing systems until users have gained complete confidence in the system.

3. Structure: The entire project team, as well as affected users, will be involved in this phase.

4. Summary: At this time the system has been installed and tested to user satisfaction. The success of the application is now the responsility of management. It is extremely important that users realize that management plans to run the business based upon the system. In doing this, it will become clear that the new system is designed to be an integral piece in business operations.

New System Audit

1. Objective: To evaluate the success of the implementation and the system.

2. Process: Between three and six months after implementation of any module of Materials Management/3000 there should be a formal system audit. Questions to be answered at this step in the implementation process are:
   * Are users effectively utilizing the system capabilities?
   * Are operating policies being adhered to?
   * What problems exist with the system?
   * What user requirements were overlooked?
   * Can the system accomodate these changes?
   * How are you preforming against established measurement targets?

   Any problems identified in the audit should be documented, investigated, and resolved.

3. Structure: The primary project team should be involved at this time.

4. Summary: A successful implementation of Materials Management/3000 should take between nine and 12 months. There are three keys to the success of any implementation:
   1. Strong project management;
   2. Thorough training of users, systems personnel, and management;
   3. Top management commitment.

   Without these three ingredients, implementation will slow down, frustrations mount, and users doubt the "reality" of the new system. Once momentum has been lost during this process, it becomes doubly hard to restore.

Conclusions

This paper was not intended to be an indepth guide to implementation of Materials Management/3000, but a document which highlights the issues and concerns surrounding the implementation of any manufacturing application. The success of any manufacturing application ultimately resides with the effeciveness of the implementation process. A key point to remember is that manufacturing organizations are not static; they will change. These changes will need to be reflected in the organization's information systems. Implementation is a process rather than a project; when these changes occur, it is again time to reiterate the analysis and customization of the Materials Management/3000 system.

Acknowledgement

I would like to recognize the assistance of Tim Mahoney in the design, development, and writing of this paper. Without the "unpublished paper" this paper would not exist.

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Form:
  Repeat Option: _____                                    [ ] ADD
  Next Form Option:___                                    [ ] CHANGE
  Next form: ________                                     [ ] DELETE
                          SCREEN LAYOUT
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Field: ________________
 Num: 1 Len:    Name:____________________ Enh: HI____ Ftype:_____ Dtype:____
 Init Value:_____________________________________________
*** PROCESSING SPECIFICATIONS ***


Field: ________________
 Num: 1 Len:    Name:____________________ Enh: HI____ Ftype:_____ Dtype:____
 Init Value:_____________________________________________
*** PROCESSING SPECIFICATIONS ***


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*** PROCESSING SPECIFICATIONS ***


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*** PROCESSING SPECIFICATIONS ***
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*** PROCESSING SPECIFICATIONS ***

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*** PROCESSING SPECIFICATIONS ***

Field: ____________________
Num: 1 Len: Name:_____________________ Enh: HI____ Ftype:_____ Dtype:_____
Init Value:____
*** PROCESSING SPECIFICATIONS ***

DATA ITEMS WORK SHEET

[ ] ADD
[ ] CHANGE
[ ] DELETE

DATA SET [ ]
DATA DEFINITION

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

Data Item Name [ ] Item Length [ ] Decimal Places [ ] Data Type [ ]

Default Value [ ]

SCREEN WORKSHEET

[ ] ADD SCREEN
[ ] CHANGE SCREEN

[ ] DATA ENTRY
[ ] RETRIEVAL
[ ] MENU

Screen Name [ ]   Transaction Code [ ]

Exit Screen Name [ ]   Help Screen Name [ ]   Next(Detail) Screen [ ]

Function Key Definitions

1[ ] 2[ ] 3[ ] 4[ ]
5[ ] 6[ ] 7[ ] 8[ ]

SCREEN LAYOUT

Screen Name [ ]

Field Seq.	Field Name	Data Type	Length Min.	Length Max.	Dec. Places	Required Field
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
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APPENDIX III

PROCESSING SPECIFICATIONS WORKSHEET

Screen Name	Sequence Number	Processing Specifications
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
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		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________
		Operation:__________ Operand 1:______________ Operand 2:______________ Comment:______________________

TERMINAL CONFIGURATION WORKSHEET

Subsystem:_____

Terminal Name	Log. Unit#	Scheduled Time Start	Stop	Start Screen	Security Time-out	Aux. LP

APPLICATION REPORT WORKSHEET

Report Name:_____

Field Name	Start Position	Length	End Position	Data Type	Decima Places

BACKGROUND JOB SCHEDULE WORKSHEET

Job Name	Auto	Run Cycle	Run Day/Month	Run Time/Shi

Description:
Control File:

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APPENDIX VII

SYSTEM VALUES WORKSHEET

Value Name	Data Type*	Value

* Data type can not be modified.