FASTPERT - A SYNTHESIS OF VE, FAST & PERT

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ABSTRACT

This paper provides the reader with a set of tools that combine attributes of both Value Engineering (VE) Function Analysis System Technique (FAST) and Program Evaluation Review Technique (PERT) to easily create project planning and cost information - **FastPert**.

INTRODUCTION

FastPert incorporates the simple verb-noun (FAST) function titles written on yellow 3M Post-it Notes to describe activities in a group brainstorming environment. This very fast information collection methodology simultane-ously creates accurate project data on schedule, manpower requirements, cost, work dependencies, and statements of work. Using **FastPert** with other management tools can provide valuable information to control and monitor schedule performance and project spending.

Tracking performance on engineering projects that are underway is a difficult task. Measuring performance without planning in place as a baseline against which to measure performance will result in inaccurate status information being utilized to predict final project cost and schedule.

Planning is the key to solving this problem. PERT planning methods have successfully solved this problem on major NASA projects. However, the PERT planning method was cumbersome, difficult to create and hard to maintain.

Now, with a computer to perform comp-licated schedule and cost calculations, and FastPert to collect the needed inputs, planning on any engineering project can be effectively created. **FastPert** is neither FAST nor function analysis as described in VE textbooks. However, **FastPert** was fostered from these VE techniques and is in this application being utilized to implement work implied in traditional FAST diagrams.

This is accomplished by selecting a function description in the FAST diagram and asking the question, "What activities must occur to accomplish this function?" The answer is a list of activity descriptions that represent a change in the level of abstraction. Simply put, the two word labels describe activities and not functions in FastPert.

FastPert uses concepts from both these techniques to collect, clearly organize, and document thoughts and ideas. This data can thenbe utilized to create useful information for project management.

One of the attributes of FAST is that the technique breaks down and eliminates the "excess baggage" of bias to find basic and secondary functions by use of the verb-noun format. FastPert takes advantage of this attribute and redefines the function description as an activity description.

FAST organizes functions in a logical how-why format FAST diagram, and FastPert mimics this diagram in a PERT chart.

FASTPERT METHODOLOGY

FastPert is a series of steps that aids the collection of project information. This information can then be used to create project data for costing, scheduling and performance measurement systems. The steps incorporate existing techniques from FAST verb-noun labeling, brainstorming, and PERT into one methodology - **FastPert**.

FastPert utilizes people, with project germane knowledge, in a brainstorming session using FAST labeling and PERT dependencies to create project data.

The following ten steps have proved to be effective as a methodology to quickly collect accurate project information. In short, it makes planning fast and easy and it proves a systematic approach using function analysis similar to the VE/VA "Job Plan" to this end.

TEN FASTPERT STEPS:

1. **Assign Facilitator** - Assign a responsible person to read and understand the statements of work or client requirements. One who can help the participants to describe what will really be required to accomplish the work. This person is responsible for keeping the meeting moving.

2. **Get Experts** - Identify and invite the participants to a FastPert planning session (i.e. knowledgeable, grassroots people with hands-on experience).

3. **Obtain tools** - Make available markers,pens, stickies, tape, and large sheets of paper taped onto a wall that will receive the stickies.

4. **Define rules** - Ensure the participants understand the ground rules:

   a. **Any idea is a good one.**

      This is a brainstorming session. Idea generation (regardless of good or bad judgement, inapplicability, source, or emotion) is the key to successful collection of project information.

   b. **Stick to verb - noun descriptions.**

      Henry Ford once said that no job is particularly difficult if you divide it into small parts. We have added to this idea by requiring that each small part or activity be defined with a measurable event that describes the start and completion of that activity (i.e. the titles of the ten steps on this page.)

   c. **Allow negotiation**

      The experts are mentally walking through the work. Problems will occur in a mental project as if it were actually underway. Problem solving and negotiation is encouraged within reason and without degenerating into argument.

   d. **Add activities**

      Add activities as the team thinks of them. This usually happens as the sequence is developed. Forgotten activities will show up as obvious omissions.

5. **Define scope** - Be sure that everyone understands the limits of the required work. Discussion should be kept within the scope of work.

6. **Brainstorm activities** - Ask the experts to list all the activities that will be required to complete the work. These ideas should be recorded in large lettering on stickies usingverb-noun function or activity descriptions.

7. **Sequence activities** - Ask the participants to arrange the activities (stickies) in an approximate sequence according to time.

8 **Set dependencies** - Use a pencil to draw arrows from activity to activity to identify predecessors and successors. Rearrange the activities as necessary.

9. **Define durations** - Ask the participants to give reasonable estimates of work day durations to perform the activity. Write the number on the sticky.

10. **Identify costs** - If possible determine which activities have fixed costs such as purchase parts associated with them. Write the cost on the appropriate sticky so it can be revisited later.

The product of this meeting is usually a mess of multi-colored stickies, tape, notes, markings, and tangled lines of dependencies - in essence, a PERT chart. (Save this activity chart for later reference.)

With this chart, the facilitator can then decipher and organize the collected data into standard formats that can be reviewed, understood by, and communicated to, the participants and performers.

Timely planning is important. Planning in the beginning of a project can aid in early identification of problems and solutions, thereby avoiding negative cost and schedule impacts. This can be accomplished by walking through the project ahead of time on paper because the participants encounter problems and develop solutions as if the project were actually underway.

The use of creative problem solving techniques, such as brainstorming, are productive in creating planning. Using a work structure for the project that indicates hardware/function areas of responsibility, will help to identify knowledgeable personnel that can contribute to the planning task.

Planning data can be efficiently created by:

1) Naming activities in a highly abbre-viated form using stickies,

2) Sequencing the tasks (posting them on a large sheet of drafting paper),

3) Defining the duration (using a min-imum time segment of one day), and,

4) Setting appropriate dependencies.

Planning data, to be useful, should be accurate and of high quality. Project data must be collected from qualified participants or sources. Participants can be selected based on their level of expertise and experience that is germane to the activities being defined.

Activity descriptions should be created by participants who will be responsible for the project budget, schedule and actual work performance. Careful selection of participants for the FastPert session can often avoid future problems because:

1. The plan is made with intelligence and expertise collected from the hands-on experience of the participants.

2. If the performers in the project are included in the planning, they will tend to "buy in" and become vested in seeing that the project is successful. This is because they helped to invent the plan - it is "their baby."

3. They will have an understanding of the work that often cannot be communicated in writing.

The information collected from a **FastPert** meeting is used to simultaneously generate a plan, total cost and schedule, statements of work, identify responsibilities, identify potential problem areas, and contribute to performance measurement in earned value systems.

TYPICAL PROJECTS

Typically, in the life cycle of a project, early reviews on cost and schedule are overlooked. People are excited about the hands-on portion work, and that is what they focus on. Delays and cost impacts occur on every project, but the magnitude of the resulting effect is not truly determined until the end of the project - which istoo late for changes.

Unfortunately, in project meetings discussing schedule and cost, project status is conveyed as best guesses and estimates as a substitute for actual performance measurement. Discussion may focus on project highlights - ignoring consideration of future work that may contain problems.

The project manager may end up interviewing each member of the project team until a course of action is realized. This is usually a painful process for those involved. Typical questions may included: What you are working on now? - Is that what you should be working on now? - What are the concerns that lay ahead? -What are you going to do about them? What the manager is really saying is, "**I want a plan!**"

Unfortunately, at the end of many projects, undesirable effort is spent preparing the client for schedule delays and cost overruns that may have been avoided.

The rewards of good planning have been well documented. However, most projects receive little or no planning because of the complexity and costs associated with the maintenance of good planning.

ACTIVITY PLANNING

Webster defines plan as "a detailed formulation of a program of action." It could also be defined as a standard of performance against which progress can be accurately measured.

A key feature of VE FAST is using function descriptions in a verb-noun format. This feature lends itself directly to planning by raising the abstraction level of the descriptions. The verb-noun labels can be related to a measurable activity of work.

The words selected to describe an activity implies more information than the label alone. The words used will suggest information on who, where, what, how, and other data pertaining to the activity.

The verb, the action-oriented part of the label, describes who is responsible for the effort and what the effort is. In a given plan, if one of the activities is *Assemble Wagon*, the wordassemble can imply a labor category such as Assembly personnel in your business (or you on Christmas eve, putting the wagon together for the next morning's enjoyment). The verb assemble is also part of the measure. Completion is measured when you are no longer engaged in assembly tasks (or your child is playing with the new wagon).

The noun, the object-oriented part of the label, identifies what will receive the action. It is describes the physical part of the activity to be measured. Obviously, in *Assemble Wagon* the object is the Wagon and not the wheels Completion is measured when the wagon has been assembled.

Performance measurement is obtained as the answer to this question: Is the activity complete? For example, Is *Assemble Wagon* complete? If the answer is yes, then performance has been planned, enacted, completed, and measured. If the answer is no, then performance has still been measured even though the work has not been completed.

The simple activity description of *Assemble Wagon* demonstrates the crux of FastPert. It is the breakdown of complex tasks into small blocks of separate functional, measurable activities that are the building blocks for the creation of planning. Accordingly, the information to create statements of work, cost estimates, schedules, and performance measurement systems is created simultaneously with the creation of the plan.

COST AND SCHEDULE PLANNING

Making a cost estimate can be similar to the planning process. In one estimating method, top down statements of work are created. The work is then segmented into work structures to allow others to develop the work statements, into manageable bite-sized elements. Then, these elements are evaluated and estimated for cost and schedule. Total costs are calculated by adding all the elements together, from the bottom, upward through the work structure.

Each element of work must be measurable to allow cost estimating: just like planning. The estimator must know the answer to questions like these: What are you going to do to what? What action

is imparted to what object? When? Whowill do it?

By the same technique, time and schedule plans can be developed. Project duration with key milestones are usually specified by the client. Translating these specified goals into a detailed plan again requires that the work be broken down to bite-sized elements and the duration estimated for each element (activity).

Schedule estimating differs from cost estimating because of its fundamental requirement of time sequencing. For example, the wagon cannot be assembled until the parts are fabricated; and, likewise, the parts cannot be fabricated until the design is complete. The logical sequence of activity durations are estimated and added together, in the longest path to obtain total schedule.

Review of dependencies will reveal illogical or unnecessary activity sequencing. These dependencies should be eliminated and efforts to create parallel paths must be taken to avoid unnecessary schedule length.

Plans that do not take into account the sequencing details will be inadequate for predicting the total duration of the project, and hence, will not meet our definition of a *plan being a standard of performance against which progress can be accurately measured*.

Planning, estimating, and scheduling all share a similar method of breaking down work into measurable level of activities.

PLAN DEVELOPMENT

Basic data needed to create a PERT plan are collected in the FastPert meeting, including:

1) A list of activity descriptions,

2) Durations in number of work days it would require a person to complete the activity,

3) Any special costs associated with the activity such as purchase items, and,

4) Activity dependencies.

The task of creating and monitoringplanning has been generally cumbersome and time consuming. Fortunately, computer software has been written to perform these complicated time calculations, and produce printed results of the PERT network. Numerous scheduling software packages are available such as ViewPoint, MacProject, and Timeline, each of which has its own strengths and weaknesses.

I cannot too strongly stress that people manage, plan and perform work on projects -computers cannot. Simply stated, the computer is a tool utilized by people. Do not let someone indicate that "...the computer is not programmed to handle that." It should not limit the planning process and should stay in the background.

Data input into a computer takes a relatively short time. Required labor hours are input for each activity based on activity durations. (It is our experience that people think in terms of one man level. Intuitively, comprehending a 2.3 person level of effort over 22 day duration is more difficult than a one person level over 50 days.) Therefore, the activity staffing level is input at one person per day per activity. Special activities may vary from the one person level, but these are usually identifiable and should be noted on the sticky and input accordingly.

As required, schedule revision iterations are made to bring the total project schedule into a duration consistent with client requirements.

There are three rules to follow when modifying CPM or PERT project schedules:

1. **Shorten the duration** of each activity. (i.e. change *Assemble Wagon* from 5 days to 2 days.)

2. **Change the dependencies**. Allow and create parallel activities (i.e. allow the *purchase parts* and *fabricate parts* activities to occur simultaneously instead of sequentially.)

3. **Delete or change the activity**. Reducing the scope of work is a negotiation tool that can be used with the client to meet imposed schedule and cost requirements.

Usually it is helpful to concentrate on the longest path through the network (the critical path). As modifications to the schedule are madethe critical path will "wiggle" back and forth through several routes of the network. Many times the critical path will return to the initial route as subsequent routes are shortened. Our experience shows that two or three paths cause most of the schedule trouble and require special attention.

As total project schedule is being shortened, manpower requirements can automatically be increased proportionally by the software being utilized. For example, a one person staffing level over 50 days is approximately equal to a 2.3 person level over 22 days. Likewise, as schedule is shortened, resource requirements rise to be equal, accordingly.

Utilizing this data in a spreadsheet program, such as Lotus 123, calculations can be made to generate: (see charts 1, 2, & 3)

1) Total cost,

2) Cost calendarization (spending curve),

3) Manpower calendarization (labor expenditure curve) and,

4) An earned value system - wherein the actual costs are compared against the sum of the plan value of completed activities.

Implied in our definition, *a plan is a standard of performance against which progress can be accurately measured*, is tracking progress or performance measurement while the project is underway. This is facilitated by three features of the well-developed plan.

1. Flexibility in end date calculations. The end date is calculated by posting progress. To post progress, insert actual dates in place of planned or calculated dates, and let dependencies and the stack of activity durations push or pull the end dates in time. Comparing the new end date to the target or original end date milestone provides a measure of overall schedule performance.

2. Reviewing current activities. Progress and future events can be fruitfully discussed in status meetings by concentrating on tasks that are on the critical path, and discussing onlythose tasks that are being worked.

   This usually limits the discussion to only a few tasks. If the plan is being followed, the balance of the work will remain as planned and meetings will be shorter.

3. Summarize status in chart form. If labor and material estimates are included for each task, an earned value reporting system can be established that communicates both schedule and cost performance in a single glance.

Measuring progress accurately and with ease requires that tasks be planned in short segments of work. This is easily recognized by viewing the Gantt chart which should generally look like a waterfall of sequenced activities from top left to bottom right.

To enable a work unit to perform work as planned a commitment of resources (usually personnel) must be made. The **FastPert** activity chart can be used to produce data on the rate at which manpower will be used over the duration of the project. This information will aid management to adjust staffing levels among competing projects.

Since, *a plan is a standard of performance against which progress can be accurately measured*, communication of the plan status is of critical importance to the success of the project. This requires two basic elements:

1. The detailed plan must be clearly communicated to and understood by the individual who is performing the work activity. The performer should know details such as: Where the inputs can be found, when the activity starts, what will be accomplished, what the budget for that activity is, and where the activity outputs will be required next.

2. A concise overview of the plan and its status must be provided to management. It is important to summarize tasks in the same manner as the grass root elements are structured (.e. logical starting and ending measurements). It is critically important that the start, end, and activity progress be tied to the network consistently so that cost and schedule variances are meaningful.

EXAMPLE - "LITTLE RED WAGON"

This section describes planning, scheduling, and costing of a sample project that was created in a training class on planning.

The client in this sample project desires to have a "very high tech", state of the art, "little red wagon" built and delivered to certain specifications.

The first requirement is to create a top down look at the work breakdown structure (WBS) based on the statement of work from the client. The class generated a grouping of five major work segments that identified functional work areas and that also act as cost collectors as follows:

Little Red Wagon - WBS

1. BASIC UNIT
2. HARDWARE
3. SOFTWARE UPGRADES
4. TESTING
5. DATA ITEMS

The client had a brief statement of work for each of the major segments of the WBS. As part of the exercise the class then developed a more detailed statement of work to look at in the **FastPert** planning session. The "basic unit" segment statement of work is presented here.

BASIC UNIT: Statement of work

1. Design and develop little red wagon with complete drawings, manuals, and documentation.

2. Procure / fabricate required parts.

3. Build and assemble parts to proper configuration.

4. Test for performance.

5. Deliver one little red wagon basic unit and drawing documentation.

In the **FastPert** meeting, the project manager described what he thought the end product would be like, and identified special considerations that could present problems. Then the facilitator reviewed the ground rules with the participants.

Two milestones were created by the facilitator to start the activity chart - *Start Project* and *End Project*. These milestones were each written on a sticky. The two stickies were posted on a large sheet of drafting paper which had been taped to the wall in a position for all to see. The instructor then solicited input from the class on required activities to accomplish the work described.

Each student, as they thought of activities, was encouraged to write the activity name on the sticky and post it on the wall. A few times the rate of activity generation would slow as discussion digressed to problem solving. The facilitator reminded the class that the effort here was to identify the activities and problems to be solved -not to actually solve them at this time.

When activity idea generation essentially stopped, the facilitator realized that most of the activities to describe the work had been generated. At this point the class was invited to stand up next to the wall where the activity labels (stickies) had been placed.

The students were asked to read the activities and rearrange them into approximate time sequence - loosely from left to right and top to bottom. This generated additional activity descriptions as gaps and omissions became obvious. These activities were added to the wall, on stickies, like the others.

The following activities with durations were identified:

START WAGON, 0
GET FUNDING, 2
ASSIGN PEOPLE, 1
REVIEW REQUIREMENTS, 5
CREATE PLAN, 7
CREATE BUDGETS, 7
CREATE LAYOUTS, 7
ANALYZE LAYOUTS, 7
EXPLORE LAYOUTS, 7
DEVELOP CONCEPT, 10
HOLD REVIEW, 1
MAKE LAYOUT, 15
FINALIZE DESIGN, 12
HOLD REVIEW, 2
START SUBASSEMBLY, 0
MAKE LAYOUT, 15
SEARCH PURCHASES, 5
ORDER ITEMS, 2
ITEMS DELIVERY, 130
MAKE DRAWINGS, 20
IDENTIFY PARTS, 20
DEVELOP PROCEDURE, 35
A-ORDER PARTS, 10
A-FABRICATE PARTS, 75
A-PURCHASE DELIVERY, 50
TEST PROCEDURES, 15
CREATE DOCUMENTATION, 30
TEST PARTS, 10
TEST PARTS, 10
A-ASSEMBLE UNIT, 5
INTEGRATE ASSEMBLIES, 10
PERFORM TESTS, 2
REWORK PARTS, 10
ASSEMBLE SYSTEM, 3
DO CHECK, 12
PACKAGE UNIT, 1
SHIP UNIT, 6
DELIVER UNIT, 0

After the stickies had been rearranged in time sequence, the facilitator started to set dependencies by asking simple questions. "What can occur immediately after *START RED WAGON*?" The class answered by identifying an activity, such as, *GET FUNDING*. The facilitator then took a pencil and drew a line from *START RED WAGON* to *GET FUNDING* with the arrowhead at *GET FUNDING*. This was repeated until all the activities had a predecessor and a successor (except for the start and end milestones).

The class discussed and negotiated work performance responsibilities as agreements on dependencies and work were made. The facilitator indicated that this type of discussion facilitates future work accomplishment among performing departments because the performers are present when dependencies are set. In short, everyone knows what is expected of them, what they need to do to get the work done, and the consequences of not performing as expected.

The next step establishes durations. Each activity was read aloud and an immediate, yet reasonable, estimate of the number of days to perform the activity was solicited. One should move through this step quickly with only minor negotiations allowed. Later changes and modifications of the durations could be made if subsequent review indicated a revision wasrequired.

As special activities such as *ORDER ITEMS* were reviewed, costs for materials, travel, and other sub-component prices were generated. Again, with the promise to verify and modify the costs if required after further review. When the dependencies, durations and special items were set for each activity, the meeting was adjourned.

Using the data collected in this class initial total cost and Gantt chart could be generated on the computer. As expected, the schedule was longer and the cost greater than the contract called for because the class did not really consist of experts for the sample project.

If this sample project had in fact been a real project situation, management could review dependencies, durations and activities on the critical path and modify them as required to: 1) shorten the overall schedule, 2) manage manpower staffing to a reasonable level, and, 3) review estimated costs of purchase items. This effort will reduce schedule and costs.

The standard format outputs from this FastPert session include:

- Network of dependencies.
- Schedule of activities - Gantt chart.
- Manpower usage plan.
- Unburdened cost estimate.
- Critical path / PERT chart.
- Spending plan (Calendarization) and earned value plan.
- Rationale for justifying costs.
- A plan to measure progress against.

Partial examples are included in the appendix for the Little Red Wagon example project.

My experience with VE has been to use the VE techniques to

solve individual problems or take a "classical" look at parts or designs an make them better, for less cost. This experience haws been a focusing or narrowing of the techniques to look at small pieces of a whole.

FastPert enlarges that focus to a project management level.

A manager can now use FastPert to create a project plan and ask some of the very questionsthat VE tells us to do at the individual pert level. Questions like: What function does this activity perform?, Can I do without it?, Can I come up with an alternative activity or group of activities that can perform the same function better and at less cost?

Essentially, FastPert has the same steps as a normal VE workshop - Identifying project scope, etc. The difference is the scope of the work being looked at.

SUMMARY

It has been our experience that the creation process is difficult. Creating a plan from little or no project information is just as difficult.

Planning also has a bias against it because of expected high costs required to create and maintain it. When in reality, as we have seen from VE work, planning now can save much money later.

Project engineers may have an idea about how to get the project started, but, in general, their approach is analytical and consequently there is usually no action until all the data has been collected and reviewed. Getting complete information is usually impossible. This is confirmed by the comment, "When I'm done, and I know what I did, that's when I'll give you a plan."

In addition, there is uncertainty and consequent reluctance associated with making commitments to perform on a project where there is little or no information available. Mandating a plan in this case leads to plans that do not perform well. There are countless examples of Gantt charts that indicate a start milestone, a one bar activity line, and an end milestone that are passed off as "plans" when in fact they are basically worthless. The problem with this method is that project status is communicated to management based on the feelings and guesses provided by the performer and not in an actual performance measurement system.

On the other hand, it has been our experience, that engineers can quickly review a proposed idea or "straw man" plan and tell you what is wrong with it and what should be done to correct it. It is relatively easier to propose animproved method to something that already exists than to create an entirely new method.

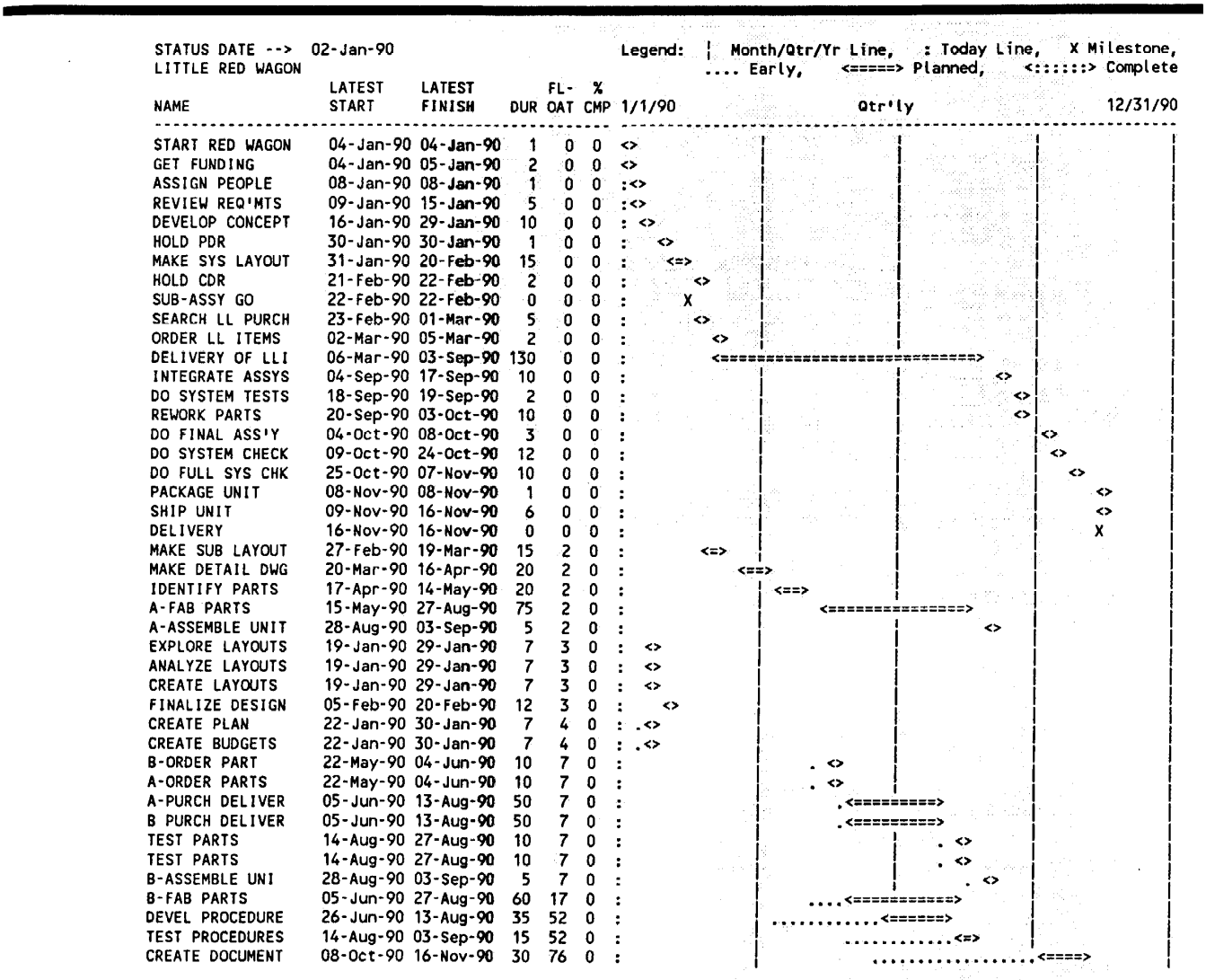
FastPert collects and documents planning information from the participants that would otherwise be very difficult to obtain. In short, it creates the "straw man" plan.

My experience indicates that using stickies removes the fear of commitment. I believe this is accomplished by the non-permanent nature of the stickies - the stickies can be easily relocated or removed. Its association to making a plan commitment is disguised.

As has been proven by VE FAST method-logy, brainstorming with a group of experts who are cross pollinated over functional areas provides a fertile environment for idea generation. Combining this technique with the "non-permanent and no commitment" sticky activity creation method, one now has a quick method of creating, collecting, and recording ideas on planning activities. Taking the collected ideas and incorporating them into a PERT network creates a powerful management tool with considerably less effort than "traditional" planning techniques.

Tracking project performance is as easy as asking a simple question as: "Is *FINALIZE DESIGN* complete?" Using this information in an earned value system where plan performance is measured against spending, the manager can see the impact of delays on the total project cost and schedule virtually as the changes or delays occur.

In summary, **FastPert** significantly improves the project planning activity by providing a method to quickly and accurately create activity, schedule and cost information.



STATUS DATE --> 02-Jan-90
LITTLE RED WAGON

Legend: ¦ Month/Qtr/Yr Line, : Today Line, X Milestone, ... Early, <=====> Planned, <::::::> Complete

NAME	LATEST START	LATEST FINISH	DUR	FL-OAT	% CMP
START RED WAGON	04-Jan-90	04-Jan-90	1	0	0
GET FUNDING	04-Jan-90	05-Jan-90	2	0	0
ASSIGN PEOPLE	08-Jan-90	08-Jan-90	1	0	0
REVIEW REQ'MTS	09-Jan-90	15-Jan-90	5	0	0
DEVELOP CONCEPT	16-Jan-90	29-Jan-90	10	0	0
HOLD PDR	30-Jan-90	30-Jan-90	1	0	0
MAKE SYS LAYOUT	31-Jan-90	20-Feb-90	15	0	0
HOLD CDR	21-Feb-90	22-Feb-90	2	0	0
SUB-ASSY GO	22-Feb-90	22-Feb-90	0	0	0
SEARCH LL PURCH	23-Feb-90	01-Mar-90	5	0	0
ORDER LL ITEMS	02-Mar-90	05-Mar-90	2	0	0
DELIVERY OF LLI	06-Mar-90	03-Sep-90	130	0	0
INTEGRATE ASSYS	04-Sep-90	17-Sep-90	10	0	0
DO SYSTEM TESTS	18-Sep-90	19-Sep-90	2	0	0
REWORK PARTS	20-Sep-90	03-Oct-90	10	0	0
DO FINAL ASS'Y	04-Oct-90	08-Oct-90	3	0	0
DO SYSTEM CHECK	09-Oct-90	24-Oct-90	12	0	0
DO FULL SYS CHK	25-Oct-90	07-Nov-90	10	0	0
PACKAGE UNIT	08-Nov-90	08-Nov-90	1	0	0
SHIP UNIT	09-Nov-90	16-Nov-90	6	0	0
DELIVERY	16-Nov-90	16-Nov-90	0	0	0
MAKE SUB LAYOUT	27-Feb-90	19-Mar-90	15	2	0
MAKE DETAIL DWG	20-Mar-90	16-Apr-90	20	2	0
IDENTIFY PARTS	17-Apr-90	14-May-90	20	2	0
A-FAB PARTS	15-May-90	27-Aug-90	75	2	0
A-ASSEMBLE UNIT	28-Aug-90	03-Sep-90	5	2	0
EXPLORE LAYOUTS	19-Jan-90	29-Jan-90	7	3	0
ANALYZE LAYOUTS	19-Jan-90	29-Jan-90	7	3	0
CREATE LAYOUTS	19-Jan-90	29-Jan-90	7	3	0
FINALIZE DESIGN	05-Feb-90	20-Feb-90	12	3	0
CREATE PLAN	22-Jan-90	30-Jan-90	7	4	0
CREATE BUDGETS	22-Jan-90	30-Jan-90	7	4	0
B-ORDER PART	22-May-90	04-Jun-90	10	7	0
A-ORDER PARTS	22-May-90	04-Jun-90	10	7	0
A-PURCH DELIVER	05-Jun-90	13-Aug-90	50	7	0
B PURCH DELIVER	05-Jun-90	13-Aug-90	50	7	0
TEST PARTS	14-Aug-90	27-Aug-90	10	7	0
TEST PARTS	14-Aug-90	27-Aug-90	10	7	0
B-ASSEMBLE UNI	28-Aug-90	03-Sep-90	5	7	0
B-FAB PARTS	05-Jun-90	27-Aug-90	60	17	0
DEVEL PROCEDURE	26-Jun-90	13-Aug-90	35	52	0
TEST PROCEDURES	14-Aug-90	03-Sep-90	15	52	0
CREATE DOCUMENT	08-Oct-90	16-Nov-90	30	76	0

1/1/90 Qtr'ly 12/31/90

Gantt chart.

CHART 1

This gantt chart indicates schedule. The data columns include: 1) Name of the activity, 2) The latest start date of the activity to not cause delays to the project end date, 3) The latest activity finish date to not cause delays to the project end date, 4) Duration in work days of the activity, 5) Float time - the number of days the activity can be delayed before it impacts the project completion date, 6) Percent complete the activity is, 7) Gantt chart bar representation of the activity performance in time.

This gantt chart is sorted by float time. Doing this brings the critical path to the top of the list. These are the activities that represent the longest path through the network. Delays to any of these activities will represent a corresponding delay in the project end date.

The other benefit of sorting by float time is that you can see what the next critical path will be if you achieve improvements in the first critical path. This chart indicates that a three day improvement will shift the critical path to the MAKE SUB LAYOUT activity. Likewise, further improvements in shortening the first path will not decrease the project end date because of the length of the new critical path would prevent it.

The chart indicates to the project manager that there about three major paths that should be looked at in both: 1) to attempt to shorten the total project duration, and, 2) to be aware that problems in any of these paths will directly affect the timely completion of the project.

TITLE: LITTLE RED WAGON File #: 12345
Estimator: FASTPERT COMMITTEE
For: CUSTOMER NAME RESP. ORG: US ENGINEER:NOT ASSIGNED Printed: 11:59 AM

TOTALS:			RESP DEPT.	DEPT #1	DEPT #2	OUTSIDE
		Men/Month	1.6	1.4	1.2	-
Total Dollars	$312.1 K	Dollars	$312,123	$52,862	$258,636	$625
Resp Org Manpower	1.6 MM					
Other Manpower	0.5 MM	G & A	$33,715	$5,710	$27,938	$68
		Manufacturing cost	$278,408	$47,152	$230,698	$558
		Burdened Material	$84,740	$0	$84,183	$558
Worksheet check OK						
		Travel	$0	$0	$0	$0
		Labor	$193,668	$47,152	$146,516	$0

SUMMARIES:		DEPT #1		DEPT #2	
3165	salary hours	1892	Performing labor	696	Performing labor
660	fabrication hours	0	Level of Effort	0	Level of Effort
28	inspection hours	199	Bus. & Admin.	73	Bus. & Admin.
		0	Management reserve	0	Management reserve
Jan-90	Estimated start date	38	Lab burden	14	Lab burden
10.5	Months duration	75	Operation burden	27	Operation burden
Nov-90	Estimated completion date				

SAMPLE DATA FROM THE FASTPERT:

ACTIVITY NAME	RESOURSE	RESPONSIBLE	HOURS	RATE	DOLLARS	PLAN START	PLAN FINISH
DELIVERY OF LLI	ENGINEERING	DEPT 1	8.00	50.00	400.00	06-Mar-90	03-Sep-90
A-PURCH DELIVER	ENGINEERING	DEPT 1	8.00	50.00	400.00	25-May-90	02-Aug-90
PACKAGE UNIT	ENGINEERING	DEPT 1	8.00	50.00	400.00	08-Nov-90	08-Nov-90
B PURCH DELIVER	ENGINEERING	DEPT 1	2.00	50.00	100.00	25-May-90	02-Aug-90
B-FAB PARTS	FABRICATION	DEPT 1	480.00	37.00	17760.00	11-May-90	02-Aug-90
A-FAB PARTS	FABRICATION	DEPT 1	100.00	37.00	3700.00	11-May-90	23-Aug-90
REWORK PARTS	FABRICATION	DEPT 2	80.00	37.00	2960.00	20-Sep-90	03-Oct-90
ORDER LL ITEMS	PURCHASE ITEM	DEPT 1	0.00	0.00	50000.00	02-Mar-90	05-Mar-90
B-ORDER PART	PURCHASE ITEM	DEPT 1	0.00	0.00	15000.00	11-May-90	24-May-90
A-ORDER PARTS	PURCHASE ITEM	DEPT 1	0.00	0.00	10000.00	11-May-90	24-May-90
B-FAB PARTS	PURCHASE ITEM	OUTSIDE	0.00	0.00	500.00	11-May-90	02-Aug-90
SHIP UNIT	PURCHASE ITEM	DEPT 1	0.00	0.00	500.00	09-Nov-90	16-Nov-90

Budgetary Estimate Pricing Worksheet

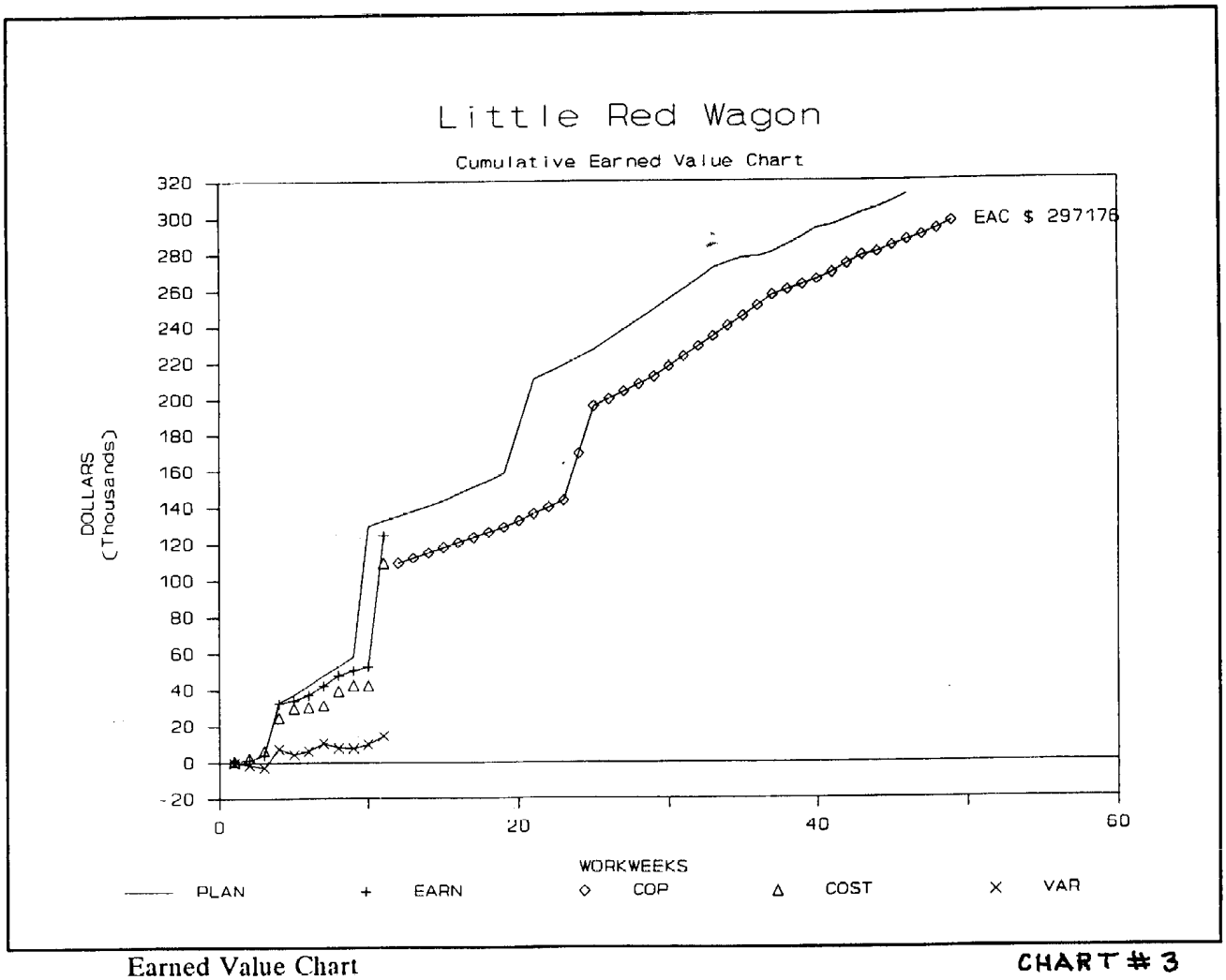
CHART # 2

This is a sample cost spreadsheet. Using the hours and material costs collected from the FastPert activities listed, a Lotus 1-2-3 spreadsheet to calculate costs can be easily generated. Adding your specific department burdens and management taxes to performance labor manufacturing cost can be developed. General and administrative, overhead and profit figures can also be incorporated into the spreadsheet to obtain total project cost to the customer.

The spreadsheet is intended to be budgetary and allow for quick and iterative cost analysis as planning changes are made to accomodate the funding avialable to accomplish the work.

Sample output of raw and performing labor data is also included in the figure above as an example.

Using computers, cost data on the original plan and subsequent revisions are available almost immediately to the manager.



Earned Value Chart

CHART # 3